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IN THE SUPREME COURT OF THE

PERMANENT FILE

DECEMBER TERM, A. D., 1909

VN

W. C. RITCHIE
COMPANY, ET ALS.

APPELLEES,

vs.

JOHN E. W. WAYMAN

AND

EDGAR T. DAVIES,
APPELLANTS.

APPEAL

FROM

THE CIRCUIT COURT OF
COOK COUNTY.

HON. RICHARD S.
TUTHILL,
JUDGE PRESIDING.

BRIEF AND ARGUMENT FOR APPELLANTS

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The Supreme Court of the State of Illinois

DECEMBER TERM, 1909

W. C. RITCHIE AND COMPANY ET AL.,
APPELLEES,

vs.

JOHN E. W. WAYMAN AND EDGAR T. DAVIES,
APPELLANTS.

This case presents the question whether the Illinois Act, approved June 15, 1909, Session Laws, page 212, entitled "An Act to regulate and limit the hours of employment of females in any mechanical establishment, factory, or laundry, in order to safeguard the health of such employees," etc., violates the constitution of the state.

The Act provides:

Section 1. . . . "That no female shall be employed in any mechanical establishment or factory or laundry more than ten hours during any one day. The hours of work may be so arranged as to permit the employment of females at any time so that they shall not work more than ten hours during the twenty-four hours of any day."

The Circuit Court of Cook County, Honorable Richard S. Tuthill, Judge Presiding, held that the "ten-hour law is unconstitutional and void and wholly beyond the power of the legislature to enact," and enjoined its enforcement on the ground that it violated Article II, Section 2, of the Constitution of the State of Illinois, which provides that

"No person shall be deprived of life, liberty, or property without due process of law."

ARGUMENT

The legal rules by which the constitutionality of the women's ten-hour law must be determined appear to be well established in Illinois, namely:

First: The "liberty" secured by Article II, Section 2, of the Illinois Constitution, "means not only freedom of the citizen from servitude and restraint, but is deemed to embrace the right of every man to be free in the use of his powers and faculties."

Braceville Coal Co. vs. People, 147 Ill. 66, 71.

Second: This right to "liberty" is, however, "subject to the restraints necessary to secure the common welfare"; in other words, is subject to the restrictions enacted in the exercise of the police power.

Braceville Coal Co. vs. People, 147 Ill. 66, 71.

Third: "The police power of the State is that power which enables it to promote the health, comfort, safety, and welfare of society. It is very broad and far-reaching, but is not without its limitations. Legislative acts passed in pursuance of it . . . must have some relation to the ends sought to be accomplished; that is to say, to the comfort, welfare, or safety of society. Where the ostensible object of an enactment is to secure the public comfort, welfare, or safety, it must appear to be adapted to that end. It cannot invade the rights of persons and property under the guise of a mere police regulation, when it is not such in fact; and where such an act takes away the property of the citizen or interferes with his personal liberty, it is the province of the courts to determine whether it is really an appropriate measure for the promotion of the comfort, safety, and welfare of society."

Ritchie vs. People, 155 Ill. 98, 110.

Fourth: "While the legislature may determine when the exigency exists for the exercise of the police power, it

is for the courts to determine what are the subjects for the exercise of this power, and it is necessary that the act should have some reasonable relation to the subjects of such power. The court must be able to see that the act tends in some degree to the . . . preservation of the public health, morals, safety, or welfare. It must be apparent that such end is the one actually intended, and that there is some connection between the provisions of the law and such purpose."

People vs. Steele, 231 Ill. 340, 345.

Fifth: The "exercise of legislative discretion is not subject to review by the courts when measures adopted by the legislature are calculated to protect the public health and secure the public comfort, safety, or welfare; but the measures so adopted must have some relation to the ends thus specified."

Bessette vs. People, 193 Ill. 334, 345.

Sixth: "The legislature have power to form classes for the purpose of police regulation, if they do not arbitrarily discriminate between persons in substantially the same situation."

Lasher vs. People, 183 Ill. 226, 231.

Facts of common knowledge of which the court takes judicial notice establish conclusively:

That the limitation imposed by the Women's Ten-Hour Law is purely a police regulation; that it is intended solely to preserve the health, safety, morals, and welfare of the community; that it does not arbitrarily discriminate between persons in substantially the same position; that there is the strongest ground for holding that to permit women in Illinois to work in a "mechanical establishment, or factory, or laundry" more than ten hours in one day is dangerous to the public health, safety, morals, and welfare; and that the prohibition of women's working in such establishments more than ten hours a day "is an appropriate

measure for the promotion of the comfort, welfare, and safety of society.”

These facts of common knowledge will be considered under the following heads:

Part I. Legislation, American and foreign, restricting the hours of labor for women.

Part II. The world's experience upon which the legislation limiting the hours of labor for women is based.

PART FIRST

LEGISLATION RESTRICTING THE HOURS OF LABOR FOR WOMEN

I

I. THE AMERICAN LEGISLATION

Twenty-five States of the Union, besides Illinois, including nearly all of those in which women are largely employed in factory or similar work, have found it necessary to take action for the protection of their health and safety, and the public welfare by enacting laws limiting the hours of labor for adult women.

This legislation has not been the result of sudden impulse or passing humor, — it has followed deliberate consideration, and been adopted in the face of much opposition. More than a generation has elapsed between the earliest and the latest of these acts.

In no instance has any such law been repealed. Nearly every amendment in any law has been in the line of strengthening the law or further reducing the working time.

The earliest statute in the United States which undertook to limit the hours of labor for women in mechanical or manufacturing establishments was Wisconsin Statute, 1867, chap. 83, which fixed the hours of labor as eight. The act, however, provided a penalty only in case of compelling a woman to work longer hours.

The earliest act which effectively restricted the hours of labor for women was Massachusetts Statute, 1874, chap. 34, which fixed the limit at ten hours. The passage

of the Massachusetts act was preceded by prolonged agitation and repeated official investigations. The first legislative inquiry was made as early as 1865.

After the Massachusetts act had been in force six years, an elaborate investigation of its economic effects was undertaken by the Massachusetts Bureau of Labor Statistics, under the supervision of its chief, Mr. Carroll D. Wright. His report, published in 1881 (Twelfth Annual Report of the Massachusetts Bureau of Statistics of Labor), to the effect that the reduction of the hours of labor had not resulted in increasing the cost or reducing wages, led to the passage, in 1885 and 1887, of the ten-hour law for women in Rhode Island, Maine, New Hampshire, and Connecticut, and largely influenced the legislation in other States.

In the United States, as in foreign countries, there has been a general movement to strengthen and to extend the operation of these laws. In no State has any such law been held unconstitutional, except Illinois and Colorado where eight-hour laws were declared void.

Ritchie vs. People, 155 Ill. 98.

Burcher vs. People, 41 Col. 495.

In 1908 the Supreme Court of the United States held the Oregon women's ten-hour law constitutional.

Muller vs. Oregon, 208 U. S. 412.

That decision has been followed by similar or additional legislation in twelve States and one territory. The main provisions of the Illinois Act of 1909 are identical in terms with the Oregon Act.

The existing American legislation is as follows:

MASSACHUSETTS

First enacted in 1874 (chap. 221), now embodied in Acts of 1909 (chap. 514).

. . . No woman shall be employed in laboring in a manufacturing or mechanical establishment more than ten hours in any one day . . . unless a different apportionment of the hours of labor is made for the sole purpose of making a shorter day's work for one day of the week, and in no case shall the hours of labor exceed fifty-eight in a week; and if any child or woman be employed in more than one manufacturing or mechanical establishment, the total number of hours so employed shall not exceed fifty-eight in any one week. From and after the first day of January, in the year 1910, . . . no woman shall be employed in laboring in a manufacturing or mechanical establishment more than ten hours in any one day . . . unless a different apportionment of the hours of labor is made for the sole purpose of making a shorter day's work for one day of the week; and in no case shall the hours of labor exceed fifty-six in a week, except that in any such establishment where the employment is by seasons the number of such hours in any week may exceed fifty-six but not fifty-eight, if the total number of such hours in any year shall not exceed an average of fifty-six hours a week for the whole year, excluding Sundays and holidays.

(Held constitutional, *Comm. v. Hamilton Mfg. Co.*, 120 Mass. 383.)

RHODE ISLAND

First enacted in 1885 (chap. 519, sec. 1) now embodied in Laws of 1909 (chap. 384).

. . . No woman shall be employed in laboring in any manufacturing or mechanical establishment more than fifty-six hours in any one week; and in no case shall the hours of labor exceed ten hours in any one day, excepting when it is necessary to make repairs to prevent the interruption of the ordinary running of the machinery, or when a different apportionment of the hours of labor is made for the sole purpose of making a shorter day's work for one day of the week.

LOUISIANA

First enacted in 1886 (Act No. 43), and amended by Acts of 1902 (No. 49); again amended by Acts of 1906 (No. 34) and Acts of 1908 (No. 301).

. . . No woman shall be employed in any places or industries enumerated in section 1 of this act (mill, factory, mine, packing-house, manufacturing establishment, workshop, laundry, millinery or dressmaking store or mercantile establishment in which more than five persons are employed, or in any theater, concert hall or in or about any place of amusement where intoxicating liquors are made or sold, or in any bowling-alley, boot-blackening establishment, freight or passenger elevator, or in the transmission or distribution of messages, either telegraph or telephone, or any other messages or merchandise, or any other occupation not herein enumerated which may be deemed unhealthy or dangerous. Agriculture and domestic industries excepted) for a longer period than ten hours per day or sixty hours per week. There shall be one hour allowed each day for dinner, but such dinner time shall not be included as part of the working hours of the day. In case two-thirds of the employees so desire, time for dinner may be reduced at their request to not less than thirty minutes.

(Certain exceptions covering Saturday and Christmas.)

CONNECTICUT

First enacted in 1887 (chap. 62, sec. 1), now embodied in Acts of 1909 (chap. 220).

. . . No woman shall be employed in laboring in any manufacturing or mechanical establishment more than ten hours in any day, except when it is necessary to make repairs to prevent the interruption of the ordinary running of the machinery, or where a different apportionment of the hours of labor is made for the sole purpose of making a shorter day's work for one day of the week; . . . but in no case shall the hours of labor exceed fifty-

eight in a calendar week; provided, that in case any employer in such establishment shall, on or before the first day of January of any year, give notice to his employees, by notices posted as hereinbefore provided, that the hours of labor of minors under sixteen years of age and of women employed by him, as aforesaid, shall not exceed fifty-five in any week during the months of June, July, and August of the ensuing calendar year, then said employer may employ such minors and women not to exceed sixty hours in any week during said year, except during said months of June, July, and August.

MAINE

First enacted in 1887 (chap. 139, sec. 1), re-enacted in Revised Statutes, 1903, chap. 40, sec. 48, amended by Acts of 1909 (chap. 70).

. . . No woman shall be employed in laboring in any manufacturing or mechanical establishment in the State, more than ten hours in any one day, except when it is necessary to make repairs to prevent the interruption of the ordinary running of the machinery, or when a different apportionment of the hours of labor is made for the sole purpose of making a shorter day's work for one day of the week; and in no case shall the hours of labor exceed 58 in a week; . . . provided, that any female of 18 years of age or over, may lawfully contract for such labor for any number of hours in excess of ten hours a day, not exceeding six hours a week, or sixty hours in any one year, receiving additional compensation therefor; . . . (In effect Jan. 1, 1910.)

NEW HAMPSHIRE

First enacted in 1887 (chap. 25, sec. 1), now re-enacted by Stat. 1907 (chap. 94).

No woman . . . shall be employed in a manufacturing or mechanical establishment for more than nine hours and forty minutes in one day except in the following cases: 1. To make a shorter

day's work for one day in the week. 2. To make up time lost on some day in the same week in consequence of the stopping of machinery upon which such person was dependent for employment. 3. When it is necessary to make repairs to prevent interruption of the ordinary running of the machinery. In no case shall the hours of labor exceed fifty-eight in one week.

MARYLAND

First enacted in 1887 (chap. 139, sec. 1), now re-enacted in Code of Pub. Gen. Laws, 1903, Art. 100, sec. 1.

No corporation or manufacturing company engaged in manufacturing either cotton or woollen yarns, fabrics or domestics of any kind, incorporated under the laws of this state, and no officer, agent, or servant of such . . . and no person or firm owning or operating such corporation or manufacturing company . . . shall require, permit or suffer its, his or their employees in its, his or their service, or under his, its or their control, to work for more than ten hours during each or any day of twenty-four hours for one full day's work, and shall make no contract for agreement with such employees or any of them providing that they or he shall work for more than ten hours for one day's work during each or any day of twenty-four hours, and said ten hours shall constitute one full day's work.

(Section 2 makes it possible for male employees to work longer either to make repairs, or by express agreement.)

VIRGINIA

First enacted in 1890 (chap. 193, sec. 1), now embodied in Virginia Code (1904), chap. 178a, sec. 3657b.

No female shall work as an operative in any factory or manufacturing establishment in this State more than ten hours in any one day of twenty-four hours. All contracts made or to be made for the employment of any female . . . as an operative in any factory or manufacturing establishment to work more than ten hours in any one day of twenty-four hours shall be void.

PENNSYLVANIA

First enacted in 1897 (No. 26), and re-enacted in Laws of 1905, No. 226.

Section 1. That the term "establishment" where used for the purpose of this act, shall mean any place within this Commonwealth other than where domestic, coal-mining, or farm labor is employed; where men, women, or children are engaged, and paid a salary or wages, by any person, firm or corporation, and where such men, women, or children are employees, in the general acceptance of the term.

Section 3. . . . No female shall be employed in any establishment for a longer period than sixty hours in any one week, nor for a longer period than twelve hours in any one day. . . . and provided further, That retail mercantile establishments shall be exempted from the provisions of this section on Saturday of each week, and during a period of twenty days beginning with the 5th day of December and ending with the 24th day of the same month; and provided, That during the said twenty days preceding the 24th day of December, the working hours shall not exceed ten hours per day of sixty hours per week.

(Held constitutional in *Comm. v. Beatty*, 15 Pa. Superior Ct. 5.)

NEW YORK

First enacted in 1899 (chap. 192, sec. 77), now embodied in Stat. 1907, chap. 507, sec. 77, 78.

77.

3. . . . No woman shall be employed or permitted to work in any factory in this State . . . more than six days or sixty hours in any one week; nor for more than ten hours in any one day except as hereinafter provided.

78.

1. A female sixteen years of age or upwards . . . may be employed in a factory more than ten hours a day: (a) regularly

in not to exceed five days a week, in order to make a short day or a holiday on one of the six working days of the week; (b) irregularly in not to exceed three days a week; provided that no such person shall be required or permitted to work more than twelve hours in any one day or more than sixty hours in any one week. . . .

NEBRASKA

First enacted in 1899 (chap. 107), now embodied in Compiled Statutes, 1905, sec. 7955a.

No female shall be employed in any manufacturing, mechanical, or mercantile establishment, hotel, or restaurant in this State more than sixty hours during any one week, and ten hours shall constitute a day's labor. The hours of each day may be so arranged as to permit the employment of such female at any time from six o'clock A. M. to ten o'clock P. M.; but in no case shall such employment exceed ten hours in any one day.

(Held constitutional in *Wenham v. State*, 5 Neb. 394.)

WASHINGTON

Enacted in 1901, Stat. 1901, chap. 68, sec. 1.

No female shall be employed in any mechanical or mercantile establishment, laundry, hotel, or restaurant in this State more than ten hours during any day.

The hours of work may be so arranged as to permit the employment of females at any time so that they shall not work more than ten hours during the twenty-four.

(Held constitutional in *State v. Buchanan*, 29 Wash. 603.)

NEW JERSEY

Enacted in 1905 (chap. 102).

No employee shall be required, permitted or suffered to work in any bakery more than 60 hours in any one week, or more than 10

hours in any one day, unless for the purpose of making a shorter work day on the last day of the week, nor more hours in any one week than will make an average of ten hours per day for the whole number of days in which such employee shall so work during such week, but it shall be lawful, in cases of emergency, for an employer to permit any employee to work on time not exceeding two hours per day, such extra work to be remunerated at the rate of weekly wages paid to such employee for his week of sixty hours.

OREGON

First enacted in 1907 (chap. 200), amended in 1909 (chap. 138).

No female shall be employed in any manufacturing, mechanical or mercantile establishment, laundry, hotel or restaurant, or telegraph or telephone establishment or office or by any express or transportation company . . . more than ten hours during any one day or more than sixty hours in one week. The hours of work may be so arranged as to permit the employment of females at any time so that they shall not work more than ten hours during the twenty-four hours of one day or sixty hours during any one week.

Held constitutional, *Muller v. Oregon*, 208 U. S. 412.

TENNESSEE

Enacted in 1907 (chap. 308).

It shall be unlawful for any person, firm, or corporation to employ in any manufacturing establishment any female . . . more than sixty-two hours in any week.

Commencing Jan. 1, 1909, it shall be unlawful for any person, firm, or corporation to employ in any manufacturing establishment . . . any female . . . more than sixty-one hours in any one week.

Commencing Jan. 1, 1910, it shall be unlawful for any person, firm, or corporation to employ in any manufacturing establishment . . . any female . . . more than sixty hours in any one week.

ARIZONA

Enacted in 1909 (chap. 100, sec. 1).

The period of employment of working women and other persons who shall be employed in working in the laundry department in any laundry establishment shall be eight hours in any one day, except when it is necessary to make repairs to prevent the interruption of the ordinary running of the machinery or when a different apportionment of the hours of labor is made for the sole purpose of making a shorter day's work for one day of the week, and in no case shall the hours of labor exceed forty-eight hours in a week.

MICHIGAN

Enacted in 1909 (Act No. 285, sec. 9).

. . . No female shall be employed in any factory, mill, warehouse, workshop, clothing, dressmaking, or millinery establishment, or any place where the manufacture of any kind of goods is carried on, or where any goods are prepared for manufacturing, or in any laundry, store, shop, or any other mercantile establishment, for a period longer than an average of nine hours in a day or fifty-four hours in any week, nor more than ten hours in any one day: Provided, however, that the provisions of this section in relation to the hours of employment shall not apply to nor affect any person engaged in preserving perishable goods in fruit and vegetable canning establishments. . . .

MINNESOTA

Enacted in 1909 (chap. 499).

No female shall be employed in laboring in a manufacturing or mechanical establishment more than ten hours in any one day, except as hereinafter provided in this section, unless a different apportionment of hours of labor is made for the sole purpose of making a shorter day's work for one day of the week; and in no case shall the hours of labor exceed fifty-eight in a week.

MISSOURI

Enacted in 1909 (p. 616).

No female shall be employed or permitted to work in any manufacturing or mercantile establishments, laundry, or restaurant in any cities . . . of over 5,000 inhabitants before 5 A. M. or after 10 P. M. of any day, nor for more than fifty-four hours in any one week. Provided, that this act shall not apply to any mercantile establishment where three or less such females are employed; provided, that women may be employed after 10 P. M. in restaurants but shall not be employed therein more than nine hours in any one day.

MONTANA

Enacted in 1909 (chap. 75).

On all lines of public telephones, operated in whole or in part within this state; it shall hereafter be unlawful for any owner, lessee, company, or corporation to hire or employ any operator or operators, other person or persons, to run or operate a telephone switch-board or boards for more than nine hours in twenty-four hours in cities or towns having a population of 3,000 or over. Provided, however, that the provisions of this act shall not apply to any person or persons, operator or operators, operating any telephone board or boards more than nine hours in each twenty-four for the purpose of relieving another employee in case of sickness or other unforeseen cause or causes.

Legislation somewhat different in character exists in the following States:

WISCONSIN

First enacted in 1867 (chap. 83, sec. 1), now embodied in Statutes of 1898, sec. 1728.

In all manufactories, workshops, or other places used for me-

chanical or manufacturing purposes the time of labor . . . of women employed therein shall not exceed eight hours in one day; and any employer, stockholder, director, officer, overseer, clerk, or foreman who shall compel any woman . . . to labor exceeding eight hours in any one day, . . . shall be punished by fine not less than five nor more than fifty dollars for each such offense.

NORTH DAKOTA

First enacted in 1877 (Penal Code, sec. 739), now embodied in Revised Code, 1905, sec. 9440.

Every owner, stockholder, overseer, employer, clerk or foreman of any manufactory, workshop, or other place used for mechanical or manufacturing purposes, who, having control, shall compel any woman . . . to labor in any day exceeding ten hours, shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine not exceeding one hundred and not less than ten dollars.

SOUTH DAKOTA

First enacted in 1877 (Penal Code, sec. 739), now embodied in Revised Code, 1903 (Penal Code, sec. 764).

Every owner, stockholder, overseer, employer, clerk, or foreman of any manufactory, workshop or other place used for mechanical or manufacturing purposes, who, having control, shall compel any woman . . . to labor in any day exceeding ten hours, shall be deemed guilty of a misdemeanor, and upon conviction, shall be punished by a fine not exceeding one hundred and not less than ten dollars.

GEORGIA

First enacted in 1889, p. 163, sec. 2240 (Code of State of Georgia, Vol. II. p. 292, sec. 2615).

The hours of labor required of all persons employed in all cotton or woolen manufacturing establishments in this state, except en-

gineers, firemen, watchmen, mechanics, teamsters, yard-employees, clerical force, and all help that may be needed to clean up and make necessary repairs or changes in or of machinery, shall not exceed eleven hours per day, or the same may be regulated by employers, so that the number of hours shall not in the aggregate exceed sixty-six hours per week; provided, that nothing herein contained shall be construed to prevent any of the aforesaid employees from working such time as may be necessary to make up lost time, not to exceed ten days, caused by accidents or other unavoidable circumstances.

OKLAHOMA

First enacted in 1890 (Stat. 1890, chap. 25, article 58, sec. 10), now embodied in Revised Statutes, 1903, chap. 25, article 58, sec. 729.

Every owner, stockholder, overseer, employer, clerk, or foreman of any manufactory, workshop, or other place used for mechanical or manufacturing purposes, who, having control, shall compel any woman . . . to labor in any day exceeding ten hours, shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by fine not exceeding one hundred and not less than ten dollars.

NEW JERSEY ¹

First enacted in 1892 (chap. 92), now embodied in General Statutes, page 2350, secs. 66 and 67.

Section 66. . . . Fifty-five hours shall constitute a week's work in any factory, workshop, or establishment where the manufacture of any goods whatever is carried on; and the periods of employment shall be from seven o'clock in the forenoon until twelve o'clock noon, and from one o'clock in the afternoon until six o'clock in the evening of every working day except Saturday, upon which

¹ It has been suggested that this provision has been repealed by a general repealing act of 1904, chap. 88

last named day the period of employment shall be from seven o'clock in the forenoon until twelve o'clock noon.

Section 67. . . . No woman shall be employed in any factory, workshop, or manufacturing establishment except during the periods of employment hereinbefore mentioned: Provided, That the provisions in this act in relation to the hours of employment shall not apply to or affect any person engaged in preserving perishable goods in fruit-canning establishments or in any factory engaged in the manufacture of glass.

SOUTH CAROLINA

First enacted in 1907 (No. 223), amended in 1909 (chap. 121).

. . . Ten hours a day or sixty hours a week, provided, however, that the hours of a single day shall not exceed eleven hours, except for the purpose of making up lost time as hereinafter provided, shall constitute the hours of working for all operators and employees in cotton and woolen manufacturing establishments engaged in the manufacture of yarns, cloth, hosiery, and other products for merchandise, except mechanics, engineers, firemen, watchmen, teamsters, yard employees, and clerical force. All contracts for longer hours of work other than herein provided in said manufacturing establishment shall be and the same are hereby declared null and void; . . . Provided, That nothing herein contained shall be construed as forbidding or preventing any such manufacturing company from making up lost time to the extent of sixty hours per annum when such lost time has been caused by accident or other unavoidable cause.

II. THE FOREIGN LEGISLATION

The leading countries of Europe in which women are largely employed in factory or similar work have found it necessary to take action for the protection of their health and safety and the public welfare, and have enacted laws limiting the hours of labor for adult women.

About two generations have elapsed since the enactment of the first law. In no country in which the legal limitation upon the hours of labor of adult women was introduced has the law been repealed. Practically without exception every amendment of the law has been in the line of strengthening the law or further reducing the working time.

(a) GREAT BRITAIN

First law enacted in 1844. The British law of 1844 was the first statute in any country limiting the hours of labor for adult women. It simply extended to women the provisions of the Act of 1833, which had restricted the work of children in textile mills to twelve hours per day. In 1847 the legal working time for women as well as children in textile mills was reduced to ten hours per day. By further legislation in 1867, 1878, 1891, 1901, and 1907 further restrictions were introduced. The law, subject to certain exceptions allowing overtime, is in substance as follows (Law of 1901, 1 Edw. VII. ch. 22):

Hours.

Textile Factories. (Sec. 24.)

The period of employment, except on Saturday, shall either begin at 6 A. M. and end at 6 P. M., or begin at 7 A. M. and end at 7 P. M.

There shall be allowed for meals during said period of employment on every day except Saturday not less than two hours, of which one hour at the least shall be before 3 P. M.

Special regulations for a shorter day on Saturdays.

Non-textile Factories and Workshops. (Sec. 26.)

The period of employment, except on Saturdays, shall either begin at 6 A. M. and end at 6 P. M., or begin at 7 A. M. and end at 7 P. M., or begin at 8 A. M. and end at 8 P. M.

There shall be allowed for meals during the said period of em-

ployment on every day except Saturday not less than one and one-half hours, of which one hour at the least shall be before 3 P. M.

Special regulations for a shorter work-day on Saturdays.

In a Workshop which does not employ Children or Young People.
(Sec. 29.)

The period of employment shall, except on Saturdays, be a specified period of twelve hours taken between 6 A. M. and 10 P. M.

There shall be allowed to a woman for meals and absence from work during the period of employment not less than one and one-half hours.

Overtime granted for special trades, press of work, etc.

For special regulations for laundries see Stat. 1907, p. 192, chap. 39.

(b) FRANCE

The law of 1848, as amended by Act of November 2, 1892, and March 30, 1900, which became operative in 1904, provides in substance:

Hours of Labor (in industrial establishments).

The maximum length of the working day shall be ten hours (Art. 3, sec. 2), broken by at least one hour of rest. (Art. 3, sec. 1.)

Overtime may be granted by departmental decrees for two hours in one day, during not more than sixty days in the year, for certain trades, chiefly season trades. (Art. 4, sec. 4.) By departmental decrees employment of women may be prohibited or regulated in trades considered dangerous to health or morals. (Arts. 12 and 13.)

(c) SWITZERLAND

The Canton of Glarus enacted in 1848 a law limiting the hours of labor to thirteen in one day. In 1864 this limit

was reduced to twelve hours, and in 1872 it was further reduced to eleven hours. The Town of Basel enacted in 1869 a law limiting the hours of labor to twelve in one day.

The Canton of Ticino enacted in 1873 a law limiting the hours of labor to twelve in one day.

The Federal Swiss Constitution of 1874 provided:

Article 34: The Confederation has the right to make uniform prescription . . . concerning the duration of labor which may be required of adults.

The Federal law enacted in 1877 provides:

Hours of Labor (in industrial establishments).

The daily hours of work shall not exceed eleven hours in one day, and shall not exceed ten hours on the days before Sundays or holidays.

These working hours must be broken by a rest of at least one hour at noon; one and one-half hours for women who have to attend to household. (Art. 2, sec. 1.)

Overtime may be granted by the separate cantons for fixed times and fixed hours.

All the cantons have the same restriction of hours as is fixed by the Federal law except

ZURICH (Law of 1894).

Hours of Labor (in industrial establishments).

The daily hours of labor shall not exceed ten hours in one day, and shall not exceed nine hours on the days before Sundays and holidays.

Overtime allowed for two hours in the day during seventy-five days in the year for various causes, such as season trades, press of work, etc. (Art. 9-16.)

(d) AUSTRIA

First law enacted in 1885; as amended by Acts of 1897, provides, in substance:

Hours of Labor (in factories and workshops).

Women shall not be employed more than eleven hours in one day. (Art. 96 a, secs. 1-3.)

These working hours must be broken by rests amounting to one and one-half hours, one hour of which is allowed at noon. (Art. 74 a.)

Overtime for one hour in the day may be granted by the Ministers of Commerce and of the Interior for certain trades, the list of which must be revised every three years. (Art. 96 a, secs. 1-3.)

The Ministers may prohibit or regulate employment of women in trades held dangerous to health.

(e) HOLLAND

First law enacted in 1889 provides as follows:

Hours of Labor (in factories and workshops).

The daily hours of labor shall not exceed eleven hours in one day. (Art. 5, sec. 1.)

Between 11 A. M. and 3 P. M. a rest of at least one hour must be allowed. (Art. 6.)

Overtime may be granted by the provincial governors, allowing a thirteen-hour day for at most six consecutive days, or on alternative days during two weeks. (Art. 5, sec. 3.)

By royal decree employment of women may be prohibited or regulated in trades held dangerous to health.

(f) ITALY

The law of June 19, 1902, provides in substance:

Hours of Labor.

Women shall not be employed more than twelve hours in one day. (Art. 7.)

The day's work shall be broken by one or more rests amounting to one and one-half hours in a day of from eight to eleven hours, and amounting to two hours in a day of more than eleven hours. (Art. 8.)

(g) GERMANY

The law of 1891 as amended December, 1908, provides in substance:

Hours of Labor (in workshops in which as a rule at least ten workmen are employed).

Working women may not be employed between eight o'clock in the evening to six o'clock in the morning, and on Saturdays and the eve of holidays not after five o'clock in the afternoon. (Sec. 137 a.)

The employment of working women may not exceed the duration of ten hours daily, and of eight hours on the eve of Sundays and holidays.

Between working hours at least one hour of noon rest must be allowed to working women.

After the end of the daily working time a continuous rest of at least eleven hours must be allowed to working women.

Working women who have to attend to a household must, at their request, be dismissed half an hour before the noonday rest, unless this lasts at least one hour and a half.

Overtime may be granted by the lower administrative authority for not more than twelve hours of labor in one day, during two weeks, not more than forty days in the year, but there must be an unbroken interval of ten hours between one day's work and the next.

For a period exceeding two weeks the same permission may be granted only by the higher administrative authority, but not to exceed fifty days in the year. (138 a.)

The Federal Council may grant overtime for special trades, not more than forty days in the year, and for not more than twelve hours of labor in one day, but there must be an unbroken interval of ten hours between one day's work and the next. (139 a.)

(h) NOVA SCOTIA

The Factories Act of 1901, as amended by the laws of 1909 (ch. 36), provides in substance:

Hours of Labor (in factories).

No . . . woman shall be employed more than nine hours in one day.

(i) SOUTH AUSTRALIA

Factories Act of 1907, Part VII, Div. I, sec. 65, provides:

Women may not be employed

a, more than forty-eight hours in any one week;

b, more than ten hours in any one day.

Overtime may be granted (in emergency) up to fifty-five hours in one week — not over one hundred hours overtime in one year.

PART SECOND

THE WORLD'S EXPERIENCE UPON WHICH THE LEGISLATION LIMITING THE HOURS OF LABOR FOR WOMEN IS BASED

I. THE DANGERS OF LONG HOURS

A. Causes

(1) PHYSICAL DIFFERENCES BETWEEN MEN AND WOMEN

The dangers of long hours for women arise from their special physical organization taken in connection with the strain incident to factory and similar work.

In structure and function women are differentiated from men. Besides anatomical and physiological differences, physicians are agreed that women are fundamentally weaker than men in all that makes for endurance; in muscular strength, in nervous energy. Overwork, therefore, which strains endurance to the utmost, is more disastrous to the health of women than of men, and entails upon them more lasting injury.

British Sessional Papers. Vol. XV. 1831-2. Report from the Select Committee on the "Bill to regulate the Labour of Children in the Mills and Factories of the United Kingdom."

**GREAT
BRITAIN**

Samuel Smith, Esq., member of College of Surgeons and practising surgeon in Leeds:

10385. Are not the females still less capable of sustaining this long labour than males would be of a similar age? — No doubt whatever of it; because in the female neither the bony nor the muscular system is so strongly developed as it is in the male; in fact, the whole body is more delicately formed.

10386. Is the peculiar structure of the female form so well adapted

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to long continued labour, and especially which is endured standing, as is that of a male? — No, it is not. (Page 503.)

10453. You stated that females were not as competent to sustain the labour of the factories as males of the same age; is it not considered that females attain to full maturity and full strength much earlier than males? — They do.

10454. And would they not be so able to do the labour proportioned to their strength as the males of the same age? — No, I think not; the female is altogether a more delicate being than the male. (Page 510.)

Thomas Young, Esq., M.D., physician at Bolton :

10600. Will you state whether the female can bear labour as well as the male? — I think females cannot endure labour as well as males. (Page 522.)

John Malyn, Esq. :

10678. Do you conceive that the evils that result from the factory system are such as would fall with still greater severity upon the female sex, as compared with the male? — I think they would, from the greater degree of delicacy of the female frame, and from their having less resiliency than man when acted upon by disease. I have already in an early part of my evidence stated the probable effect of too early employment on the pelvis of that sex. (Page 532.)

10698. You have already said that its effect would be more pernicious to the females, and consequently that they need at least an equal protection, and that, coupled with the circumstances of the majority of those employed in mills and factories being females, strengthens you in your conclusion as to the necessity of a legislative measure on behalf of those individuals? — Yes, for three reasons: first, they are naturally of a weaker constitution than the male; secondly, injuries during growth might be of serious moment at the time of parturition; and, thirdly, their propensities are developed earlier than in the male, — which might be counteracted, if time or means were afforded for mental cultivation. (Page 533.)

James Blundell, Esq., M.D., lecturer on physiology and midwifery in the school of Guy's Hospital :

10874. . . . Will you state whether the female sex is as well fitted to sustain long exertion, especially in a standing position, as the male, either in respect of the peculiar structure of certain parts of the skeleton or of muscular power? — Decidedly females are not so well fitted to bear those exertions as the males; and the standing position long

continued is, from the peculiarities of the womanly make, more especially injurious to them. (Page 544.)

Sir Anthony Carlisle, F.R.S., surgeon in the Westminster Hospital:

11067. A considerable majority of those employed in mills and factories are females; do you conceive that the female sex is as well fitted to endure labour of the description alluded to as males? — Oh, no, certainly not; they are by nature less muscular, and I would say there is less sensorial power about them, and less animal vigour. (Page 561.)

Peter Mark Roget, Esq., M.D., F.R.S., practising physician in London, consulting physician to the Northern Dispensary, consulting physician to Queen Charlotte's Lying-in Hospital:

11167. It is known that a considerable majority of persons employed are females; do you think the female constitution is as well adapted to labour of the description alluded to as that of the male? — I think it is not as well adapted, certainly. (Page 570.)

Sir William Blizard, F.R.S., surgeon to the London Hospital and lecturer on surgery, anatomy, and physiology:

11220. It is a known fact, and often referred to as a sort of an apology for this system, that it affords employment to females principally; would you conceive, arguing on physiological principles, that the female is as well calculated to endure long and active labour as the male? — Certainly not; and universal observation would confirm that opinion. (Page 574.)

Sir George Leman Tuthill, F.R.S., physician to the Westminster Hospital and Bethlem Hospital.

11334. . . . Do you conceive that the constitution of the female is as well calculated to sustain long and fatiguing labour as the male? — I do not. (Page 582.)

Joseph Henry Green, Esq., F.R.S., surgeon of St. Thomas's Hospital and professor of surgery at King's College:

11380. . . . Do you conceive that the female frame and constitution is as well adapted to long-continued and strenuous exertion as that of the male? — I do not.

11381. So the protection becomes the more necessary, when we refer to the fact of females being the principal operatives in such works? — Yes. (Pages 587-588.)

Charles Aston Key, Esq., surgeon at Guy's Hospital:

11441. . . . Do you consider that the female sex is, generally speaking, as well calculated to endure labour and fatigue as the male

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sex? — Much less able to endure labour than the male sex. (Page 593.)

James Guthrie, Esq., F.R.S., vice-president of Royal College of Surgeons, surgeon to Westminster Hospital and to Westminster Eye Hospital.

11488. . . . Will you state whether the female sex is as well fitted to sustain long exertion, especially in a standing position, as the male, either in respect of the peculiar structure of certain parts of the skeleton or of muscular power? — It is not. (Page 596.)

Benjamin Travers, Esq., F.R.S., senior surgeon to St. Thomas's Hospital in Southwark:

11603. It is alleged that a great majority of the young persons employed are of the female sex; do you think females as competent to sustain labour as males? — I should think not, in general. (Page 606.)

British Sessional Papers. Vol. XXVIII. 1844. Reports of Inspectors of Factories for Half-year ending 31st Dec. 1843.

Twelve hours' daily work is more than enough for any one; but however desirable it might be that excessive working should be prevented, there are great difficulties in the way of legislative interference with the labour of adult men. The case, however, is very different as respects women, for not only are they much less free agents, but they are physically incapable of bearing a continuance of work for the same length of time as men, and a deterioration of their health is attended with far more injurious consequences to society. (Page 4.)

British Sessional Papers. Vol. XVII. 1892. Select Committee on Shop Hours Bill.

Witness, Mr. Thomas Sutherst, barrister, and author of "Death and Disease behind the Counter":

1358. You have taken the evidence of 173 male shop assistants? — Yes.

1360. If all these men, with hardly an exception, complain of the conditions of shop life, must it not be harder upon the women than upon the men? — Very much harder. (Page 60.)

Ibid. *Report of Lancet Sanitary Commission on Sanitation in the Shop.* GREAT
BRITAIN

Without entering upon the vexed question of women's rights, we may nevertheless urge it as an indisputable physiological fact that, when compelled to stand for long hours, women, especially young women, are exposed to greater injury and greater suffering than men. (Page 248.)

British Sessional Papers. Vol. XII. 1895. Report of Select Committee on Shops (Early Closing) Bill.

Witness, Dr. Percy Kidd, M.D., University of Oxford, Fellow of the College of Physicians and Member of the College of Surgeons; attached to the London Hospital and the Brompton Hospital.

5282. Are those symptoms (debility of the nervous system, indigestion, constipation) more marked in women than in men?—I think they are much more marked in women. I should say one sees a great many more women of this class than men; but I have seen precisely the same symptoms in men. I should not say in the same proportion, because one has not been able to make anything like a statistical inquiry. There are other symptoms, but I mention those as being the most common. Another symptom especially among women is anæmia, bloodlessness or pallor, that I have no doubt is connected with long hours indoors. (Page 215.)

British Sessional Papers. Vol. VI. 1901. Report from the Select Committee of the House of Lords on Early Closing of Shops.

Witness, Sir W. MacCormac, President of the Royal College of Surgeons:

2470. Would you draw a distinction between the evil resulting to women and the evil resulting to men?—You see men have undoubtedly a greater degree of physical capacity than women have. Men are capable of greater effort in various ways than women. If a like amount of physical toil and effort be imposed upon women, they suffer to a larger degree. (Page 120.)

British Sessional Papers. Vol. X. 1904. Report of the Chief Inspector of Factories and Workshops. Report on the Thirteenth International Congress of Hygiene and Demography.

Dr. Trèves cited the case of a machine capable of giving 33,000 blows per diem, at which the men employed utilize on an average

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18,000 to 20,000, while the women, less inured to fatigue and less capable of attention, utilize but 13,000. (Page 298.)

History of Factory Legislation. B. L. HUTCHINS and AMY HARRISON. *Westminster, King, 1903.*

Women are "not only much less free agents than men, but they are physically incapable of bearing a continuance of work for the same length of time as men, and a deterioration of their health is attended with far more injurious consequences to society. (Page 84.)

Man and Woman. A Study of Human Secondary Sexual Characters. HAVELOCK ELLIS. *London, Scott, 1904.*

In strength as well as in rapidity and precision of movement women are inferior to men. This is not a conclusion that has ever been contested. It is in harmony with all the practical experience of life. It is perhaps also in harmony with the results of those investigators (Bibra, Pagliani, etc. *Arch. per l'Antrop.*, Vol. VI, p. 173) who have found that, as in the blood of women, so also in their muscles, there is more water than in those of men. To a very great extent it is a certainty, a matter of difference in exercise and environment. It is probably, also, partly a matter of organic constitution. (Page 155.)

The motor superiority of men, and to some extent of males generally, is, it can scarcely be doubted, a deep-lying fact. It is related to what is most fundamental in men and in women, and to their whole psychic organization. (Page 156.)

CANADA

Toronto University Studies in Political Science. First Series, No. 3. The Conditions of Female Labour in Ontario. JEAN THOMPSON SCOTT. *Toronto, 1892.*

In the struggle for existence women must recognize that whatever they are or may become intellectually, physically they are not men; . . . A girl who had lost her health, and finally was obliged to give up her situation, on account of continuous application to work, which after some years' experience proved beyond her strength, said to me, "We do not know at the time and do not believe that we are over-exerting ourselves." Isolated cases of women having shown themselves able to stand a severe physical strain cannot refute the fact that a vast majority of women are of a weaker mould than men.

and that overwork has in many cases been the cause of a life of semi-invalidism. It is nothing short of criminal to permit, let alone to exact, an undue exertion of physical strength from women; and it is the duty of the government to prevent it. That women are willing, nay, even anxious sometimes, to attempt hard physical labour, is no reason for their being permitted to do so. (Pages 29.)

CANADA

Verhandlungen des Deutschen Reichstags. 103 Sitzung, April 18, 1891. [Proceedings of the German Reichstag. 103d Session, April 18, 1891.]

GERMANY

Representative Bebel:

Workers, both men and women, who realize the true relations of life and labor are everywhere united in endeavoring to shorten the hours of labor as much as is possible. . . . Even those who refuse to listen to this request from working men are inclined to take a different attitude in regard to working women. (Pages 2418-2419.)

Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten. XXII. 1897. [Official Information from the Reports of the (German) Factory Inspectors, 1897.] Berlin, Bruer, 1898.

The inspector from Baden writes:

The present 11-hour day, requiring constant standing, in weaving and spinning rooms, is far more destructive to the organism of women than it is to men. The undermining effects of the long hours mentioned upon health are clearly noticeable in the appearance of the middle-aged women. (Pages 241-242.)

Hygiene of Nerves and Mind in Health and Disease. AUGUST FOREL, M.D. Trans. from the German by AUSTIN AIKENS, Ph.D. London, Murray, 1907.

The nervous hygiene of women demands special consideration because certain periods of their life require extraordinary precautions in view of the special predisposition to nervous troubles caused by menstruation, pregnancy, confinement, and the climacteric. (Page 320.)

It is of special importance to accentuate the injuriousness of certain kinds of fine hand-work which overstrain the attention and irritate the brain, especially long-continued sewing and similar sedentary occupations that strain the mind. The one-sided over-doing of

GERMANY such work makes many women nervous and psychopathic or exaggerates bad tendencies which are already present. (Page 321.)

UNITED STATES *Report of the Massachusetts Bureau of Statistics of Labor, 1875.*

Mr. D——, the publisher of a well-known periodical, says:

I have had hundreds of lady compositors in my employ, and they all exhibited, in a marked manner, both in the way they performed their work and in its results, the difference in physical ability between themselves and men. They cannot endure the prolonged close attention and confinement which is a great part of type-setting. I have few girls with me more than two or three years at a time; they must have vacations, and they break down in health rapidly. I know no reason why a girl could not set as much type as a man, if she were as strong to endure the demand on mind and body. (Page 91.)

Report of the New York Bureau of Labor Statistics, 1884. Hygiene of Occupation, by Dr. ROGER S. TRACY, Sanitary Inspector of the Board of Health, New York.

Since the dangers due to various occupations have been brought to public notice, it has become a grave question how far the employment of women and children in factories should be allowed. Women are certainly more delicately organized than men, less capable of sustained muscular exertion, and more susceptible to many of the poisons used in the arts and manufactures. As the physical condition of women has such an important bearing on the welfare of the race, and on the health of future generations, it becomes fairly a question of government control. (Page 199.)

Report of the Maine Bureau of Industrial and Labor Statistics, 1888.

Let me quote from Dr. Ely Van der Warker (1875):

Woman is badly constructed for the purposes of standing eight or ten hours upon her feet. I do not intend to bring into evidence the peculiar position and nature of the organs contained in the pelvis, but to call attention to the peculiar construction of the knee and the shallowness of the pelvis, and the delicate nature of the foot as part of a sustaining column. The knee-joint of woman is a sexual characteristic. Viewed in front and extended, the joint is but a slight degree interrupted the gradual taper of the thigh into the leg. Viewed in a semi-flexed position, the joint forms a smooth ovate spheroid. The reason of this lies in the smallness of the patella in front, and the

narrowness of the articular surfaces of the tibia and femur, and which in man form the lateral prominences, and thus is much more perfect as a sustaining column than that of a woman. The muscles which keep the body fixed upon the thighs in the erect position labor under the disadvantage of shortness of purchase, owing to the short distance, compared to that of man, between the crest of the ilium and the great trochanter of the femur, thus giving to man a much larger purchase in the leverage existing between the trunk and the extremities. Comparatively the foot is less able to sustain weight than that of man, owing to its shortness and the more delicate formation of the tarsus and metatarsus. (Pages 142-143.)

Report of the Nebraska Bureau of Labor and Industrial Statistics, 1901-1902.

They (women) are unable, by reason of their physical limitations, to endure the same hours of exhaustive labor as may be endured by adult males. Certain kinds of work which may be performed by men without injury to their health would wreck the constitution and destroy the health of women, and render them incapable of bearing their share of the burdens of the family and the home. The State must be accorded the right to guard and protect women as a class against such a condition, and the law in question to that extent conserves the public health and welfare. (Page 52.)

Report of the New York Department of Labor: Report of the Commissioner of Labor, 1908. C. T. GRAHAM-ROGERS, M.D., *Medical Inspector of Factories.*

The average healthy woman is very much inferior in physical strength and endurance to the average man. Her physical conformation is different, and the physiological and social parts that she plays in life differ from those played by man, therefore we find her more susceptible to the effects of hard labor and prolonged or sedentary occupation, which susceptibility is increased during the child-bearing period. (I. 73.)

Reference Handbook of the Medical Sciences. Hygiene of Occupation. Vol. VI. 1903. GEORGE M. PRICE, M.D., *Medical Sanitary Inspector, Health Department of the City of New York.*

In many industries . . . female labor is very largely employed; and the effect of work on them is very detrimental to health. The

injurious influences of female labor are due to the following factors: (1) The comparative physical weakness of the female organism; (2) The greater predisposition to harmful and poisonous elements in the trades; (3) The periodical semi-pathological state of health of women; (4) The effect of labor on the reproductive organs; and (5) The effects on the offspring. As the muscular organism of woman is less developed than that of man, it is evident that those industrial occupations which require intense, constant, and prolonged muscular efforts must become highly detrimental to their health. This is shown in the general debility, anemia, chlorosis, and lack of tone in most women who are compelled to work in factories and in shops for long periods.

The increased susceptibility of women to industrial poisons and to diseases has been demonstrated by a great number of observers. The female organism, especially when young, offers very little resistance to the inroads of disease and to the various dangerous elements of certain trades. Hirt says, "It must be conceded that certain trades affect women a great deal more injuriously than men"; and he mentions, among others, the effects of lead, mercury, phosphorus, and other poisons. Even where there are no special noxious elements, work may produce, as already mentioned, harmful effects on the health of women; but when to the general effects of industrial occupation are added the dangers of dust, fumes, and gases, we find that the female organism succumbs very readily, as compared with that of the male. Schuler found the frequency of sickness in females under eighteen, as compared with that of men of the same age, as 174 to 100. Miss Mary E. Abrams (Oliver: "Dangerous Trades") found that out of 138 lead-poisoning cases in Newcastle, where the number of men and women workers was about the same, there were ninety-four cases among the women and forty-one among the men. She also found that out of the twenty-three deaths from plumbism in the years 1889-1892, twenty-two were women and only one was a man. The women were all between seventeen and thirty years of age. These figures are substantiated by Hirt, Arlidge, C. Paul, Tardien, and others. The predisposition of women in industrial occupations to disease in general is greater than it is in men, as was proven by Hirt in his statistics of tuberculosis among workers. The effect of work on the physical development of women was found to be very detrimental, especially when they were very young. Arlidge says that in those who from their youth work in high temperatures,

the bones and joints are imperfectly developed, and that they are liable to female deformities and to narrow pelves. Herkner found in his studies of Belgian female workers that girls who are engaged in mines suffered from deformed joints, from deformities of the spinal column, and from narrow pelves.

UNITED
STATES

It has been estimated that out of every one hundred days women are in a semi-pathological state of health for from fourteen to sixteen days. The natural congestion of the pelvic organs during menstruation is augmented and favored by work on sewing-machines and other industrial occupations necessitating the constant use of the lower part of the body. Work during these periods tends to induce chronic congestion of the uterus and appendages, and dysmenorrhoea and flexion of the uterus are well-known affections of working girls. (Page 321.)

(2) THE GREATER MORBIDITY AMONG WOMEN

(a) GENERAL MORBIDITY

The need of protecting the health of working women by limiting their working hours is emphasized by statistics of the relative morbidity of men and women. In all countries where such statistics have been kept by sickness insurance societies, the morbidity of women has been found to be higher than that of men.

Sixth International Congress of Hygiene and Demography. Vienna, 1887, Part XIV, Vol. I. Fabrikhygiene und Gesetzgebung. [Factory Hygiene and Legislation.] Dr. FRIDOLIN SCHULER, *Swiss Factory Inspector, Vienna, 1887.*

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At time of menstruation, during pregnancy and after childbirth the woman is especially liable to infectious and other diseases. This has been proved by the statistics of morbidity in Switzerland in those industrial establishments where men and women are at work together. In one year's time in the same trade the proportion of cases of illness was as follows: Women, 127; men, 100. The number of days lost compared thus: Women, 150; men, 100. These proportions become more divergent when the workers are under 18 years of age. Thus, for such workers we find: proportion of cases

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of sickness, girls, 174; boys, 100. Taking the statistics of cotton mills only, we find the proportion of cases of sickness, for women, 156; for men, 100. These figures alone, to go no further, show the necessity of special protection for those who, without this legal protection, are liable to be frightfully exploited. (Page 29.)

Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [Investigations into the Conditions of Health of the Swiss Factory Workers.] Dr. FRIDOLIN SCHULER, *Swiss Factory Inspector*, and Dr. A. E. BURCKHARDT, *Prof. of Hygiene, Basle. Aarau, Säuerländer, 1889.*

There are great varieties in the morbidity of the two sexes. In general men showed a greater frequency of sickness than women. In 1000 general cases there were among men 291 cases of illness; among women, 257. This result is partly induced by the large number of workers in mechanical shops who fall ill. If, however, the figures are taken solely from workers in the same occupation the results are often reversed. So, for example, in cotton mills (spinning processes), where women show a morbidity of 128 : 100 as compared to men, and in cotton factories (weaving processes) of 139 : 100. In the silk mills the proportion of illness among the women is even more extreme, while in machine embroidery it is nearer to a balance — 111 : 100. (Page 33.)

An das Schweiz. Industriedepartement, Bern. Die Eidgenössischen Fabrikinspectoren. [Report of the Swiss Factory Inspectors to the Swiss Department of Labor on the Revision of the Factory Laws.] Schaffhausen, 1904.

The 10-hour day is now almost the rule for men. . . . Those industries where the 11- or 12-hour shift is retained are almost entirely those which employ chiefly, or in large proportions, women and children. In other words, those as yet unprotected classes of workers who are obliged to toil for the longest number of hours in a day are almost entirely women and children. And yet women should be better protected than men, not only because their physical strength is less, but because they are the bearers of the race, whose vigor is materially modified by the health of the mothers. The State has the deepest interest in maintaining vigorous and able defenders, and therefore its foremost duty is to protect women and children from

being overburdened. This necessity is most glaring in the case of **SWITZERLAND** cotton mills, as the researches of Schuler and Burckhardt, which have never been contested, prove a morbidity of women in this industry notably greater than that of men in the same. (Pages 26-27.)

Verhandlungen des Deutschen Reichstags, 103 Sitzung, April 18, 1891. [Proceedings of the German Reichstag, 103d Session, April 18, 1891.] **GERMANY**

Representative Dr. Schädler:

At the Sixth International Congress of Hygiene in Vienna, 1887, Dr. Schuler, the expert factory inspector, pointed out the greater liability of women to disease produced by unfavorable factory conditions. He stated that the morbidity of women in factory work in Switzerland had been approximately 27 per cent higher than that of men in the same industries. (Page 2406.)

Das Verbot der Nachtarbeit. Bericht erstattet an den internationalen Kongress für gesetzlichen Arbeiterschutz in Paris, 1900. (Schmoller's Jahrbuch, 25³⁴.) [Prohibition of Night Work. Report presented to the International Congress for Labor Legislation at Paris, 1900. (Schmoller's Yearbook, 25³⁴.)] Dr. **MAX HIRSCH**, Germany. Leipzig, 1901.

Adult women have also an inferior power of resistance to the evils of night work as well as to the other harmful tendencies of industry. . . . On this point the sick benefit funds give striking testimony. (Page 265.)

Schriften der Gesellschaft für Soziale Reform, Heft 7-8. [Publications of the Social Reform Society, Nos. 7 and 8.] *Die Herabsetzung der Arbeitszeit für Frauen und die Erhöhung des Schutzalters für jugendliche Arbeiter in Fabriken.* [The Reduction of Women's Working Hours and the Raising of the Legal Working Age for Young Factory Employees.] Dr. **AUGUST PIEPER** and **HÉLÈNE SIMON**. Jena, Fischer, 1903.

The daily toil in factory or shop, the harm that — aside from the evitable mental and physical exertion — arises from harmful bodily postures, such as continuous sitting or standing, and from the dust or steam that fill workrooms, have been becoming more extensive

GERMANY with the lapse of years, and the longer the hours of work, the more serious are the bad results of these conditions. The statistics of the Sickness Insurance Societies, both as to the total number of cases of illness and as to the relatively longer duration of attacks of illness among working women, show an astonishing amount of sickness under the present working hours. The reports of the factory inspectors for 1899 upon the employment of married women in factories show that they especially suffer an alarming extent of ill-health, and that this is, in many cases, directly traceable to beginnings long before marriage. (Page 4-5.)

In contrast to the usual "occupation diseases" (as lead colic, etc.) are the characteristic diseases of weakness among women wage-earners, viz., anæmia and chlorosis; as in the printing trades of Berlin, where among the 4734 women there were 296 such cases, but only 72 among all the 11,801 men insured in these trades.

When the dangers to both sexes are alike, the figures of the sick fund are always higher for women, unless the totals are complicated by accidents.

It is so in textiles, glove and shoe trades, in the post-office and cigar manufacture. The Local Insurance Society for Berlin in 1899 showed 29.7 per cent ill, and 41.0 per cent women in cigar-making. According to Wirminghaus the percentage of illness in all Germany in 1888 in cigar-making was 0.20 for men and 0.25 for women, while the percentage for the whole country in spinning and weaving was 0.61 for men and 0.72 for women. (Page 93.)

Die Neue Zeit, 23², 1905. *Ehret die Frauen*. [*Honor to Women*.]
EMANUEL WURM. Stuttgart, 1905.

In 1903 there were 1,000,000 and more women working beside the 4,000,000 men in German mills and factories. . . . The factory laws have some protective regulations, but not nearly enough to equalize the woman's far inferior physical power of resistance with that of men. The indisputable proof of this lies in the far higher percentage of illness among the women operatives as shown by the sick funds. Many such funds, as, for instance, those of the textile industry, with its membership of 420,000 women and 380,000 men in 1903, are, by this disproportionately high morbidity of women, in the most embarrassing financial situation. (Page 157.)

Le Travail de Nuit des Femmes dans l'Industrie. Rapports sur son importance et sa réglementation légale. Préface par Prof. ETIENNE BAUER. [Nightwork of Women in Industry. Reports on its importance and legal regulation. Preface by Prof. ETIENNE BAUER.] Le Travail de Nuit des Femmes dans l'industrie en Autriche. [Nightwork of Women in Industry in Austria.] ILSE VON ABLT. Jena, Fischer, 1903. **AUSTRIA**

According to the testimony of the Sickness Insurance Societies, women, when subjected to the same work as men, have a larger percentage of illness, this predominance being attributed to the influences of industrial labor, since the loss of time incident to childbirth is classified separately. It is much to be regretted that there are no data available which might enable us to judge how women would stand as to health, compared with men, provided that they were only employed during periods when their working capacity was unimpaired. Such data would not simply have purely theoretical interest, but would enable us to determine with precision the dangers to which women are exposed in the different industrial lines, and to elaborate protective measures for them upon an exact basis. (Page 100.)

Tenth International Congress of Hygiene and Demography, Paris, 1900. In one volume. Législation et réglementation du travail au point de vue de l'hygiène. [Labor Legislation and Regulation from the Standpoint of Hygiene.] M. ÉDOUARD VAILLANT. M.R.C.S., England. Paris, Masson & Co., 1900. **FRANCE**

. . . All reduction of daily and weekly working hours must be regarded as important hygienic progress.

If we study the statistics of morbidity and mortality in the different trades, and seek to isolate, as far as possible, the effects of dangerous trades and of working hours, we shall see very plainly in the reports of factory inspectors, and especially in the insurance records of Germany and Austria, that the reduction of working hours has succeeded, in a few years' time, in bringing down the totals of morbidity and mortality even below the total of trades that are considered relatively more healthy, but where the length of hours had not been decreased. (Pages 515 and 516.)

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Report of the New York Bureau of Labor Statistics, 1890.

Dr. Schuler, factory inspector of Switzerland, states in a recent report: ". . . According to the experiments made in Switzerland, the morbidness of female factory operatives is 27 per cent higher than that of males; and the average number of days during which the former are incapacitated to work is one and a half times as great as in the case of male workers." (Page 81.)

Bulletin of the United States Bureau of Labor, No. 75, March, 1908.
Industrial Hygiene. GEO. M. KÖBER, M.D., LL.D.

The statistics of the morbidity and mortality of various occupations, while far from satisfactory, and subject to more or less erroneous conclusions, nevertheless indicate that persons habitually engaged in hard work are more frequently subject to disease, and present a higher mortality than persons more favorably situated; and this is especially true of factory employees, because their work is generally more monotonous, fatiguing, performed under less favorable surroundings, and they are too often also badly nourished and badly housed. (Page 473.)

(b) DURATION OF ILLNESS GREATER AMONG WOMEN

The morbidity of women, measured by the number of days lost through illness, is greater than that of men. That is, women suffer from illnesses of longer average duration than men do, — and consequently are more disastrously affected by exhaustion from overlong working hours.

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Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [Investigations into the Conditions of Health of the Swiss Factory Workers.] Dr. FRIDOLIN SCHULER, Swiss Factory Inspector, and Dr. A. E. BURCKHARDT, Prof. of Hygiene in Basle. Aarau, Säuerländer, 1889.

If, however, not only the frequency but the average duration of single cases of sickness is observed in the two sexes, it will be found

that the duration of illness averages, among men, only 85 per cent of that among women. And this prolonged duration of illness is not only found in single branches of industry, but throughout all — probably from various causes. For the woman not only belongs to the “weaker sex,” but she is also the one who makes most effort to employ herself usefully in the house, even when she is not well enough to work in industry — contrary to the man whose work is entirely outside of the house. . . . More favorable figures for women are only found among youthful workers. (Pages 33-34.)

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Le Travail de Nuit des Femmes dans l'Industrie. Rapports sur son importance et sa réglementation légale. Préface par ETIENNE BAUER. [Night Work of Women in Industry. Its importance and legal regulation. Preface by ETIENNE BAUER.] Jena, Fischer, 1903.

From the hygienic point of view it is evident that the protection of wage-earning women can have only good effects, when we remember that the susceptibility of women with regard to disease germs is greater than that of men. According to the data of the statistics of diseases of the German Empire there have been for each case of sickness among the men 16 days, and for each case among the women 18 days of assistance or treatment at the hospital during the years 1888-1899. In Switzerland, judging from the researches made by F. Schuler and A. E. Burkhardt (1889) on the health conditions of factory workers, the average duration of sickness has been 21 days for men and 25 days for women. (Page xxxvii.)

Die Gegenseitige Hilfsgesellschaften in der Schweiz im Jahre 1903. [Mutual Aid Societies in Switzerland in 1903.] Berne, 1907.

Of 100 men insured, an average of 26.76 received sick relief, but of 100 women only 24.26.

The men who received sick relief averaged 23.55 days of illness: the women averaged 32.46.

The women, therefore, gave a lower percentage of relief, but a longer average of sick time, and, as a result of these two circumstances together, the average morbidity of the women is higher than that of the men, — 7.87 as against 6.30. (Page 42.)

FRANCE : *Encyclopédie d'Hygiène et de Médecine Publique, T. 6.* [*Encyclopedia of Hygiene and Public Medicine, Vol. 6.*] Edited by Dr. JULES ROCHARD. *Le Travail des Enfants et des Femmes dans l'Industrie.* [*Industrial Labor of Women and Children.*] Dr. ALEXANDER LAYET. Paris, Delahaye, 1894.

The few statistics that we possess on these lines show that the morbidity of women is greater than that of men in the same trades.

The Mutual Aid Society of silk workers at Lyon (with 4117 members of all ages and both sexes) in 1889 found that the days of sick time for the men in its membership amounted to 1522, and for the women, during the same time, 3978. Between the ages of 20 and 40, the days lost by sickness averaged 3.56 apiece for men, and 7.28 for the women. (Page 721.)

Italian Workman's Aid Societies with mixed membership showed the same results. Thus, while between 20 and 40 years each man in the membership lost 5.4 days' average by sickness, the women's average was 8.1. (Page 722.)

GERMANY *Handbuch der Hygiene, Bd. 8¹.* [*Handbook of Hygiene, Vol. 8¹.*] Edited by Dr. THEODORE WEYL. *Allgemeine Gewerbehygiene und Fabrikgesetzgebung.* [*General Industrial Hygiene and Factory Legislation.*] Dr. EMIL ROTH. Jena, 1894.

The investigations of Schuler and Burckhardt, embracing 18,000 members of Swiss insurance against sickness (about 25 per cent of the Swiss factory workers and fifteen industries), show that factory work, even in a short period, produces very unfavorable effects upon the development of the body of young men. It is even more conspicuous in the case of women. Thus, of 1000 men in the manufacture of embroidery, 302 were sick to 332 women. In bleaching and dyeing, 279 men, 316 women; also in cotton spinning and weaving, the morbidity of women was much greater than of men.

Similarly, the number of working days lost through illness was more among women than among men, being 6.47 among women to 6.25 among men.

With increasing years, both frequency and duration of illness increase. (Page 7.)

A second form of physical inferiority of women is their lessened refractoriness to external injurious conditions. All statistics dealing

with the relative morbidity of men and women employed in factories **GERMANY** justify the deduction that the greater number of days lost from work by women indicate that disease makes greater inroads upon them, and that in general industrial labor is more injurious to women than to men. (Page 86.)

Jahresberichte der Gewerbe-Aufsichtsbeamten und Bergbehörden für das Jahr, 1903. Bd. I, Preussen. [Annual Reports of the Factory and Mine Inspectors for 1903. Vol. I, Prussia.] Berlin, Decker, 1904.

The following figures are taken from the statistics of the local sickness insurance societies for men and women in tailoring and allied trades (chiefly dressmaking establishments of Berlin) and also, for the first time, for those employed in home industries (needle trades), for the year 1901. Corresponding figures for all the German Sickness Insurance Societies throughout the Empire, with over nine and a half million members, are given from the imperial statistical year-book for 1900 and 1901:

| | Tailoring trades. | General German Statistics. | |
|--------------------------------|-------------------|----------------------------|-------|
| | 1902. | 1900. | 1901. |
| Cases of illness per member | 0.36 | 0.39 | 0.38 |
| Days of illness per member | 9.21 | 6.82 | 6.91 |
| Average duration of an illness | 25.6 | 1.74 | 18.1 |

The figures showing cases of illness to each member are seen to be lower in the tailoring trades, but those showing the average days of illness and the average duration of illness are both considerably higher. This difference is largely due to the women members, who constitute ninety-two per cent of the workers. The figures relating to the men tailors approach more nearly to those of the General Imperial Statistics. (Page 71.)

GERMANY *Handbuch der Medizinischen Statistik.* [*Handbook of Medical Statistics.*] Dr. FRIEDRICH PRINZING, *Ulm. Fischer, Jena, 1906.*

The days of illness per person averaged, to every 100 persons, as follows:

| Age. | Frankfort. | | Austria. | | Bocken-heim. | Mutual Leipzig, 1856-80. | | Ital. Working-men's Society, 1866-75. |
|----------|------------|--------|----------|--------|--------------|--------------------------|--------|---------------------------------------|
| | Men. | Women. | Men. | Women. | Men. | Men. | Women. | Men. |
| Under 15 | 14.7 | 18.4 | 12.6 | 14.5 | 10.3 | ... | ... | 17.9 |
| 15-20 | 16.4 | 19.3 | 13.7 | 16.1 | 12.5 | 19.3 | 21.6 | 23.4 |
| 20-30 | 19.3 | 24.6 | 14.3 | 18.0 | 12.3 | 19.9 | 30.3 | 24.9 |
| 30-40 | 22.7 | 31.4 | 15.9 | 20.2 | 13.9 | 24.0 | 33.4 | 25.4 |
| 40-50 | 27.1 | 31.6 | 18.6 | 21.6 | 17.9 | 30.7 | 37.9 | 28.2 |
| 50-60 | 32.9 | 45.4 | 21.4 | 23.9 | 19.4 | 38.9 | 44.4 | 30.3 |
| 60-over | 38.9 | 58.1 | 29.8 | 31.3 | 26.0 | 44.1 | 55.1 | 36.8 |
| Average | 21.6 | 24.4 | 16.5 | 18.8 | 14.3 | 27.4 | 35.0 | 27.3 |

(Page 110.)

The appearance of anæmia and chlorosis among women is unusually frequent, especially when the cases of those who continued at work are included. In Frankfort, about one-fifth of all the insured women members have medical treatment for these troubles. (Page 116.)

Geschäfts Bericht der Ortskrankenkasse für Leipzig und Umgegend, über das Jahr, 1907. [Official Report of the Local Sickness Society of Leipzig and Environs for 1907.] Bär and Hermann, Leipzig, 1907.

Most of the published statistics speak only of "members" without distinguishing between men and women. How different the curve actually is for men and women is shown in the following table:

| Age. | Days of sickness for | |
|-------------|----------------------|--------------------|
| Years. | One hundred Men. | One hundred Women. |
| Under 15 | 595.0 | 533.5 |
| 15-19 | 617.4 | 753.6 |
| 20-24 | 657.1 | 955.0 |
| 25-29 | 707.5 | 1,205.4 |
| 30-34 | 813.6 | 1,395.1 |
| 35-39 | 940.9 | 1,465.3 |
| 40-44 | 1,088.0 | 1,433.3 |
| 45-49 | 1,243.4 | 1,495.9 |
| 50-54 | 1,456.2 | 1,489.8 |
| 55-59 | 1,704.7 | 1,485.0 |
| 60-64 | 2,068.9 | 1,631.7 |
| 65-69 | 2,760.3 | 2,376.0 |
| 70-74 | 3,426.3 | 2,530.5 |
| 75 and over | 4,042.9 | 2,512.1 |

(Page 74.)

The curve of women shows how injuriously the double task of being woman and wage-earner affects them. It is evident their number of days lost through sickness during the years of development and child-bearing capacity is greatly in excess of those lost by men. The younger women, those under 15, have a more favorable curve of morbidity than boys of the same age. From 15 to 54 years women are more subject to loss of time from illness than men. Only when the active period of sex life has passed does the woman's curve again show her superior resistance to morbidity as well as to mortality. (Page 75.)

Statistik des Deutschen Reichs. Bd. 186. [Statistics of the German Empire. Vol. CLXXXVI.] Die Krankenversicherung im Jahre 1906. Bearbeitet im Kaiserlichen Statistischen Amt. [Sickness Insurance for 1906. Compiled in the Imperial Office of Statistics.] Berlin, 1908.

According to Heym, among 100 cases of illness, the length of time lost by men as compared with women was as follows:

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| | Men. | Women. |
|-------------------|------|--------|
| 14-25 weeks | 3.5% | 5.7% |
| 26 weeks and over | 2.3% | 2.8% |

Prinzing adds to this: "Sickness of short duration is almost twice as frequent among men as women: but with sickness of a longer duration (more than 3 weeks), the case is exactly reversed." (Page 12.)

(c) CONTINUANCE AT WORK DURING ILLNESS

Women suffering from minor illnesses continue at work more commonly than men. That is, women have fewer illnesses involving complete loss of earning capacity, more illnesses during which they continue to remain at some form of work. Hence excessive hours of labor are doubly injurious to them, because often performed when health is already impaired.

Handbuch der Medizinischen Statistik. [*Handbook of Medical Statistics.*] Dr. FRIEDRICH PRINZING, *Ulm. Fischer, Jena, 1906.*

The records next below show only those cases of illness that entailed incapacity for work. The numbers, as before, show the percentage, exclusive of confinements.

| Age. | General Relief Fund. Some voluntary members. | | Vienna 1896 Trade Societies' Funds (Genossenschaftskasse). | | Mutual (Gegen- seitigkeit). Leipzig. 1856-80. | | Italian Workman's Society. 1866-75 |
|----------|---|--------|--|--------|--|--------|---|
| | Men. | Women. | Men. | Women. | Men. | Women. | Men. |
| Under 15 | 43.4 | 30.9 | 38.2 | 26.9 | | | 28.0 |
| 15-20 | 56.9 | 46.9 | 40.2 | 36.5 | 29.5 | 20.8 | 29.6 |
| 20-30 | 51.6 | 48.0 | 29.4 | 26.9 | 25.6 | 20.8 | 25.0 |
| 30-40 | 53.3 | 46.8 | 27.9 | 26.3 | 24.5 | 19.6 | 24.4 |
| 40-50 | 55.4 | 52.9 | 35.3 | 28.2 | 26.1 | 18.8 | 24.8 |
| 50-60 | 57.0 | 49.9 | 41.8 | 30.6 | 28.1 | 18.4 | 26.3 |
| over 60 | 68.0 | 59.2 | 56.2 | 41.4 | 31.7 | 21.5 | 31.2 |

The differences in frequency of illness in the above tables could **GERMANY** only be explained by a thoroughgoing consideration of the details of the management of the sick funds. . . . (Page 107.)

The difference in morbidity between the two sexes is obvious. In general, women have fewer illnesses involving complete inability to work, than men. . . . On the other hand, illness without loss of earning capacity is much more frequent among the women. (Page 108.)

The total list of all the Berlin sickness insurance offices for 1898 show that to every hundred men insured, 39.46 had illness attended with loss of earning capacity, and of every hundred women, 37.64 had illness attended with loss of earning capacity. (Page 115.)

Inquiries have all shown that the number of sick cases with loss of earning capacity do not in themselves alone give a correct idea of the morbidity of an occupation. (Page 125.)

To estimate the morbidity of an occupation those cases of illness which do not necessitate loss of earning power must be considered. It is then found that many occupations which appear favorable when loss of earning power alone is considered, have actually a much worse standing. So, for instance, Frankfort a. M. in the year 1896, has the following tables:

| MEN. | Cases of Illness. | | | | To every 100 Members (including both sick and well.) | | | |
|----------------------------------|-------------------|-----------|---------------|-----------|---|-----------|---------------|-----------|
| | 20-30 Years. | | 30-40 Years. | | 40-50 Years. | | 50-60 Years. | |
| | Able to earn. | Not able. | Able to earn. | Not able. | Able to earn. | Not able. | Able to earn. | Not able. |
| Factory workers and day laborers | 33 | 34 | 34 | 41 | 30 | 45 | 31 | 56 |
| Porters, Packers | 40 | 24 | 46 | 30 | 51 | 31 | 52 | 39 |
| Traffic men and drivers | 32 | 31 | 28 | 30 | 26 | 41 | 34 | 55 |
| Waiters, Cooks | 44 | 21 | 43 | 25 | 50 | 30 | 42 | 68 |
| Salespersons . . | 55 | 21 | 41 | 20 | 45 | 34 | 60 | 26 |
| Printers-lithographers | 43 | 29 | 40 | 31 | 41 | 37 | 44 | 31 |
| Tailors | 44 | 21 | 52 | 28 | 37 | 32 | 53 | 37 |
| Carpenters . . . | 40 | 33 | 50 | 37 | 27 | 30 | 43 | 54 |
| Painters, Varnishers | 28 | 29 | 33 | 35 | 40 | 53 | 46 | 58 |
| Smiths (lock and other) | 40 | 36 | 42 | 34 | 43 | 55 | 41 | 48 |
| All occupations | 41 | 29 | 38 | 35 | 37 | 40 | 40 | 48 |

GERMANY Among women the cases of illness without loss of earning capacity predominate in every occupation.

In Frankfort a. M.

| WOMEN. | Cases of Illness. | | | | To every 100 Members. | | | |
|-------------------------------|-------------------|-----------|---------------|-----------|-----------------------|-----------|---------------|-----------|
| | 20-30 Years. | | 30-40 Years. | | 40-50 Years. | | 50-60 Years. | |
| | Able to earn. | Not able. | Able to earn. | Not able. | Able to earn. | Not able. | Able to earn. | Not able. |
| Factory and day workers . . . | 45 | 37 | 52 | 40 | 47 | 32 | 51 | 40 |
| Servants . . . | 43 | 24 | 43 | 30 | 30 | 26 | 42 | 38 |
| Waitresses, Cooks | 46 | 21 | 35 | 18 | 53 | 34 | 25 | 41 |
| Salesgirls . . . | 63 | 30 | 64 | 37 | 33 | 20 | 47 | 37 |
| Sewing women | 53 | 31 | 62 | 40 | 49 | 40 | 29 | 54 |
| All occupations | 51 | 31 | 51 | 36 | 42 | 33 | 41 | 40 |

(Page 127.)

(d) MORTALITY

Statistics show that the mortality of working women is higher than that of working men, and also higher than that of other women not at work.

FRANCE *Royal Statistical Society, Vol. LV. London, 1892. Morbidity and Mortality according to Occupation. DR. JACQUES BERTILLON, Chief of the Municipal Statistical Department of Paris, [Trans. from the Journal de la Société de Statistique de Paris, October-November, 1892.]*

[*Statistics from the Lyons Silk Workers' Mutual Aid Society — (Société de Secours mutuels des Ouvriers en Soie de Lyon), — the Statistical Office of Italy, and M. Henri Rauchberg's Study of Workmen's Sick Funds in Vienna — (Die Erkrankungen und Sterblichkeits Verhältnisse bei der allgemeinen Arbeiter, Kranken, und Invaliden Casse in Wien — Statistische Monatschrift, Vienna, 1886.)*]

Women between 20 and 45 show a considerably greater morbidity than men of the same age; above 45 their rate approaches that of the

men. At least it is so in the Lyons Silk-Workers' Society, in the Italian societies, and (as far as can be judged from a table in which there is no distinction of age) in the Vienna Arbeiter-Casse. At the same time it should be noted that among the Lyons silk-workers not only the morbidity but also the mortality of females is considerably above that of the males, whereas the opposite holds good with the population as a whole. It is thus at least permissible to enquire whether there be not some peculiarity in this employment which is hurtful to the health of the women engaged in it. The Italian table, which includes a great number of occupations, also brings out a higher rate of morbidity for women than for men, and their mortality at each age (calculated, however, from too small a number of cases) is greater than that of the men.

TABLE II. COMPARATIVE MORBIDITY OF THE TWO SEXES.

| Age of the members. | Lyons Silk-Workers (1872-1889) | | | | Italian Societies (1881-1885). (Corrected figures.) | | | | | |
|---------------------|-----------------------------------|-------|--|-------|--|-------|--|------|------------------------------------|------|
| | Annual average number of members. | | Morbidity. | | Mortality. | | Morbidity. | | Mortality. | |
| | | | Days of sickness per annum per member. | | Deaths per annum per 1000 members. | | Days of sickness per annum per member. | | Deaths per annum per 1000 members. | |
| Years. | Mas. | Fem. | Mas. | Fem. | Mas. | Fem. | Mas. | Fem. | Mas. | Fem. |
| 18 and 19 | 96 | 479 | 1.76 | 2.18 | ... | ... | ... | ... | ... | ... |
| 20-24 | 607 | 3897 | 3.06 | 6.37 | 13.0 | 10.2 | 5.0 | 7.8 | 6.3 | ... |
| 25-29 | 1481 | 6100 | 3.40 | 7.49 | 5.4 | 9.3 | 5.4 | 8.0 | 5.9 | 9.1 |
| 30-34 | 2507 | 7377 | 3.57 | 7.64 | 6.4 | 9.2 | 5.1 | 8.9 | 6.2 | 10.7 |
| 35-39 | 3259 | 8209 | 4.32 | 7.92 | 6.4 | 8.9 | 6.0 | 7.7 | 7.8 | 8.1 |
| 40-44 | 3442 | 8161 | 5.29 | 7.64 | 10.2 | 6.2 | 6.2 | 9.3 | 9.2 | 10.0 |
| 45-49 | 3569 | 7720 | 5.89 | 8.12 | 11.8 | 13.5 | 6.8 | 8.2 | 11.6 | 8.9 |
| 50-54 | 3214 | 6429 | 8.04 | 9.58 | 20.2 | 14.3 | 7.9 | 9.3 | 14.9 | 14.1 |
| 55-59 | 2964 | 5021 | 8.38 | 11.01 | 19.5 | 21.9 | 9.2 | 9.7 | 22.2 | 15.9 |
| 60-64 | 2623 | 3795 | 11.15 | 14.52 | 40.7 | 41.9 | 11.2 | 10.0 | 32.5 | ... |
| 65-69 | 1936 | 2617 | 16.73 | 18.57 | 67.0 | 55.0 | 15.4 | 8.2 | 50.4 | ... |
| 70-74 | 909 | 1146 | 10.76 | 24.48 | 88.0 | 85.4 | 14.7 | ... | 73.6 | ... |
| Above 75 | 378 | 366 | 26.90 | 30.87 | 148.0 | 161.0 | 13.4 | ... | ... | ... |
| Average | 27098 | 61817 | 7.81 | 9.39 | 23.4 | 17.6 | 6.6 | 8.5 | 11.7 | 10.7 |

FRANCE The tables of the Vienna Arbeiter-Casse point also to the fact that the morbidity of women (526 cases and 9,255 days of sickness per annum per 1,000 women) is above that of men (427 cases and 8,366 days.) (Pages 564-565.)

NOTE (6). The general mortality of the women (without distinction of age) is, on the other hand, less than that of men, while the mortality at each age is greater. To explain this apparent anomaly, it is sufficient to consider the first two columns in Table II: it will be seen that nearly half the women (42 per cent) are under 40 years of age, whilst only a quarter (26 per cent) of the men are under 40. The female members being younger, it is not surprising that their general mortality is lower than that of the men, although their mortality at any particular age is greater.

GERMANY *Handbuch der Medizinischen Statistik.* [Handbook of Medical Statistics.] Dr. FRIEDRICH PRINZING, Ulm. Jena, Fischer, 1906.

As to the danger to life to women in industry the statistics are scanty: those of the Austrian sick insurance offices for 1891-95 are almost the only figures that offer considerable material as to women in industry on this point (mortality). According to them, the women engaged in industrial labor not only have a far higher mortality than working men, but also their mortality between the ages of 15-50 years is higher than that of the remaining female population. Compared with men, the mortality of working women between 15-60 years is as 100 (men) to 109 (women). (Page 492.)

Le Travail de Nuit des Femmes dans l'Industrie. Rapports sur son importance et sa réglementation légale. Préface par ETIENNE BAUER. [Night Work of Women in Industry: Its importance and legal regulation, with preface by ETIENNE BAUER.] Jena, Fischer, 1903.

Moreover and above all we observe, in all countries where woman is protected, a lessening of female and also of infant mortality. For England the convincing argument drawn from this fact has often been cited. There, since the rigorous enforcement of the protective legislation concerning them, the total mortality of women has fallen much below that of men. The ratio of the mortality of men to that of women, 1841 to 1850, was 23.11 per cent for men to 21.58 per cent for women; from 1881 to 1890, as 20.22 per cent to 18.01 per cent. The diminution of these figures shown by comparing the earlier with

the later period should be attributed to the great hygienic progress **GERMANY** realized during the interval; and the relatively greater reduction of female mortality should be attributed to the protective legislation for the workers, and doubtless also to the activities resulting from sick benefits. By way of reaction, this fortunate condition was shown in the figures of infant mortality. (Pages xxxvii-xxxviii.)

The following figures for the German Empire, giving the proportional figures for men and women in the Sickness Insurance Department, show that after 1891, when women were legally protected, their mortality diminished more than that of men.

| ONE TO ONE HUNDRED. | | |
|---------------------|------|--------|
| Years. | Men. | Women. |
| 1890 | 1.05 | 0.75 |
| 1891 | 0.99 | 0.74 |
| 1897 | 0.91 | 0.63 |
| 1898 | 0.87 | 0.61 |
| 1899 | 0.93 | 0.66 |

(Page xxxviii.)

(3) THE NEW STRAIN IN MANUFACTURE

(a) SPEED.

Such being their physical endowment, women are affected to a far greater degree than men by the growing strain of modern industry. Machinery is increasingly speeded up, the number of machines tended by individual workers grows larger, processes become more and more complex as more operations are performed simultaneously. All these changes involve correspondingly greater physical strain upon the worker.

British Sessional Papers. Vol. XXI. 1833. Second Report of the . . . Commissioners for Inquiring into the Employment of Children in Factories . . . and Reports by the Medical Commissioners. Medical Reports by Sir DAVID BARRY.

**GREAT
BRITAIN**

The first and most influential of all disadvantages of factory work is the indispensable, undeviating necessity of forcing both their mental

and bodily exertions to keep exact pace with the motions of machinery propelled by unceasing, unvarying power. (Page 72.)

British Sessional Papers. Vol. XVI. 1875. Reports of Inspectors of Factories for the Half-year ending 30 April, 1875.

. . . The speed of machinery has already been pushed to the farthest extent, and lowered from a point which had been attempted but found unprofitable, and injurious to the work. The real evil has long been, not too long hours, but too great tension of the nervous system by aiming at a larger earning, and consequently, the charge of more machinery than is consistent with the health or good work of either.

Hence also an increase of irritating conflict between master and man as to the excellence of workmanship. . . . Far better 60 hours a week and less of this sad unnatural strain; for over-tension may kill in 50 hours a week, and reasonable work not injure in 60. (Page 32.)

British Sessional Papers. Vols. XXIX and XXX. 1876. Factories and Workshops Acts Commission. Vol. XXX. Minutes of Evidence. A. REDGRAVE.

205. . . . Unhealthiness combined with necessity for close application to rapidly moving machinery. I take those two to be the principal and main causes for the limitation of the hours of young persons and women. (Page 14.)

Effects of the Factory System. ALLEN CLARKE. London, 1899.

Greater speed of improved machinery, whereby the work is increased sixfold, resulting in physical deterioration and mental worry. (Page 41.)

The toil is ceaseless; the machinery demands constant watching. . . . Their feet are never still; their hands are full of tasks; their eyes are always on the watch; they toil in an unending strain that is cruel on the nerves. (Page 49.)

And all these hours — ten hours a day — spinner and weaver are on their feet; no sitting down; no resting; one must keep up to the machinery though agonized with headache or troubled by any other complaint. While the engine runs the workers must stand. (Page 51.)

Women's Work. AMY A. BULLEY and MARGARET WHITLEY. London, Methuen, 1894.

**GREAT
BRITAIN**

. . . machinery has been speeded up to a point which is immensely in excess of that which prevailed when the hours were longer. At the present time, therefore, the strain upon the attention and the wear and tear of the nervous system are greatly in excess of former times, and the worker must be "on the stretch" the whole time to attend properly to the work. (Page 152.)

Dangerous Trades. THOMAS OLIVER, M.A., M.D., F.R.C.P.,
*Medical Expert on the White Lead, Dangerous Trades, Pottery,
and Lucifer Match Committees of the Home Office.* London,
Murray, 1902.

The introduction of steam has revolutionized industry. . . . Machinery acts with unerring uniformity. At times so simple is its mechanism that a child can almost guide it, yet how exacting are its demands. While machinery has in some senses lightened the burden of human toil, it has not diminished fatigue in man. All through the hours of work in a factory the hum of the wheels never ceases. . . . While the machinery pursues its relentless course and is insensitive to fatigue, human beings are conscious, especially towards the end of the day, that the competition is unequal, for their muscles are becoming tired and their brains jaded. . . . Present-day factory labor is too much a competition of sensitive human nerve and muscle against insensitive iron, and yet, apart from an appropriate shortening of the hours of labor, it is difficult to see how this can be remedied. The greater the number of hours machinery runs per day the larger is the output for the manufacturer, but the feebler are the human limbs that guide it. To the machine time is nothing; to the human being each hour that passes beyond a well-defined limit means increasing fatigue and exhaustion. (Page 117.)

*Women Workers. Conference in Manchester, 1907. Arranged by the
National Union of Women Workers of Great Britain and Ireland
in conjunction with the Committee of the Manchester Branch of
N. U. W. W.* London, King and Son.

Factory legislation has done much to improve general conditions and to shorten hours in the textile factories, but the intensity of labour

has increased. Owing to the overdriving and the speeding up of machinery the nervous strain and pressure upon the worker is probably greater than in any other industry. (Page 28.)

The Economic Journal. Vol. XVIII. 1908. Gaps in our Factory Legislation. B. L. HUTCHINS. London.

Now it is important to remember that these (ten) hours mean more work and more fatigue than they did when the normal day was first introduced fifty-odd years ago. The speeding up of machinery has increased the strain, and even as long ago as 1872 shorter hours were agitated for by the trade unions. . . . One of H. M.'s inspectors tells me that "both in cotton and woollen the strain of the full hours with speeding up is almost intolerable to the less robust women and girls." (Pages 223-224.)

Diseases of Occupation from the Legislative, Social, and Medical Points of View. THOMAS OLIVER, M.A., M.D., F.R.C.P., *Medical Expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the British Home Office.* New York, Dutton, 1908.

In trades that are dangerous to health the hours should not be long; and in textile industries, as the speed of machinery is quickened and the nervous tension upon the worker becomes greater, the hours of labour should be proportionally reduced. (Page xi.)

It is an interesting problem to consider the probable effects upon the health of the workpeople in the future of the increased speed at which machinery is being run in the factories and the speeding-up of the work in ship yards. That there is greater strain upon the nervous system, more exhaustion and consequently need for greater leisure, few will deny, and that in many instances the hard work induces premature old age goes without saying. Will this speeding-up tend to make female mill-workers better mothers and help them to give birth to healthy and robust children, or to infants who are puny, ill-nourished, and of a highly strung nervous system? In some American factories in which stitched muslin underwear is made, so great has been the improvement in the machinery of late that the sewing machines are carrying two to ten needles instead of one as formerly, and as a consequence many of the girls are no longer capable of the sustained effort necessary to follow the improved speed, and have been obliged to relinquish their occupation. The strain of the eyes

in watching for broken threads in order to stop the machinery is almost intolerable; it requires an amount of nervous energy and a constancy of attention which the operators cannot supply. There is a limit beyond which the speeding of machinery cannot be run without detriment to the health of the operators unless their hours of work are materially shortened.

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BRITAIN**

Clearly, therefore, there are occupations, especially the textile trades, that tend through sheer strain to wear out the body of the worker and induce premature old age. These industries may be said to show their baneful effects upon the nervous system. (Pages 3-4.)

Although the introduction of machinery has cheapened products and placed more of them within the reach of the poorer working classes, it has not always lightened labour. The rate at which machinery is run demands greater attention from the workpeople and imposes upon them a severe strain. To the artisan classes the Saturday half-holiday and the shortened working day have proven a boon from a purely physical point of view. Great as the rush and pressure are in this country, they are even greater in America. (Page 5.)

The lightening of the burden of the textile worker by improved machinery has not altogether made mill-work easier, for by raising the speed and increasing the output a larger amount of machinery has to be tended, and this constant vigilance imposes a considerable strain upon the worker. If this is true of simple muscular movements necessitating only mechanical supervision, how much greater must be the strain and exhaustion upon persons who in their employment are obliged to execute a series of educated and rapid muscular movements in which volition is sustained throughout. (Page 358.)

Report of the Inspectors of Factories for the Province of Ontario, Canada, 1894. **CANADA**

With the increased speed and complications of machinery in textile industries, especially in cotton looms, the attendant has more mental worry in watching the machines, and no doubt is more exhausted physically after a day's work. (Page 13.)

Report of the Inspectors of Factories for Ontario, Canada, 1895.

A very small fraction of the work requires muscular strength, but it is the constant and steady application of the mind, the eager use of the eyes, which exhaust and wear out the human body. The entire nervous system is so intently directed to the detail of the work, while

CANADA the machinery is running to its utmost capacity, that by night the workers are not only tired and weary, but well-nigh worn out. (Page 25.)

Report of the Inspectors of Factories for the Province of Ontario, Canada, 1896. Toronto, 1897.

Though there is little work which requires great muscular strength or exertion in our factories, yet the alertness and exactness of attention and constant application required exhaust the nervous vitality very rapidly. Most of the operators are necessarily on their feet nearly all the time, and this fact has an unfavorable effect upon the health of women and girls. (Page 22.)

Canada Labour Gazette, August, 1903. [Report of British Columbia Royal Labour Commission.] Dawson. Ottawa.

The report concludes with a recommendation as to the shortening of the hours of labour. "In these days," says the Commissioners, "when the human energies are strained to their utmost amid whirling dust and machinery, long hours are a crime against nature. The machine should be the servant of man, and not man the slave of the machine. One of the most legitimate modes in which a legislature can aid in improving the condition of the workmen is by the shortening of hours. (Page 136.)

Report of the Royal Commission on a Dispute Respecting Hours of Employment. The Bell Telephone Company of Canada, Ltd. and Operators at Toronto, Ontario. The Department of Labour, Canada, Ottawa, 1907. Conclusions and Recommendations.

We agree entirely with the view expressed by the local manager that it is the pace that kills, and the working of women at high pressure at work of this kind should be made a crime at law as it is a crime against Nature herself. (Page 98.)

**AUSTRA-
LIA** *New South Wales. Legislative Assembly. Report of the Working of the Factories' and Shops' Act, 1904.*

Miss Duncan, Inspector:

The effect of factory work on the individual appears to be to produce a skillful specialized worker moving within narrow limits and ill-fitted to rise above them.

On the physical side, the want of exercise among those who sit all day at their work, the long standing of others in those processes which cannot be conveniently carried on when sitting, in either case the over-exercise of certain muscles and the non-exercise of others, must bring about a very one-sided development. . . . Again the constant vibration and noise, the unflagging attention demanded by work on power machines, and the high rate of speed, must tend to operate disadvantageously on the nervous system. (Page 13.)

AUSTRALIA

Fatigue. A. MOSSO, Professor of Physiology, University of Turin, ITALY
1896. Translated by MARGARET DRUMMOND, M.A., and W. B. DRUMMOND, M.B., Extra Physician, Royal Hospital for Sick Children, Edinburgh. New York, Putnam, 1904.

By constant increase in the rate of movement, by instruments ever better adapted to their ends, modern society endeavours to multiply and render more productive the work both of muscle and of mind. The prodigious extension of the arts and the increasing velocity of machinery combine to hurry us onward; our haste will grow from more to more, till it reaches an extreme point at which the law of exhaustion sets an insuperable barrier to the greed of gain. . . . (Page 168.)

The machinery in our factories is ever becoming more ponderous; it is increasing in size, velocity of motion, and productivity, and this increase still continues despite the fact that we have already surpassed the furthest limit set at first by our imagination. (Page 169.)

One very quietly perceives, however, that those machines are not made to lessen human fatigue, as poets were wont to dream. The velocity of the flying wheels, the whirling of the hammers, and the furious speed at which everything moves, these things tell us that time is an important factor in the progress of industry, and that here in the factory the activity of the workers must conquer the forces of nature. The hiss of the steam, the rattling of the pulleys, the shaking of the joints, the snorting of these gigantic automata, all warn us that they are inexorable in their motion, that man is condemned to follow them without a moment's rest, because every minute wasted consumes time that is worth money, seeing that it renders useless the coal and the movement of these colossi. (Page 171.)

Marx, in his celebrated work (*Le Capital*, Karl Marx, p. 161), devotes a chapter to machinery, and arrives at the following conclu-

ITALY

sions: that all our inventions have not diminished human fatigue, but simply the price of commodities; that machinery has rendered worse the condition of the worker, because by rendering strength of no avail it has entailed the employment of women and children, instead of shortening the working-day it has prolonged it, instead of reducing fatigue it has rendered it more dangerous and injurious; that to the accumulation of riches corresponds an increase of poverty; that owing to machinery society is receding further and further from its ideal; that the reality has not corresponded to our hopes.

. . . The powerful automaton of mechanics wants nothing but intelligence and a nervous system; this want a child or a woman can supply and guide the blind giants by the hand. It is a grave accusation to launch against science, that in making herself mistress of the forces of nature she tends to establish a monopoly for machinery, to make labour the slave of capital. There are, moreover, those who fear that human fatigue will come to be less and less regarded, and that the workers will be gradually eliminated and dismissed without means of subsistence, that the intelligence of the people is deteriorating, because the greater the perfection of the machine, the less the skill and ability required from the worker. (Pages 172-174.)

GERMANY *Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten. XXII. 1897. [Official Information from the Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1898.*

The demand for shorter hours of work is justified by the hardships in which modern industry has plunged the whole working class. In a comparatively short time, for instance, machinery of much greater speed has been installed in a number of branches of industry. Even the young, industrious workman must stretch every nerve to keep up with the speeding process necessitated by machinery. (Page 156.)

Machine work allows no time for rest and variety, the workman's nerves suffer, and when, as sometimes happens, his Sunday's rest is taken from him, he breaks down. Older workmen cannot accommodate themselves to this pace, and the rapidity of development has been such that a gradual adaptation to the altered conditions is for them absolutely out of the question. The result is that older people are excluded more and more from factory work. (Page 157.) No unsatisfactory results appear to have followed in any instance where hours have been shortened. (Page 158.)

Jahresberichte der Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr 1902. [Reports of the Factory Inspectors in the Kingdom of Württemberg for 1902.] Stuttgart, Lindemann, 1903. GERMANY

In general the reduction of women's hours takes place with the utmost slowness, sometimes under pressure of organization . . . sometimes where employers have come to an agreement among themselves. . . .

But this reduction of hours does not keep pace with advances in technique . . . where there is an obvious tendency to make use of human power to the fullest possible extent. This is especially true in the textile mills, where certain older processes are modified by new contrivances. . . . The result now is, that, while the wages of skilled spinners (women) have risen about 12 or 13 per cent, the number of spindles, on which they must concentrate attention for 11 hours, has been raised from 500 to 750 — an increase of 50 per cent. This is not quite the same as saying that the strain upon the spinners is 50 per cent greater, since a certain number of helpers are provided, nevertheless the attention and skill demanded are much greater than was formerly the case. . . . Such examples make it plain that, with this increasing intensity of strain in work, the hours of work must be correspondingly shortened if the people are to be protected from ruin of health. (Pages 74-75.)

Jahresberichte der Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr 1903. [Reports of the Factory Inspectors in the Kingdom of Württemberg for 1903.] Stuttgart, Lindemann, 1904.

To-day the technical development of industry leads to ever and ever greater demands upon the intensity and attention of the worker. When the speed of the machine is greatest, then the workman has more given to him to attend to. This uncontested fact of rising claims upon the physical and mental capacity of the workman, which is more or less strikingly evident in every department of labor, has in recent years brought the question of shorter hours to the front. The necessity of compensation through shorter hours is not only recognized by the inspectors, but by many employers as well. (Page 96.)

GERMANY *Jahresberichte der Gewerbeaufsichtsbeamten und Bergbehörden für das Jahr 1904.* [Reports of the Factory and Mine Inspectors for 1904.] Vol. II. Württemberg. Berlin, Decker, 1905.

The claim for a ten-hour day for women is an old and much-contested one: factory inspectors are continually reminded of the great need for its fulfilment, as they see how technical improvements in machinery increase the productivity of the machine and consequently intensify the demands made upon the working strength and capacity of the wage-earners. And this is especially true of the industries which employ women in large numbers. (Pages 4, 102.)

Die Arbeitszeit der Fabrikarbeiterinnen. Nach Berichten der Gewerbeaufsichtsbeamten bearbeitet im Reichsamt des Innern. [The Working Hours of Women in Factories. From the Reports of the (German) Factory Inspectors compiled in the Imperial Home Office.] Berlin, Decker, 1905.

From Frankfurt am Oder it is reported that the insurance records for two textile mills show steady deterioration in the health of the women employed eleven hours a day. One reason for this is believed to be the speeding up of the machinery. Vigorous weavers stated repeatedly that the old, slow looms exhausted them less in twelve and thirteen hours than the swift new looms in eleven hours. The more intensive work requires better nourishment; but there is no adequate increase in wages to afford this improved food, and the eleven-hour day of more rapid work is presumably responsible for the deteriorated health. (Page 119.)

Archiv für Unfallheilkunde Gewerbehygiene und Gewerbekrankheiten.
Bd. I. Über den Gesundheitsschutz der Gewerblichen Arbeiter.
[Protection of the Workingman's Health.] Dr. SCHAEFER.
Stuttgart, Enke, 1896.

The more technic is perfected, the more complicated the machine and the more rapid its speed, the greater are the demands made upon the workman and the more important it becomes to shorten his hours of work. (Page 204.)

Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of Political Science. Vol. I. Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen; and EDG. LOENING, Professor of Law in Halle. Arbeitszeit: Hours of Work.] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909. GERMANY

The workman sees in reduction of working hours the surest remedy for all the dangers that arise from his work, and that menace him with premature exhaustion of his working power, his only capital. The more piece work and speeding stimulate the intensity of production, the more quickly a dangerous degree of fatigue is likely to appear, resulting from the one-sided exertion of certain nerves or muscles (a feature of the subdivision of labor). (Page 1204.)

Intensiveness of work means progress for the worker, so long as the tempo keeps within customary bounds; that is, while speed can be maintained without requiring continuous new impulses of will-power. If, in spite of shorter hours intensiveness of work leads to chronic overfatigue, then it is just as necessary to overcome that evil as the overfatigue resulting from overlong hours of less intensity. (Page 1217.)

Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [Investigations into the Conditions of Health of the Swiss Factory Workers.] Dr. FRIDOLIN SCHULER, Swiss Factory Inspector and Dr. A. E. BURCKHARDT, Prof. of Hygiene at Basle. Aarau, Säuerländer, 1889. SWITZ-
ERLAND

Instead of becoming wearied by personal labor, as in earlier stages of industry, it is to-day the unremitting, tense concentration in watching the machine, the necessary rapidity of motion, that fatigues the worker. (Page 62.)

An das Schweiz. Industriedepartement, Bern. Die Eidgenössischen Fabrikinspektoren. [Report of the Swiss Factory Inspectors to the Swiss Department of Labor on the Revision of the Factory Laws.] Schaffhausen, 1904.

As technique becomes more developed, machinery more complicated, and the pace swifter, so much more insistent become the

SWITZERLAND demands of the workers and the claims of hygienists for a shorter work day as a physiological necessity. (Page 26.)

When we consider the great material advantages of modern industry in being enabled to economize material by the use of water power day and night, by keeping its furnaces forever burning, and so on, it seems as if it might well be in place to economize also the strength of the people by shortening their shifts of work. (Pages 34-35.)

AUSTRIA *Eighth International Congress of Hygiene and Demography at Budapest, 1894. Vol. VII, Sec. V. Über das-Verhältniss der Dauer des Arbeitstages zur Gesundheit des Arbeiters und dessen Einfluss auf die Öffentliche Gesundheit. [The Length of the Working Day in its Relation to the Workman's Health and its Influence upon Public Health.] Dr. E. R. J. KREJCSI, Vice-Secretary of the Chamber of Commerce in Budapest. Budapest, 1896.*

In branches of industry where machinery is used, the normal working day of which the worker is fully capable is shorter in proportion as machinery is more complicated and the demands made upon the intelligence, attention, and memory of the worker are more incessant.

Such workers expend both their mental and physical strength in strenuous exertion, and thus their normal energy is sooner exhausted and the injurious results of overstrain become evident earlier than in simpler forms of labor. (Page 326.)

UNITED STATES *Report of the Maine Bureau of Industrial Labor Statistics, 1892.*

The constant nervous tension from continued exertion in a modern factory or workshop, for a period of ten hours, is a severe strain upon the physical system. Work is not done in the old, slow way, and, in nearly all industries, by the present methods, from two to four times the quantity of product is turned out in the ten hours. How much faster is the operative compelled to work, and how much greater is the strain, to accomplish this amount of work, in comparison with the old twelve-hour method. (Page 11.)

Seventh Annual Convention of the International Association of Factory Inspectors of North America. Chicago, Sept. 19-22, 1893.

UNITED
STATES

Inspector Dyson, of Massachusetts:

Let it be remembered that the gradual reduction in the hours of labor has been met by the manufacturers with improved machinery. . . .

In a textile mill there is a very small fraction of the work that requires muscular strength. But it is the constant and steady application of the mind, the eager use of the eyes, which exhaust and wear out the human body.

The entire nervous system is so intently directed to the detail of the work while the machinery is running to its utmost capacity, that by night the worker is not only tired and weary, but wellnigh worn out. (Pages 118-119.)

Report of the United States Industrial Commission on the Relations and Conditions of Capital and Labor employed in Manufactures and General Business, 1900.

Mrs. Robertson tells me that when she was a girl, to run one or two looms was as much as any woman would have tried. Now, in some instances, there are women running nine looms, and the looms have more than doubled or trebled their speed. This means more work and harder work. (Page 63.)

United States Congress, House Report No. 1793. (4405). Hours of Laborers on Public Works of the United States. Report from the Committee on Labor. 57th Congress, 1st Session. 1901-1902.

While there is still a variance of opinion on the question whether modern machinery and methods so lighten the physical drudgery of most occupations as to have an equivalent effect to the shortening of hours in the conservation of energy, or whether such machinery and methods operate to so tax the nervous powers as to be equivalent in exhaustive effects to the lengthening of hours, your committee are of the opinion, after what has been said on both sides, that the higher tension of modern employment is at least a full offset to the saving accomplished in muscular force.

This effect of modern machinery on the powers of the worker has been a question more immediately affecting the American workman than those of any other nations. The foreign workman has very

generally held to the surface theory of some older varieties that machinery is a competitor of labor and the one most threatening to his employment, hence labor has strenuously and to a considerable extent successfully resisted the introduction of modern machinery. (Pages 9-10.)

Report of the United States Industrial Commission, Vol. XIX, 1901.

It is brought out that in nearly all occupations an increasing strain and intensity of labor is required by modern methods of production. . . . The introduction of machinery and the division of labor have made it possible to increase greatly the speed of the individual workman. . . . The testimony of a representative of the Cotton Weavers' Association shows this increasing strain of work. He says:

"Anybody who works in the mills now knows it is not like what it was twenty-five or thirty years ago, because the speed of the machinery has been increased to such an extent, and they have to keep up with it." (Page 763.)

Even these cases where machinery has not increased the intensity of exertion, a long workday with the machine, especially where work is greatly specialized, in many cases reduces the grade of intelligence. The old handwork shops were schools of debate and discussion, and they are so at the present time where they survive in country districts; but the factory imposes silence and discipline for all except the highest. Long workdays under such conditions tend to inertia and dissipation when the day's work is done. (Page 772.)

Report of the Maine Bureau of Labor and Industrial Statistics, 1908.

For the first time, women were interviewed who were running twelve and sixteen Draper looms. These machines are practically a recent addition, and are so arranged that the filling in the shuttle is changed automatically, thus enabling them to go at a greater rate of speed and with less interruption. The women are not expected to clean, oil, or sweep. This matter was quite fully discussed and the complaint made that the work was too hard, but that they tried to do it, as they were dependent upon their positions and they knew there were plenty of foreign men waiting for their places. Where a woman has been accustomed to tend a six loom set, with

the Drapers she is given from twelve to sixteen which extend over quite an area. There is no time for sitting during the day, as when employed on the other looms. One woman said she could not sleep at night after running these fast machines, and many have had to give up their places and find other work.

This marks another evolution in the machinery world. Years ago, a woman tended two slowly running looms. Later, as the hours of work grew less, the number of looms was increased to four and six, and now with the Drapers, an operative is expected to look out for twelve or sixteen. (Pages 42-43.)

National Civic Federation, New York, 1903. Industrial Conference.
Prof. GEORGE GUNTON, *Institute of Social Economics.*

The factory system makes this (shortening of the working day) more and more necessary in proportion as it is perfected in its mechanism. It becomes all the time more and more exacting. The greater the perfection of the machinery or the method, the more attention is required. (Pages 172-173.)

American Academy of Political and Social Science. Vol. XXVII, No. 3, 1906. The Manhood Tribute to the Modern Machine: Influences Determining the Length of the Trade Life among Machinists.

James O'Connell, President International Association of Machinists:

The purpose of this paper is to prove that with the introduction of modern high-speed machinery the life of the operator of such machinery has been shortened. . . .

Great changes have been made in the last quarter of a century, and every industry has been affected with the advent of the machine, but in no other sphere of human activity has such a change been affected as has occurred in the machine shop. (Pages 491-492.)

First of all, old men have disappeared.

. . . Time was when age was honored in the machine shop; . . . The speeding up of the machine has changed all this, . . . his added years prevent him from keeping pace with the machine, its gait is too rapid, so he is forced aside to make room for a younger man. . . .

The youth fresh from school . . . enters the machine shop. . . . The great strain, both mental and physical, soon proves too much

for him. . . . If his period of service in the machine shop is broken by intervals of rest and recreation, nervous breakdown is averted.

. . . Great care and watchfulness to guard against the effects of the nervous strain are necessary when the youth begins his career in the machine shop, for skill, exact skill, cannot be acquired without it. And when proficiency has been reached, although the young machinist does not notice it, he is still bearing the strain upon his nerves. It is this over-exertion kept up at high tension, day in and day out, year after year, that is shortening the life of the machine-shop worker, and robbing him of longevity. (Pages 462-494.)

Lessen the number of hours the worker is forced to work at high speed, concert pitch, and his nerves will remain normal, and he will live to the full — his promised threescore years and ten. (Page 495.)

Ibid. Length of the Trade Life in the Glass Bottle Industry.

Denis A. Hayes, President of the Glass Bottle Blowers' Association of America:

Each year the production of the individual workman becomes greater. The highest day's work of this season becomes the standard for the next.

A man working according to present-day methods can make three times as many bottles in a day of eight and a half hours as he did twenty years ago in a day of ten hours, but the expenditure of strength and energy is now much greater than it was then.

. . . The hours of labor should be still further reduced, so that men would, after leaving their work, retain sufficient mental and physical vigor for recreation, study, and social intercourse. (Page 498.)

*Charities and the Commons, January 2, 1909. Vol. XXI. No. 14.
New York. The Working Women of Pittsburgh. ELIZABETH
BEARDSLEY BUTLER, Former Secretary New Jersey State Consumers' League.*

In canneries and cracker factories we find Polish girls who are lighter-handed, fairer, more delicately built than those of the metal trades and the glass houses. These girls have rapid work to do. They have the nervous energy to pack or to fill cans at high speed. They stand beside the travelling conveyor which carries cans of

beans, and slip a bit of pork into each can as it passes. Without turning their heads or changing their position, working with high concentration and intensity, they can keep pace with the chains. (Page 577.)

Charities and the Commons, January 2, 1909. Vol. XXI. No. 14.
New York. The Civic Responsibilities of Democracy in an Industrial District. PAUL U. KELLOGG.

We have the statements of old employees that not more than 25 girls of the 300 in the coil-winding room in one of the Pittsburgh electrical industries have been in the plant as long as three or four years. The speeding-up tends to make the girls nervous, weak, and easily overcome by illness.

Apart from dangers of accident, of speeding, and of injurious processes, the health of a working force bears a direct relation to the length of the working day. (Page 637.)

Charities and the Commons, March 6, 1909. Vol. XXI. No. 23.
New York. The Industrial Environment of Pittsburgh's Working Women. ELIZABETH BEARDSLEY BUTLER, *Former Secretary New Jersey State Consumers' League.*

A third factor affecting health (beside essential trade disease, and careless building construction) enters into the industrial environment. This is the system of pace-setting. Four stogy factories, for example, stimulate the speed of their girl rollers by the following sliding scale:

| | |
|--------------------------|---------------------|
| 300 stogies from a pound | 10 cents a 100. |
| 325 stogies from a pound | 11 cents a 100. |
| 350 stogies from a pound | 12 cents a 100. |
| 375 stogies from a pound | 13 cents a 100. |
| 400 stogies from a pound | 13½-14 cents a 100. |

In order to earn the market rate in the district (12 cents a hundred), girls must cut close, and at the same time work at an almost impossible rate of speed. In another factory rollers receive only 9 cents a hundred if they make less than 6000 stogies a week, and 11 cents a hundred (the market rate in the district) if they make 6000 or over. The foreman of a printing establishment paid his girls seven dollars a week for an average output (in register folding) of 900 an hour. A system of piece payments was introduced, and in

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two days the rate went up to 500 an hour; week work was then resumed, and the girls were required to keep the same pace. A lamp factory pays 14 cents an hour for punching 600 pieces, and a cent for every extra hundred pieces finished within the same time.

Besides the driving force of these premiums for extra work, the pace of the workers is kept high by the speed of machinery. A travelling chain carries cans of beans past a row of cannery operatives. They must slip a bit of pork into each can as it passes, and the chain is set at a pace which keeps each girl rigid in her place, with every nerve at a tension, fixed on the one motion required of her. In a cracker factory girls lift hot crackers from a travelling conveyor, packing them in oblong boxes with one quick motion, as the conveyor passes; each girl is responsible for all the crackers on a certain section of the conveyor, which is set at a pace requiring her utmost physical and nervous effort. The speed of machinery, when pay is by the week; or a piece payment system, impels the worker to increase the quantity of her output, although rate-cutting keeps weekly earnings down to a customary level. The nervous strain inevitable under these conditions has no inconsiderable share in causing the ill-health or positive breakdown which so frequently follows a girl into her home after she has left the factory. It is the final exaction that the trade makes of her. (Page 1139.)

(b) MONOTONY

Besides the physical strain due to speed and complexity of machinery, health is injured by the extreme monotony of many branches of industry. Specialization has been carried so far that change and variety of work is reduced to a minimum. Minute division of labor results in the constant repetition of similar motions and processes by the same worker, favoring the onset of fatigue and requiring for relief the establishment of a shorter workday.

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British Sessional Papers. Vols. XXIX-XXX. 1876. Factory and Workshops Acts Commission. Vol. XXIX. Report.

We have already referred more than once to the unremitting and monotonous character of all labor at a machine driven by steam.

If the day's work of a housemaid or even of a charwoman be closely looked at and compared with that of an ordinary mill hand in a card room, or spinning room, it will be seen that the former, though occasionally making greater muscular efforts than are ever exacted from the latter, is yet continually changing both her occupation and her posture, and has very frequent intervals of rest. Work at a machine has inevitably a treadmill character about it; each step may be easy, but it must be performed at the exact moment under pain of consequences. In hand work and house work there is a certain freedom of doing or of leaving undone. Mill (*i. e.* machine) work must be done as if by clockwork. . . . The people are tied as it were, to machinery moving at a great speed in certain operations; again it has been alleged that the state of the atmosphere is very unhealthy, and the temperature at a great height, and from the employment of machinery the speed has been so much increased that the wear and tear, not merely of the body but of the mind also, of the operatives were too great for them to bear. (Pages xxix-xxx.)

The Hygiene, Diseases, and Mortality of Occupation. J. T. ARLIDGE, M.D., A.B., F.R.C.P. London, Percival, 1892.

The majority of indoor industries have the disadvantage of presenting little variety in the methods of working, especially in manufacturing, where there is great monotony in whatever branch of employment is pursued, and the workman counts for little else than an appendage to a machine. Day by day the worker is called upon to do the same mechanical act, without feeling a personal interest in the result of his labour; for this is no product of his thinking or inventive faculty, but predetermined by mechanical contrivances; and day by day he continues at his task, wearisome to the spirit, earning a fixed rate of payment, sufficient, usually, to supply his animal requirements, but holding out small prospect of escape from toil, and whilst he can perform it, or a coming period of competency and enjoyment. (Page 18.) And, generally speaking, it may be asserted of machinery that it calls for little or no brain exertion on the part of those connected with its operations, it arouses no interest, and is wearisome by monotony. Machinery, consequently, has nothing in it to quicken or brighten the intelligence, though it may sharpen the sense of sight, and stimulate muscular activity in some one limited direction.

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. . . That some effect must follow upon the rapid whirling of machines and the noise produced, is a reasonable inference. The special senses so exposed are necessarily subjected to a species of strain or overuse. Those unaccustomed to machinery are dazed by its operations, and willingly escape from its presence; and those regularly occupied with it, in conducting and regulating its action, and in intently watching its output, can only do so at the expense of more or less wear and tear of nerve function, and, indeed, of the whole nervous system. Their fatigue is the fatigue of watching, not of working. (Pages 25-26.)

Condition of the Working Class in England in 1844. FREDERICK ENGELS. London, Sonnenschein, 1892.

The supervision of machinery, the joining of broken threads, is no activity which claims the operative's thinking powers, yet it is of a sort which prevents him from occupying his mind with other things. We have seen, too, that this work affords the muscles no opportunity for physical activity. Thus it is, properly speaking, not work but tedium, the most deadening, wearing process conceivable. The operative is condemned to let his physical and mental powers decay in this utter monotony. . . . Moreover, he must not take a moment's rest; the engine moves unceasingly. . . . This condemnation to be buried alive in the mill, to give constant attention to the tireless machine, is felt as the keenest torture by the operatives, and its action upon mind and body is in the long run stunting in the highest degree. (Page 177.)

The Effects of the Factory System. ALLEN CLARKE. London, Grant Richards, 1899.

And all these hours — 10 hours a day, spinner and weaver are on their feet, no sitting down, no resting; one must keep up to the machinery though agonized with headache, or troubled by any other complaint. While the engine runs the workers must stand. . . . It will thus be seen that this employment is a severe and ceaseless mental strain that makes a tribe of toilers alert at their tasks, but weakens the physique, as does all narrow and monotonous mental strain if continuous. (Pages 51-52.)

No doubt the factory system, by the increased work and worry, contributes a good share of the imbeciles to the asylums. It is well

known that monotony is a cause of insanity, and there is nothing more drearily monotonous than factory work. (Page 86.)

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Women's Work and Wages. EDWARD CADBURY, M. CECILE MATHE-
SON, and GEORGE SHANN. London, T. Fisher Unwin, 1906.

The incessant noise of the machinery, the excessive monotony of the work (presswork), and, above all, the long hours, which are too often spent in an ill-lighted and ill-ventilated atmosphere, all tend to produce a depressing and deadening effect which cannot fail to destroy alertness of attention and to create a craving for excitement which will catch at the least opening for distraction. . . . (Pages 53-54.)

Women Workers. Conference in Manchester, 1907. Arranged by the National Union of Women Workers of Great Britain and Ireland in Conjunction with the Committee of the Manchester Branch of the N. U. W. W. London, King and Son, 1907.

Monotony, noise, and dirt are inseparable from many occupations and have a depressing effect on vitality that we are apt to forget. In many cases only the movements of a machine are required in tending a machine, and this monotony is largely responsible for the ungovernable excitement shown by many boys and girls when released from work. As one girl said, "When you have been a few days at a press you want to scream." Imagine passing ten hours a day, with never a week's holiday, unless one is ill or out of work, amid the noise of looms, the dirt and dust of polishing lathes, in the heat of a lacquering shop, or in the odour of rubber manufacture or of French polishing. (Page 106.) Monotony of work, movement, or position may be responsible for mental sluggishness, but its effects are more apparent in the low standard of physical development reached by many of the working classes, while the whole trend of industrial development is to increase and not decrease this monotony. (Page 108.)

The Economic Journal. Vol. XVIII, 1908. Gaps in our Factory Legislation. B. L. HUTCHINS. London, Macmillan.

The extreme monotony of factory work is in itself a cause of strain. (Page 224.)

GERMANY *Gesammelte Abhandlungen, Bd. III.* [Complete Works, Vol. III.] *Die Volkswirtschaftliche Bedeutung der Verkürzung des Industriellen Arbeitstages.* [The Economic Significance of a Shorter Working Day. Paper read before the Political Society. ERNST ABBÉ. Jena, 1901.] Jena, Fischer, 1906.

Our whole industrial labor nowadays is characterized by what we call "Effects of the Division of Labor." . . .

This division and subdivision has become a necessary condition of progress, and, much as we may deplore its effects in certain details, it is impossible to abandon it. It stamps all work with uniformity. . . . With this sameness and continually recurring monotony we also get the continuous fatigue of the same organ, — of the same group of muscles, — of the same nerve centres, — of the same part of the brain, — because all that is to be done, whether muscular or brain work, must be constantly repeated in the same manner from morning to night, day by day, and week by week. (Page 225.)

Fourteenth International Congress of Hygiene and Demography. Berlin, September, 1907. Vol. II, Sec. IV. Ermüdung durch Berufsarbeit. [Fatigue Resulting from Occupation.] Dr. EMIL ROTH, Regierungsrat, Potsdam. Berlin, Hirschwald, 1908.

. . . With the progressive division of labor, work has become more and more mechanical. . . . A definite share of overfatigue and its sequels, especially neurasthenia, must be ascribed to this monotony, — to the absence of spontaneity or joy in work. (Page 613.)

ITALY *Proceedings of the First International Convention on Industrial Diseases. Milan, 1906. Frenastenia e delinquenza in rapporto a taluni ordinamenti del lavoro.* [Imbecility and Criminality in Relation to Certain Forms of Labor.] Prof. CRISAFULLI.

To understand how cerebral fatigue can cause the arrest of mental development in youths and criminal actions in adults, we must bear in mind that the special functions of the brain have separate centres, the foundation of the psychic and motor-psychic life of individuals. Thus, there is a centre for hearing, another for sight, another for speaking, etc. When only one centre works it becomes overfatigued much more easily than if the functions were alternately performed by the various centres.

Here, then, is another factor in overfatigue due to the *monotony* of ITALY work, interrupted only at long intervals.

This monotony is the determining cause of local disturbances and endangers the entire organism. (Page 150.)

The National Civic Federation Review. Vol. II, No. 8. Jan.-Feb., 1906. The First Annual Meeting of the New England Civic Federation. Boston, Jan. 11, 1906. UNITED STATES

Marcus M. Marks, President of the National Association of Clothing Manufacturers:

. . . Labor asks for shorter hours . . . because the conditions of employment have been changed so much in recent years that workers feel justly entitled to a shortening of the day. They contend that the introduction of machinery has in a large degree replaced the exercise of the muscles, by the use of the eye and mind. This causes more strain on the system. They contend further that specialization of labor has taken away the restful variety and change of occupation which formerly diversified the day's employment, and has substituted a regular monotony of daily labor which is much more tiring. For, whilst a workman might contribute his maximum efficiency in working to twelve hours per day when strictly variegated effort was required, the greater strain of the present so-called "improved" condition of labor may now bring about the necessity for a reduction of hours in order to preserve the same degree of efficiency. (Page 8.)

Charities and the Commons. March 6, 1909. Vol. XXI, No. 23. New York. The Industrial Environment of Pittsburgh's Working Women. ELIZABETH BEARDSLEY BUTLER, former Secretary, New Jersey State Consumers' League.

Monotony of occupation, of movement of foot or hand, monotony of thought which directs the foot or hand, has been illustrated repeatedly in the descriptions of different trades. One woman is putting fifty hinges a minute through a machine. Each second a hinge is lifted out and slipped into place, the hand drawn back as the machine moves, another hinge lifted and slipped into place, for ten hours each working day. Other women spread out the tobacco leaves on the suction plates, put the half-made bunch in the leaf, press the treadle

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and push the rolled stogy aside; spread out another leaf, cut, put the bunch in place, press the treadle and push aside. Others pack crackers, candy, glass, lamps, with quick machine-taught, unvarying motions, lifting, wrapping, putting in place, lifting, wrapping, putting in place, for ten hours each day. Still others steady the paper in a box-covering machine, guide it according to the gauge, replace it when the strip runs out, guide it according to the gauge.

Each of the women-employing trades illustrates the same fact. This work is not creative, — slipping a hinge into place, rolling a stogy at a suction table, running a box-covering machine, packing crackers. It is not merely subsidiary, it is stupefying. Work which demands nothing of the intelligence, costs the intelligence more than work which demands too much. Machine-like precision and speed tend inevitably toward machine-like absence of thought, and the operative, herself reduced to an adjunct, needs for her single task neither training, intelligence, strength, nor skill. (Page 1140.)

(c) PIECE WORK

All the evils of speed and monotony in industrial establishments are intensified by the system of piece work. When each worker aims to work faster for the sake of a slight increase in wages, a premium is put upon feverish activity, regardless of the physical cost to the worker.

SWITZER-
LAND

Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [Investigations into the Conditions of Health of the Swiss Factory Workers.] Dr. FRIDOLIN SCHULER, Swiss Factory Inspector, and Dr. A. E. BURCKHARDT, Prof. of Hygiene at Basle. Aarau, Säuerländer, 1899.

. . . The larger proportion of women in factories is certainly to be thought of in estimating the effects of the violent motion of the machinery on health. . . . But even more important is the overexertion . . . this is exhausting, especially when the practice of piece work spurs the women to greater exertion, and much more so when an overseer, warning and reprimanding the workers, urges them to the utmost degree of exertion. (Page 82.)

Deutsche Medizinische Wochenschrift, Nr. 21, Mai 25. Die Neurasthenie in Arbeiterkreisen. [Neurasthenia in the Working Classes.] DR. P. LEUBUSCHER and DR. W. BIBROWICZ, formerly of the Beelitz Sanitarium of the State Old Age and Invalidity Department of Berlin. Berlin, 1905. GERMANY

. . . Work has become very different! Piece work has indeed obtained larger wages, but has developed an impetus and speed and intensity of effort that used to be unknown, and this invariably crushes the weaker workers, those for whom all work is a heavier burden than for the strong. Continuous anxiety is felt by these lest they fall behind. Then sometimes voluntarily, sometimes compulsorily, overtime is undertaken, and so it turns out that the working hours, instead of being comparatively shorter than the usual day, are really much longer, and, by reason of the irregularity, far more exhausting. (Page 821.)

Fourteenth International Congress of Hygiene and Demography. Berlin, September, 1907. Vol. II, Sec. IV. Ermüdung durch Berufsarbeit. [Fatigue resulting from Occupation.] Dr. EMIL ROTH, Regierungsrat, Potsdam. Berlin, Hirschwald, 1908.

Of greater importance is the excessive overstrain of piece work, which indeed pays better, but at the cost of a speed and intensity of work which was formerly unknown. That these injurious effects first assail the weaker part of the working population is self-evident. (Page 614 and 615.)

Il Ramazzini. Giornale Italiano Di Medicina Sociale. Anno I, 10-11. [Italian Journal of Social Medicine.] October-November, 1907. *Le Stagioni, i giorni, le ore degli infortuni del lavoro. [Days, Seasons, and Hours when Industrial Accidents occur.]* PROF. G. PIERACCINI and DR. R. MAFFEI, Head Physicians in the Royal Main Hospital of S. M. Nuova, Florence, Italy. ITALY

Piece work, necessitating higher speed, tends both in itself and together with the fatigue that ensues to favor the occurrence of labor accidents. . . .

We should see to it . . . that, above all, piece work should be condemned, preference being given to time work, the honesty of the worker and the consciousness of his own labor capacity regulating the speed of work. (Pages 593-594.)

CANADA *Report of the Inspectors of Factories for the Province of Ontario, Canada, 1898. Toronto, 1899.*

In almost every industry the working day is ten hours. The system of piece work is becoming more generally adopted. The small pay given by the hundred or thousand, according to the different industries, stimulates the eagerness of the workers to the highest possible pitch. I have seen girls working so rapidly that I have asked myself the question, how long their nervous systems could resist the strain of the excessive fatigue resulting therefrom. A shorter working day for this class of operatives seems an imperative necessity. (Page 31.)

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Report of the Minnesota Bureau of Labor, Industries and Commerce, 1907-1908.

. . . The work that is done by women in so many departments of industry is "piece" work, where the nervous strain is at its highest tension.

When, by reason of skill or deftness, or a longer sustained energy, a girl is able to do a maximum amount of work, she is said to "set the pace," and she becomes a "pace maker" for the others. Those less skilled or less deft, or who for any reason are unable to keep up with the leader, are striving with every nerve to earn as much as is possible, and this great demand upon nervous energy entails a rapid decay of nervous force. (Pages 243-244.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics, 1907-1908. Part VII. Women Workers in Milwaukee Tanneries, IRENE OSGOOD, Special Agent.

Organized workmen usually object to the piece-work system. It so frequently leads to "speeding up." And the rate per piece is often cut down until only the fastest workmen are able to secure anything like a living wage. Those less skilled and less dexterous are thus made to suffer from the ambition or greed of a few involuntary pace-makers who work themselves out in a short time for the sake of temporarily carrying higher wages. (Page 1053.)

The girls have complained, too, of being cut when they began to earn high wages. This was substantiated by a superintendent, who

remarked: "Oh, if they get to earning too much they know what they will get," contending that a general level of wages must be maintained. This would mean, then, that the average worker practically determined the amount one could earn, and any exertion beyond this only reacted upon all in a general cut of the piece rate. Employers quite generally admit this situation. Men meet it by organization and by attempting to regulate their employment by agreements with the employer.

But, paradoxical as it may seem, stimulation to greater speed is frequently furnished in the opposite way. Another superintendent insisted that cutting the rate was the surest way to get more work done. He argued that when workers find their wages decreasing from a customary sum they naturally try to get back to the old standard by extra work. Thus they are caught between the upper and the nether millstones. The possibility of a cut is ever-present. If they work unusually hard and earn higher wages, they face a cut in rates. If they do not turn out enough work to satisfy the superintendent, a cut is made anyhow to spur them on to higher exertions. They are annoyed and bewildered and uncommonly helpless. (Page 1054.)

B. *The Nature and Effects of Fatigue*

(1) GENERAL MEDICAL VIEWS OF FATIGUE

The fundamental need of limiting excessive working hours for women is based on their physiological organization. For medical science has demonstrated that while fatigue is a normal phenomenon — the natural result of bodily and mental exertion — excessive fatigue or exhaustion is abnormal, — the result of over-exertion or work pursued beyond the capacities of the organism.

Two processes are continually carried on in the living body: assimilation or building up; dissassimilation or throwing off waste products. These wastes are poisonous impurities arising from the chemical processes of cellular life. They circulate in the blood, poisoning brain and nervous system, muscles, glands, and other organs until normally removed by the oxygen of the blood, by the liver or kidneys.

When these waste products accumulate in the blood, fatigue ensues. When they exceed their physiological or normal amount, exhaustion results and health is impaired. In extreme instances of over-exertion death results, not from sheer physical exhaustion of the heart or other organs, but from chemical poisoning due to the unexpelled products of fatigue.

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Diseases of Occupation from the Legislative, Social, and Medical Points of View. THOMAS OLIVER, M.A., M.D., F.R.C.P., *Medical expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the British Home Office.* New York, Dutton Co., 1908.

Fatigue or tiredness is a sensation, the outcome of a particular state of the nervous system, the result of work carried beyond the capabilities of the organism. In ordinary physiological activity exhaustion is never attained, for fatigue is the warning signal. In each of us there is a certain amount of reserve force which allows our muscles and nerves to be overtaxed at times without injurious consequences. The increased functional activity is met by a corresponding improved nutrition, whereby recovery is secured. Life involves change of structure. The waste products added to the blood act upon the nerve endings in muscle and upon the gray matter of the brain, and create a sense of fatigue. Although the sensation of tiredness is referred by us to the overworked muscles, the location of the cause is less in the peripheral than in the central nervous system. On the one hand waste products act upon the muscles, diminish their contractibility and render them less responsive to nerve stimuli; and on the other hand they poison the large nerve cells in the gray matter of the brain, render them less receptive of sensory stimuli, and in this way reduce their power of emitting volitional impulses. There is, therefore, in fatigue an element that is mental as well as physical.

After rest and sleep the sensation of fatigue wears off, we rise invigorated and strengthened for work. During repose structure is being rebuilt and waste products are eliminated.

The proof that the circulation of waste products in the blood is a cause of fatigue is demonstrated by taking some of the blood of a fatigued animal and injecting it into a healthy one, when in the latter the physical signs of fatigue gradually appear. (Pages 6-7.)

*Thirteenth International Congress of Hygiene and Demography in GERMANY
Brussels, 1903. Vol. V, Sect. IV. Dans quelle mesure peut-on
par des méthodes physiologiques, étudier la fatigue, ses modalités
et ses degrés dans les diverses professions? Quels sont les argu-
ments que les sciences physiologiques et médicales peuvent ou
pourraient faire valoir en faveur de tel ou tel mode d'organisation
du travail. [To what extent may fatigue, its forms and degrees in
different occupations be studied by physiological methods? What
arguments may physiological or medical sciences bring to bear in
favor of various modes of industrial organization?] DR. ZUNTZ,
University of Berlin. Brussels, 1903.*

Fatigue, resulting from various occupations, which marks the limits of the workingman's capacity or, if disregarded, endangers his health, is very variable in its aspects, according to the organs especially affected.

We may first of all differentiate between fatigue of the motor apparatus and fatigue of the nervous apparatus.

The first group may be again subdivided into two divisions: first, the general muscular weariness resulting from heavy work; second, the fatigue of certain local groups of muscles which have been overstrained.

In fatigue of the nervous apparatus we distinguish between fatigue of the special organs of sense, and fatigue of the central nervous system. (Page 1.)

*Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of
Political Science. Vol. I.] Edited by Drs. J. CONRAD, Professor of
Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin;
W. LEXIS, Professor of Political Science in Göttingen; and ENG.
LOENING, Professor of Law in Halle. Arbeitszeit: Hours of
Work. Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.*

Conclusions from the physiological and psychological investigations into fatigue.

Physiologically considered, human labor represents a transformation of the potential energy of oxygen and food materials. When assimilated, they are transformed into mental and physical energy, and, in so far as this is utilized for industrial purposes, we have work in the ordinary sense. Every piece of work, then, means expenditure of energy. . . .

GERMANY Products of tissue change are created (after fatigue), especially carbonic acid and other acids which have a poisonous and paralyzing action. Fatigue consists essentially in this — that waste products are created in the muscles more rapidly than they can be eliminated by the blood current and excretory organs. (Page 1214.)

Fourteenth International Congress of Hygiene and Demography, in Berlin, 1907. Vol. II, Sec. IV. Ermüdung durch Berufsarbeit. [Fatigue Resulting from Occupation]. Dr. E. ROTH. Berlin, Hirschwald, 1908.

Every muscular contraction increases the consumption of oxygen. This greater demand for oxygen is largely met by the correspondingly increased rapidity of the circulation. The increased drain made by the tissues upon the supply of oxygen may be fully compensated for by the more rapid circulation, though the kind of work being done may modify or interfere with this balance. . . .

Accordingly, as a greater amount of oxygen is consumed, a correspondingly greater amount of carbonic acid gas is produced, so that the relative proportion remains the same during work as during rest. . . . Only when work becomes overwork, or when the needed oxygen is not supplied to the tissues, is the excretion of carbonic acid gas greater than the intake of oxygen; in this case the respiratory coefficient fluctuates. (Page 595.)

The well-known experiments of Ranke and Mosso have proved that the products of fatigue circulate in the blood. . . . From the experiments of Ranke we know that, among these fatigue products, acids play a prominent part, whilst those of Kronecker show that blood containing a high percentage of oxygen is of far superior restorative power for muscular fibre than an ordinary supply. The experiments of Fletcher likewise suggest that the beneficial effect of oxygen on fatigued muscle arises from the rapid oxidation of readily combustible fatigue products in the tissues. . . . (Pages 595-596.)

It has been shown by Mosso that the blood of fatigued animals is poisonous, and Kraus has stated that the lack of energy in the motions of fatigued animals is due primarily to the toxic products of disassimilation (waste materials) and that fatigue is thus a form of auto-intoxication. (Page 597.)

The more gradually the metabolic processes go on, the more slowly does fatigue develop, for the fatigue products are then excreted as

rapidly as the assimilation of nutritive material takes place, if not more rapidly. On the other hand, fatigue appears more quickly when waste products are created in the tissues more rapidly than they are excreted, no matter whether this is the result of delayed excretion or of accelerated production of waste material. The latter condition may be demonstrated, as an example, by the action of extreme heat, with the resultant sweating followed by languor; the former in the absence of sufficient oxygen. (Page 605.)

Fatigue. A. MOSSO, *Professor of Physiology, University of Turin.* ITALY
1896. Translated by MARGARET DRUMMOND, M.A., and W. B. DRUMMOND, M.B., *Extra Physician, Royal Hospital for Sick Children, Edinburgh.* New York, Putnam, 1904.

Fatigue is a chemical process. At the end of the eighteenth century Lavoisier, in a memorable series of chemical analyses made jointly with Sequin, succeeded in demonstrating a fact of fundamental importance, namely, that muscular exertion increases the quantity of oxygen absorbed and of carbonic acid eliminated by man.

The most demonstrative experiments in the analysis of fatigue are usually made upon cold-blooded animals, commonly on frogs. When the sciatic nerve is stimulated, we notice a contraction of the leg. The contraction, upon being repeated a great number of times, becomes more and more feeble. This diminution of energy is not to be attributed to the dissipation of some explosive substance, so to speak, in the muscle, that is to say, of the substance capable of giving rise to contractions. In fact the muscle will still continue to contract for a long time, but no stimulus will produce a contraction so strong as the first ones. The lack of energy in the movements of a weary man depends, as in the case of the frog, upon the fact that the muscles, during work, produce noxious substances, which little by little interfere with contraction.

The proof that we are not here dealing with a phenomenon of deficit is found in the fact that after the frog's leg has been fatigued by long exertion, we can restore its contractility and render it capable of a new series of contractions, simply by washing it. Of course we do not wash the outer surface, but having found the artery which carries blood to the muscle, we pass through it water in place of blood. . . . Upon the passage of a current of this liquid through the muscle, the fatigue disappears, and the contractions return as vigorously as at the beginning. (Page 106.)

ITALY

The experiment upon frogs' muscles washed in saline solution shows that, in order to maintain muscular contractility, there is no need of continual contact between the muscle fibre and the oxygen of the air through the medium of the blood's. It is only necessary to eliminate the carbonic acid. (Page 112.)

Two important facts mark the beginning of our knowledge of the chemistry of muscle.

In 1845 Helmholtz discovered that a muscle in repose contains only a small quantity of matter soluble in alcohol. Let 1 represent the quantity found. Upon taking an equal amount of muscle from a fatigued animal, he found there was a greater quantity of such matter, the amount being 1.3. This is an experiment made, as the saying is, *en bloc*, by which one gets a glimpse of the changes which are produced in the muscles as the result of exercise.

Another discovery of no less importance is that of Du Bois-Raymond, who found that the fatigued muscle is acid, while the muscle in repose is alkaline. (Page 116.)

To demonstrate that muscles accumulate products which interfere with contraction, Ranke made an aqueous solution of muscle which has been exercised, and having injected this into a fresh muscle, found its power of exertion was diminished. After it had been washed, however, its energy returned. (Page 116.)

It was a French chemist, Gautier, who isolated some of these substances which are derived from the albuminoids of living cells. He gave them the name of leucomaines to indicate that they are chemical compounds arising from the decomposition of albumen. Here we have some very recent observations which open a new horizon in the study of the causes which produce disease. (Page 117.)

I have now given a rapid glance at the toxic substances which are produced in the organism. They are not so much poisons as dross and impurities arising from the chemical processes of cellular life, and are normally burned up by the oxygen of the blood, destroyed in the liver, or excreted by the kidneys. If these waste products accumulate in the blood, we feel fatigued; when their amount passes the physiological limit, we become ill.

Thus is our conception of fatigue widened. It is a process which, as we examine it, seems even to become more complicated. Meantime, we know that fatigue is not produced merely by the lack of certain substances which are consumed during exertion, but that it depends also in fact upon the presence of new substances due to decomposition within the organism. (Page 119.)

Observing that after a whole day's walk even the muscles of the arms are tired, I was struck by the thought that fatigue might alter the composition in the blood; and so long ago as 1887 I found that the blood of a fatigued animal is toxic, for if injected into another animal, it produces the phenomena characteristic of fatigue. (Page 119.)

Thirteenth International Congress of Hygiene and Demography, at Brussels, 1903. Vol. V. Section IV. Dans quelle mesure peut-on par des méthodes physiologiques, étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? [To what extent may fatigue resulting from occupation be estimated by physiological methods, and what arguments can medical and physiological science present in favor of special methods of industrial organization?] DR. ZACCARIA TREVES, University of Turin. Brussels, 1903.

The internal process which causes the phenomenon of fatigue is, according to the doctrine of Hering, and applied by Biedermann to muscular tissue, a defective balance between the processes of assimilation and those of disassimilation. These two categories of phenomena are displayed, in permanent fashion, side by side, in the living tissues, and this fact constitutes the very basis of all life.

As long as these opposing processes balance one another there is no fatigue; but, as soon as this equilibrium, under the influence of any excitation whatever, is disturbed in favor of the processes of disassimilation, fatigue appears; the capacity of the tissues to function is weakened little by little; that is to say, under stimulation which does not vary in intensity, the degree of irritability of muscle diminishes. This conception of fatigue, which a thousand different biological phenomena confirm experimentally, is so simple and so rigorously logical that it is impossible to pick a flaw in it. If we now consider that this degradation of tissue is not only quantitative but that it may, at a given moment, become qualitative and be accelerated by an accumulation of the products of disassimilation, we shall have included in the definition of fatigue, beside the two first factors, *i. e.*, 1. *Repetition of stimulus*, and (2) *excess of the processes of disassimilation over those of assimilation* — the third factor, which is to-day

ITALY for every physiologist indissolubly bound to the idea of fatigue — namely, *auto-intoxication of tissue*. (Page 2.)

Professor Kraus . . . calls "measure of the constitution" that relation existing between the maximum quantity of energy that the organism is capable of developing at a given moment and that part of this energy that is utilized in the form of external muscular work. . . .

The respiratory changes are measured by the method of Zuntz and Geppert, and the results serve to establish the relation between the work and the energy employed.

As a general rule, the higher degrees of fatigue are clearly shown in the chemics of respiration.

The consumption of oxygen, corresponding to a given quantity of work, is so much the greater as the muscles are nearer to exhaustion. When the cardiac activity begins to be insufficient and the blood does not convey enough oxygen to the muscles, an abnormal augmentation in the value of the respiratory quotient becomes noticeable: that is to say, the organism has eliminated CO_2 in excess, as compared with the amount of oxygen consumed. The number of calories developed by the organism during the execution of a given amount of external work may be deduced from the quantity of oxygen (in c.cm.) respired. (Page 29.)

FRANCE *De la Fatigue et de son Influence Pathogénique.* [Fatigue and its Pathogenic Influence.] Dr. M. CARRIEU, University of Montpellier. Paris, Baillière et Fils, 1878.

General fatigue, when carried to an extreme degree, takes the name of exhaustion; all the reserves of strength, accumulated in the organism by nutrition, are expended; all functions flag or cease, the organism, incapable of manifesting activity, is overwhelmed with depression: the organs necessary to life alone continue with difficulty to perform their functions. A state of fatigue incompatible with life is seen in animals that have been overdriven or pursued: thus a stag after a long and desperate chase has been known to drop dead, though unwounded. The body becomes rigid immediately and putrefaction comes on rapidly. (Pages 6-7.)

There are indeed individuals who are always under the influence of fatigue. This subnormal condition is usually linked with anæmia, and is caused by some one of the many pathogenic conditions of this malady (anæmia). (Page 8.)

Etude sur l'Influence de la Durée du Travail Quotidien sur la Santé Générale de l'Adulte. [Study of the Effect of the Length of Working Hours upon the General Health of Adults.] ILIA SACHNINE. Lyon, 1900. FRANCE

Gautier has shown that, among the products of muscular exertion in the tissues, alkaloidal leucomaines are formed whose toxicity is not inferior to those poisons produced in putrefied meat which are well known as ptomaines. (Page 31.)

According to Herzen, fatigue is produced first in the motor centres, less so or not as evidently in the terminal filaments of the motor nerves, and to a certain still inferior degree throughout the body. Then there occur in the muscular fibre those nutritive changes due to the combustion which accompany contractions. These chemical changes profoundly alter the structure of the tissues at whose expense they have taken place, and from this alteration the products of combustion, of disassimilation, appear in the muscles. (Pages 32-33.)

Acute overstrain is then a poisoning by products appearing in the course of chemical transformation of muscular tissues. (Page 34.)

The toxicity of urine is considerably augmented after muscular effort pushed to the degree of fatigue, even if the diet is exclusively of milk.

According to Tissié, urine, after excessive muscular exertion, has a toxic power greater than the co-efficient of that of acute infectious fevers. (Page 37.)

M. Arloing has demonstrated that the toxicity of sweat is almost nil when it is produced by a hot bath, etc., but that it is very considerable during violent muscular exertion. (Page 37.) Sub-acute overstrain, says Lagrange, is due to the impregnation of the organism with the waste materials of activity. It is found among persons whose bodies have been subjected to sustained labor or to repeated fatigue without having had sufficient periods of rest. (Page 43.)

La Protection Légale des Travailleurs. [Legal Protection for Working People.] Discussions of the French Section of the International Association for Labor Legislation in 1905 and 1906. Paris, Alcan, 1907.

Mme. Moll-Weiss:

. . . It has been shown absolutely beyond question that, when work of a certain duration of time is under consideration, — say, for

FRANCE example, eight or ten hours, — the effectiveness of any worker is less at the end of five hours than previous to that time, because there is an accumulation of waste products in the organism, the remains of incomplete combustion, resultant upon work. It has been commonly agreed upon to call this fatigue. (Page 181.)

UNITED STATES

The Mental Symptoms of Fatigue. (Reprinted from the *Transactions of the New York State Medical Association*). EDWARD COWLES, M.D., *Medical Superintendent of the McLean Hospital, Somerville, Mass. New York, Fless and Ridge, 1893.*

The bodily conditions of fatigue should first be considered as far as we can know them, and may be studied in their two forms or degrees: (1) *normal fatigue*, or the condition of wholesome tire from daily physiological use; and (2) *pathological fatigue*, or the condition of persistent "impoverishment of nervous tissue in excess of repair," according to Beard, which constitutes nervous exhaustion or neurasthenia. The mental symptoms are to be studied in their close and direct correspondence with these conditions of fatigue.

The effects of fatigue are produced by sufficiently continued exercise in the physiological use of any functions, muscular or nervous. The sense of fatigue is complex, and may have a central or peripheral source, or both together. In muscular tissue, the condition of fatigue depends upon the physiological fact that muscular contraction is in some way or other the result of a chemical change whereby the latent energy is set free and expended in the mechanical work, with also the setting free of heat. The resultant chemical products are toxic, and obstructive of muscular function unless they are duly washed away in the blood current; and time must be given in rest and sleep for this process, as well as for nutrition and repair. These toxic products being variously irritant or benumbing, doubtless thus affect the sensory apparatus through which fatigue is felt. It is evident from this that the condition of muscular fatigue has always a dual character — there is direct expenditure of energy, requiring repair, and a toxic element that may be obstructive of function, both that of discharging energy and of taking up nutrition.

In nervous substance, the nature of nerve force being unknown, the effects of the passage of a nervous impulse along nerve-fibres are not demonstrable as attended by chemical changes, or loss of normal irritability as a manifestation of fatigue. But in the central

nervous organs it is found that their function is dependent on an adequate supply of oxygen, and this implies that "in nervous, as in muscular substance, a metabolism, mainly of an oxidative character, is the real cause of the development of energy." In fact we do not doubt that toxic waste products attend upon central nervous activity, and this accords with the biological theory that all function is due to chemical changes taking place within the organism, and that the functional activity of a specialized tissue depends upon the changes in its individual cells. The dual character of all conditions of primary fatigue is evident, as is also the importance of recognizing the effects of the self-produced poisonous substances that regularly result from the chemical changes in tissue metabolism within the body, as we are taught by the brilliant revelations of modern chemical physiology and pathology. (Page 7.)

Sixty-fifth Annual Meeting of the American Institute of Instruction.
The Relation of Fatigue to Social and Educational Progress.
HENRY S. BAKER, Ph.D. Boston, 1895.

It is a fact not questioned, that every movement of a muscle and every mental act, whether it be thinking, feeling, remembering, or the passive reception of impressions through the senses, is accompanied by some chemical change in the muscular or nervous tissue or both. This change may be called a "wearing out," an oxidation or metabolism, and the worn out material or ashes, as it were, is thrown into the blood, from which it is removed by the various organs of depuration as the kidneys and liver. It is important to note that this debris of nerve and muscle is decidedly toxic to the various organs and especially so to the brain. (Page 33.)

Any movement of the mind or body, because it introduces some of the above materials (leucine, creatine, leukomaines, and lactic or saro-lactic acid, tyrosin, and a substance with effects like ptomaines) into the blood, and because it removes by oxidation a portion of the brain always, and, when a muscle is moved, of the muscular tissue, also produces fatigue. Three conditions always exist: 1. Deleterious material in the blood. 2. A changed, abnormal condition of the brain cells. . . . 3. There is general fatigue of the entire body, caused by toxic materials in the blood. . . . 4. There sometimes exists also a local accumulation of waste products in the tissue which produced them, as a muscle, and this is the case when the labor is rapid or vio-

lent. Since the brain is the motive power, all fatigue is brain fatigue; that is, there can be no fatigue in which the brain does not share, locally in some centre. In all cases, then, there is local fatigue of brain or muscle, or both. When these conditions exist to a small extent the fatigue is normal, healthful, and the recovery takes place quickly. When they are carried to a great extent the system, as a whole, is weakened and permanently injured in one or more organs or tissues. (Pages 34-35.)

The waste products in the blood not only poison tissues and glands by their presence, but prevent the oxygen of the blood from performing its functions. When a man or animal falls dead from over-exertion, it is because he is poisoned to death by his own waste products, which were formed faster than they could be eliminated. Fire horses last but a few years, because at every run the above conditions exist to a great extent. (Page 35.)

Report of the New York Bureau of Labor Statistics, 1900.

- A French physician . . . concludes that the abnormal sickness and mortality among working people is due not simply to poisonous or noxious substances in the materials of work, but also to fatigue, which affects the nerves. He describes as follows the effects of long hours of work: (1) Fatigue resulting from prolonged *physical* effort is a phenomenon of self-poisoning produced by the substances destroyed within the body. (2) It is altogether probable that in mental effort the phenomena of fatigue likewise proceed from the products of decomposition which have been thrown into the circulation. (3) In physical fatigue, resulting from excessively prolonged manual labor, there appear not only the phenomena of peripheral fatigue localized in the muscles and ends of nerves, but also the same phenomena in the nerve centres. Hence, mental effort after physical labor, or vice versa, bodily exercise after long mental effort cannot serve as rest; the human organism then demands a certain period of absolute rest. (4) Bodily exercises set the circulation strongly in motion, raise the blood pressure and sensibly increase the number of heart beats. If muscular efforts are excessive or continued long they may in due time produce functional and organic alterations both in the heart and in the blood vessels. Hypertrophy and enlargement of the heart are the most usual consequences. (5) It is very probable that excessive and prolonged physical labor retards the circulation of the kidneys.

and in some degree causes anæmia of the kidneys. . . . (7) The bodily development of the factory operative remains inferior to that found in other social classes. (Pages 65-66.)

UNITED STATES

The Harvey Lectures. Fatigue. FREDERIC S. LEE, Ph.D. Philadelphia, Lippincott, 1906.

It is customary to seek the causes of the physical phenomena of fatigue in the chemical changes undergone by the active living substance. . . . In all tissues during activity substances of value to the organism are broken down and substances of little or no value are formed. . . . It is now customary to recognize three distinct metabolic products as fatiguing, namely, sarcolactic acid, mono-potassium phosphate, and carbon dioxide, all of which are acid in reaction. . . . The organism produces normally in the course of its activity a number of acid substances which tend to inhibit further activity. Fatigue is due in great measure to the depressant action of these toxic products of metabolism on the body tissues, particularly on the muscular system, and the sensation of fatigue is in large part the psychic manifestation of the recognition of this depressant action. (Page 180.) The action of fatigue substances is not confined to the tissues in which they arise. The excessive activity of one tissue is capable of causing fatigue to appear in others. . . . Thus localized activity is capable of producing general fatigue, a fact which is often overlooked in our daily life. The explanation of this is afforded by Mosso's well-known experiment: A dog was fatigued by long-continued running; his blood was then transfused into the vessels of a second dog, from which an equivalent amount of blood had been withdrawn, with the result that the second dog exhibited the usual phenomena of fatigue. The blood had evidently become charged with the fatigue substances produced in the muscles, and thus they were able to reach all parts of the body. (Pages 188-189.)

(2) THE TOXIN OF FATIGUE

The need of limiting excessive working hours for women is further emphasized by the most recent medical research of the last five years, which has discovered that fatigue is due not only to actual poisoning, but to a specific poison or toxin of fatigue, entirely analogous in chemical and physical nature to other bacterial toxins such as the diph-

theria toxin. It has been shown that when artificially injected into animals in large amounts the fatigue toxin causes death.

The fatigue toxin in normal quantities is said to be counteracted by an antidote or anti-toxin, also generated in the body. But as soon as fatigue becomes abnormal, the anti-toxin is not produced fast enough to counteract the poison of the toxin.

**GREAT
BRITAIN**

Diseases of Occupation from the Legislative, Social, and Medical Points of View. THOMAS OLIVER, M.A., M.D., F.R.C.P., *Medical Expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the British Home Office.* New York, Dutton Co., 1908.

Weichardt, in 1904, advanced the theory that the cause of fatigue is a toxin generated in the overtaxed organism, and that the ravages of the toxin, like the poison of diphtheria, can be met by the introduction of an anti-toxin into the body. Wolff-Eisner (*Centralb. f. Bakteriologie*, bd. XI, 1906, page 634) is of the opinion that during athletic training there is produced an immunity to the toxin of fatigue, whereby the trained athlete becomes capable of accomplishing more than the untrained man, and without experiencing the sensation of fatigue. It is common knowledge that men who are doing hard, physical toil regularly have not the sense of tiredness felt by men who are new to the work, and we explain this by saying that the latter are not trained. Wolff-Eisner throws new light upon the subject, having obtained a fatigue toxin from overworked animals; he injected small doses of the poison into other animals and produced in them symptoms of fatigue, drowsiness, and a lessening of activity. Large doses caused death, but if very minute doses were injected for a lengthened period there was established in the animals a genuine immunity to fatigue. The toxin is not found in the blood but in the muscles, whereas the anti-toxin is only present in the blood. (Pages 6-7.)

GERMANY *Centralblatt für Bakteriologie, Bd. XI, Abt. I; Heft 5; 1906. Über Ermüdungs und Reduktionstoxine.* [The Toxin of Fatigue.] Dr. ALFRED WOLFF-EISNER, Charlottenburg. Berlin, 1906.

In the early part of 1904 Weichardt propounded his theory that fatigue was produced by a toxin the composition of which was fully

analogous to such previously well-known toxins as ricin, abrin, **GERMANY** diphtheria and tetanus toxins, the leading characteristic of which was also to be found in it, in that injections of the fatigue toxin produced an anti-toxin which neutralized the effects of the toxin *in vivo* and *in vitro*. This theory was at first striking through its novelty, as the view had been quite generally held, among physiologists, that fatigue was produced by chemically analyzable products of metabolism, especially lactic and other acids. And yet there were numerous well-known facts which might have given rise to fresh inquiries into the nature of fatigue products.

It was well known that suitable "training" had an astonishing effect, and every one knew, also, that expert — that is, trained — professional bicyclists, gymnasts, etc., could easily accomplish achievements which would have resulted in death after a comparatively short time, for raw recruits or untrained men. It seemed impossible to explain these undoubted facts simply on the ground that the blood supply and its circulation were better in trained muscles. . . . There was much to support the thesis that the trained man benefited by an anti-toxin, which neutralized the fatigue poison at the moment when it was produced. From this point of view it also became clear why for an efficient training it is essential not only to develop the muscles but also to observe a special daily regimen.

It was to be expected that this teaching of the actions of poisons in fatigue would meet great opposition in many circles of physiological specialists, the more so as the whole doctrine of toxins and immunity, well founded though it was, was still regarded in these circles as a dubious acquisition. It was consequently necessary to prove that fatigue, when pushed beyond normal circumstances, produced an accumulation of poison which was capable of causing death.

An experimental demonstration to prove that fatigue had such capacity naturally encountered extraordinary difficulties. In instances where men might be subjected to extraordinary physical exertion, circumstances would make scientific observation impossible. Physiology had already an apparatus for testing dogs while running; but running is not a sufficiently exhausting exertion for large dogs to make it possible to demonstrate the anti-toxin. Weichardt therefore invented a modification of this apparatus by which, while standing on a rough surface, large dogs were continuously pulled backward. Their resistance to this and their efforts to go forward resulted in exertions sufficient to produce an accumulation of fatigue products.

GERMANY (This being obtained and injected into small and rapidly moving animals, such as mice, the influence of the fatigue-producing toxin was fully demonstrated.)

After Weichardt had succeeded in demonstrating the clinical "symptomo-complex" of forced fatigue, his next task was to demonstrate the fatigue material itself. This material, he proved, is not found in the blood current, as the first supposition might be. The blood functions solely as a carrier of the anti-toxin, and in the blood of highly overfatigued dogs no fatigue poison was present. The poison was demonstrated in the muscles, — a discovery that helps to explain the lifelong activity of the cardiac muscle, for the heart, of all muscles, has the richest blood supply, and the blood continually frees the cardiac muscle from its fatigue material. (Pages 634-635.)

The effects of the toxin on animals are as follows: in small doses it produces weariness and craving for sleep, whose demonstration is made evident by the length of time in which the animals will remain in unusual positions, as, for instance, a mouse placed upon its back will remain so for some time. (Page 638.)

In large doses it causes the death of animals, after a persistent fall of temperature, that is, with all the symptoms analogous to those of extreme fatigue.

The injection of the toxin produces in the large animals experimented on a true anti-toxic immunity. (Page 638.)

From all these researches into the nature of albuminous material, poisons, etc., it is evident that fresh emphasis must be laid upon the importance to the animal and human organism of adequate aeration with oxygen, such as is accomplished by the functioning of healthy lungs. Here we must remember the clinical experiences with human beings, — that in all of those whose supply of oxygen is interfered with, whether it be by disease of the lungs or by a deficiency of hemoglobin arising from anemia, — the body is extremely susceptible to fatigue, and it will be seen that it is far more important to bring the natural supply of oxygen for the body to its normal adequacy, than it is to administer an artificial anti-toxin to fatigue. In this connection it may be recalled how often it is possible by deep inhalations of fresh air to dispel the symptoms of accumulating fatigue toxin. The effect of bad air, as leading to fatigue, is also explained by the insufficient oxidation. (Page 643.)

I would define "training" as follows:

As practice of muscle groups in harmonious associated activity

(Synergesis) without detriment to strength; as modification of respiration in the sense of increased aeration with oxygen for the repair of the blood and tissues and for the oxidation of fatigue products created by work; finally, as heightened production of the anti-toxin of fatigue, by which a surplus of unoxidized fatigue toxin in the blood may be neutralized and so a working capacity made possible which would, for the untrained, result in steadily lowered temperature and death. (Page 644.)

Fourteenth International Congress of Hygiene and Demography. Vol II, Sec. IV. Berlin, Sept., 1907. Ermüdung durch Berufsarbeit. [Fatigue resulting from Occupation.] Dr. EMIL ROTH. Berlin, Hirschwald, 1908.

Weichardt succeeded in obtaining a toxin from the extract of the muscles of fatigued guinea pigs, which he injected into the peritoneal cavity of a mouse, with the result that it was thrown into the same condition of extreme fatigue that follows from forced exertion. With repeated intravenous injections of large animals with the fatigue poison, a specific anti-toxin was produced, with which he conducted active and passive immunization experiments, proving successfully that under its influence the muscles of the animals experimented on displayed a lesser degree of fatigue than under ordinary conditions. The fatigue toxin does not pass through dead membranes by dialysis, but is taken up by the living cells of the stomach.

As has been demonstrated by experiments with animals, the toxin exhibits a composite character, as do other well-known poisons (tuberculin; Snakepoison).

Weichardt subsequently succeeded in preparing the toxin artificially, and in augmenting the endurance capacity of animals under experiment by administering small doses to them; he also demonstrated the presence of the fatigue poison in the excretions of animals and human beings.

Weichardt is of the opinion that this proteid-like product of fatigue characterized by poisonous qualities is extremely widely distributed both in the vegetable and animal kingdoms. (Page 597.)

The experiments of Zuntz and Schumberg as well as others show that the expenditure of strength, or, in other words, the cost in energy, for a given work-unit, diminishes with increased practice. The skilled worker economizes his strength more than the unskilled. Ac-

GERMANY cording to Weichardt, the value of "training" so-called consists not only in bringing about an actual increase in tissue elements, but also in producing a bio-chemical substance of marked characteristics, the anti-toxin of fatigue, which is produced by the immunizing action during "training" of the small amounts of toxic material developed in the course of repeated exertions. (Page 608.)

Vierteljahresschrift für Öffentliche Gesundheitspflege, XXXIX, 1907.
Ermüdungs und Überermüdungs Massmethoden. [Methods of estimating Fatigue and Overfatigue.] Dr. WOLFGANG WEICHARDT, Erlangen. Braunschweig, Vieweg, 1907.

I first sought for the toxin in the bodies of animals, and in those which had been excessively overfatigued I found it, not in the blood, but in the juices extracted from their muscular tissues. When this (by various processes described) was freed from indifferent albumins and then injected into animals, it produced symptoms of excessive fatigue and, in large doses, killed them. When repeated injections of this purified extract were administered to horses, the specific, neutralizing agent — the antidote for the fatigue poison — appeared in the blood serum of the horses. Both also, the toxin and its antidote, may be produced, as I was later able to state, by the separation of the albumin molecules by means of physical and chemical processes.

I have demonstrated isolating both substances and have used them in an extensive series of experiments. All the typical signs of fatigue, up to death from extreme fatigue, may be produced by the artificially produced fatigue poison. On the other hand, the effect of the poison has been invariably successfully neutralized by the artificially produced anti-toxin.

That fatigue toxin is of ordinary routine occurrence in the excreta and urine of human beings, shows that the production of poison takes place with ordinary, physiological fatigue; and that it does not follow that there must be a state of severe, pathological fatigue for the development of fatigue poison in the body.

In every healthy body the process of supplying an increased amount of the specific anti-toxin takes place as soon as moderate amounts of the fatigue poison appear. This is easily demonstrated by mice, with which, by means of a special apparatus, the Kymograph, one can obtain a curve illustrating this process. (Page 330.)

The results of experimentation allow us to formulate the two fol-

lowing principles, taking into consideration the practical as well as the theoretical domain of the researches into fatigue and overfatigue. Small amounts of fatigue toxin bring about active immunization, which is later, after a certain time, expressed in heightened efficiency. GERMANY

Overdoses of toxin, on the other hand, bring on a decrease of efficiency and may even produce death.

If overdoses of toxin are met by corresponding amounts of anti-toxin a decrease of efficiency does not take place, but, instead, after a certain time, a notable increase in capacity is evident. (Pages 332-333.)

The Harvey Lectures. Fatigue. FREDERIC S. LEE, Ph.D. Philadelphia, Lippincott, 1906. UNITED STATES

Mention should here be made of the claim of Weichardt, working in Zuntz's laboratory in Berlin, to have isolated from fatigued muscles a true toxin, of a chemical and physical nature like bacterial toxins, which when introduced in minute quantity into the body is capable of giving rise to the phenomena of fatigue. Weichardt further claims to have obtained by the usual methods of bacteriologists an anti-toxin endowed with the power of neutralizing the fatiguing properties of the toxin. (Page 187.)

(3) NERVOUS FATIGUE

The most serious injury to the health of working women from excessive hours of labor is due to the fact that over-exertion uses up their store of nervous energy. For all industrial work, whether it involves muscular effort or not, requires the expenditure of nervous energy. Over-long working hours may therefore wholly exhaust the sources of nervous endurance.

Nerve cells are the producers of energy; nerve fibres its carriers to the muscles. Medical observation and science have shown that the poisonous waste products of fatigue have a paralyzing action upon the nerve cells, and that after excessive exertion demonstrable changes are found in the cells of the brain and spinal cord.

Since the central nervous system controls all the vital

functions, unrepaired nervous fatigue is more fatal to the organism than the exhaustion of any other organ or function.

BELGIUM *Royaume de Belgique. Conseil Supérieur du Travail, 6^e Session, 1901-1902. T. I. Fasc. II. Repos Hebdomadaire. [Weekly Rest Day.] [Discussions on 21st Jan. 1902, M. DENIS, Member of Council.] Brussels, 1902.*

In order to justify the intervention of the legislator the testimony of psychology must be added to that of the physiology of fatigue. We then learn that the consciousness of fatigue does not appear coincidentally with the physiological phenomena of fatigue and the accumulation of the waste of combustion in our tissues. It comes on more slowly. "The workman who works," says M. Nitti, "does not perceive the oncoming of fatigue until it has reached a certain degree of intensity. This is the chief reason why society, desirous of preventing a wasteful expenditure of energy, must of necessity resort to a legal limitation of labor." And we understand the import of these words when we read in Mosso:

"Fatigue, which we may regard as a sort of poisoning, can alter the composition of the blood and the conditions of life without our experiencing any other feelings than a vague sensation of weakness." (Page 174.)

The labor contract made by one individual with another may thus be vitiated by a sort of permanent error or illusion of the worker, and the principle of social intervention is based on the psycho-physiological constitution of his being.

The collective consciousness of injury must supplement the individual consciousness. (Page 175.)

Les Projets de Limitation de la Durée du Travail des Adultes en Belgique. [Proposals regarding Limitation of Hours of Work for Adults in Belgium.] HECTOR DENIS, [No. X. of the publications of the Belgian Section of the International Association for Labor Legislation.] Liège, Benard, 1908.

Researches into the psychology of work prove that the consciousness of fatigue is only attained when a really grave state of over-

fatigue has been reached. This alone would justify the intervention of the law. . . . The classic idea was that unrestricted individual liberty best secured individual interests . . . but now it is shown that, in what is a most imperative interest of the working man, namely, conservation of his strength, he is only enlightened imperfectly and tardily by consciousness; what, then, must be the result of all that complicated train of motives which, as Treves has pointed out, may impel the working man to risk overwork and overstrain? (Pages 10-11.)

BELGIUM

Thirteenth International Congress of Hygiene and Demography at Brussels, 1903. Vol. 5. Section IV. Dans quelle mesure peut-on par des méthodes physiologiques, étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? [To what extent may fatigue resulting from occupation be estimated by physiological methods, and what arguments can medical and physiological science present that will influence favorably certain methods of industrial organization?]
Dr. ZACCARIA TREVES, University of Turin. Brussels, 1903.

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The solution of the problem (of nerve fatigue in muscular work) has a very practical importance, because the working man, especially when he works with machinery, is most frequently subjected to a mechanical rhythm and uniform intensity, and his labor continues regularly for hours. In reality, *man is provided, by his neuro-muscular apparatus and the systems of levers dependent on it, with a mechanism capable of making a lengthy resistance either to the direct exhaustion of muscle, or to the action of poenogenic substance (waste materials derived from the brain or nerve tissues); so that he is capable of doing intense work, under a permanent routine, and yet of being unaware of the gradual appearance of fatigue, which, however, reveals itself by other symptoms.* (Page 5.)

By the effect of training, which, as we know, enables the minimum maximal weight (technical ergographic term, meaning minimum of effort with maximum result of work accomplished) to be doubled, in experiments, the individual will be able to endure more intensive work as a regular thing; but it will be necessary for him to expend, with every contraction, a greater amount of nervous energy,

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so that his total store of disposable nervous energy will be reduced to a minimum.

Now, according to my experiments, *it has not been found that training has as favorable an effect upon nervous energy as upon muscular strength.* The only evident advantage that training shows in the nervous function of voluntary motion is a more ready co-ordination of muscles and an accomplishment of the purpose with a smaller number of muscles.

This qualitative perfecting of motion has also, no doubt, the effect of conserving a certain amount of nervous energy.

The well-trained athlete, then, can by practice lift heavy weights with increasing ease; but, when his muscles have attained their greatest strength, the nervous energy at his command will not have augmented proportionately with the work that his muscles are able to perform. The result is that in order to perform this work his nervous energy will be proportionately more expended. (Page 6.)

This fact explains why muscular training cannot go beyond certain limits and why athletes are often broken down by the consequences of overexertion.

And this fact also teaches us the practical necessity of preventing women, children, and even adult men from being subjected to toil, which, indeed, a gradual muscular training may make possible, but at the price of an excessive loss of nervous energy which betrays itself by no evident and immediate symptom, neither objective nor subjective.

While the individual works, the reserves of disposable nervous energy in the neurones, which preside over muscles, diminish much more rapidly than the production of work, which may, indeed, proceed according to a regular pace. In spite of this diminution, if circumstances continually demand intense and constant work, the stimulus will continue to be sent to the muscle with the intensity necessary to accomplish the purpose. (Page 6.)

Here we have an arrangement of things which is of inestimable value to man in the production of work: but this beneficent provision becomes injurious to the dynamic equilibrium of the organism as soon as it is irrationally employed. It is this that needs to be avoided in the practical organization of industry. (Page 7.)

The dynamometer might serve for this purpose (examination of approximate nervous energy of the individual) by calculating the product of medium strength exerted upon the dynamometer by the

duration of the tetanic contraction. A dynamometric comparative test of different hours of work in different occupations, made upon a large number of individuals over a long period of time, might perhaps give us some satisfactory results and discover for us symptoms of fatigue that a superficial observation can neither perceive in the subjective condition of the individual nor by the quality or quantity of work executed. (Page 7.)

Intelligence and will-power driving us on in intensive labor in order to attain the maximum useful result in a minimum of time, and our practically inexhaustible muscles aiding in this, a state of things is established which involves formidable overstrain of those parts of the nervous system which act as the immediate regulators of our energies. . . . I must conclude from my experiments that the average energy of contraction does not increase in an appreciable extent as the result of practice: *It would appear that a true training of the nervous motor function does not exist.* (Page 28.)

Industry has developed in an almost dizzy fashion, and the worker's tasks have been almost completely transformed, labor having become more intense and more monotonous. It is only by following the methods indicated previously that we shall be able to know exactly whether this state of things may, or may not, be a natural cause of physical and psychical overstrain of working people.

Such overstrain would constitute a danger with which our hygienic reviews have concerned themselves too little, and which is no less grave and menacing than overwork in the school, which in the past few years has become the favorite theme of sociologists and pedagogues as well as physiologists.

And yet, when we consider the knowledge and the methods in the possession of physiology to-day for examining into the resistance of the human organism, the study of the fatigue of working men seems to offer the hygienist a better chance of arriving at a practical solution than that of the fatigue of the schoolboy. (Page 30.)

The above (ergograph, modified ergograph, electric stimuli, sphygmograph, physical and laboratorial examination, psychic tests, ergostat, chemical experiments) are the most exact methods at the disposal of the physiologist for measuring the energetic value of the human organism, and these methods only can prove to the hygienist how a state of what we may call chronic fatigue may be a permanent cause of enfeeblement of the working man. (Page 30.)

. . . The efficiency of the human organism depends rigidly on

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the stage of evolution and of the resistance of all higher faculties, both moral and intellectual. The workman's productivity depends on his ability to use his head as well as his hands. (Page 32.)

Archiv für Anatomie und Physiologie, 1890. Physiologische Abtheilung. Über die Gesetze der Ermüdung. [The Laws of Fatigue.]
Dr. ARNALDO MAGGIORA, University of Turin. Leipzig, 1890.

I found, by experiments morning and evening, that the chief importance of sleep is for its effect on the nerve centres. With moderate exertion, such as the ordinary occupations of a day demand, the store of muscular energy is not exhausted, and the night's rest is therefore of minor effect upon the muscles, but the influence of sleep upon the nerve centres is far more definite. (Page 225.)

Fatigue. A. MOSSO, Professor of Physiology, University of Turin, 1896. Translated by MARGARET DRUMMOND, M.A., and W.B. DRUMMOND, M.B., Extra Physician, Royal Hospital for Sick Children, Edinburgh. New York, Putnam, 1904.

The nervous system is the sole source of energy; and although we must admit a certain amount of localization, this is not of such a nature as to prevent the neighboring organs feeling any loss through the great activity of any one organ. The exhaustion of energy is general; and all the magazines of energy can be drained by the exag-geration of any activity whatever of the organism. The conclusion to which we are led by my experiments is that there exists only one kind of fatigue, namely, nervous fatigue; this is the preponderating phenomenon, and muscular fatigue also is at bottom an exhaustion of the nervous system. (Page 243.)

Cerebral fatigue diminishes the force of the muscles, and with the ergograph we measure this phenomenon with exactitude. The need of rest after intense brain work arises then from the fact that the nervous centres are exhausted and the muscles weakened. The feeling of discomfort and the prostration which characterize intellectual fatigue are due to the fact that the brain, which is already exhausted, has to send stronger stimuli to the muscles in order to make them contract. The exhaustion is twofold: central and peripheral. This explains why after brain fatigue one feels one's energy exhausted by the slightest movement, and why every obstacle

which we have to overcome seems to have grown more serious. (Page ITALY 280.)

Berliner Klinische Wochenschrift, N^o 5. Feb. 4, 1901. Ermüdung GERMANY und Erholung. [Fatigue and Repair.] Prof. MAX VERWORN, Jena. Berlin, Hirschwald, 1901.

There is an organ whose state of fatigue arouses our physiological and pathological interest to a far greater extent than does muscular fatigue, and this is the central nervous system. The central nervous system, as the dominating system of our bodies, which communicates to all other however important organs the impulses which promote or check their activities, must always share in the fatigue of single organs, such as the muscles, by reasons of this co-ordinating function and relation. But it results, too, from the centralization of the control of all our vital functions there, that fatigue of the central nervous system has a far more decisive importance for the collective bodily activities than has the fatigue of a single group of organs such as the muscles. This is made most plainly evident by all the symptoms of pathological fatigue. (Page 127.)

Grenzfragen des Nerven und Seelenlebens. [Borderland Problems of Nervous and Psychic Life.] Edited by LOEWENFELD and KURELLA. Vol. 6. Über die Geistige Arbeitskraft und ihre Hygiene. [On Mental Working Power and its Hygiene.] Dr. L. LOEWENFELD. Wiesbaden, Bergmann, 1906.

The nerve elements of the brain, like other nerve structures, are by no means capable of activity for unlimited time periods. After a certain duration of activity the nerve elements lose their responsiveness to stimulation, and fatigue results, or, under forced stimulation, complete exhaustion follows, even though the store of energy accumulated in the chemical combinations of the nerve cells has not been used up. If we ask why nerve elements become incapable of exertion after long-continued work, though their disposable energy is not consumed, we find that we have here to do with the effect of a poisonous product, the toxic waste product of fatigue. The accumulation of this poison paralyzes the nerve substance. This is one of nature's protective measures. Through the paralyzing action of the poison the elasticity of the tissues is protected from overstrain, and a destruction of tissue substance, which cannot be compensated by

GERMANY rest and food, is prevented. (Page 13.) The hygiene of the mental working capacity in adults demands before all else an economic use of the same, that is, the avoidance of overexertion. The individual's capital of available nerve force, whether that capital is large or small, must not be permanently decreased by the work executed. A disproportionate mental exertion may impair the nerve-capital in two ways:

1. By necessitating a consumption of nerve elements which cannot be fully compensated for by the available nutrition and sleep, thus leading to a progressive diminution of strength.

2. By accumulating poisonous waste products in the tissues, in excess of excretion. These wastes, as we have seen, by virtue of their poisonous properties, and their paralyzing action on nerve elements, lower the mental efficiency even more seriously than is the case when the chemical constituents of the tissues are impoverished by insufficient nourishment.

According to all evidences, mental overexertion does not always exhibit these two phenomena in equal proportion, but one or the other predominates according to the circumstances of the nutrition of the individual. It is clear that those persons whose cerebral circulation is poorer will sooner suffer a loss of mental capital if they are forced beyond their normal mental working power, just because the overconsumption of elasticity that is made necessary by the overexertion does not find adequate reimbursement in the nutritive properties of the blood; and it is also clear that those whose cerebral circulation is especially abundant are enabled to retain their mental capital longer even if subjected to severe nervous strain of work. The disturbances noted in course of time in such an individual are more likely to be those of auto-intoxication from retained waste products. (Pages 43-44.)

Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of Political Science. Vol. I.] Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen; and EDG. LOENING, Professor of Law in Halle. Arbeitszeit: Hours of Work. Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

In modern industry the activity of the worker is usually confined to certain muscular groups alone. The burden therefore rests upon

a few overworked organs. The same muscles, the same nervous **GERMANY** tissues, and the same parts of the brain are continually at work. In this way fatigue comes on much more rapidly than where an alternation allows temporary use of various organs, thus giving them time for rest. As, in monotonous muscular work, muscular fatigue comes on quickly, so with monotonous, one-sided mental work (for instance, long-continued addition) fatigue comes on very quickly. In general, fatigue of the nerves approaches more slowly than muscular fatigue; but, on the other hand, nervous repair takes a much longer time. (Page 1215.)

Man realizes fatigue not only by the less satisfactory results of work but also by sensations of pain and aversion. These are warning signals and protective devices of nature, by whose help injury may be averted. But it is possible that in the zeal of work these signals may be ignored. The injurious effects will therefore, however, not be avoided. Again, the signal may be noticed but cannot be heeded through the compulsion of circumstances. The day's work must be finished, and work must be kept up longer for the sake of the day's wages. Then, with the utmost strain of the will power, further activity must be wrung from the wearied organism. But this effort of will also means an expenditure of energy, probably a more excessive drain upon albumen. (Pages 1215-1216.)

La Fatigue et l'Entraînement Physique. [*Fatigue and Physical Training.*] **FRANCE** Dr. PHIL. TISSIÉ. Paris, Alcan, 1897.

Every muscular act stimulates a nervous activity; every nervous act stimulates a muscular activity. There is an intimate relation between the brain, spinal cord, and muscles. Violent or prolonged activity wearies the brain. (Page 102.)

Etude sur l'Influence de la Durée du Travail Quotidien sur la Santé Générale de l'Adulte. [*Study of the Effect of the Length of Working Hours upon the General Health of Adults.*] ILIA SACHNINE. Lyon, 1900.

According to the same author (Lagrange) there are two other types of overwork which are not due to auto-intoxication; first, organic exhaustion; an individual compelled to work with expenditure of physical strength must, if his nutrition is insufficient or im-

FRANCE perfectly assimilated, draw upon his reserve tissues for material for combustion, and, when this reserve is exhausted, the organs essential to life are next drawn upon to supply the necessary energy. The organism then deprives itself of the organic elements indispensable to the equilibrium of health. This is auto-phagia, or exhaustion. According to Lagrange, overwork, insufficient sleep and nourishment, and, above all, excessive hours of work, give rise to organic exhaustion. The second type of overwork mentioned is dynamic exhaustion; here there is a sort of exhaustion of the motor nerve centres. This form of fatigue shows no appreciable anatomical changes, but only a loss of energy. It results from an over-expenditure of nerve force. (Pages 45-46.)

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Diseases of Occupation from the Legislative, Social, and Medical Points of View. THOMAS OLIVER, M.A., M.D., F.R.C.P., *Medical Expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the British Home Office.* New York, Dutton Co., 1908.

As the result of overwork Hodge, an American physiologist, found structural changes in the nerve cells which rest removed. F. H. Scott (*Journ. Physiology*, Vol. XXXIV, Nos. 1 and 2, p. 145) states that in nerve cells there is formed from the nucleus and Nissl bodies of the cell a substance which passes into the nerve fibres. These fibres are capable of carrying impulses without becoming fatigued, but they cannot maintain the end-organs of the nerve in a condition of activity beyond a limited period. It would appear, therefore, as if some substance were given out from the nerve cells, hence as a consequence the readier fatigue of the central nervous system compared with the peripheral. Scott tried to locate the seat of fatigue. Muscle fibre may become fatigued, also the nerve cells in the spinal cord, owing to the hypothetical substance already alluded to being used up and time not given for fresh secretion to have been formed.

**UNITED
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Brain Work and Overwork. Dr. H. C. WOOD. Philadelphia, Blakiston, 1880.

Voluntary motion of a hand and arm is the result of a complicated series of acts. Successive discharges of nerve force occur, commencing in the upper brain and passing downward along the spinal cord and outward along the nerves until the muscles are reached and are

called by the nervous impulse or force into action. It is a lesson not to be forgotten, that in exercise, not merely the muscle, but almost the whole nervous system labors; and that muscular movements are just as truly a putting forth of nervous power or energy as are mental efforts. (Page 92.)

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There is certainly in the adult some antagonism between hard physical and mental labor. Muscular work rests upon a putting forth of nervous energy, and the man who has exhausted his stock of nervous energy in violent exercise cannot be expected to perform a prodigy of brain labor. (Page 98.)

Alienist and Neurologist. Vol. XXI. Influence of Age in the Production of Nervous Diseases. WILLIAM A. KRAUSS. St. Louis, Hughes, 1900.

The study of the influence of exhaustion upon the central nervous system has received renewed vigor and enthusiasm since the classic experiments of the American investigator, C. F. Hodge, and later verified by those of Vas, Lambert, Lugaro, Mann, and others. In a series of brilliant experimental researches, Hodge has established the existence of definite morphological alterations in the cell bodies of neurons accompanying the excessive exercise of their physiological function. His experiments on cats, sparrows, pigeons, and honey bees, showing that after prolonged exercise or activity demonstrable changes take place in the protoplasm and nucleus of the cells of the brain and cord, are familiar to you all. (Page 647.)

The Harvey Lectures. Fatigue. FREDERIC S. LEE, Ph.D. Philadelphia, Lippincott, 1906.

The term, muscular fatigue, requires a word of explanation, for it has been shown by various investigators, including Waller, Abelous, Santesson, and Joteyko, that when the muscle in fatigue ceases to respond to stimuli sent to it through its nerve, it is still capable of contracting on direct stimulation. Their inference from this fact is that the motor nerve endings within the muscle are the first part of the mechanism to succumb. This nerve ending is probably more susceptible to fatigue than the protoplasm of the muscle cells, and hence the muscle protoplasm itself within the organism probably never reaches the stage of profound exhaustion. . . . It has long gone without dispute that on prolonged activity the brain and spinal cord

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succumb first, and thus the exhaustion of the peripheral tissues is prevented. The nerve centre has been compared to the fuse of an electric circuit, the burning out of which protects the muscle from grievous injury. By most upholders of the neuron theory central fatigue has been referred to the bodies of the nerve cells, in which Hodge, Vas, Mann, Lugaro, Eve, and others have demonstrated histologic changes after activity. According to most of these observers, moderate activity is accompanied by an increase in the bulk of both cytoplasm and nucleus, excessive activity by a decrease in bulk and the appearances of vacuoles in both, and a loss of the substance of the Nissl bodies. . . . these histologic changes after excessive activity have generally been interpreted as significant of fatigue. (Page 173.)

(4) MUSCULAR FATIGUE

The dangers of excessive working hours for women are increased by the fact that the onset of fatigue is often unperceived by the worker. Not until the damage is done and health is impaired by the strain of overlong hours is the injury manifest.

Yet though fatigue may thus accumulate unperceived, the laws of fatigue and its progressive growth have been exactly studied by scientific instruments of measurement. The most important such instrument — the ergograph — was devised to measure the fatigue of finger muscles. It records the curves traced upon a revolving cylinder by momentary contractions of the finger muscles lifting a known weight at regular intervals. Such a record shows a steady diminution of the lifting power of the muscle, the rate and regularity of the diminution varying with individuals.

After a certain degree of fatigue has set in, the muscle becomes incapable of performing further work unless a lighter weight is attached, or its contractility is restored either by artificially irrigating the muscle or by allowing an interval of adequate rest to intervene before renewed exertion. If fatigue has not proceeded too far, this suffices to remove the toxic fatigue products which have been

produced in the muscle. After exhaustion has set in, a much longer period of rest is required to restore the muscle to use, or it may become wholly incapacitated.

To prevent injurious accumulation of unperceived fatigue, therefore, over-exertion through excessive working hours must be prevented.

Special Reports on Educational Subjects. Vol. IX. On the Measurement of Mental Fatigue in Germany. C. C. TH. PAREZ, German Master at Merchiston School. Edinburgh, London, Wyman, 1902. GERMANY

The application of the first of the above-mentioned methods (physical or muscular test) is due to Mosso, professor of Physiology in Turin, who perfected a method of measuring the work done by a certain group of muscles in raising a definite weight again and again at regular intervals until complete exhaustion ensued.

For this purpose Mosso hit upon the idea of employing an adapted form of the myograph, an instrument devised by H. von Helmholtz for recording muscular contractions, the principle of which may be gathered from the following well-known experiments:

The leg of a frog is separated from the rest of the body, and to its extremity a pencil is attached, which is so arranged that its point comes in contact with a cylinder covered with sooty paper, which revolves round a vertical axis; as long as the leg remains at rest, the pencil traces out an even line on the revolving cylinder, but if the nerves connected with the muscles are excited by electricity, the muscles contract, and the pencil traces a curve on the cylinder, first upward and then downward, whose form corresponds to the muscular contraction of the leg, and gives a measure of the energy developed in the leg by the nervous irritation produced by electricity. After continued application of electricity, the muscle becomes tired and the curves traced on the cylinder show a corresponding modification in size and form.

Acting on the principle here exemplified, Mosso constructed the ergograph, an instrument designed to record the work done by a particular muscle or group of muscles of the human body. The chief point aimed at in the construction of the instrument was to isolate the working muscles completely, so that no other muscle could be in a position to aid them when tired. The apparatus is accordingly

GERMANY arranged so that one part of it holds the arm, hand, and all the fingers fast, except the middle finger, which alone is capable of extension and contraction; that is, the flexor muscles alone can be brought into play; the other part of the apparatus is similar to Helmholtz's instrument, except that to the writing apparatus, which records the curves on the cylinder, a weight of two, three, or more kilograms is attached.

When using the instrument, the person who is to be subjected to the test contracts his middle finger at regular intervals of time, generally every two seconds; the height to which the weight attached to it is raised, is recorded on the cylinder, and decreases gradually until at length, in consequence of fatigue, the flexor muscles have no longer the power to raise the weight at all, so that the mark on the cylinder appears simply a straight line. If a grown man uses a weight of three to four kilograms, and repeats the contractions every two seconds, he is usually able to raise the weight forty to eighty times, each lift being, as a rule, slightly less than the previous one. . . .

If the highest points of all the separate contractions as recorded on the cylinder be joined, the result is a line of characteristic form known as the Curve of Fatigue.

This curve displays a characteristic and constant form for each individual, supposing him to be in fresh condition and the weight raised and the intervals of time to be the same at each trial, from which it may be inferred that every person has special characteristics as regards capacity for work, and liability to fatigue. This inference is confirmed by the following experiment: The nerves of the muscles employed in lifting the weight, attached to the weight were subjected to the action of an electric current, so that all mental influence was eliminated. In this case the curve obtained from the record of the work done by the excited muscles showed again the characteristic form peculiar to the individual, although deficient in length and height. At the same time, however, variations in the mental and physical state of the individual have of course a direct influence in the form and size of the curve; the curve is in fact, as Mosso tells us, "the resultant of a complexity of causes which influence the muscles, nerve centres, and circulation, and depend upon the composition of the blood, and the general condition of the system."

Increase and decrease of bodily vigour, practice, mode of life, duration of sleep, rest, mental excitement, physical as well as mental exertion, all tend to cause modification of the curve. . . .

Practice, of course, strengthens the muscles and enables them to perform more work in course of time, but the results of practice can easily be distinguished and do not effect the characteristic form of the curve. (Pages 531-533.)

A comparison of curves obtained from different individuals affords an interesting insight into their respective working powers.

Seldom are the curves alike; the number of lifts varies, as also the height of each single effort.

With some persons the contractions attain the same height for a considerable period and drop suddenly towards the end, with others they drop more quickly at first, while in the case of others again, the height decreases regularly for a considerable period and suddenly sinks to a minimum after some time. (Page 533.)

In fact, the record of the ergograph bears out the results of ordinary observation, that some persons feel tired and begin to play almost immediately while others work at comparatively high pressure for some time and give way suddenly as complete exhaustion ensues, some are capable of longer, others of shorter periods of work. (Page 533.¹)

Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of Political Science. Vol. I.] Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen; and EDG. LOENING, Professor of Law in Halle. Arbeitszeit: Hours of Work. Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

Precise estimates of phenomena of fatigue are more easily made in the case of muscle than of nerve. Energetic muscular work makes extra work for the heart, lungs, and digestion, that is easily estimated. If, for instance, the pulse rate exceeds 50-60 per cent of its rate when at rest — if it is over 140, and if after 10 minutes' rest it has not yet fallen to normal, we have before us an injurious degree of fatigue.

Respiration should not exceed the rate existing in a state of rest by more than 75 per cent, and after a fifteen minutes' pause for rest it should not remain higher than 30 per cent above normal. Elevation of the body temperature to 39° or 40° centigrade (Fahrenheit 103°-104°) is unquestionably very harmful.

¹ For another full description of the ergograph see the Text Book of Physiology by William H. Howells, M.D. Philadelphia, W. B. Saunders Co., 1907.

GERMANY The most exact estimate we can make of the consumption of energy is that obtained by the test of the oxygen consumption of the body. This procedure it is true, requires the use of complicated apparatus in physiological laboratories. (Page 1215.)

GREAT BRITAIN *Diseases of Occupation from the Legislative, Social, and Medical Points of View.* THOMAS OLIVER, M.A., M.D., F.R.C.P., *Medical Expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the British Home Office.* New York, Dutton Co., 1908.

During inactivity living muscle is absorbing oxygen from the blood and is throwing off small quantities of carbonic acid — it is storing up glycogen and fat; but during activity the nutrition of the muscle is quite altered. A larger quantity of oxygen is absorbed, the carbonic acid evolved is considerable, glycogen disappears, for it is used up, and the temperature rises. The contractile substance of the muscular fibre becomes acid in reaction, owing to the presence of lactic acid and other derivatives. Whenever muscular activity is carried to the point of exhaustion, glycogen, which is the source of the muscular energy, disappears. It is used up, being transformed into carbon dioxide and water with lactic acid. Although deprived of glycogen, muscle can still contract owing to the nitrogenous substances it contains. Muscular activity requires nervous activity as well. Nerve cells as producers of force, nerve fibres as carriers, and muscles as the agents of contraction are all involved in manual labour. Each of these plays its own part in fatigue. (Page 9.)

ITALY *Thirteenth International Congress of Hygiene and Demography in Brussels, 1903. Vol. V, Section IV. Dans quelle mesure peut on par des méthodes physiologiques, étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail. [To what extent may fatigue resulting from occupation be estimated by physiological methods, and what arguments can medical and physiological science present in favor of special methods of industrial organization?]* Dr. ZACCARIA TREVES, *University of Turin, Brussels, 1903.*

The curves of work production and of contractile energy in voluntary muscular work, both under a given rhythm and under a spon-

taneous rhythm, have shown us that the unfavorable conditions of work may be unperceived by the workman who is subjected to a task beyond his strength. This possibility is greater than is realized, for the observations of Zuntz and Schumberg have proved that, though muscular work provokes ordinarily a greater expenditure of albumin, a fatiguing piece of work performed by an organism in a state of slight inanition results in an accumulation of albumin, an augmentation of the muscular mass, from whence there is an augmentation of the absolute strength of the muscles: so that even in a condition of slight inanition the individual may still exact greater and greater efforts from his muscles.

All circumstances which hamper work in any way, such as ill health or local pain, have the effect of augmenting the expense of energy in proportion to the external work. . . . We can then affirm, as a general law, that *fatigue finds its expression in an abnormal augmentation of the expenditure of tissue materials as compared with work done.* (Page 28.)

When, after fatiguing work, ordinary reagents show traces of albuminuria, it must be concluded that the muscular effort, even if it has not been too prolonged, has surpassed the physiological limits of the individual. The resistance of the human body to work depends on the integrity of its organs; all work results in a destruction of organic substance which should be replaced by food. Alimentary substances constitute not only an aid to matter, but to energy also. The sum of energy which they represent is estimated by the calories developed during the combustion of aliments, while a definite amount of mechanical work estimated by kilogrammeters corresponds to these calories. Now, man can transform into motor force the energy brought to him by his food, and this is a more or less economical way according to circumstances. If conditions are favorable, the useful result may correspond to a third of the energy contained in the substances consumed; but this proportion between energy employed and useful result may fall to one-sixth, and then there will be waste.

This latter working system is injurious to the organism and must be scrupulously avoided, since, if waste augments and continues, the nutritive alterations of the muscle, which at first were only quantitative, become qualitative as well; that is to say, the afflux of blood having become insufficient, the muscular substance undergoes a remarkable and lasting alteration and becomes functionally damaged. (Pages 27-28.)

ITALY *Archiv für Anatomie und Physiologie, 1890. Physiologische Abtheilung. Über die Gesetze der Ermüdung. [The Laws of Fatigue.]* Dr. ARNALDO MAGGIORA, *University of Turin. Leipzig, 1890.*

My experiments proved that after one whole night's wakefulness the muscles weary much more quickly, so that at 8 A. M. of the following morning the amount of mechanical work obtainable from them is reduced to the half of what it would be under normal circumstances.

In the daytime, after a night without sleep the finger contractions give one contraction of normal or nearly normal size, but the next ones fall off with unusual rapidity. As in anæmia, the reserve strength may be observed to diminish even though spasmodic or single contractions may be performed.

Mosso has shown that, under such circumstances (nightwork without sleep), not only the irritability but the productive capacity is lessened. The diminution of mechanical work is often more extreme than that caused by anæmia. (Page 226.)

Loss of sleep promotes muscular fatigue for the reason that it brings about a general exhaustion of the organism. The muscles can, it is true, continue to perform some work, but they more quickly give out and the amount of mechanical work they produce is small.

This exhausting effect of loss of sleep is not altered by taking food, but disappears only after a compensating degree of sleep. (Page 227.)

FRANCE *La Fatigue et l'Entraînement Physique. [Fatigue and Physical Training.]* Dr. PHIL. TISSIÉ. *Paris, Alcan, 1897.*

The need of repair is unconsciously made manifest by the muscles (by means of curves) before this need is recognized by the psychic centres. The first degree of fatigue is then, evidently, of peripheral origin. It indicates that fatigue and nutrition are two related states, since speed is slackened with the need of nutriment and augments when this need has been satisfied. (Page 24.)

Travail et Plaisir. [Work and Enjoyment.] CHARLES FÉRÉ, *Doctor of Medicine. Paris, Alcan, 1904.*

The maximum useful work of a muscle is obtained (in experimentation) with a medium weight. Increase of this weight can only

be balanced by a much greater increase in the intervals of rest allowed between muscular contractions. The more frequent the contractions the smaller is the quantity of work and the greater the fatigue. The longer the rest pauses, the less fatigued does the muscle become. The strength of a muscle under intermittent work may attain almost double that which it displays under continuous work. Rapid contractions exhaust the oxygen of the blood, place the muscle in an anaerobic state which is fatal to it, while intermittent contractions permit the blood to renew its oxygen, which destroys the noxious and toxic products of muscular activity. . . . In voluntary ergographic work a rhythm is spontaneously established which represents the maximum frequency compatible with constant work. (Page 20.)

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Institute Solway: Travaux du Laboratoire de Physiologie, Tome VI, Fasc. 4. Les Lois de l'Ergographie: Etude Physiologique et Mathématique, [The Laws of the Ergograph — a Physiological and Mathematical Study.] Mlle. J. IOTAYKO. Brussels, Misch and Thron, 1904.

BELGIUM

All physiologists agree in attributing a double origin to muscular fatigue. There is, from the view-point of chemistry, a predominance of the process of disassimilation over that of assimilation. On one hand there is progressive consumption of elements necessary to activity which cannot rebuild themselves rapidly enough to suffice for the exigencies of the moment, and on the other hand there is an accumulation of waste products which cannot be eliminated or neutralized with sufficient rapidity. (Pages 393-394.)

Consumption of stored elements is never absolute: a muscle ceases to contract before complete exhaustion of its reserves. . . . It is, then, not so much the consumption of all reserves as the impossibility of drawing further upon them that characterizes fatigue. . . . It is generally admitted that, in its initial contractions, a muscle does not consume the same materials as it consumes in its final contractions. (Page 39.)

Mosso has devised an apparatus which records the curve of nervous effort which functions during fatigue. He has demonstrated by experiments with the ponometer that the nervous stimulus necessary to produce contraction in muscle is much greater if it is fatigued than if it is rested. "Effort increases with fatigue" (Mosso). Thus ergographic fatigue has, for effect produced, increasing resistance in the muscles (proof of the peripheral seat of fatigue), and it is to over-

BELGIUM come this resistance that the nerve centres are compelled to send to the periphery orders of increasing intensity. The ponometric curve, says Mosso, follows, therefore, a course which is the inverse of the ergographic curve. (Page 398.)

UNITED STATES *The Harvey Lectures. Fatigue.* FREDERIC S. LEE, Ph.D. Philadelphia, Lippincott, 1906.

Owing to the unequalled opportunity of applying to the study of muscular activity the exact methods of the physicist and the chemist, the phenomena of muscular fatigue are known more exactly than those of other tissues. . . . Let . . . a muscle be stimulated by a series of artificial stimuli of equal intensity, regularly repeated and applied either directly to the muscle itself or indirectly through the mediation of the nerve, and let the muscle perform mechanical work, such as the lifting of a certain load. We may then observe the following phenomena: the degree of shortening of the muscle during each contraction increases for a considerable time, hence the height to which the load is lifted or the amount of work that is performed is gradually increased. Later the reverse occurs — the shortening decreases, reaches its original amount, falls below it, and disappears slowly and very gradually, the muscle becoming incapable of performing further work unless a stronger stimulus or a lighter load be employed, or a period of rest be allowed to intervene, or the chemical composition of the muscle be artificially altered in a suitable manner. The irritability of the muscle at first increases and later decreases; its total capacity for performing work begins to decrease at the beginning of the experiment. (Page 170.)

More than twenty years ago the Italian physiologist, Mosso, devised the important apparatus called the ergograph, and by its means began the long series of studies of voluntary contractions in man, which has made the Turin school famous, and has immeasurably extended our knowledge of fatigue in living human beings. An ergographic record usually consists of a series of curves of momentary contractions, at regular intervals, of certain finger muscles, either one or more, a known weight being lifted or a spring of known tension being stretched. Such a record exhibits in fatigue a gradual diminution of the lifting power of the muscle, the rate and regularity of the diminution varying with individuals. . . . In the course of the experiments I have quoted, it may justly be said that fatigue begins with the first contraction — the muscle is less capable of work

by reason of this contraction. It is convenient to set aside the late stages as the period of exhaustion, although the beginning of such a period is not marked by distinctly physical phenomena. If at any time the muscle be irrigated by a stream of fresh blood, by Ringer's solution, or even by an indifferent isotonic solution of sodium chloride, or, what is less efficient, although in some degree effective, if it be allowed simply to rest, the physiologic pendulum tends to swing back, the irritability and the total capacity for work increase, and physiologically the organ is pushed back to an earlier stage of the fatigue process; in other words, the muscle is in some degree restored.

In recent years we have learned much regarding the nervous relations of muscle, and the existence of the well-developed muscle sense has been established. Sensory end-organs have become recognized in muscles and tendons, and afferent fibres in muscle nerves; the muscles undoubtedly keep the brain informed of their general condition and of the intensity of their contractions. Along with this advance of our knowledge, it has become generally recognized with Wundt, James, Münsterberg, and Baldwin that the feeling of the amount of effort required to make muscles contract is dependent on impulses reaching the psychic centres from the muscles, tendons, and joints. The feeling of effort is of peripheral origin. The same is probably true of the feeling of fatigue. We are distinctly conscious of the fatigue of our muscles; their tone is diminished; their unusual tension gives us a feeling that they are heavy; it seems more difficult to make them respond to our will, and their response is often painful. Moreover, we are aware that our limbs are swollen, the blood vessels are dilated, and that lymph has accumulated in the intercellular spaces. These are but a few of the sensations. Other tissues add their share of stimuli, many of them obscure and difficult of analysis and location. The result of this flood of impulses pouring into the brain is a large complex of sensations, which we call the feeling of fatigue. (Pages 178-179.)

(5) THE GREATER DRAIN ON FATIGUED MUSCLES

The need of limiting the length of working hours for women is due to the fact that the greatest strain is attendant upon "overtime," or work continued after and in addition to the regular working day.

When the hours of labor are so long that work must be continued after fatigue has set in, the dangers to health are correspondingly increased. Greater injury results from work done by fatigued muscles than from severer labor accomplished before the worker is tired. This is because strain, or the continued exertion of will power to keep up, is more exhausting than work in itself.

Scientific investigation confirms this fact and demonstrates by the ergograph that the final small contractions of the finger muscles expend more energy and exhaust more than the first large ones, made before fatigue has set in.

Archiv für Anatomie und Physiologie, 1890. Physiologische Abtheilung. Über die Gesetze der Ermüdung. [The Laws of Fatigue.] Dr. ARNALDO MAGGIORA, University of Turin. Leipzig, 1890.

At the outset of my experiments I found that muscles which had been wearied rapidly regained their former energy after the night's rest, but that, by subjecting them to continuous work through the day without sufficient time for rest, they gave a regularly diminishing amount of mechanical work as the day went on. (Page 205.)

It was shown by my experiments that for the first three observations an hour's rest period was sufficient for each hand, to restore energy completely, but not after the three first trials. Following muscular fatigue which is not completely banished we get a mechanical result which diminishes in a regular ratio. (Page 206.)

Having found a one-hour pause insufficient, I repeated the experiments with a pause of an hour and a half for rest. It was proved that this also did not suffice to keep the muscles up to their full capacity, as the amount of mechanical work gradually diminished. Then in another series of experiments I lengthened the pause to two hours, and found this period was sufficient to keep the muscles up to their full capacity and to prevent the development of fatigue, so that from morning to evening the muscles were able to produce that normal amount of mechanical work that they exhibited after full and complete rest. (Page 207.)

It is important to give the muscles a rest in the beginning, so that fatigue does not accumulate, if it is desired to obtain recurring me-

chanical work from them at regular periods throughout the day. ITALY (Page 207.)

Fatigue is complicated here (in certain experiments which have been described) because the utmost possible exertion of the will was continually made. This altered the results, because, as Mosso has shown, and as I have also demonstrated, strain is more exhausting than work. (Pages 210-211.)

The work performed by a muscle that is already wearied is much more harmful in its wear and tear than severer work would be under normal circumstances. (Page 211.)

It is a well-established fact that muscles weary much more quickly under direct stimulus than when they are indirectly stimulated by the nerves, and that a more powerful nerve stimulus is required to make a wearied muscle contract than one which is rested. (Page 211.)

It was shown plainly by a series of experiments that, when the strength of the muscle was not completely exhausted, but the task was remitted before the final stage of weariness came on, the muscle remained much more capable and wearied less easily, being able to produce an amount of mechanical work which was double that produced when it was worked up to full exhaustion, even though the most favorable conditions of periodical rest were then allowed. (Page 213.)

These observations teach that the last smaller contractions of a work tracing exhaust more than the first large ones, and this is most important, as it proves that strain is more fatiguing than work. This result is also stated by Mosso and Kronecker. (Page 213.)

Anemia produces the same results as fatigue. (Page 217.)

The fatigue of the working muscles reproduces itself in those that are not working directly. (Page 218.)

Mayer, in his work "Die organische Bewegung in ihrem Zusammenhang mit dem Stoffwechsel," stated that weariness, when it did not simply result from a momentary excess of work, was diffused over the whole muscular system; for instance, the temporary work of one arm does not fatigue the other arm, but after a fatiguing walk the arms as well as legs are indisposed to further exertion. This I have demonstrated experimentally with the ergograph. (Page 218.)

After a fatiguing day's march, certain soldiers' hand tracings showed a notable diminution of energy even after the night's rest, being very low at 7 A. M., less so at 9 and 11, but only rising to normal energy by 3 P. M. (Page 224.)

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Fatigue. A. MOSSO, Professor of Physiology, University of Turin. 1896. Translated by MARGARET DRUMMOND, M.A., and W. B. DRUMMOND, M.B., Extra Physician, Royal Hospital for Sick Children, Edinburgh. New York, Putnam, 1904.

The consumption of our body does not increase in proportion to the work done. If I do a unit of work, I cannot say that I shall have a unit of fatigue, nor that, if I do twice or thrice the amount of work, I shall have twice or thrice the amount of fatigue.

Dr. Maggiora, in a series of researches carried on in my laboratory, has shown that *work done by a muscle already fatigued acts on that muscle in a more harmful manner than a heavier task performed under normal conditions.*

This method was as follows: By a preliminary series of experiments, he proved that two hours' rest is required before every trace of fatigue disappears from the flexor muscles of the fingers after they have been exhausted by a series of contractions in the ergograph. This was the period of repose which Dr. Maggiora, for example, had to allow his muscles in order to annul entirely all the effects of the exhaustion. If he diminished this period, if, for example, he allowed only one hour instead of two to elapse between one series of contractions and another, it was only natural that the muscle should do less work because it was insufficiently rested.

Now, it might be thought that if the work were reduced by one half, the period of repose might also be reduced in the same proportion. But by experiment it was found that the period of repose might actually be reduced not to a half, but to a quarter; that is to say, if thirty contractions are required to exhaust a muscle completely, the period of repose necessary after fifteen contractions is only half an hour. These observations show that the expenditure of energy in the first fifteen contractions is much less than in those following; and that the fatigue does not increase in proportion to the work done. . . . We find that the work done during the first fifteen contractions is much greater than that done during the second. . . . If the energy of the muscle is not completely exhausted, that is to say, if the final contractions are not made, the fatigue is much less, and the muscle is able to perform more than double the amount of mechanical work which it would do if it worked to the point of exhaustion with the most favorable conditions for repose.

Every one who has made the ascent of a mountain is familiar with the fact that the last part of the climb, when the summit is almost

attained, demands a much greater effort than that necessitated by **ITALY** greater difficulties when one was less fatigued. Our body is not constructed like a locomotive which consumes the same quantity of carbon for every kilogrammetre of work. When the body is fatigued even a small amount of work produced disastrous effects. (Pages 151-152.)

I have stated that our organism is more injured by work when it is already fatigued. One of the causes of this is that the muscle having consumed in normal labour all the energy at its disposal finds itself compelled by additional work to trench upon other provisions of energy which it has held in reserve; and thus it happens that the nervous system lends its aid with a greater intensity of nervous action. But though the nervous energy comes more into play the contractions of the fatigued muscle are weak. (Page 152.)

The workman that persists in his task when he is already fatigued not only produces less effective work, but receives greater injury to his organism.

The intervals between one effort and another should be longer when one is tired, because one's energies are restored less rapidly, the excitability of nerve and muscle having been diminished by fatigue. (Page 157.)

Etude sur l'Influence du Travail Quotidien sur la Santé Générale de l'Adulte. [Study of the Effect of the Length of Working Hours upon the General Health of Adults.] **FRANCE** ILIA SACHNINE. Lyon, 1900.

Maggiora, after numerous experiments, proved that, in order to obtain a series of tracings of normal fatigue in one and the same day and from one hand only, it was necessary to allow two hours to intervene between the tracings, while, if the experiment was made with a hand previously fatigued, it was necessary that a much longer time of rest be allowed in order that the strength of the hand be completely restored. Two hours did not suffice to restore the normal energy.

By the aid of the ponometer, Mosso showed that a much stronger stimulus is necessary to produce muscular contraction when the muscle is fatigued than when it is rested. While the output of work produced in a fatigued state is diminished, the nervous effort is progressively greater; the wearied muscle needs a more intense nervous action to make it contract. This physiological law is shown in all

FRANCE the acts of our daily life. . . . Every one knows what a fund of nerve energy must be expended to enable him to sustain with outstretched arms a weight which at first was hardly felt. (Pages 49-51.)

GERMANY *Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of Political Science. Vol. I. Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.*

A workman, in the morning hours, between 9 and 10, with an expenditure of energy (a), produces an output (x). In the last hour of the day, on account of fatigue which was plainly felt and required special exertions of will power, he produced an output of $\frac{x}{2}$, but not with the expenditure of energy a , but with $a + \frac{a}{2}$. It would therefore be a great mistake to think that, as x has cost one hour of work, $\frac{x}{2}$ has cost only half the work. It would actually correspond to an expenditure of energy, not of $\frac{a}{2}$, but $3\frac{a}{2}$.

Precisely because a general relation between time spent, work, and output may be assumed, one can easily fall into the error of regarding all prolongation of working hours as economic advantage and all reduction as disadvantage. (Page 1219.)

If this error still persists it is because practical and easily utilizable methods of exact measurement are still new and of recent development. (Page 1220.)

(6) THE PHYSIOLOGICAL FUNCTION OF REST

(a) REST NEEDED TO REPAIR EXPENDITURE OF ENERGY

During rest, fatigue disappears. Rest is thus a physiological necessity. With the intensity of modern industry, the individual worker can keep up efficient labor only on condition that the fatigue engendered on one day is completely repaired before the next day. If fatigue is not balanced by adequate rest, a deficit remains which may be little noticed at first, but which inevitably accumulates, and after a shorter or longer period results in physical breakdown.

When an individual has worked to exhaustion through excessive hours of labor, normal rest does not suffice for repair. He has literally "used himself up."

Die Menschliche Arbeitskraft. [Human Energy.] Dr. GUSTAV OERMANN
YÄGER. Professor of Zoölogy, Physiology, and Anthropology,
Stuttgart. Munich, 1878.

The incidents of the transformations of albumins in the tissues make it clear that repair after overfatigue is a very slow process, . . . and explain the more remote fact that overfatigue often results in a permanent ruin of the constitution by interfering with the regulatory apparatus. (Page 280.)

Gesammelte Abhandlungen. Bd. III. [Complete Works. Vol. III.]
Die Volkswirthschaftliche Bedeutung der Verkürzung des Industriellen Arbeitstages. [The Economic Significance of a Shorter Working Day.] ERNST ABBÉ. [Papers read before the Political Society, Jena, 1901.] Jena, Fischer, 1906.

Now, when an activity is repeated daily in the same grooves, in the same form, the individual concerned can keep up this activity day by day only on condition that the fatigue engendered on one day has been completely banished by sufficient rest and proper nutriment before the next day's work is undertaken.

If even the smallest deficit remains after the equalization of fatigue and rest, — a deficit that would not be noticeable on any one single day, but which is added to daily and accumulates little by little, then the inevitable consequence is that, after a more or less prolonged period of time, the individual goes to pieces physically. It is the same as when he spends daily ever so little more than his income. If he keeps this up, there comes a time when he inevitably becomes bankrupt. (Page 226.)

I can therefore say: every workman whose work is done under these labor conditions must be afforded daily recuperation for his expended energies, and the daily compensation of rest and food must wholly equal his average total of exertion. The daily average of fatigue and expended strength must be absolutely balanced by fresh strength and recuperation, because the least deficit will accumulate gradually and will finally have ruinous effects. (Page 226.)

GERMANY, *Concordia: Zeitschrift der Zentralstelle für Volkswohl* [ahrt, Nov. 1, 1907. *Arbeit, Ermüdung, und Erholung. [Work, Fatigue, and Recuperation.]* Dr. F. RITZMANN, *Factory Inspector, Karlsruhe, Berlin, 1907.*

In a modern allegory of life the three fates, weaving the destiny of man, would bear the names Work, Fatigue, and Recuperation, for our whole being is so exclusively under the domination of these three entities that a life free from them is hardly conceivable. It is the more remarkable, then, to see how superficial a knowledge most men have of the actual significance of these three things. And yet an understanding of the relations between work, weariness, and reparative rest is no less important for mankind and for social betterment than the comprehension of other, definitely hygienic, questions of a general nature. The question of the relation between work, fatigue, and recuperation is pre-eminently a hygienic one.

The problem is: How must we arrange our work in order to remain, in the widest sense, healthy in mind, body, and spirit? What is Work?

The science of psychology is concerned, roughly stated, with the study of every kind of mental process. Among these processes, again roughly stated, are to be reckoned every manifestation of life not arising exclusively from muscular movements; namely, the sensibilities, desires, variations of disposition, thought, judgment, and all such manifestations.

. . . Every alteration in the condition of the brain sets free a mental wave: every mental process brings about an alteration of the state of the brain, even as every physical process is inseparably bound up with an alteration of the muscular structure.

Physiological investigations have taught us that chemical transformations occur during these changes of nerve and muscular cells, and with the knowledge thus gained we are able to give a new definition of the term "Work."

By "Work" we mean every process which tends to destruction of tissue cells and the production of poisonous waste matter, and in contrast to this we define the term *Reparation, or Recuperation*, to signify all those processes which tend to a rebuilding of the tissue cells and the removal of poisonous wastes. Full and intimate knowledge of the nature of those chemical processes which I have defined as destruction of cells and production of poisonous substances has

not yet been attained. We know, though, familiarly, that accom- **GERMANY**
paniment of work which we call Fatigue.

This conception of the idea of work which we attain through physiology is the amplest that we can imagine. It includes all fatigue-producing activity, even when, as with Sport and Play, this activity is not classed in popular terms with work. It includes also, however, as well, — and this is essential for its usefulness, — every activity which, according to popular terms, whether in the physical or in the politico-economical sense of words, can be regarded as work.

Physiology gives us not only a useful definition of the term Work, but also of the terms "Fatigue" and "Recuperation," and this brings us measurably nearer to a solution of our problem — the hygienic regulation of work.

Fatigue is at once the inseparable companion and the bitterest enemy of work. The most important task of the Hygiene of Work is, therefore, to combat fatigue. (Page 360.)

Fourteenth International Congress of Hygiene and Demography in Berlin, Sept., 1907. Vol. II, Sec. IV. Ermüdung durch Berufsarbeit. [Fatigue resulting from Occupation.] Dr. EML. ROTH. Berlin, Hirschwald, 1908.

The increasing use of machinery as a substitute for handwork, and the rapid tendency toward subdivision of labor, are bringing about conditions that are more and more favorable for the employer, but for the worker, on the contrary, harder and less favorable, and especially more monotonous. Therefore, from the point of view of health preservation, it must be considered proper to regulate working hours in accordance with the principles enunciated by Abbé: viz.: The daily supply of energy required for daily labor must be gained by sufficiently long periods of rest and economical use of strength, and must not exceed the expenditure of energy required by the accelerated pace of industry. (Pages 593-594.)

A consideration of all the factors concerned in the study of over-work resulting in over-fatigue, shows that these factors are many. One of the most important of all, from the standpoint of prevention, and in the interest of the workers' health, is this: The intensiveness of the labor, or the relation of the energy expended in fulfilling the work's requirements to the length of time during which energy is so

GERMANY expended, must not overstep a certain fixed limit. That industrial establishments fail notoriously in meeting this first and fundamental requirement of labor protection, admits of no debate. (Page 604.)

Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of Political Science. Vol. I.] Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen, and EDG. LOENING, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

Quotation from Pope Leo XIII. Encyclical on the Labor Problem:

"Justice and Humanity protest against demands upon laboring men, so excessive that the body gives way and the spirit is dulled. As in man all things have their limitations, even so is it with the capacity for labor, and no one can exceed the limits of his powers.

"Working strength is enhanced, it may be true, by practice and habit, but yet it attains its due efficiency only when, at proper times, rest is provided.

"In respect to hours of work the principle should be recognized that they should not be longer than is proportioned to the workmen's strength." (Page 1205.)

"In general it should be a fixed rule that as much rest should be granted the worker as is needed to restore his strength; for the release from work has the restoration of strength as its purpose." (Page 1205.)

These declarations are in so far noteworthy that they state with great clearness the fundamental principle that the time for rest after the day's work must allow complete restoration of the expended strength. . . . On the other hand the laborer's right to a compensation that exceeds mere recuperation, his right to pleasure, enjoyment of family life, etc., is not recognized. (Page 1205.)

It is a cause for thankfulness that some employers have with great pains voluntarily undertaken a methodical and unprejudiced presentation of material (relating to the problem of overwork), and, also, that the symptoms of fatigue are at present receiving a thorough-going investigation at the hands of factory hygienists and physiologists. In this way alone will it be possible to understand the causal relations of fatigue, and discriminate between typical and adventitious

features described in individual observations. Then, too, for the first time it will become possible, with exact estimates of fatigue symptoms (by instruments of precision) to agree upon the proper times for pauses for rest, and upon that duration and intensity of work which will yield the maximum of product, while at the same time the working power of the laborer is fully conserved. (Page 1212.)

The numerous instances of favorable results from reduced hours can no longer be ignored, even though all are not of equal value. Taken in connection with the most recent psychological and physiological researches, they strengthen the presumption that, where working hours exceed ten, . . . either the employer suffers from slack work or the worker from overfatigue. A reduction to ten hours would therefore, as a rule, not only work no injury to economic interests, but would further them in many cases. As to how far a progressive reduction to 9 or 8 hours could go without injury to commerce, this must also be learned by special investigations which should cover every detail and accessory circumstance in the case. Above all it must be shown, by perfected statistics and scientific methods of precision both physiological and psychological, whether, or why, with a 10-hour day a sober workman of normal physical and mental equipment should suffer fatigue which cannot be compensated for by the daily resting times.

(Length of work, heat, dust, nutrition, etc., must be estimated.) If it appears that the direct or indirect origin of this fatigue is to be found in the length of working hours, then, in such cases, in the interests of the general health, a reduction of hours must be sought, even if, economically, some risk is run. If this reduction cannot be assured by the contracting parties, then the state must take it in hand. Should there be no necessity on hygienic grounds, nevertheless from the standpoint of commercial progress it may appear desirable to approach the 9 or 8 hour limit. (Page 1216.)

Revue Internationale de Sociologie, Nov., 1895. *Le Travail Humain et ses Lois*. [The Laws of Human Work.] FRANCESCO S. NITTI, Professor, University of Naples. Paris, Giard and Brière, 1895. ITALY

In every case it is certain that the workman disposes of a certain amount of potential energy, which, within certain limits, is capable of augmentation and of diminution.

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A workman, even one sufficiently nourished, cannot produce, beyond a certain limit, without injury. Beyond this limit, if he continues his work, he exposes himself absolutely to fatigue and exhaustion and his productivity is gained at the expense of his own organism. (Page 1026.)

There is a cruel antithesis between the interests of the capitalist and of society. . . . If for the benefit of the former the workman must consume his own tissues and is not able to protect himself, then production proceeds along with the degeneracy of the worker. (Page 1026.)

The consequent loss of energy is a social loss. . . . Society sees the average strength of the workman diminishing, morbidity and mortality extending, the physical development of the masses retrograding. . . . It is therefore natural that society should awake to the need of interference. (Page 1027.)

It is certain that there is a work-limit which the average workman cannot exceed without danger, as beyond it he risks fatigue and degeneracy. (Page 1027.)

The physiological law that work done by a tired muscle injures it more than work done under normal conditions can be verified by every one from his own experience. (Page 1027.)

Thirteenth International Congress of Hygiene and Demography in Brussels, 1903. Vol. V, Sect. IV. Dans quelle mesure peut on par des methodes physiologiques étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? To what extent may fatigue resulting from occupation be estimated by physiological methods, and what argument can medical and physiological science present in favor of special methods of industrial organization?] DR. ZACCARIA TREVES, University of Turin. Brussels, 1903.

In answer to a political economist, who has said "the physiological limits of the duration of work have not yet been found and cannot easily be found," the physiologist replies that *the physiological limit of the duration and the intensity of work is that limit beyond which the organism is reduced to the necessity of working wastefully.* (Page 33.)

Royaume de Belgique. Conseil Supérieur du Travail, 6e Session, 1901-1902. T. I, Fasc. II. [Higher Council of Labor, 6th Session. 1901-1902. Vol. I, Part II.] Le Repos Hebdomadaire. [The Weekly Rest Day.] Brussels, 1902. **BELGIUM**

M. Adolphe Prins (Member of Conseil):

To-day under present conditions of competition and production it is more than ever necessary to protect working men from overstrain. Rest is more and more indispensable as work becomes more intense. In every line of activity, only the regular alternation of work and rest is able to conserve energy, and those individuals and nations whose lives are so regulated will surpass others in economic rivalry. (Pages 81-82.)

M. Beco:

The man who works must have rest. Rest must alternate with work; this is a physiological necessity. The workman becomes incapable of any physical or mental work whatever if after a certain number of hours he is not able to rest. The desire for sleep, after a certain time, overcomes him. . . . Then in addition to rest during the day, the worker needs periodic rests. (Page 124.)

Every health regulation must have a scientific, exact, and acknowledged basis. . . . Thus the demands of hygiene justify the legal protection of workers against special dangers, poisons, and physical overstrain from excessive labor unreasonably prolonged. No one contests the legality of such legislation; . . . on such lines the police power is extensive and effectual, and its right to be so is not disputed.

Discussion on 21 January, 1902. M. Denis (Member of Conseil):
 . . . Man has a new right, the right to leisure and rest, as well as work. . . . The history of labor legislation can be given in two words: the right to rest is inherent in man's physiological structure. It involves an inflexible social necessity to do away with the exhaustion resulting from overwork, and to conserve working power, the most precious possession of a nation.

On this the most learned physiologist of Italy has said: "The prodigious development of industry and of machinery is resulting in extreme intensity of labor and the law of exhaustion must of necessity put a limit to greed for gain."

Science traces out a path for the modern lawmaker: his difficult but glorious mission is to accomplish the normal synthesis of these two inalienable rights springing from the very laws of life — the right

BELGIUM to employ one's working powers and the right to conserve them. (Page 169.)

When we compare the actual working day (in Belgium) with the most moderate requirements for rest endorsed by scientists, we find that there is an absolute necessity for a periodic rest day.

At the International Conference on Sunday Rest in 1889, Dr. Haegler's report justified the weekly rest day from the point of view of hygiene, as he said, "The labor of each day leaves an organic deficit, and the weekly rest day is essential for the purpose of restoring this loss." (Page 172.)

Maggiara has demonstrated that in order to obtain the same quantity of muscular work evenly throughout the day, the muscles must, from the outset, have their proper periods of rest, so that they can act each time with fresh energy and so that fatigue will not accumulate. This accumulation of fatigue is the most important phenomenon to consider now; it arises in the course of the day, from every breach of equilibrium between work accomplished and rest given to the muscles. As soon as work is in excess, or rest is insufficient, there is an accumulation of fatigue, and this, as Maggiara has shown, is displayed by a diminution of effectiveness. What is true of the different hours of the day is true from one day to another. Waste products of fatigue are carried over from one day to another with cumulative effect. Maggiara's writings contain a remarkable chart showing the effects of a sleepless night, — that is, a night without repair. From this chart we may gain an idea of the rapid cumulation of waste substances, and the gradual extension of the organic deficit. (Page 174.)

School children have been submitted to valuable tests. Intellectual fatigue is measured by tactile sensibility as recorded by the esthesiometer. This sensibility diminishes gradually as fatigue increases, and there is a veritable accumulation from one day to another. To return to the normal condition of tactile sensibility, a weekly rest day must be obtained. (Page 174.)

Thus, the accumulation of fatigue which is favored by the modern industrial system and the intensive character of machine work takes place from day to day, and the weekly rest is a liquidation period — a necessary re-establishment of the physiological equilibrium. (Page 174.)

Fourteenth International Congress of Hygiene and Demography, in Berlin, 1907. Die Ermüdung durch Berufsarbeit. Vol. II, Sec. IV. [Overwork as a Result of Occupation.] Prof. IMBERT, Montpellier. Berlin, Hirschwald, 1908. **FRANCE**

An industrial machine works, but is not fatigued.

A muscle, on the contrary, works, and becomes fatigued.

Fatigue, essentially and exclusively a physiological phenomenon, characterizes the human organism when the latter is regarded as a working machine. Consequently, even from the economic point of view, the discussion of every question involving the factor of labor in industry is incomplete if the influence and the possible consequences of fatigue are not contemplated. Fatigue, on the other hand, disappears during rest, both as to its causes and effects, if the rest is as much prolonged as the labor has been exacting.

Rest is thus, quite aside from any social or humanitarian consideration, a physiological necessity. . . .

It is physiologically and, one may add, economically essential that the night's rest and the weekly rest should suffice to permit the human organism, which has been subjected to a period of labor, to return to its normal state. If this does not happen, the human machine deteriorates, as complained of by the worker, and the output suffers, which affects the employer, to say nothing of the charges upon Society which may result from such deterioration.

Overstrain is present if, after the daily or weekly rest, at the moment of resuming labor, traces of fatigue still remain and the primal and normal productive capacity has not been restored. (Pages 634-635.)

Eighth International Congress of Hygiene and Demography at Budapest in 1894. Vol. III, Sec. IV. De l'Influence de la Durée du Travail sur l'État de Santé des Travailleurs. [The Influence of Working Hours on the Conditions of Health of Working People.] Dr. JULES FÉLIX, Hungary. Budapest, 1895. **AUSTRIA**

Every being must obey the law of work, which is nothing else than the regular and harmonious functioning of the body . . . but there is also another law, that of the necessity of rest, the need of repair . . . for organisms, as well as for separate organs, all prolonged activ-

AUSTRIA ity leads to exhaustion, and to effect repair, periods of rest from functioning are imperative. . . . The time needed for rest, and the materials required for repair must be proportioned to the organic expenditure, to the intensity and duration of work; or, in other words, the duration of rest and the reparative material of every organism must be proportioned to the length and intensity of its activity. (Page 2.) For civilized man sleep alone is not enough for rest. It is also necessary — even indispensable, if man is to preserve the plenitude of his physiological, intellectual, and moral faculties, and not degenerate — that he shall vary his work as well as his recreation. (Page 3.)

GREAT BRITAIN *History of the Factory Movement from the Year 1802, to the Enactment of the Ten Hours' Bill in 1847.* "Alfred." London, Simpkin, Marshall, 1857.

Rest of body is the first requisite for one who is habitually overworked; no evil can flow from this requirement being reduced to practice. Experience has proved that factory regulation has been beneficial in body, mind, and morals to those for whose good it was intended. Its promoters have not been deluded theorists, they have been practical statesmen. (Vol. I, page 268.)

Transactions of the National Association for the Promotion of Social Science. Vol. II, 1869. On Public Recreation. WM. HARDWICK, M.D. London, Longmans, 1870.

The necessity for lessening the hours of severe labour begins to show itself in many ways.

In former times when labour was not so ardent, holidays were many; now that civilization advances and labour begins to be more intense, the exhaustion is consequently greater, and the period of rest must be more frequent or more prolonged. (Page 476.)

The Lancet. Vol. I. March 4, 1905. "Overwork." (Editorial). London.

Ingenious attempts have been made by Maschek and other writers to classify work under the three headings of effort, velocity, and dura-

tion, and to arrive at formulæ which should show the proper relations of these three elements to each other. Such attempts have not been conspicuously successful, but they at least serve to call attention to the distinctness of the elements in question and to the necessity of taking each of them into consideration when endeavoring to estimate the output of an individual. They remind us that the spurt of a tired man may be more injurious to him, may, in common parlance, "take more out of him," than sustained efforts more deliberately accomplished. . . .

Maschek succeeded in establishing at least one formula which appears to show that the time occupied in strenuous endeavor should not greatly exceed one-third of the twenty-four hours.

. . . Of the three elements . . . that of duration is usually most under our command, and those who would retain health and attain longevity should see to it both that their efforts are not too prolonged and that they are followed by corresponding periods of rest. . . . If we turn to the elements of velocity in work we shall find abundant reasons for the belief that its predominance implies an amount of strain greatly in excess of the actual accomplishment and calls for a corresponding equivalent of repose. The wise man who must spend his life in living will be all the more solicitous so to manage his expenditure that it may not be wasteful and he will be careful to guide his activities to this end. . . . He will realize that exceptional duration and exceptional speed of work should be avoided whenever possible, and that when they cannot be avoided, they should be followed by correspondingly exceptional periods of repose. (Page 580.)

(b) REST NEEDED TO REPAIR THE DEFICIT OF OXYGEN

The injuries from excessive working hours are confirmed by medical observation and science, which has demonstrated that during overexertion the expenditure of oxygen of any individual exceeds the amount respired, and must be met by the reserves of the organism, by the oxygen of the blood and tissues.

GERMANY *Handwörterbuch der Staatswissenschaften, Bd. I.* [Compendium of Political Science, Vol. I. Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen, and EDG. LOENING, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

We distinguish Exhaustion from Fatigue.

In exhaustion there is a deficiency of reparative material for the restoration of the vital tissues. This is especially a deficiency of oxygen. During work more oxygen is taken from the red blood corpuscles than can be normally replaced by them from respiration and food. (Verworn.) While fatigue can be banished by rest, exhaustion can only be overcome by fresh supplies of oxygen and organic tissue building material in food. Recuperation takes place in fullest extent only in sleep, as during sleep the consumption of oxygen is diminished.

Now it is to be remembered that consumption of energy takes place not only in work, but also in the vital processes themselves. We are continually losing heat (energy) to our environment. There is, however, a great difference. The organism at rest requires, in 24 hours, about 2770, the actively working organism 4550, calories.

The consumption of energy during work results from the mechanical and mental activities required by the occupation processes. To this is added further consumption by standing; certain postures of the body; strain of special senses; jarring of the body, by machinery, etc.

In this wise, fatigue of the muscular and of the nervous apparatus is brought about. In laborious work, involving the whole body, fatigue of the entire muscular apparatus appears. (Page 1214.)

FRANCE *Tenth International Congress of Hygiene and Demography at Paris, in 1900, in one vol. Législation et Reglementation du Travail au Point de Vue de l'Hygiene.* [Labor Legislation and Regulation from the Standpoint of Hygiene.] M. ÉDOUARD VAILLANT, M.R.C.S. England. Paris, Masson and Co., 1900.

Physiological researches have proved that if work has been pushed to exhaustion, normal aliment and normal rest no longer suffice for repair; that any work acts more injuriously upon a wearied muscle than even heavy work under normal conditions, that when the normal

muscular energy has been expended, the nervous system is under excessive strain and becomes exhausted; that this nerve exhaustion, combined with physical work, increases with a rapidity proportionate to the expense of nervous force and attention demanded by the work; that all muscular work, however light, aggravates a condition of intellectual fatigue and nervous tension, and that rest must be sufficient to ward off fatigue.

It is most important to determine the physiological limits of work which the workman should not overpass. . . .

This limit contracts or expands with the physical and intellectual strength, the age, sex, general and technical education, training, the nature and surroundings of the work, and a number of other temporary or permanent conditions. (Page 509.)

The principle of organic protection is this: an individual, in no matter what category, should never exceed the physiological boundary of labor where, through duration, or intensity of effort, overwork and fatigue begin.

This limitation could be easily determined by simple hygienic and medical oversight of that kind now established in an elementary way by the German wage-earners insurance, if carried to completion and established generally throughout industry. (Page 510.)

But even now this physiological limit can be determined. . . .

Combustion, the principal source of energy, can be measured. The transformation of gases, the pulmonary respiration, being the sum of all partial respiratory processes and the amount of oxygen absorbed and of carbonic acid eliminated increasing directly with work, there is a disturbance of equilibrium and an organic deficit, whenever the expenditure of oxygen in the formation of carbonic acid has exceeded the amount respired, and has been met by the reserves of the organism, by the oxygen of the blood and the tissues. Intoxication then begins with stasis of carbonic acid.

The robust workman, turning the wheel of Pettenkofer and Voit, demonstrated how much he had surpassed this limit even in his nine-hour day, and despite his rest. (Page 511.)

The respiratory quotient . . . varies precisely with work, its factors increasing with work and diminishing with rest, for the relation of the carbonic acid produced to the oxygen consumed expresses exactly the expenditure of potential glycogen during work and its renewal during rest. (Page 511.)

FRANCE

The value of the preservative individual warnings of fatigue is evident.

This signal of alarm, from an organism that has, by overwork, or defect of training and education, arrived at the physiological limit of work, is not an uncertain psychic incident. It is a warning: in default of rest, physical effects will follow: morbid effects, menacing intoxication, organic alteration caused by overwork (*surtravail*) and fatigue. (Page 513.)

As the work of each day causes an organic deficit, the weekly rest, as shown by Dr. Haegler, is a necessity to make up this deficit: the effort is to add one half day of Saturday.

But even with this addition, the reparative rest is not sufficient, its effect is only apparent. The rest of the Sunday and Saturday half holiday should be entered upon without a deficit, without fatigue, and it should be a period of recuperation of strength and of the organic equilibrium, bringing it to a higher level, giving more moral and physical strength to man, — the active energy necessary to carry him without encumbrance of fatigue through his next period of work. (Page 514.)

For all these reasons overtime should be forbidden by law, as infracting the limitation of hours, causing overwork, and contributing to non-employment. (Page 517.)

Etude sur l'Influence de la Durée du Travail Quotidien sur la Santé Générale de l'Adulte. [Study of the Effect of the Length of Working Hours upon the General Health of Adults.] ILLA SACHNINE. Lyon, 1900.

During the night, and above all during sleep, man absorbs more oxygen than he exhales. According to Voit and Pettenkofer, this surplus oxygen is stored up to be used later in the exertions of the day. (Page 173.)

Dr. Haegler demonstrated, on the basis of Pettenkofer's experiments, that, as each day's work added a slight deficit of oxygen to the deficit of the day before, a weekly rest of 24 hours was necessary to replenish the normal sum of oxygen used in labor or continuous exertion throughout the week. (Page 175.)

De la Fatigue et de son Influence Pathogénique. [*Fatigue and its Pathogenic Influence.*] Dr. M. CARRIEU, University of Montpellier. Paris, Baillière and Son, 1878. FRANCE

It had been well established (by Lavoisier and others) that the organism consumed more oxygen during activity than in a state of rest, but the experiments of Voit and Pettenkofer (*Zeitschr. f. Biol.*, 1866) necessitate some modifications of the results of their experiments.

Their researches put into evidence interesting differences in the same individual, accordingly as he was at work or at rest, awake or asleep. The subject of the experiment was a vigorous workman of 28 years of age. He had the same quantity of food whether working or resting except that when working he drank an additional 600 grams of water. The results are thus shown:

JULY 31, 1868. DAY OF REST

| | Absorbed. | Eliminated. | | | O of CO ₂ |
|-------------------------|-----------|-----------------|-------|-------|----------------------|
| | Oxygen. | CO ₂ | HO. | Urea. | |
| From 6 A. M. to 6 P. M. | 234.6 | 532.9 | 344.4 | 21.7 | 175 |
| From 6 P. M. to 6 A. M. | 474.3 | 378.6 | 483.6 | 15.5 | 58 |
| Total for 24 hours | 708.9 | 911.5 | 828.0 | 37.2 | 233 |

AUGUST 3, 1868. WORK

| | Absorbed. | Eliminated. | | | O of CO ₂ |
|-------------------------|-----------|-----------------|--------|-------|----------------------|
| | Oxygen. | CO ₂ | HO | Urea. | |
| From 6 A. M. to 6 P. M. | 294.8 | 884.8 | 1094.8 | 20.1 | 218 |
| From 6 P. M. to 6 A. M. | 659.7 | 309.4 | 947.3 | 16.7 | 44 |
| Total for 24 hours | 954.5 | 1284.2 | 2042.1 | 37.8 | 262 |

FRANCE These numbers show that the excretion of carbonic acid is more considerable by day than by night, and that per contra the absorption of oxygen is more active by night than by day. (Page 14.)

Further the amounts of water and of carbonic acid excreted are much greater during work than during rest, whilst the oxygen absorbed does not vary to the same extent. Finally, a larger proportion of oxygen is inspired during the night following the day of work, whilst the amount of carbonic acid excreted was nearly the same in both cases.

The authors conclude from these experiments that oxygen inspired at night is stored up to be drawn upon next day to oxidize food materials. If one works, he exhales a greater amount of CO_2 and then oxygen must be inspired in greater amount during rest. (Page 15.)

ITALY *Revue Internationale de Sociologie, Nov. 1895. Le Travail Humain et ses Lois. [The Laws of Human Work.]* FRANCESCO S. NITTI, Professor University of Naples. Paris, Giard and Brière, 1895.

The workman, busy with his work, does not perceive the oncoming of fatigue, or, to speak more accurately, he only perceives it when it has attained a certain intensity. This is the principal reason why he does not and cannot protect himself: it is the principal reason why every society, which desires to prevent a wasteful loss of energy, must necessarily resort to regulation to protect him. (Page 1041.)

Variations between individuals, it is true, are very great, but . . . there is an average limit which may be found and applied in legislation. What shall this limit be? . . . In the experiments of Voit and Pettenkofer it was found that the workman at the end of nine hours' labor had expended, in the form of carbonic acid, 192 grammes of oxygen more than he had been able to inhale during this time. He had therefore had to give up 20 per cent of the supply of oxygen stored up in his tissues. We may ask, therefore, if the average limit of eight hours would seem altogether arbitrary. (Page 1041.)

UNITED STATES *Text Book of Physiology.* WM. H. HOWELLS, M.D., Professor of Physiology in the Johns Hopkins University, Baltimore. Philadelphia, W. B. Saunders Co., 1907.

Chemical Changes in the Muscle during Contraction and Rigor.—Perhaps the most significant change in the muscle during contrac-

tion is the production of carbon dioxid. After increased muscular activity it may be shown that an animal gives off a larger amount of carbon dioxid in its expired air. In such cases the carbon dioxid produced in the muscles is given off to the blood, carried to the lungs, and then exhaled in the expired air. Pettenkofer and Voit, for instance, found that during a day in which much muscular work was done a man expired nearly twice as much CO_2 as during a resting day. The same fact can be shown directly upon an isolated muscle of a frog made to contract by electrical stimulation. The carbon dioxid in this case diffuses out of the muscle in part to the surrounding air, and in part remains in solution, or in chemical combination as carbonates, in the liquids of the tissue. It has been shown by Hermann and others that a muscle that has been tetanized gives off more carbon dioxid than a resting muscle when their contained gases are extracted by a gas pump. This CO_2 arises from the oxidation of the carbon of some of the constituents of the muscle, and its existence is an indication that in their final products the changes in the muscle are equivalent in those of ordinary combustion at high temperatures, the burning of wood or fats, for instance. Moreover, the formation of the CO_2 in the muscle is accompanied by the production of heat, as in combustion; and for the same amount of CO_2 produced in the two cases the same amount of heat is liberated. It has been shown, however, in the frog's muscle freshly removed from the body, that the CO_2 is produced whether or not any oxygen is supplied to the muscle, — that is, when the muscle is made to contract in an atmosphere containing no oxygen, or in a vacuum. In this respect the parallel between physiological oxidation and ordinary combustion fails. Wood, oil, and other combustible material cannot be burnt at high temperatures in the absence of oxygen. We must believe, therefore, that in the muscle there is a supply of stored oxygen, and that the muscle will give off CO_2 as long as this supply lasts. The oxidation, instead of being direct, as in the case of combustions, is indirect. . . .

The oxygen is absolutely necessary to the normal activity of the muscular tissue, but the tissue, by storing the oxygen, can function for some time when the supply is suspended. As Pfüger has expressed it, in a most interesting paper, the oxygen is like the spring to a clock — once wound up, the clock will go for a certain time without further winding. It must be borne in mind, however, that different tissues show considerable variation in the time during which they will

function normally after suspension of their oxygen supply. The cortex of the brain, for instance, loses its activity, — that is, unconsciousness ensues almost immediately upon cessation or serious diminution in the supply of blood, and the same may be said of the functional activity of the kidney. In the cold-blooded animals, with their slower chemical changes, the supply of stored oxygen maintains irritability for a longer time than in the warm-blooded animals. (Pages 62-63.)

BELGIUM *Du Repos Hebdomadaire. [On the Weekly Rest Day.]* ESTÈVE DE BOSCH. *Antwerp, 1907.*

De Bosch says of the (following) tracing:

Dr. Haegler has represented in an ingenious fashion the variations which occur in the entirety of our vital forces, in the form of a line, "b," which, instead of remaining on the same level at all times, rises or falls according to the alternating work and rest of which life is composed. (Page 49.)

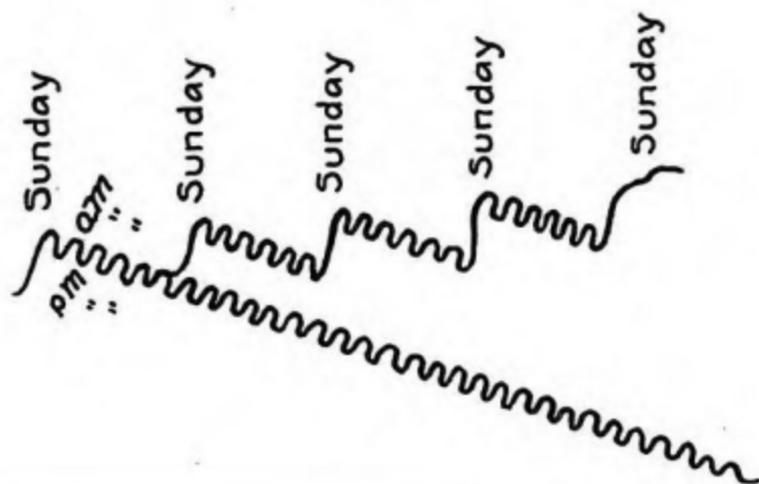
The night's sleep repairs a part of the losses which we suffer by day, but it is not sufficient to make up entirely for the deficit produced by the hours of work. The result is that the line is not found to be on the same level in the morning that it was 24 hours before, and the level of our energy is lowered slightly from day to day.

But there is a way of bringing it up again to its normal place, and that is, to take, every week, 36 consecutive hours of rest; the curve of the line "a," which represents the variations of vital energy in a man resting from Saturday evening to Monday morning, proves this fully. The upper line (a) represents the variation of strength in a life where work is suspended from Saturday evening to Monday morning.

The lower line (b) represents the gradual loss of strength that follows in a life when work is not suspended except by the night's rest. (Page 50.)

This chart was shown by Haegler at the Swiss International Exposition in 1896 in Geneva.

Another chart, also by Dr. Haegler, and shown at the same exhibition, shows that the length of life is longer with those who observe the custom of a weekly day of rest. (Page 51.)

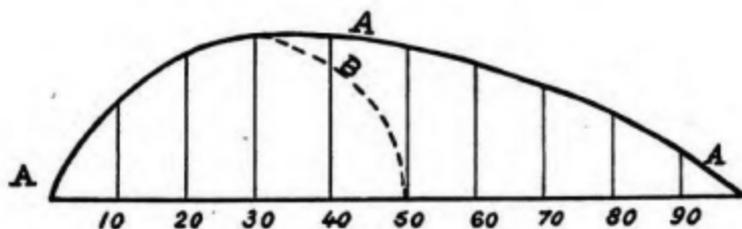


HAEGLER'S CHART

Fatigue curves showing morning rise and afternoon depression. The upper line shows the effect of the weekly day of rest.

The lower line shows the gradual depression of strength with daily work and no time of rest.

(Page 50, in "Du Repos Hebdomadaire.")



HAEGLER'S CHART, Geneva, 1896

Line A shows the normal average of life with proper time of rest.

Line B shows the average life line under overwork and insufficient rest.

(Page 51, in "Du Repos Hebdomadaire.")

(c) ADEQUACY OF RESTING TIME ALLOWED BETWEEN WORKING HOURS

1. *In Ordinary Work*

The adequacy of rest depends on the length of time allowed between working hours. Hence the shorter working day benefits the worker, not alone by requiring less expenditure of energy, but by allowing a more adequate period of rest before the next working day begins.

On the other hand, it is precisely after excessive working hours that the need of repair is greatest and the time allowed away from work is least.

GERMANY *Handbuch der Hygiene. Bd. 8¹. [Handbook of Hygiene. Vol. 8¹] Edited by Dr. THEODORE WEYL. Allgemeine Gewerbehygiene und Fabrikgesetzgebung. [General Industrial Hygiene and Factory Legislation.] Dr. EMIL ROTH. Jena, 1894.*

. . . We may point out that the social condition of the worker, his home, nutrition, and conduct of life are highly important factors in the rate of sickness, and that, the longer the working hours, the less opportunity is left to him of utilizing these health-preserving forces. (Pages 27-28.)

Handbuch der Arbeiterwohlfa^hrt. [Handbook of the General Welfare of the Working Classes. Edited by Dr. OTTO DAMMER. Vol. II.] Arbeiterschutz. [Protection of Working Men.] Dr. ASCHER Stuttgart, Enke, 1902.

The injurious consequences of bad conditions upon health cannot, unfortunately, all be as clearly demonstrated as that of dust in the experiments of Moritz and Röpke; we know, however, that for the elimination of dangerous substances from the body a certain time — dependent upon the nature of the material and the constitution of the individual — is essential, and that therefore a shortened exposure to the unfavorable conditions has a double advantage — first, in that the probability of elimination of unhealthful material is increased and its unhygienic consequences more fully avoided. In this connection we must consider also the severer forms of fatigue or exertion of organs beyond the physiological limits of their endurance and the

impossibility of repairing their waste and restoring them to normal **GERMANY** conditions without ample resting time. (Page 78.)

Gesammelte Abhandlungen. Bd. III. [Complete Works. Vol. III.] Die Volkswirtschaftliche Bedeutung der Verkürzung des Industriellen Arbeitstages. [The Economic Significance of a Shorter Working Day.] ERNST ABBÉ. [Paper read before the Political Society, Jena, 1901.] Jena, Fischer, 1906.

I have briefly referred to the balance between expenditure and renewal of strength. Renewal of strength by nutriment and rest — upon what does it depend? For any one specific individual it is beyond a doubt that the length of resting time allowed is the paramount condition for recuperation of strength. There cannot be the smallest doubt that one who has 16 hours rest between his working hours can repair a greater amount of previous fatigue than he who has only 10. Every one can prove this for himself. (Page 231.)

Therefore, aside from the personal factors which one may call the intensity of metabolism or of the vital functions in different individuals, the important thing is the length of time permitted for rest. The day has only 24 hours; so the time for rest must be the difference between the working day and 24 hours. If the former is 8 hours, there are 16; if 10 hours, only 14 for rest. (Page 231.)

Tenth International Congress of Hygiene and Demography at Paris, in 1900. In one vol. Législation et Règlementation du travail au point de vue de l'Hygiène. [Labor Legislation and Regulation from the standpoint of Hygiene.] M. EDOUARD VAILLANT, M.R.C.S., England. Paris, 1900. **FRANCE**

Professor Setschenoff has dealt cleverly with the physiological problem of the necessary relative length of rest and work so that the weariness of one day shall not be felt on the morrow. The normal heart with its regular rhythm of contraction and relaxation, gains sufficient rest during every second to work for a lifetime, its total rest being to its total work as 10 hours to 6 in 16 hours. Now, giving the industrial worker 8 hours of sleep, he has 16 left for work and rest.

It then seems that during the 16 hours of waking time remaining for the worker, his relative rest should not be less in duration than

FRANCE

that of the heart, especially as the skeletonic muscles are less richly supplied with blood than those of the heart and as physical rest is not complete in the waking state. (Page 512.)

GREAT
BRITAIN

British Sessional Papers. Vol. XV. 1831-32. Report from the Select Committee on the "Bill to regulate the Labour of Children in the Mills and Factories of the United Kingdom."

Thos. Hodgkin, Esq., M.D., physician to the London Dispensary, Lecturer at Guy's Hospital:

10941. Is not the body in your opinion, in a very unfit state to renew its exertion when it has been insufficiently recreated by sleep, and when therefore labour has to be commenced at the beginning of the day with the feelings and signs of weariness still remaining?—Certainly, it is. . . .

10942. That accumulated fatigue you conceive to be peculiarly injurious to the constitution?—Yes; without the interposition of intervals sufficient to repair the demand which has been made on the system. (Page 549.)

John Morgan, Esq., surgeon to Guy's Hospital:

10998. Do you not think that the body is in a very unfit state to renew its daily labour when the preceding evening's sleep has been insufficient to remove a sense of weariness and fatigue?—Certainly, in a very unfit state. (Page 553.)

Joseph Henry Green, Esq., F.R.S., a surgeon of St. Thomas's Hospital and Professor of Surgery at King's College:

11386. Do you not think that labour is peculiarly pernicious and prejudicial when it has to be commenced in the morning; the body not being sufficiently refreshed and recruited by the insufficient sleep of the preceding evening?—Certainly.

11387. And that fatigue perpetuated is peculiarly wearisome, of course, to the body, and pernicious to all the functions of life?—Yes, I do. (Page 588.)

Benjamin Travers, Esq., F.R.S., senior surgeon to St. Thomas's Hospital in Southwark:

11605. Is it not a strong indication that labour is pernicious when it has to be resumed in the morning with a great sense of remaining weariness and fatigue, which has not been dissipated by the rest of the preceding night?—Certainly.

11606. That, long continued, will be, in your opinion, pernicious to the constitution?—Certainly, especially so. (Page 606.)

2. In Work involving Absorption of Injurious Substances

Adequate resting time between working hours is particularly important in trades where injurious substances, such as dust, fluff, or industrial poisons may be absorbed by the worker. As all trades share these dangers in greater or less degree, the longer the period away from work, the greater the possibility that injurious substances may be eliminated from the body before another workday.

Handbuch der Arbeiterwohlfahrt. [*Handbook of the General Welfare of the Working Classes. Edited by Dr. OTTO DAMMER. Vol. II.*] *Arbeiterschutz.* [*Protection of Working Men.*] Dr. ASCHER. Stuttgart, Enke, 1902. GERMANY

When we arrange the medical testimony given in regard to the longer or shorter working time the following conclusion appears: in any or every trade when a substance injurious to health (poison) may possibly be taken into the body tissues of the worker, the danger is lessened by just so much as the time during which the worker is so exposed, is shortened. The longer the period of rest away from work, the greater the possibility of the injurious material being eliminated from the body. The same is true of mechanically irritant dust. Moritz and Röpke found that, when workmen were exposed continuously to breathe in the dust from polishing during a considerable period of time, the sensitiveness of the mucous membranes, larynx, and bronchi was so diminished that the in-breathed dust could not be coughed up and, instead, found lodging place on the delicate vocal cords. A short time of rest outside of the dusty air sufficed to restore to the tissues their normal irritability, so that the harmful dust acted as an irritant and could be expelled by coughing. On this ground they argued for longer rest periods and shorter working time. Similar reasons hold for shorter hours in all occupation where individual organs — eyes, muscles, bony structure, nerves, heart, lungs — are liable to overexertion. Naturally, then, the free time must be given to healthful exercise and recreation. . . . Through all these reports a gradual tendency to shorten the hours of labor may be accepted as a modern movement. (Pages 61-62.)

GERMANY *Handwörterbuch der Staatswissenschaft. Bd. I. Compendium of Political Science. Edited by Drs. J. CONRAD, Professor of Political Science in Halle: L. ELSTER, Ober Reg. Rath in Berlin: W. LEXIS, Professor of Political Science in Göttingen, and EDG. LOENING, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Vol. I. Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.*

. . . The more injurious any process of work is by reason of great heat, poison, dust, noise, etc., the more important does it become to provide some counterbalance to these harmful influences by shortening the time given to labor under these conditions. (Page 1204.)

**SWITZ-
ERLAND**

An das Schweiz. Industriedepartement — Bern — Die Eidgenössischen Fabrikinspectoren. [Report of the Swiss Factory Inspectors to the Swiss Department of Labor on the Revision of the Factory Laws.] Schaffhausen, 1904.

Finally we must mention those arguments in favor of a shorter day which have been presented by medical men. A prominent hygienist, Dr. Ascher, declares: "In all those industries where more or less injurious foreign material is taken into the body of the workman, the danger is lessened in proportion to the brevity of the time during which he is exposed. The longer the periods of rest outside and away from his work place, the greater the possibility of the tissues of the body casting off the injurious substances. It has been found that, with long or continuous inspiration of dust, the irritability of the mucous membranes, larynx and bronchi is so much lessened that the inspired dust is no longer coughed up, and remains to find lodging place on the delicately sensitive vocal cords. For this reason longer periods of rest and shorter working hours are essential. Analogous reasons are in force for every occupation in which overexertion of special organs — eyes, muscles, bones, nerves, heart, or lungs — is necessitated by the work." (Page 26.)

AUSTRIA *Eighth International Congress of Hygiene and Demography. Budapest, 1894. Vol. VII, Sec. V. Über das Verhältniss der Dauer des Arbeitstages zur Gesundheit des Arbeiters und dessen Einfluss auf die Öffentliche Gesundheit. [The Length of the Working Day in its Relation to the Workman's Health and its Influence upon Public Health.] Dr. E. R. J. KREJCSI, Vice-Secretary of the Chamber of Commerce in Budapest. Budapest, 1896.*

The longer the hours of work, the longer the organism is exposed to injurious influences; — the sooner bodily resistance is overcome,

and consequently occupation diseases are early established which might have been avoided or at least postponed to a much later period if the hours of labor had been short. (Page 327.)

C. *Bad Effect of Long Hours on Health.*

(1) GENERAL INJURIES TO HEALTH.

The fatigue which follows excessive working hours becomes chronic and results in general deterioration of health. While it may not result in immediate disease, it undermines the whole system by weakness and anæmia. Continuous overexertion has proved even more disastrous to health than a certain amount of privation; and lack of work in industrial crises has entailed less injury to health than long-continued overwork. The excessive length of working hours, therefore, constitutes in itself a menace to health.

British Sessional Papers. Vol. XV. 1831-1832. Report from the Select Committee on the "Bill to regulate the Labour of Children in the Mills and Factories of the United Kingdom."

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William Sharp, Esq., . . . surgeon to the Dispensary, Bradford, Yorkshire:

7097. Do you consider that excessive labour, or labour too long continued, has a direct tendency to produce disease and debility, and to shorten life? — Yes, I do.

7080. Do you not think the worst effects are produced by the terminating hours of a long day's labour? — Yes. (Page 302.)

Samuel Smith, Esq., . . . member of College of Surgeons and practising surgeon in Leeds:

10341. Do you consider the very uniformity of the exertion would, in all probability, occasion fatigue, and abate the energies of those who have to endure it? — Even supposing no labour whatever were required under such circumstances, the merely having to sustain the erect position of the body for so long a period is harassing in the extreme and no one can have an adequate idea of it unless he has himself been subjected to it. (Page 497.)

10492. Should you attribute part of the pernicious effects upon

the constitution of those employed, to their being deprived of fresh air? — Certainly; the long-continued labour and the want of fresh air are the two principal causes of the general effects to which I have alluded. (Page 514.)

Sir Anthony Carlisle, F.R.S., . . . surgeon in the Westminster Hospital:

11035. Is it not an equally received opinion with medical authorities, that exercise or labour, so long continued as to produce great fatigue of mind and body, without affording due intermissions for meals, recreation, and sleep, is inconsistent, generally speaking, with the maintenance of health? — I think every one of the points of that question may be answered in the affirmative. I can, from my own experience and knowledge, affirm that it is so.

11036. Your affirmation in the respect is founded upon the principles of your profession as well as upon your personal experience? — Certainly. (Page 559.)

British Sessional Papers. Vol. XXI. 1833. Second Report of the . . . Commissioners for inquiring into the Employment of Children in Factories . . . and Reports by the Medical Commissioners.

Sir David Barry's report (Scotland):

Although both the young and the adult mill-workers may command more abundant food and better clothing than their unemployed neighbors, there are causes to whose operation they are exposed, which, in a sanitary point of view, counterbalance the advantage alluded to.

1. The first and most influential of all is the indispensable, undeviating necessity of forcing both their mental and bodily exertions to keep exact pace with the motions of machinery propelled by an unceasing, unwearying power.

2. The continuance of an erect posture for periods unnaturally prolonged and too quickly repeated.

3. The privation of sleep. (Page 72.)

Hansards' Parliamentary Debates. Vol. LXXII. 1844.

Mr. Hindley:

Even though the Government only went the length of relieving from the pressure of excessive labour the female portion of the population, a great object would be attained. The inspectors told them

that woman ought not to work for more than 10 hours. The surgeons told them that to work for 12 hours was highly injurious. . . . It was universally felt that human labour was quite overdone, and that the state of the law affecting it required immediate and material revision. (Pages 284-285.)

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Hansards' Parliamentary Debates. Vol. LXXIII. 1844.

He [Lord Ashley] had been told by operative spinners that, under the present system of working 12 hours a day, their exhaustion was so great that it was absolutely necessary they should have at least 4 meals a day; but that, with a reduced period of labour, they would be content with 3 meals per day. They stated that under the existing system they were obliged to take food even without appetite as a stimulus to enable them to go through the closing hours of their days' work. . . . It was calculated . . . that, if the hours of labour were reduced from 12 to 10, it would have the effect of prolonging by at least 3 years the duration of the working life of the operatives. (Page 1386.)

British Sessional Papers. Vol. XIX. 1873. Reports of Inspectors of Factories (for the half year ending 30th April, 1873).

The house surgeon of a large hospital has stated that every year he had a large number of cases of pulmonary disease in girls, the origin of which he could distinctly trace to long and late hours in overcrowded and unhealthy workrooms. (Page 43.)

British Sessional Papers. Vol. LV. 1873. Report to the Local Government Board on Proposed Changes in Hours and Ages of Employment in Textile Factories. J. H. BRIDGES, M.D., and T. HOLMES.

Experience afforded by residence in the worsted manufacturing town of Bradford, and extensive practice among its population during periods of from one to thirty-five years:

A. Amongst the women of factory operatives, much more than among the general population, derangements of the digestive organs are common, *e. g.*, pyrosis, sickness, constipation, vertigo, and headache, generated by neglect of the calls of nature through the early hours of work, the short intervals at meals, the eating and drinking

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of easily prepared foods, as bread, tea, and coffee, and the neglect of meat and fresh cooked vegetables. . . .

Signed on behalf of the Bradford Medico, Chirurgical Society, at a meeting held February 4, 1873.

Sub-Committee,

President, J. H. BELL, M.D.

P. E. MIALL, M.R.C.S.

Secretary, DAVID GOYDER, M.D.

(Pages 39-40.)

British Sessional Papers. Vol. XVI. 1875. Reports of Inspectors of Factories.

The breaking down of the health, the curved spine, the deformity of the extremities are not now to be met with; but we are confronted with a new evil which has come upon us in the development of the factory system which improved sanitary arrangements of dwellings, better water supply, purer air, more satisfactory drainage, are not sufficient to eradicate. I mean the increased and increasing employment of women in factories. . . . Evidence has been given again and again of the unhappy consequences to child-life and infant development of the working of the mothers in factories. A great deal has been advanced lately against the impolicy of placing any restrictions upon the labour of adult women and upon securing to them the power of making contracts as adult men, and even those who admit the force of these principles cannot shut their eyes to the evils which have existed and still exist in the employment of mothers in factories, and which from the demand for adolescent and adult female labour in factories are not likely to subside of themselves. The abstention from factory labour of women for a month or six weeks after confinement would to a small extent mitigate the evil as regards their more certain restoration to health, but it would not touch the evils of the loss to the infant of its natural food and of maternal care and love. . . . Here is a question which demands our most serious consideration, whether, either by means of legislation or by other less direct but as effective means, the health of the mother and well-being and physical development of the offspring can be protected, so as to prevent eventual deterioration, and to promote health and happiness in so large a population as our factory operatives. (Pages 25-26.)

British Sessional Papers. Vol. XVII. 1892. Select Committee on **GREAT BRITAIN**
Shop Hours Bill.

Paper handed in by the Chairman. Petition in favour of the Early Closing Bill. 1888. (Presented by Sir John Lubbock.)

To the Honourable the Commons of the United Kingdom of Great Britain and Ireland, in Parliament assembled.

We, the undersigned medical men, having had our attention called to the very late hours to which shops are open, and being satisfied that such prolonged hours of labour are grievously injurious to the health especially in the case of women, pray your Honourable House to Enact the Early Closing Bill, introduced by Sir John Lubbock. . . . And your Petitioners will ever pray.

| | |
|------------------------------|-----------------------------------|
| J. MATTHEWS DUNCAN | 71 Brook Street. |
| JOHN MARSHALL | 16 Savile Row, W. |
| WM. S. SAVORY | 66 Brook Street, W. |
| SAMUEL WILKS | 72 Grosvenor Street. |
| JAMES PAGET | 1 Harewood Place. |
| WM. O. PRIESTLEY | 17 Hertford Street, Mayfair. |
| W. S. PLAYFAIR | 31 George Street, Hanover Square. |
| RICHARD QUAIN | 67 Harley Street. |
| ANDREW CLARK | 16 Cavendish Square. |
| And 298 others. | |

(Page 238.)

British Sessional Papers. Vol. XXXIV. 1893. Royal Commission on Labour. Group C.

Mr. Kenneth M. Milligan, Scottish Shopkeepers' and Assistants' Union:

30962. . . . I have letters here from a good many eminent physicians in Glasgow proving that not only want of sanitary conveniences, but the long hours, and the long time that the girls especially have to stand, is very injurious to their health. I have one letter here from a doctor to whom I wrote, Dr. Yellowlees, from the Gartnavel Asylum, Glasgow. It says, "I am sure that the long hours of shop assistants are injurious to health, and that much might be done to lessen the evil. The mental disorders which I have observed in shop girls have been chiefly traceable to bodily weakness and poverty of blood, caused by confinement and long hours." (Page 434.)

British Sessional Papers. Vol. XXXVII. 1893. The Royal Commission on Labour: Employment of Women. Reports by Misses ORME, COLLET, etc.

I have also evidence from Dr. Edmestoun, who has had several opportunities for acquiring knowledge of conditions among shop assistants, and who writes he "can bear testimony that the long system of shop hours is exceedingly injurious to young women and is undoubtedly the cause of a train of particular ailments such as anæmia, nervous disorders, constipation, indigestion, and a large number of diseases peculiar to young women. (Page 287.)

British Sessional Papers. Vol. XII. 1895. Report of Select Committee on Shops (Early Closing) Bill.

Witness, Dr. Percy Kidd, M.D., University of Oxford, Fellow of the College of Physicians and Member of the College of Surgeons; attached to the London Hospital and the Brompton Hospital:

5281. . . . The most common effect I have noticed of the long hours is general deterioration of health; very general symptoms which we medically attribute to over-action, and debility of the nervous system; that includes a great deal more than what is called nervous disease, such as indigestion, constipation, a general slackness, and a great many other indefinite symptoms. (Page 215.)

5303. Have you ever had any complaints from women who come as patients of their being obliged to stand at their work so long? — Yes, I have heard that complained of in many cases. . . . 5313. It is disadvantageous for women to stand too much, is it not? — Yes, it is, 5314. But you do not think many break down from that cause, do you? It is difficult to separate that from the general exhaustion which results from long hours . . . 5322. Then you would not like to say that you speak with any authority in particular as regards the shop assistants, would you, and that it is a class which has bad health? — It is a class which is very liable to these complaints, as far as my experience goes, especially this general debility, which is more frequent in them than in other classes. I will not say it is confined to shop assistants; it affects factory workers as well. (Pages 216-217.)

British Sessional Papers. Vol. VI. 1901. Report from the Select Committee of the House of Lords on Early Closing of Shops. **GREAT BRITAIN**

5. We [the Committee] are able, however, to appeal to the highest medical testimony as to the injury thus caused (long hours — especially on women). In 1888 presidents of the two great medical colleges with some of the other leaders of the medical profession, Sir James Paget, Sir Andrew Clark, Dr. Matthews Duncan, Mr. John Marshall, Dr. Playfair, Dr. Priestly, Sir Richard Quain, Sir Wm. Savory, Sir Samuel Wilks, called the attention of Parliament to the subject and urged the passing of the Early Closing Bill.

6. Considering the weight which belongs to that memorial, the Committee did not deem it necessary to multiply medical evidence on the subject. The presidents, however, both of the College of Physicians and of the College of Surgeons, have come before us and spoken strongly on the great and increasing evils of the present long hours. (Page v.)

Witness, Mr. J. G. Beaumont, Representative from the Birmingham and District Retail Drapers and Hosiers' Association:

348. The House of Commons Committee reported in 1886 that these long hours were prejudicial and often ruinous to health; have you any evidence on that point? . . .

Sir James Sawyer, wrote: "The manifold evils which arise in impaired health, induced diseases and shortened lives from working too long by day, and especially in a standing posture and in impure air, are well known to physicians, and are prominent and preventable causes of human suffering." Dr. Jordan Lloyd wrote: "Weakened bodies and enfeebled minds are necessary consequences of prolonged confinement and monotonous occupation." . . .

"Dr. Malins wrote: "My experience undoubtedly tells me that the long hours of female shop assistants are highly detrimental to their health." . . .

. . . I might say that, in my own experience, when I was about 19 years of age I was working for 74 hours per week, and the effects of the long hours on Saturday, breathing the vitiated atmosphere of the shop, was to produce vomiting and ultimately a stomach trouble which took me from my business for over a year, and it was really in consequences of my own experience of the physical injury which resulted from such long shop hours that I devoted some attention to the reform movement. (Page 28.)

Witness, Sec. Scottish Shopkeepers Association :

1034. . . . Professor McKendrick, of Glasgow University, who is identified with our movement as Honorary Vice-President, . . . says "I have no doubt whatever that the long hours and confinement of shop assistants are injurious to health, and I am glad in a general way to express that opinion." . . . Then Dr. Yellowlees, Governor of the Glasgow Royal Lunatic Asylum, writes: "I am quite sure that the unreasonably long hours and close confinement of shop assistants are a great evil, and are often not only a great hardship, but very injurious physically, mentally, and morally." (Page 75.)

Witness, Sir William S. Church, President of the Royal College of Physicians:

2292. Before this committee we have had evidence that the hours of labour are still as long as they were then (*i. e.* in 1886), that they still range from 80 to 90 per week, or 14 hours a day; and the point upon which the committee would be glad to have your opinion is whether you concur in the view expressed by the medical men at that time, that such long hours of labour are grievously injurious to health and often ruinous, but especially in the case of women? — I think it is self-evident that 14 hours a day of that sort of confinement must, in the long run, be prejudicial to the health of those who are exposed to it. (Page 107.)

2474. . . . I consider that the long hours in themselves deprive a man of the physical enjoyment of life. They prevent him from taking a sufficient amount of daily exercise; they prevent him being in an adequate degree in the open air. All that entails loss of appetite, and loss of strength, and loss of active interest in life from the physical point of view, and therefore I think it to be a thing to be discouraged. (Page 121.)

British Sessional Papers. Vol. XII. 1902. Report of the Chief Inspector of Factories and Workshops.

Ten and a half hours sitting bent over stitching, requiring very careful attention, with two intervals so short that only a hasty meal can be eaten, that there is no time for exercise, even were the workers permitted to go out, and that, day after day, might well try the strongest constitutions and ruin the best digestions and nerves. That its effect on the health is injurious is constantly brought before one, and anæmic and heavy-eyed workers who suffer from neuralgia who form too large a proportion of the whole number, make one feel very strongly that some reform is needed. (Page 176.)

*British Sessional Papers. Vol. XXXIII. 1904. Report of Inter-
departmental Committee on Physical Deterioration.* **GREAT
BRITAIN**

147. Miss Anderson, Chief Lady Inspector of Factories, gave a classification of the sources of injury to health, life and limb, from factory employment as follows:

1. Accidents.
2. Poisoning and damage from toxic agents, or excessive dust, fumes, etc.
3. Overfatigue.
4. Defective ordinary hygiene.

As regards the first two, men suffer most, as regards the third, women. And on this head Miss Anderson as well as Dr. Scott thought there had not been a sufficient amount of scientific study. . . . In many cases hours are too long for women, and in some industries, especially the clothing trade and dressmaking, there are not sufficient pauses for food. Laundries and food-preserving industries give an example of too long hours; and excessive strain by carrying heavy weights takes place in food-preserving works, bleach and dye works, earthenware and china works, and various metal trades. (Page 28.)

The Pioneer of Progress. JOHN DENNIS. London, Hamilton, Adams, 1860.

But close and prolonged confinement, at the desk or in the warehouse and shop, will enervate the strength of even the strongest constitution. The want of time for anything beyond the daily task-work, the monotony and hopelessness of toil which ceases not except on the Sunday, and often not then, and the stolid listlessness, and in many cases the dissipation, which are thus induced, very greatly affect the health, and as far as the evil extends destroy the high courage and athletic vigour which formed at one time the conspicuous heritage of Englishmen. (Pages 34-35.)

Hours of Labour. GEORGE J. ECCARIUS. London, Office of Labour Representation League, 1872.

The death rate settles all disputes as to the effect of overwork on health and life. On two recent occasions the death rate has proved that constant work, which is generally synonymous with overwork,

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is more dangerous to life than a certain amount of privation. During the cotton famine the death rate of Manchester fell, and when all work stopped in the East of London, and the distress of the poor was at its height, the death rate of St. George's in the East sunk to the level of the most favored districts. (Page 27.)

A general reduction of the hours of labour is necessary on social, economical, sanitary, and moral grounds, and is demanded by the working classes all over the world. (Page 29.)

The Hygiene, Diseases, and Mortality of Occupation. J. T. ARLIDGE, M.D., A.B., F.R.C.P., *Late Milroy Lecturer at Royal College. London, Percival, 1892.*

Excessive exertion may operate either over a long period and produce its ill results slowly, or be sudden and severe. . . . When such people are seized by some definite lesion, attention is so completely attracted to it that the antecedent over-toil laying the foundation for the malady is apt to be overlooked. (Page 16.)

The want of exercise of the body induces general torpidity of functions, reduces lung capacity and respiratory completeness, and the activity of the abdominal muscles, which aid both respiration and the functions of the digestive organs. Hence, the proclivity to venous stasis (congestion), particularly in the pelvis and lower extremities and in the rectal vessels, with the production of constipation, — and in women of menstrual difficulties. — add to these disorders of digestion in their multiform shape, debilitated muscular power, and a low vitality and vigor generally. (Page 19.)

GERMANY *Jahres Berichte der k. Preussischen Gewerbeberäthe.* [Report of the Royal Prussian Industrial Commission. 1894.] Berlin, 1895.

While the legally restricted working day has been introduced throughout in establishments coming under the law, such is not the case in the smaller work places or in the laundries, where the health of the working women is still seriously endangered by the long hours of work frequently spent in unsanitary, ill-ventilated rooms. (Page 252.)

An excessive working day obtains in the laundries, where the hours are almost always from 12 to 14 . . . so long a work day as this, and under such conditions cannot but be regarded as ominous for

health, and in fact its bad result is proved by the records of the laundresses' sickness funds. (Page 252.) GERMANY

Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten, XXI, 1896. [Official Information from Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1897.

Complaints are not lacking about the unhealthful influence of industry on physical development. The inspector for Dantzig writes: "On account of the predominatingly rural character of the region the women alternate between factory and outdoor work and seldom remain for a long time in the factory. Consequently their health is good even in comparatively unhealthy trades such as rag-picking, etc., and occupation diseases are not found here." (Page 246.)

The occupations of women show no ill results upon morals, but there are cases where physical development is injuriously affected and definite ailments fostered. In weaving rooms and other places where women are obliged to stand at their work varicose veins are more than commonly frequent and naturally enough occur more frequently among the married women. Zittaw. (Page 249.)

As to the effect of industrial work on health it is undeniable that when women can work out of doors (as in tile works) they always have a healthy and vigorous appearance. But in industries where they are compelled to sit for a long working day this is not the case. The workwomen of the large cities make a distinctly poorer impression in their appearance than those of country districts. Posen. (Page 250.)

Most of the working women who are no longer young, that is from about 30 years upward, give the impression of being chronically overtired. They look badly, worn and old. But the younger workingwomen now have a fresher, more robust appearance than formerly. Here we see the good effects of the prohibition of child-labor and the improved hygiene of workrooms. True, during the years of youth the favorable and unfavorable influences of occupation, affecting the female organism, appear to balance each other, but the latter outweigh the former as time goes on. The long standing, in itself, causes serious disturbances of the female organism. There is no difference of opinion among the medical profession on this point. When first youth is past these injuries make themselves felt. (Page 251.)

GERMANY *Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten, XXII, 1897.* [Official Information from the Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1898.

. . . The results are shown in an incredible extent of chlorosis, tuberculosis, nervous diseases, and genital disorders. (Page 263.)

The inspector for Baden writes that a physician had called his attention to the inordinate length of working hours in laundries, where work is often carried on until late at night. The physician finds a shockingly large number of cases of swollen veins and varicose ulcers among these people, as well as conjunctival inflammations of the eyes.

The ironers had the appearance of utter exhaustion; they were anæmic, and tuberculosis was not unusual among them. The at times extreme length of hours in laundries is also specified in the report from Leipzig. (Page 264.)

Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten, XXII, 1897. [Official Information from the Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1898.

The physicians connected with the local insurance against sickness in Aachen, in reply to a question of the president as to how far they attributed ill-health among adult working men to extremely long hours of work, replied that the freedom of employers to work their men without legal restriction had certainly led to grave abuses, and that there were workmen who at times were subject to over-exertion that could not but be prejudicial to health. (Page 240.)

In the interest of the workingmen's health it is greatly to be regretted that such long hours are prevalent . . . especially as experiments have so often shown that product has not been lessened by reduction of hours of work. It is greatly to be desired that the physically broken down factory workers (of this region) might have the beneficent aid of a maximum working day.

Well-meaning and clear-sighted employers lament the conditions, but can do nothing individually.

One employer declares that "the very fact that weavers who have 3 or 4 looms to attend to cannot even stand up straight, because they must keep them continuously going — is reason enough for a shorter day." (Page 241.)

Bad conditions are prevalent in tailoring and shoemaking. . . . GERMANY
 The results of excessively long hours and bad conditions are seen in the pale faces, round-shouldered attitude and low vitality of these workers. Their most apparent disease forms are articular rheumatism, eye troubles, chest and lung diseases, inflammation of the joints and of the abdominal organs. In order to overcome the evils of shoemaking and tailoring, there should be the same regulation of working time and pauses as in bakeries. (Page 259.)

Jahresberichte der Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr 1901. [Reports of the Factory Inspectors in the Kingdom of Württemberg, 1901.] Stuttgart, Lindemann, 1902.

Human physique has not progressed proportionately with the perfection of machinery, — on the contrary, there are signs that it is suffering deterioration, and it is therefore not surprising that the workman's body cannot for a long stretch of time keep pace with the machine and the extensive demands it makes upon his attention and vigilance, without suffering serious injury to health. The efforts made in consequence by the workers to preserve their health (their only capital) by attaining a reduction of working hours and a legal normal day are entirely justifiable. (Page 14.)

Jahresberichte der Gewerbeaufsichtsbeamten und Bergbehörden für das Jahr 1903. Bd. I: Preussen. [Annual Reports of the (German) Factory and Mine Inspectors for 1903. Vol. I. Prussia.] Berlin, Decker, 1904.

Although laundries are usually ample enough, yet the workwomen here incur dangers to health from the hot stoves . . . from the continuous standing, the strenuous character of the work and the unreasonably long hours, which even robust constitutions can hardly resist for any great length of time. (Page 58.)

Die Arbeitszeit der Fabrikarbeiterinnen. Nach Berichten der Gewerbeaufsichtsbeamten bearbeitet im Reichsamt des Innern. [The Working Hours of Women in Factories. From the Reports of the (German) Factory Inspectors Compiled in the Imperial Home Office.] Berlin, Decker, 1905.

The Inspector for Erfurt urges the introduction of the ten-hour day for women because "eleven hours' daily toil in a factory is ex-

GERMANY tremely exhausting for the weaker physical organization of woman. Although perhaps under good sanitary conditions of work no direct injury to health may be traced to the eleven-hours day, still it is certain that women and girls who work in factories are worn out much sooner than those who do not. The factory worker who has most likely a poor physical inheritance to contend with, and is poorly nourished, is liable to frequent attacks of sickness."

Report for Cassel: The ill effects of factory work for women are most marked in those cases where long hours are joined to heavy work. The female frame is not strong enough to resist the harmful influence of such work for any length of time. Although the ill effects may not show themselves at once, it is not unlikely that injuries to health which manifest themselves years after may be traced back to former work in the factory. The total exclusion of women from the factories is not at present contemplated, but the introduction of the ten-hour day will tend towards reducing the harmful influence of factory work. (Page 107.)

Jahresberichte der Gewerbeaufsichtsbeamten und Bergbehörden. Bd. III. [Reports of the (German) Factory and Mine Inspectors for the Year 1906. Vol. III.] Berlin, Decker, 1907.

Elsass-Lothringen:

The efforts toward establishing shorter hours are so gratifying that it is all the more regrettable still to find a number of industries, even some which stand high, retaining the systematically long hours of work which are bound to exhaust prematurely the mental and physical power of the workers. (Pages 26, 64.)

Annalen des deutschen Reichs. Bd. XXI. 1888. [Annals of the German Empire. Vol. XXI. 1888.] Der internationale Schutz der Arbeiter. [International Labor Legislation.] Dr. GEORGE ADLER, University of Freiburg. Berlin, 1888.

The results to the worker of an unduly long working day are easy to perceive. His health, his energy, and working capacity are undermined. His body becomes more receptive to disease; his family life is ruined. His whole time is spent in work, except for the sleep that is necessary to maintain life — with the result that he is deprived of all that tends to culture and is reduced to a purely animal existence. (Page 482.)

Handbuch der Hygiene. Bd. 8^e. [Handbook of Hygiene. Vol. 8^e.] GERMANY
 Edited by Dr. THEODORE WEYL. *Allgemeine Gewerbehygiene*
und Fabrikgesetzgebung. [General Industrial Hygiene and
Factory Legislation.] Dr. EMIL ROTH. Jena, 1894.

Among the dangers of occupation in the more restricted sense those injuries that are induced by a too prolonged working time and by too heavy an amount of work take first place.

It is evident that the health of even the most robust workingman suffers if he is compelled to exceed the limits of his physical capacity — if wearied organs are denied the necessary reparation. There must be, therefore, in every case a relation between the length of working time and severity of work if occupation dangers are to be considered. (Page 26.)

Berichte über die Fabrikinspektion in der Schweiz im Jahr 1879. SWITZER-
[Reports of the Swiss Factory Inspectors, 1879.] Bern, Stämp-
flische Printing House, 1880. LAND

It is a great pity that, in estimating the pros and cons of the "normal day of work," so little consideration is paid to the results of the long hours both on the physical and moral well-being of the worker.

In going about in the embroidery regions, one hardly thinks of physical drawbacks, when seeing the factories, which are usually clean, light, and airy; but when one meets men who, formerly robust, have lost their healthy looks after a few years of the excessively long hours of work and who are now worn out and unstrung; when one hears embroiderers of 48 years called old and invalid, one feels like inquiring further. It will be found that the work is in itself extraordinarily strenuous. . . . The physicians in these regions universally affirm the extreme danger to health in the unreasonably long hours of work. (Page 14.)

Berichte über die Fabrikinspektion in der Schweiz im Jahre 1881.
[Reports of the Swiss Factory Inspectors, 1881.] Schaffhausen,
Brodthmann, 1882.

When the normal day was introduced by law for factory workers, it was first of all based on reasons of health. More and more numerous protests had been made as to the excessive labor imposed upon

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the worker, and the injury to health and strength that was being suffered by our people was emphasized on all sides. Measures of prevention against these abuses were regarded as counselled by nature, which provides men with the instincts of self-preservation. To these reasons were added others of a social nature. It was hoped to elevate the working classes morally and intellectually, to give them more time for family life, social amenities and education. (Page 13.)

Sixth International Congress of Hygiene and Demography, Vienna, 1887. Part XIV. Sec. on Hygiene. Fabrikhygiene und Gesetzgebung. [Factory Hygiene and Legislation.] Dr. FRIDOLIN SCHULER, *Swiss Factory Inspector, Vienna, 1887.*

In the factory inspection reports of many countries there may be found ample observation of the destructive influence of long hours. Thus a Saxon report says of glassmakers "they have high wages, and live well, but do not live to old age. They have excessive hours of work." (Page 35.)

Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [Investigations into the Conditions of Health of the Swiss Factory Workers.] Dr. FRIDOLIN SCHULER, *Swiss Factory Inspector, and Dr. A. E. BURCKHARDT, Prof. of Hygiene at Basle. Aarau, Säuerländer, 1889.*

Labor of an exacting kind, involving extreme muscular exertion, must, if it is long continued, have an injurious secondary effect on every part of the body. (Page 176.)

BELGIUM

Royaume de Belg'que. Commission du Travail. Institutée par Arrêté Royal du Avril 15, 1886. [Royal Belgian Labor Commission, 1886.] Réponses au Questionnaire concernant le Travail Industriel. T. I. [Questions and Answers on Industrial Work. Vol. I.] Brussels, Lesigne, 1887.

Question 10. As to unemployment.

Answers: 783. . . . The workers' health often improves at times of forced unemployment; so true is it that excess of labor harms health more even than poverty harms it. (Countess de Stainlein-Saalenstein.) (Page 100.)

Royaume de Belgique. Conseil Supérieur du Travail, 1907. Règlementation de la Durée du Travail des Adultes. [Belgian Higher Council for Labor. Regulation of Hours of Work for Adults.] Brussels, 1907. **BELGIUM**

Report of Van Cauwenburgh and Baron Snoy:

Excessive requirements which are beyond the strength of the workman and exhaust him prematurely, show themselves in three ways:

1. In depriving the worker of a day of rest after a number of days' work.

2. In subjecting him to night work more wearisome and more exhausting than day work.

3. In overstraining him by prolonged toil during excessive daily working hours. (Page 32.)

Etude sur l'Influence de la Durée du Travail Quotidien sur la Santé générale de l'Adulte. [Study of the Effect of the Length of Working Hours upon the General Health of Adults.] Dr. ILIA SACHNINE. Lyon, 1900. **FRANCE**

There is a weighty factor, over and above such external conditions as housing, nutrition, etc., etc., which exercises a widespread influence upon the health of the people. This is no other than the duration of the working hours of wage-earners. The day's work of the workman, the shop girl, . . . is too long. (Page 20.)

Revue d'Hygiene. T. 26, 1904. Enquête sur la Situation Sanitaire des Ouvriers du Textiles dans l'Arrondissement de Lille. [Inquiry into the Sanitary Conditions in the Textile Trades in Lille and its Environs.] Dr. D. VERHAEGHE. Paris, Masson.

The longer the working hours and the whole period of occupation in the mills the less probability is there that the textile worker may retain his health unimpaired. (Page 1066.)

42.08 to 100 of the textile workers had poor health. . . . Some ailments were due to bad hygienic conditions, . . . the others were due rather to physical overstrain. (Page 1078.)

ITALY *La Règlementation Légale du Travail des Femmes et des Enfants dans l'Industrie Italienne.* LIONEL BAUDOIN. [*Labor Legislation for Women and Children in Italian Industry.*] Paris, Paulin, 1905.

At the International Congress at Milan, on accidents among the laboring class, in May, 1894, Mr. Luigi Belloc (Factory Inspector of the Department of Labor) represented Italy. He stated that the continuous motion of the body taxes the nervous system, causing the gravest troubles. The sewing-machine, which requires of the operator 40,000 movements a day, causes in the long run abdominal and renal troubles, disarrangement of the menstrual function, and falling and deviations of the uterus. Functional weaknesses and paralysis are the result of the continual performance of the same movement. The necessity of standing or sitting for the whole day causes malformation of the body or curvature of the spine, as a result of the strained position. The attention required in watching a machine, especially an automatic one, is very fatiguing, on account of the large number of wheels operating at the same time which need attention. . . .

Tuberculosis spreads with alarming rapidity, especially among cotton and wool weavers. Those whom tuberculosis spares drag along with anæmia, the most common malady of the women factory workers, especially the textile workers, who are subject to long hours of labor. . . .

For the cotton industry in particular Mr. Luigi Belloc demands the ten-hour day. (Pages 14-16.)

AUSTRIA *Berichte der k. k. Gewerbe Inspektoren über ihre Amtstätigkeit im Jahre 1886.* [*Reports of the (Austrian) Royal and Imperial Factory Inspectors for 1886.* Vienna, 1887.

The most frequent cause of disapproval by the inspector lies in the employment of girls between 14 and 16, not indeed on account of hard work, but because of excessive hours of work. This is found in many lines of industry . . . (flower-making, etc.). The adult women, too, in these lines are excessively overstrained by the unreasonably long hours, and their health is severely injured thereby, the more so because of artificial light, etc., etc. (Page 38.)

It is greatly to be desired that these (jute) factories, where mostly women and very young men are employed, and where extreme attention must be continuously given to the machinery; where, more-

over, the work requires almost continuous standing and where dust and jarring are especially marked, — should establish a shorter working day. By reason of the disadvantages mentioned, the hours of work ought to be diminished. (Page 14.)

(General remarks:) In close relation to the efforts made for the protection of life in industrial occupations are all those special provisions for minimizing special dangers arising from heat, dust, etc., for it must be remembered that all influences that are in themselves injurious, such as the constrained bodily posture, dampness, etc., assume a vastly greater dangerous quality by reason of the very considerable proportion of his life during which the workman is exposed to them. (Page 11.)

Eighth International Congress of Hygiene and Demography in Budapest, 1894. Vol. VII, Sec. V. Über das Verhältniss der Dauer des Arbeitstages zur Gesundheit des Arbeiters und dessen Einfluss auf die Öffentliche Gesundheit. [The Length of the Working Day in its Relation to the Workman's Health and its Influence upon Public Health.] Dr. E. R. J. KREJČSI, Vice-Secretary of the Chamber of Commerce in Budapest. Budapest. 1896.

All accumulated experience and evidence fully justify the conclusion that the length of working time is of weighty importance to the workman's health and that overwork is accompanied by most harmful consequences to the organism.

As a matter of fact, practising physicians observe among persons with excessive hours of work, such as bakers, tailors, sewing women, shop girls, etc., definite disturbances of health for which they hold the long hours directly responsible. And yet a direct proof of every injury resulting from overwork is almost unattainable. For, connected with the overwork are other and related factors that are injurious, such as a fixed artificial posture, or dust, or poisons, insanitary shop and factory, or insufficient nutrition, and it is often almost impossible to separate their effects. Other complicating factors might also be adduced in many cases, such as insufficient sleep, great haste at meals, imperfect safety appliances in the lesser industries. Nevertheless the relation of long working hours to health is, in certain forms of ill health, easily demonstrable. So, for instance, in certain trades, definite maladies result from too long standing. . . . Others equally definite are caused by too long sitting . . . and others are conspicuous

AUSTRIA as resulting from excessive muscular over-exertion. . . . Now, though we may say, in such cases, that the injuries to health are the direct results of standing, sitting, or lifting, there can scarcely be room for disagreement when we take it to be a settled fact that the *underlying relation* of the length of the working hours to the state of the health is clearly established.

Taking for granted that all other conditions (nutrition, housing, general sanitation, etc.) remain unchanged, this difference of time in the occurrence of sickness must be attributed to the *excessive hours of work, which reach beyond the limits of endurance.* (Page 327.)

UNITED STATES *New Hampshire. House Journal. June, 1847. Report recommending Shortening Hours of Labor, Regulating Child Labor, and Establishing 10-hour Day.*

Their duties do not generally require great exertion of physical strength, but are rendered fatiguing by the constant attention required by the rapid and increasing motion of the machines, attended by a constant noise and jar which are distracting to persons unaccustomed to the mills.

It seems certain to the undersigned that labor of this nature cannot be continued any great length of time without serious injury to the health of the operatives. . . . If the slow and fearful diseases which this mode of life tends to bring on are escaped, a loss of strength and activity must ensue from it, which may result in the perpetual evil of a sickly and enervated population in all the large manufacturing towns. (Page 476.)

Massachusetts House Documents. No. 153. 1850. Minority Report Re Limitation of Hours of Work.

Excessive labor not only debilitates the body, and thereby exposes it to disease, but also tends to exhaust the mental powers, and thus expose the whole moral and intellectual character to undue and dangerous depression. To this evil and danger the factory operatives — that large and valuable class of the population of this State which by their labor produce so large a portion of its material wealth — are especially exposed. (Page 19.)

Massachusetts House Documents. No. 98. 1866.

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Dr. Jarvis, physician of Dorchester, says:

Every man has a certain amount of constitutional force. This is his vital capital, which must not be diminished. Out of this comes daily a certain and definite amount of available force, which he may expend in labor of muscle or brain, without drawing on his vital capital. He may and should work every day and expend so much force and no more, that he shall awake the next morning and every succeeding morning until he shall be threescore and ten, and find in himself the same amount of available force, the same power, and do his ordinary day's work, and again lie down at night with his . . . constitutional force unimpaired. (Page 36.)

Judging by this standard, there can be no doubt of the serious injury often resulting from overwork, even when no palpable evidence appears. (Page 36.)

Dr. Ordway, practising physician many years (in Lawrence), has no hesitation in saying that mill work, long continued, is injurious to bodily and mental health, and materially shortens life, especially of women. (Page 63.)

Massachusetts Legislative Documents. Reports of Commissioners on the Hours of Labor. House. No. 44. 1867.

Workmen and . . . women are held under the present customs and ideas to at least five hours each half day of continuous work, often in the most tedious, minute, and monotonous employ. It is assumed . . . that they have no lower limbs to ache with swollen or ruptured veins, no delicacy of nerve, or versatility of mind, to revolt from such severity of application. (Pages 66-67.)

Report of the Massachusetts Bureau of Statistics of Labor. 1870-71.

"The 11th hour was the worst — we are worn out and we feel that we can't get off as much work. That hour is a great deal worse than the first hour. I feel faintly when I come out of mill at night, and I did not when I worked 10 hours. That last hour is dreadful bad." An operative. (Page 499.)

"Has lived in twenty different factory towns, and has observed that young women who work in the factories are many of them ruined

"in morals and nearly all in health. A rosy-cheeked girl put in a mill will begin to fade in three months." G. Bootcutter. (Page 606.)

Report of the Massachusetts Bureau of Statistics of Labor, 1872. Domestic Labor and Woman's Work.

In the cotton mills at Fitchburg the women and children are pale, crooked, and sickly-looking. The women appear dispirited, and the children without the bloom of childhood in their cheeks, or the elasticity that belongs to that age. Hours, 60 to 67½ a week. (Pages 94-95.)

Rhode Island. Governor's Message. 1875.

Henry Howard:

It seems to me that the time has come for considering the question of regulating by legislation the hours of employment of women and children in our factories. . . . I know that many regard it as wisest to leave such matters to their own adjustment. Protracted observation and some experience lead me to an opposite conclusion. Work in our factories is largely made up of the labor of women and children. The disposition of the former to sacrifice enjoyment, comfort, health, nay, even life itself, to the pressing demands of family necessity, is well known. . . . In trades which are mainly occupied by men, ten hours is allowed to constitute a day's work. Why should women and children be compelled to labor at an employment quite as trying both to brain and body, and more confining than almost any other, for a longer period of time? Experience shows that impaired health is most frequent in those mills which run the greatest number of hours daily. (Pages 16-17.)

Report of the Massachusetts Bureau of Statistics of Labor, 1884.

We secured the personal history of these 1032 of the whole 20,000 working girls of Boston, a number amply sufficient for the scientific purposes of the investigation. (Page 5.)

Long hours, and being obliged to stand all day, are very generally advanced as the principal reasons for any lack or loss of health occasioned by the work of the girls. (Page 69.)

Report of the New Jersey Inspector of Factories and Workshops. 1885. UNITED STATES

Dr. Gledden, the town physician, testified that the employees of the mills were not as healthy as those outside, and this he fairly attributed to the long hours of labor. (Page 46.)

Report of the New York State Factory Inspectors. 1887.

Inquiry among those females above the statutory age who worked twelve and fifteen hours a day in printing offices, candy factories, woolen mills, and other manufacturing establishments, elicited the information that the women who labor these long hours were more subject to fits of nervous prostration and debility than those who worked the normal day of ten hours. (Page 28.)

Report of the Maine Bureau of Industrial and Labor Statistics. 1888.

Many saleswomen are so worn out, when their week's work is ended, that a good part of their Sundays is spent in bed, recuperating for the next week's demands. And one by one girls drop out and die, often from sheer overwork. This I know from observation and personal acquaintance. (Page 142.)

Report of Pennsylvania Factory Inspector. 1895.

Great is my disappointment when advised of overtime, in visiting the premises in question, to find, out of a force of upward of a hundred or more, from four to ten minors are employed. Their time is at once curtailed, while the other goes merrily on grinding out the very lives of these beings called women. It may be that they were intended to fill the places of such, but their very industrial environment, being utterly slavish, soon makes of them subjects not for home grace and beauty, but rather a physically degenerating class fit only for treatment in the hospital and home. It would be interesting to secure an exact statistical record based upon this particular question, the effect of overtaxation upon women's physical health caused by long hours and arduous labor. (Pages 17-18.)

Report of the New York Factory Inspector. 1897.

In our opinion there seems to be no good reason why there should be any age limit at all placed on the hours of labor of any working

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woman. The restrictive clause limiting the hours of toil to sixty per week should apply to all females irrespective of their age.

Any woman employed at manual labor for ten consecutive hours per day and constantly employed, is performing a task beyond her strength, whether she is just under or over twenty-one years of age. (Pages 25-26.)

Report of the Michigan Bureau of Labor Statistics. 1898.

The long working hours, the close air of the shop, with the cold lunch hastily eaten, are no small factors in the rapid change of appearance and health many of these women and children undergo in the first few years of factory life. (Page 77.)

Report of the New Jersey Bureau of Statistics of Labor and Industries. 1902.

The weak, physical condition of the operatives, especially the females, is very noticeable. (Page 378.)

The long hours of labor, frequently ten or twelve, and the foul air of the workroom is most marked in its effects upon the female operatives. In addition to throat and lung diseases, which are almost equally prevalent among both sexes, the suffering of the female operatives from causes peculiar to the sex is very greatly aggravated by the conditions under which they work. (Pages 377-378.)

A physician of high standing whose practice is largely among the operatives of these mills is authority for the statement that a large majority of female mill-workers are sufferers from some one or more of the organic complaints brought on or intensified by the conditions under which they work. If no such disease existed before entering the mill, it was almost sure to develop soon after beginning work; if it did exist before, it was aggravated to a degree that made them easy victims of consumption.

The long hours of labor, being constantly standing, the foul air of the workroom, and, more than all, the ceaseless vibration of the floor from the motion of the great mass of machinery are the prime factors in producing these diseases. (Page 378.)

Report of the Minnesota Bureau of Labor Statistics. 1901-1902.

A writer in the British Medical Journal (September 2, 1899), in discussing the influence of prolonged standing in the production of

women's diseases, declares that while only a comparatively small number of factory and shop girls break down at an early age, forty per cent of married women who have been factory or shop girls "come under medical attention for pelvic troubles under thirty years. The girls are broken down and wearied, but keep at their work by force of circumstances." (Pages 339-340.)

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(2) INJURIES TO THE FEMALE FUNCTIONS AND CHILDBIRTH

The evil effect of overwork and continuous standing before as well as after marriage is marked and disastrous upon the female functions and childbirth.

British Sessional Papers. Vol. XXI. 1833. [Second Report of . . . the Commissioners for inquiring into the Employment of Children in Factories . . . and Reports by the Medical Commissioners. Dr. HAWKINS (Lancashire district). ELIZABETH TAYLOR, Midwife . . . 9th May, 1833.

GREAT
BRITAIN

... Are miscarriages more common among factory women than among others whom you attend? — Much more frequent among the factory women. . . .

Do you find the children of factory women are as healthy when first born as those of other women? — No, certainly not; they are more delicate. . . . You often examine the persons of factory wives; do you often find any hurt or blemish? — I often find their feet and legs swelled. . . .

Whom do you find most lean, the factory wives or the others whom you attend? — The factory wives are a good deal more lean. (Page 14.)

Hansards' Parliamentary Debates. Vol. LXXIII. 1844.

Lord Ashley:

Many anatomical reasons are assigned by surgeons of the manufacturing towns, that "the peculiar structure of the female form is not so well adapted to long-continued labour and especially labour which is endured standing." Mr. Smith of Leeds declares:

"This [the operation of the factory labour] occasionally produces the most lamentable effects in females when they are expecting to become mothers."

On the anatomical difficulty of parturition, he states:

"It is often the painful duty of the accoucheur to destroy the life of the child. I have seen many instances of the kind, all of which, with one exception, have been those of females who have worked long hours in factories. (Pages 1089-1090.)

He (Mr. Saunders) often witnesses the effect of so much standing when parturition comes on, adding:

"Work in the night is the most injurious; it is unnatural, and not adapted to the constitution of women."

Another surgeon of great experience in Lancashire, writes to me that . . .

"The effects of long-continued labour in factories become more apparent after childbirth. The infants are at birth below the average size, have a stunted and shrivelled appearance. . . . Miscarriages very frequent, and all the physical and surgical mischiefs of mistreated pregnancy — varicose veins produced by the continued evil practice — aggravated greatly in pregnant women. Again troublesome ulcers of the legs, arising from varicose veins which, in some cases, burst, and bring on a dangerous and sometimes fatal hemorrhage. The practice of procuring abortion is very frequent even among married women."

I have, moreover, the personal testimony of several females to the truth of these statements they speak of — the intolerable pain in their breasts by such long absences from children, and the suffering of returning to work within ten days of confinement. (Page 1093.)

"Very young children (says Dr. Johns) are, by the existing system, not sufficiently taken care of by their mothers; as regards themselves during gestation, and their offspring, after childbirth — the women during pregnancy continue as long as possible at their work. (Page 1094.)

British Sessional Papers, Vol. LV. 1873, Report to the Local Government Board on Proposed Changes in Hours and Ages of Employment in Textile Factories. J. H. BRIDGES, M.D., and T. HOLMES.

Experience afforded by residence in the worsted manufacturing town of Bradford, and extensive practice among its population during periods of from one to thirty-five years:

A. Amongst the women of factory operatives, much more than among the general population. . . . Other deranged states of a still

worse character are present, *e. g.*, leucorrhœa and too frequent and profuse menstruation. Cases also of displacement, flexions, and versions of the uterus, arising from the constant standing and the increased heat of and confinement in the mill. (Pages 39-40.)

Signed on behalf of the Bradford Medico-Chirurgical Society, at a meeting held February 4, 1873.

Sub-Committee,

President, J. H. BELL, M.D.

P. E. MIALL, M.R.C.S.

Secretary, DAVID GOYDER, M.D.

(Pages 39-40.)

British Sessional Papers. Vol. XVII. 1892. Report from Select Committee on Shop Hours Bill.

(Quotation from Lawson Tait, Surgeon to the Birmingham and Midland Hospital for Women and Specialist in diseases of women:)

1242. . . . Shops as generally arranged, with their atmosphere charged with the products of gas consumption, are not conducive to health. Long hours for women produce a great variety of uterine and ovarian diseases and the general dyscrasias of anæmia. Women should not work more than ten hours a day, and in very many cases not so many as that. A great many cases under my observation, women suffering from uterine displacements, chronic inflammatory diseases of the ovaries and tubes Quotation from Dr. Norman Kerr: "It is impossible for me to find language strong enough to convey a hundredth part of the mischief which I have seen arise from the excessive hours of labour of shop assistants who have been under my professional care. The great length of the hours at work I have seen break down strong constitutions, seriously aggravated as the evil has been by the dyspeptic misery and disease produced by the necessary . . . bolting of food through the far too short period allowed for meals. (Page 53.)

Witness, J. A. Stacey, Sec. Early Closing Association:

2428. . . . You are strongly of opinion that these long hours are very prejudicial to health, especially, I presume, to women? — Yes; and I may say that Sir James Risdon Bennett, the late President of the Royal College of Physicians, was one of our honorary medical staff; he . . . very strongly denounced the evils of long standing and the general effect of overworking. (Page 98.)

Witness, W. Abbotts, M.D., Editor of "Hygiene."

4813 . . . What is it that women suffer from chiefly in connection with the long hours that the Committee are already satisfied shops keep open? — They suffer from various affections in the lower part of the body and from nervous and spinal complaints and from varicose veins. . . .

4815. Is it not the long hours of standing, insufficient time for meals, and bad atmosphere which are the chief causes of the illnesses to which women are subject? — Those would be.

4816. What are those illnesses? — Those illnesses would be various: irregularities of the parts incidental to women, the female organs; diseases of the spinal cord, causing nervous complaints, and varicose veins arising chiefly from the long standing position.

4817. Well-grown women suffer from these complaints through the long standing as well as young girls under eighteen, say? — Yes, they would. (Page 207.)

British Sessional Papers. Vol. XII. 1895. Report of Select Committee on Shops, (Early Closing) Bill.

Witness, Miss MacDonald, M.D., now attached to the Hospital for Women in Euston Road:

5379. Dr. Kidd told us just now that in his experience at Brompton Hospital there was a good deal of general deterioration of health among women? — That is exactly what I should say, anæmia and general nervous debility.

5386. And would not standing so long very much affect women, if they were married, afterwards? — It is not good for women to stand . . . at all really.

5387. If it is not good for them to stand at all, still less will it be good for them to stand thirteen hours a day? — I think it is shocking.

5389. . . . The standing of course would exhaust the women and make them more liable to other illnesses. (Pages 218-219.)

Witness, Dr. W. Chapman Grigg (formerly out-patient physician for the diseases of women at Westminster Hospital, and senior physician to the Queen Charlotte Lying-in Hospital, and connected with the Victoria Hospital for Children):

5402. Would you please tell us in a general way your experience as to the effects of these prolonged hours on health? — It has a very grave effect upon the generative organs of women, entailing a great

deal of suffering and also injuring a very large body of them permanently, setting up inflammation in the pelvis in connection with those organs. . . .

5403. . . . I have had a great many sad cases come before me of women who were permanent invalids in consequence.

5404. . . . If the matter could be gone into carefully, I think the committee would be perfectly surprised to find what a large number of these women are rendered sterile in consequence of these prolonged hours.

5409. . . . I think it must be acknowledged that sterility is often due to this inflammatory mischief arising round the generative organs. I believe that is one of the greatest evils attached to these prolonged hours. I have seen many cases in families where certain members who have pursued the calling of shop-girl assistants have been sterile, while other members of the family have borne children. I know of one case where four members of a family who were shop-girls were sterile, and two other girls in the family, not shop-girls, have borne children; and I have known other cases in which this has occurred. . . . I have patients come to me from all parts of London. It appears to be a most common condition.

5410. When these women have children, do you find that the children themselves suffer from the woman having been affected by these very long hours? — I have seen many cases where I have attributed the mischief arising in childbed to this inflammatory mischief in the mother, which, after delivery, has set up fresh mischief, and I have seen serious consequences resulting.

5419. You think that if the hours were altered, there would be less of this deterioration to health which you speak of? — I am sure of it; they all tell the same tale, and say it is the prolonged hours and not being allowed to sit down. (Pages 219-220.)

Artisans and Machinery: The Moral and Physical Condition of the Manufacturing Population. P. GASKELL, Esq., Surgeon. London, John Parker, 1836.

That the physical energies of the factory women are injured is proved by the fact that miscarriages are exceedingly common amongst them. We have had many opportunities of noting this circumstance in girls engaged in both silk and cotton mills. (Page 189.)

History of the Factory Movement, from the Year 1802 to the Enactment of the Ten-hours' Bill in 1847. "Alfred." Mr. SADLER'S speech before the House of Commons, March, 1832. London, Simpkin, Marshall, 1857.

. . . But again taking with me the highest medical authorities, I refer to the consequences of early and immoderate labor; especially at the period when the system rapidly attains its full development and is peculiarly susceptible of permanent injury. Still more are the effects felt when they become mothers, for which, I fear, their previous pursuits have little qualified them. It is in evidence that long standing has a known tendency — how shall I express it? — *contrahere et minuere pelvem*, and thereby to increase greatly the danger and difficulty of parturition, rendering embryotomy — one of the most distressing operations which a surgeon ever has to perform — occasionally necessary. I have communications on this subject from persons of great professional experience; but still I prefer to appeal to the evidence before the public; and one reference shall suffice. Dr. Jones, who had practised in the neighborhood of certain mills, in favor of which much evidence was adduced, which indeed it is rarely difficult to procure, states that in the "eight or ten years during which he was an accoucheur, he met with more cases requiring the aid of instruments (that circumstance showing them to be bad ones), than a gentleman of great practice in Birmingham, to whom he was previously a pupil, had met with in the whole course of his life. Abundance of evidence is before me. But I forbear. (Vol. I, Page 181.)

The Hygiene, Diseases, and Mortality of Occupation. J. T. ARLIDGE, M.D., A.B., F.R.C.P. London, Percival, 1892.

Continuous standing for hours together is a strain especially upon the arch of the feet and the ankle joints; a cause of weary spine and spinal curvature, favoring also pelvic fulness, and in the female sex, productive of derangements of the uterine functions and of uterine displacements. (Page 170.)

Condition of the Working Class in England in 1844. FREDERICK ENGELS. Translated by FLORENCE KELLEY. London, Sonnenschein, 1892.

The influence of factory work upon the female physique also is marked and peculiar. The deformities entailed by long hours of

work are much more serious among women. Protracted work frequently causes deformities of the pelvis, partly in the shape of abnormal position and development of the hip bones, and partly of malformation of the lower part of the spinal column.

"Although," says Dr. Loudon, in his report, "no example of malformation of the pelvis and of some other affections came under my notice, these things are nevertheless so common that every physician must regard them as probable consequences of such working hours, and as vouched for besides by men of the highest medical credibility."

That factory operatives undergo more difficult confinement than other women is testified to by several midwives and accoucheurs, and also that they are more liable to miscarriage. (Pages 160-161.)

Women's Work. A. AMY BULLEY and MARGARET WHITLEY. London, Methuen, 1894.

The long hours of standing are, of course, apt to be injurious to the health of women, and especially of young girls. Physicians give evidence of diseases contracted in this manner, and the report of the "Sanitary Commission" of the *Lancet*, though moderate in expression, is sufficiently explicit upon this point. (Page 56.)

Ämtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten, XXII, 1897. [Official Information from the Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1898. GERMANY

The inspector in Hesse regards a reduction of working hours to ten for women in textile mills as "absolutely imperative," as the continuous standing is very injurious to the female organism. (Page 241.)

Die Beschäftigung Verheiratheter Frauen in Fabriken. Nach den Jahresberichten der Gewerbe Aufsichtsbeamten für das Jahr 1899. Bearbeitet im Reichsamt des Innern. [The Employment of Married Women in Factories. From Reports of the (German) Factory Inspectors for the Year 1899. Compiled in the Imperial Home Office. Berlin, 1901.]

The harm from continuous standing or sitting was repeatedly emphasized. It was stated that continuous standing was extremely

GERMANY injurious for all women in the years of developing maturity, as it caused uterine relaxation and malpositions (falling of the womb).

. . . The inspector from Dresden wrote: "It is an undisputed fact that prolonged standing as required in many lines of manufacture as well as continuous sitting (sewing and many trades), is a cause of impairment to health. Unmarried women are as liable as married ones to the ill results of long hours of sitting or standing." (Page 101.)

In Württemberg, where anæmia and disturbances of the abdominal organs (intestines, etc.) were widely characteristic of working women in all the various lines of industry, "it was found that the bent attitude standing up in the mills, and the equally bent attitude sitting down in the lace curtain factories, etc., both promoted illness. Sometimes still other unhealthful influences were added to these, such as continuous standing on wet and cold stone floors, as was the case in certain mills.

In the report from Anhalt it was stated as an accepted fact that, if continuous standing or continued sitting while at work was combined with *long hours of work*, definite impairment of the health of women followed (varicose veins, uterine disorders, etc.). (Page 101.)

**SWITZER
LAND**

Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [Investigations into the Conditions of Health of the Swiss Factory Workers.] Dr. FRIDOLIN SCHULER, *Swiss Factory Inspector*, and Dr. A. E. BURCKHARDT, *Prof. of Hygiene at Basle. Aarau, Säuerländer, 1889.*

The high morbidity of women is not a little influenced by the frequency of uterine disorders. It is known that, on the whole, women are more subject to diseases of the genitalia than men, yet the difference shown in the statistics of the sick benefit funds cannot be regarded as normal. These disorders are not equally prevalent in all occupations, nor do they always appear in the same varieties. Next to the kind of employment it is important to know whether the workers are married or single, and have borne children or not. Among young unmarried workers one finds lower figures, chiefly of menstrual disorders and slight catarrh. (Cotton mill and silk mill operatives. The figures rise as the genital organs are more directly affected by the kind of work. Again, in certain industries (weaving, cotton print works), we find figures which call for serious consideration. Here

the forms of disease become more threatening. Miscarriages are frequent, displacements and chronic metritis take a prominent place. If we wish to apply a remedy we must study all the circumstances which contribute to these abnormalities.

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First of all, as already stated, the kind of work and way in which it is done must not be overlooked. Pre-eminently must continuous standing, jarring of machinery, whirling dust, and direct or indirect pressure upon the abdominal organs be condemned. By the utmost possible avoidance of bad conditions much improvement may be reached even without excluding women from their share of industrial work. (Pages 170-171.)

International Congress for Labor Legislation, Zurich, 1897. Official Report of the Organization Committee. Die Beurteilung der Folgen der Kinderarbeit vom Standpunkte des Arztes. [The Results of Child Labor as judged from the Physicians' Standpoint.] Dr. F. GEHRIG, in *Wiener Staatswissenschaftliche Studien, Bd. V., 1903. Zurich, 1898.*

We may place special injuries in two groups, accordingly as work requires the sitting or standing position.

In the first group stasis is promoted in abdominal organs by the obstructed circulation and chronic constipation, hemorrhoids, and, in women, uterine disorders follow. The fixed position leads to scolioses and asymmetrical thorax, curvatures of the spine, etc. The obstacles to free, unconstrained respiration induce pulmonary tuberculosis. With the overuse of certain groups of muscles distinct neuroses arise.

It is to be borne in mind that these diseases by no means always declare themselves in youth; the seeds only of many ills are planted by overexertion in youth, and from them develop later disease or invalidism. (Page 190.)

Report of the Massachusetts Bureau of Statistics of Labor. 1871.

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Exhaustion from overwork. In consequence of the long hours of labor, the great speed the machinery is run at, the large numbers of looms the weavers tend, and the general overtaking, so much exhaustion is produced in most cases that, immediately after taking supper, the tired operatives drop to sleep in their chairs. . . . 10. Predisposition to pelvic disease. There appears, as far as my obser-

vation goes, quite a predisposition to pelvic disease among the female factory operatives, producing difficulty in parturition. The necessity for instrumental delivery has very much increased within a few years, owing to the females working in the mills while they are pregnant and in consequence of deformed pelvis. Other uterine diseases are produced, and, in other cases, aggravated in consequence of the same. (Pages 505-506.)

Report of the Massachusetts Bureau of Statistics of Labor. 1875.

Profuse, difficult, deficient, or retarded menstruation, anæmia, chlorosis, anasarca and œdema of feet, pains of back and limbs, nervous headaches, hacking coughs, by-and-by tubercular symptoms, and more or less early decline, is the usual list and order of complaints that our errors of industrial employment are establishing with this proportion of our working world, and with their results are grafting upon our nationality to its steadily progressive decline and decay. (Page 70.)

It seems to be the back that gives out. Girls cannot work more than eight hours, and keep it up; they know it, and they rarely will, — and even this seems to "pull them down," so that it is extremely rare that a girl continues more than a few years at the business. (Page 91.)

Mr. B——, foreman of a large printing establishment, says: "Girls must sit at the 'case.' I never knew but one woman, and she a strong, vigorous Irishwoman, of unusual height, who could stand at the case like a man. Female compositors, as a rule, are sickly, suffering much from backache, headache, weak limbs, and general 'female weakness.'" (Page 91.)

Miss —, for several years in charge of the female department of one of the largest telegraph offices in the country, testified: "One year is as long as one can work in a busy office without a good vacation. The confined position, constipation, heat, and dizzy headache, I think, are the most noticeable troubles of 'lady operators' who are 'grown up.' The hours are too long for such strained employment. From 8 A. M. to 6 P. M., with only an hour for dinner, makes too long a day for the kind of work." (Page 96.)

Miss J——, a lady compositor, says: "We cannot stand at the 'case.' It increases back and head ache, and weakness of limbs, as well as a dragging weight about the hips. I have been at this work

five years, but have been frequently obliged to give up for vacations from peculiar troubles and general debility. I began to menstruate when fourteen; I am now twenty-two. I was well until I had set type for a year, when I began to be troubled with difficult periods, and have been more or less ever since. When I go away I get better, but, as often as I return to my work, I am troubled again. Have wholly lost color, and am not nearly as fleshy and heavy as when I began work. I have now a good deal of pain in my chest, and some cough, which increases, if I work harder than usual. I am well acquainted with many other lady composers who suffer as I do." (Pages 91-92.)

Miss S—, a lady long in charge of the "composing-room" (female department) of a large printing establishment testifies: "I was myself a composer, and have had scores of girls under me and with me, many of whom I have known intimately. I have no hesitation in saying that I think I never knew a dozen lady composers who were 'well.' Their principal troubles are those belonging to the sex, and great pain in back, limbs, and head." (Page 92.)

Report of the New Jersey Inspector of Factories and Workshops. 1884.

The law passed this year through the efforts of the State Trades Unions, compelling employers to provide seats for the use of their female employees, is one of the best on our statute books, and has been approved by men of all classes, especially by the medical fraternity, many eminent members of which have testified that it is destructive to the health of women to keep them standing for hours in mills or stores without an opportunity to rest. (Page 25.)

Report of the Chief of Massachusetts District Police for the Year ending Dec. 31, 1885.

Many complaints have been made in the public press, and some agitation in other quarters, based upon the physical hardship of compelling women and girls employed many hours daily in manufacturing mechanical and mercantile establishments to remain standing at their respective occupations. It was shown by the testimony of medical men that serious results to the health were produced in such ways. (Page 34.)

(3) INJURIES TO THE FEET AND LEGS FROM LONG STANDING

Long hours of standing result in injuries to the tissues of the legs and feet, often persisting for years, occasioning much pain and in some cases total disability. Varicose veins and flat foot are the most common injuries.

**GREAT
BRITAIN**

British Sessional Papers. Vol. XV. 1831-1832. Report from the Select Committee on the "Bill to regulate the Labour of Children in the Mills and Factories of the United Kingdom."

James Blundell, Esq., M.D. (Lecturer on Physiology and Midwifery in the School of Guy's Hospital):

10850. Is not the exertion necessary to sustain the erect position of the body for a great length of time more fatiguing than any other natural position ordinarily maintained, or moderate exertion equally and alternately exercising the various muscles of the body? — Decidedly it is. . . .

10851. According to physiological principles, might the excessive fatigue that a person endures who has to maintain an erect position for a great length of time be explained and accounted for? — I think it might, inasmuch as the movements of the body in locomotive exercise tend effectually in man to help circulation, and further, the standing position implies that the same muscles are kept continually in action, while in the locomotive movements there are alternate changes of the operative muscles.

10852. Is there not alternate rest and exercise in the varied movements of the body, which is not the case in the standing position so fully? — Exactly so, alternate rest and exercise of different sets of muscles. (Page 542.)

Thos. Hodgkin, Esq., M.D. (Physician to the London Dispensary, Lecturer at Guy's Hospital):

10928. It has been asserted by witnesses before this committee, that diseased and ulcerated legs, especially among the female part of the operatives, have been produced; should you conceive that long standing at the labour in question might produce that effect? — Certainly, by interfering with the circulation. (Page 548.)

John Morgan, Esq. (Surgeon to Guy's Hospital):

10990. Should you be prepared to expect that diseases of the legs, especially in the female sex, would result from very long standing at

their labour?— I should consider it as a necessary consequence. (Page 553.)

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Benjamin Collins Brodie, Esq., F.R.S. . . . (Surgeon of St. George's Hospital):

11095. Is not the maintenance of the erect position of the body fatiguing when continued for a great length of time?— It is more fatiguing than a recumbent or sitting posture, inasmuch as more muscular exertion is necessary to maintain it. (Page 565.)

11100. Many of the operatives, it is said, especially the females, suffer from this labour other effects, namely, diseases in the legs?— Diseases in the legs generally, and especially varicose veins and ulcers of the legs are more likely to occur in persons who are constantly in an erect posture. I observe in this town those who are a great deal in an erect posture, especially if they carry weights, become flat-footed, which is a very distressing complaint. (Page 565.)

Sir William Blizard, F.R.S. (Surgeon to the London Hospital and Lecturer on Surgery, Anatomy, and Physiology):

11200. May the committee ask you, appealing now to the principles of your profession, whether it does not require some considerable degree of muscular exertion to maintain the erect position for a great length of time together?— No doubt of it, and it is a position which, if long maintained, is unfavorable in many respects, and leading to consequences very serious. (Page 572.)

Sir George Leman Tuthill, F.R.S. (Physician to the Westminster Hospital and Bethlem Hospital):

11307. Is the muscular effort to sustain for a great length of time together the erect position of the body very fatiguing?— Certainly. (Page 580.)

So that such labour, so pursued, would be still more exhausting?— I think it would. (Page 580.)

Joseph Henry Green, Esq., F.R.S. (A surgeon of St. Thomas's Hospital and Professor of Surgery at King's College):

11375. Does not the maintaining of an erect position of the body itself induce considerable fatigue if long endured? In order to maintain an erect position of the body, it is necessary that a muscular action should be constantly exerted, therefore it necessarily induces fatigue. (Page 587.)

James Guthrie, Esq., F.R.S. (Vice-President of Royal College of Surgeons, surgeon to the Westminster Hospital and to Westminster Eye Hospital):

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11474. Is not the exertion necessary to sustain the erect position for a great length of time more fatiguing than any other natural posture ordinarily maintained, or moderate exertion equally and alternately exercising the muscles of the body?—Unquestionably. (Page 595.)

British Sessional Papers. Vol. XXI. 1833. Second Report of the . . . Commissioners for Inquiring into the Employment of Children in Factories and . . . Reports by the Medical Commissioners.

Sir David Barry's report (Scotland):

In examining the feet and ankles of mill girls, I find, that in reference to their being swelled or otherwise a good deal depends upon the hour of the day at which they are examined. Most of them acknowledge that their feet are more or less swelled towards night, particularly in the summer months. (Page 8.)

Both adult males and females whose work obliges them to stand constantly are more subject to varicose veins of the lower extremities, and to a larger and more dangerous extent than ever I have witnessed even in foot soldiers. The females are more subject than males to evening swellings of the feet and ankles. (Page 73.)

British Sessional Papers. Vol. LV. 1873. Report to the Local Government Board on Proposed Changes in Hours and Ages of Employment in Textile Factories. J. H. BRIDGES, M.D., and T. HOLMES.

Experience afforded by residence in the worsted manufacturing town of Bradford and extensive practice among its population during periods of from one to thirty-five years:

. . . Œdema and varicose veins of the legs are common amongst female mill-workers of middle age.

Signed on behalf of the Bradford Medico-Chirurgical Society, at a meeting held February 4, 1873.

Sub-Committee,

President, J. H. BELL, M.D.

P. E. MIALL, M.R.C.S.

Secretary, DAVID GOYDER, M.D.

(Pages 39-40.)

British Sessional Papers. Vol. XVII. 1892. Report of Select Committee on Shop Hours Bill. Report of the Lancet Sanitary Commission on Sanitation in the Shop.

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... Undoubtedly the standing for such long hours is a great and terrible grievance. Young shop assistants have explained to us how towards the evening they became giddy, "a swimming sensation" overcame them, and they continued to serve almost unconsciously. In time they became hardened to the excessive strain, but in the course of years many were obliged to lie up, the most frequent complaint from which they suffered being that of varicose veins. (Page 245.)

British Sessional Papers. Vol. XXXVII. 1893. The Royal Commission on Labour: Employment of Women. Reports by Misses ORME, COLLET, etc.

Statement by Dr. Service: The long hours which shop girls work and the conditions under which they do their work are injurious to their constitutions. Prolonged standing, long hours, and want of proper sanitary accommodations lead to ailments affecting the bladder, bowels, uterus, nervous, vascular (blood) and muscular systems. These ailments are evidenced by the legs becoming swelled with fluid, varicose veins appearing in the lower extremities and muscular pains and weakness being felt from the waist to the soles of the feet. The nervous system is seriously injured by the undue strain which is put upon all the organs of the body. Facial neuralgia, spinal neuralgia, and headache are very common complaints. Anæmia (popularly speaking poverty of the blood) will be found in the majority of shop women. This arises from long hours, close confinement, and long intervals between meals, with consequent disturbance of the digestive and assimilative functions. (Page 318.)

British Sessional Papers. Vol. XII. 1895. Report from the Select Committee on Shops (Early Closing) Bill.

Witness, Dr. Percy Kidd, M.D., of University of Oxford, Fellow of College of Physicians and Member of the College of Surgeons. Attached to London Hospital and Brompton Hospital:

5284. Would prolonged standing have an injurious effect upon the female constitution?— I have no doubt it has. . . . I have no doubt it causes varicose veins. (Page 215.)

**GREAT
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The Hygiene, Diseases, and Mortality of Occupation. J. T. ARLIDGE, M.D., A.B., F.R.C.P., *Late Milroy Lecturer at Royal College, London, Percival, 1892.*

When insufficient muscular activity is associated with almost constant standing, the increased difficulty to the return of the blood from the lower limbs is the most pronounced feature, and productive of varicose veins, and ulcers and thickened knee and ankle joints. (Page 19.)

Workpeople obliged to stand long, and especially when this happens in early youth, lose the arch of the foot and become flat-footed, with deformed ankles and often "knock knees." (Page 558.)

British Association for the Advancement of Science. 1903. Women's Labour: Third Report of the Committee . . . appointed to Investigate the Economic Effect of Legislation Regulating Women's Labour.

In so far as the law has checked, and this it certainly has done in a considerable degree, the excessively long night and day turns of work (in laundries) at the middle and end of the week, gain must have accrued to the workers in lessening the number of cases of complete exhaustion. . . . Greater liability of laundresses, as compared with women of occupations treated in those infirmaries, to ulcerated legs and to phthisis. . . . The figures supplied by the records of the cases attended by the Kensington District Nursing Association show a large proportion of ulcerated legs and of forms of internal disease aggravated by standing for long hours. (Pages 359-360.)

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Die Beschäftigung Verheirateter Frauen in Fabriken. Nach den Jahres Berichten der Gewerbe Aufsichtsbeamten für das Jahr 1899. Bearbeitet im Reichsamt des Innern. Berlin, 1901. [The Employment of Married Women in Factories. From Reports of the (German) Factory Inspectors for the year 1901. Compiled in the Imperial Home Office, Berlin, 1901.]

Other inspectors emphasized the injurious effects of continuous standing. The frequent occurrence of flat foot was ascribed to this, and the frequency of displaced uterus in working women was also attributed largely to this cause.

The inspector from Alsace, who personally interviewed the women

operatives, found that "varicose veins were frequent, rubber stockings **GERMANY** were often necessary, and weariness and inability to do the household work after returning from the factory were almost universal even among the younger women. This weariness, often accompanied by backache . . . often developed into positive incapacity for work and physical disability." (Page 102.)

Jahresberichte der Grossherzoglichen Badischen Fabrikinspektion für das Jahr 1902. [Reports of the Factory Inspectors of Baden, 1902.] Karlsruhe, Thiergarten, 1903.

The direct injuries to health from industrial work are unmistakably shown in certain individual kinds of work, though ordinarily difficult to prove.

Thus the factory physician of two large mills states that the employees suffer much more from flat foot and other troubles of the feet than other classes of the population, and he ascribes it to the long-continued standing and walking during work, which is too much for young people in the period of development, and which, aside from specified troubles, undoubtedly causes the rapid fading of the women. (Page 26.)

Handbuch der Arbeiterwohlfahrt. Bd. I. [Handbook of the General Welfare of the Working Classes. Vol. I.] Edited by Dr. OTTO DAMMER. Beschädigung der Arbeiter bei der Arbeit. [Injuries of Occupation.] Dr. Ascher. Stuttgart, 1902.

Widely prevalent is the inflammation of the instep leading to flat-foot, the result of continuous standing or walking, and found especially among waiters, shopboys, bakers, etc. Continuous standing, especially when united to severe exertion, as by smiths, laundresses, etc., produces also varicose veins. Through the long-enforced standing only certain muscle groups are brought into action, while the large muscles of the lower extremities are inactive. There follows an enlargement of the spaces between skin and muscles, a knotting of the large veins of the legs; resulting in congestion of the blood and tedious inflammatory process. (Leg ulcers.) Another result of great exertion of the abdominal muscles is rupture (hernia). (Page 493.)

SWITZERLAND *Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [An Investigation of the Health of Factory Workers in Switzerland.]* Dr. F. SCHULER, *Factory Inspector*, and Dr. A. E. BURCKHARDT, *Prof. of Hygiene at Basle*. Aarau, Säuerländer, 1889.

Continuous standing must always be regarded as injurious to health. (Page 131.)

UNITED STATES *National Child Labor Committee. New York. Proceedings of the Third Annual Conference. Cincinnati, Ohio. 1907. Some of the Ultimate Physical Effects of Premature Toil.* ALBERT H. FREIBERG, M.D., *Cincinnati, Ohio.*

Standing occupations naturally involve the feet and legs in greatest strain, and more especially the feet. In consequence we see developing, during the adolescent years, that condition known as weak and flat foot. This frequently occurs in the adult also from causes of similar nature, but only too frequently the result of conditions and weakening which must be attributed to the period of active growth. . . . Commonly the foot loses its strength and shape gradually, so that at this time but little notice is taken of it. Later . . . the feet only too frequently become so painful that long abstention from work is imperative, and it happens not rarely that an entire change of employment cannot be avoided; . . . for while medical science can do much for these unfortunates, they are often debarred from continuing in trades requiring constant standing. Frequently upon coming under medical care the condition is such that nothing short of a long stay in hospital will prove availing, and this means loss of income if not loss of independence for a greater or less period. I doubt whether it is generally realized how frequently such conditions are met as those to which I have just referred. (Page 23.)

National Child Labor Committee. New York. Proceedings of the Fifth Annual Conference. Chicago, Ill. 1909. Some Effects of Improper Posture in Factory Labor. ALBERT H. FREIBERG, M.D., *Cincinnati, Ohio.*

Muscular exercise is beneficial. Exercise is our only means of strengthening the muscles, of encouraging their development, but the building up of a muscle which is actively growing and developing

must be accomplished by exercises which are not too severe, which are not too long continued, and which are of constantly varying character.

Furthermore, the muscle which carries out exercises must be given frequent periods of rest, during which it may recover; it should be given an opportunity to build up again that which has been consumed by use. . . .

. . . That which is unfortunate in factory employment as far as purely physical effects upon the muscles are concerned, is the fact that a muscle must perform its functions for a long period of time without the opportunity of relaxing, without the opportunity of recovering. When a muscle has performed its function up to a certain point, we experience the sensation which we speak of commonly as fatigue. Fatigue means that there is an accumulation in the muscle of the waste products of its use, which have not yet been carried away and replaced by new material. If we continue to use a muscle far beyond the point of fatigue repeatedly, there results in that muscle in the course of time instead of further upbuilding, a degeneration and the result of such excess fatigue is the final weakening of a muscle which, if treated properly, would on the contrary grow stronger continuously. (Page 106.)

(4) INJURIES TO EYESIGHT

Serious injury to the eyes results also from excessive working hours. The danger of eye-strain from overlong hours and close application is intensified by the lack of proper and adequate lighting of workrooms. Shorter working hours not only relieves the strain upon the eyes, but diminishes the necessary time for working with artificial light.

Fatigue. A. MOSSO, *Professor of Physiology, University of Turin.* ITALY
1896. Translated by MARGARET DRUMMOND, M.A., and W. B.
DRUMMOND, M.B., *Extra Physician, Royal Hospital for Sick
Children, Edinburgh.* New York, Putnam, 1904.

Rest has such an effect upon vision that some workmen, such as printers, tailors, and shoemakers, after their Sunday rest, see very

ITALY

well for several days; but in the middle of the week the symptoms of asthenopia recommence; and so troublesome are they that the sufferers have to cease work and go to the doctor, complaining not only of obscurity of vision, but of pain extending from their eyes to the frontal and occipital regions of the head. (Page 139.)

Fatigue of the eyes in perception of the colour has been thoroughly studied by Goethe (*Zur Farbenlehre*, 1812).

From his work on colours I shall quote some paragraphs which deal specially with ocular fatigue.

We have all tried the experiment of looking at the sun, or gazing fixedly on the flame of a candle, and then shutting our eyes. We are all aware that the eye retains an image of a circle, which is at first bright with a pale-yellow centre, but quickly becomes rose-coloured around the edges.

After a time, this red increasing towards the centre covers the whole circle and at last the bright central point. No sooner, however, is the whole circle red than the edge begins to be blue and the blue gradually incroaches inward upon the red. When the whole is blue the edge becomes dark and colorless. The image then becomes gradually fainter and at the same time diminishes in size. (Page 230.)

Goethe has likewise pointed out the effect of debility upon vision: "In passing from bright daylight to a dusky place we distinguish nothing at first; by degrees the eye recovers its susceptibility: strong eyes sooner than weak ones; the former in a minute, while the latter may require seven or eight minutes."

This observation of Goethe's as to longer duration of fatigue phenomena in enfeebled persons is of great importance in our present study. (Page 230.)

GREAT
BRITAIN

British Sessional Papers. Vol. XIV. 1868-1869. Reports of Inspectors of Factories.

... Medical testimony to be found in the evidence in the Second Report of the Children's Employment Commissions, on the effects of late hours amongst all sorts of female employments, on the eye, where vision has to be concentrated on minute objects under artificial light:

"After long work," says Mr. Lawson, "the eye becomes fatigued, the strain is relaxed, and the image, being thrown slightly out of

focus, appears indistinct. A continuance of work without resting the eyes, causes a complete loss of the object on which the eye is fixed." (Page 186.)

**GREAT
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Etude sur l'Influence de la Durée du Travail Quotidien sur la Santé Générale de l'Adulte. [Study of the Effect of the Length of Working Hours upon the General Health of Adults.] DR. ILIA SACHNINE. Lyon, 1900.

FRANCE

Bocci has studied the influence of fatigue on human vision. He holds that in fatigue of the eye and its attachments there are two distinct factors, namely, purely muscular fatigue and weariness of the nerve centres. In a series of experiments with normal individuals who were fatigued he found a diminution of keenness of vision, of refraction, of accommodation, of impressionability of the retina, of equilibrium and of muscular co-ordination. (Page 59.)

Handbuch der Arbeiterwohlfahrt. Bd. I. [Handbook of the General Welfare of the Working Classes. Vol. I.] Edited by Dr. OTTO DAMMER. *Beschädigung der Arbeiter bei der Arbeit.* [Injuries of Occupation.] DR. ASCHER. Stuttgart, 1902.

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Over-exertion of different organs:

The eye:

Puddlers, glassblowers, and others whose eyes are continually exposed to extreme heat and light not only suffer greatly from inflammation of the connective tissues of the eyes, but also frequently from cataract. . . . Shortsightedness was found in a great number of cases among the darners of a worsted mill the result of the spasmodic accommodation of the eyes, as well as inflammation of the conjunctiva; that is the result of overstrained eyes in many occupations, especially those carried on in artificial or in poor light — the remedy lies in improving lighting facilities and in shortening the working hours. (Page 492.)

Report of the Massachusetts State Board of Health. Boston, 1907.
Report on the Sanitary Conditions of Factories, Workshops, and other Establishments.

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Poor light is itself a factor of no mean consequence in reducing the physiological resistance to disease. It may be a concomitant of a

number of other unsanitary influences which affect the health of the worker, as, for example, in the weaving and spinning rooms; or it may be the principal factor, as in web drawing. Apparently too little thought has been given, in mill construction, to providing for light in accordance with the kind of work to be done in a given room. Many rooms are of old construction, with comparatively low ceilings, small windows, and small panes of glass. Some of these rooms are narrow, and admit fair light from the sides; but some are wide, and some are basement rooms, which lack both an ample supply and an even distribution of light.

Aside from the question of mill construction, two important factors contribute to poor light in a large number of rooms, viz.: (1) neglect to keep the ceiling and walls clean and white; and (2) infrequent washing of windows, allowing them to go unwashed in some instances for several years. It is frequently the case that prismatic glass of different kinds and sizes is introduced into poorly lighted rooms; but unless this glass is kept reasonably clean, it is of little value. In poorly constructed and neglected rooms, with or without prismatic glass, artificial light is not uncommonly used even on bright, sunny days in the late morning or early afternoon hours; and in such rooms gas jets are as likely to be found as incandescent bulbs. Even if artificial light is not used until the late afternoon hours, there is then much variation as to the time and method of lighting and the kind of light in use. In some instances the light should be turned on half an hour, or longer, before the engineer sees fit to do so; yet the employees during this time are supposed to continue their work with the same degree of accuracy and rapidity as with good light.

It is a well-established fact that either the overuse of the eyes, or the use of eyes under bad conditions, may give rise to eye fatigue or to eye strain; and many eye specialists believe that at least 80 to 90 per cent of headaches are dependent upon eye strain.

With these facts in mind, it is impossible to ignore the probability that many individuals working by gaslight, or even electric light, in dirty, unpainted, overheated rooms, with impure air and excessive moisture, for ten hours a day or merely for the last two hours during the day, use up a great deal of nervous energy, and suffer from eye fatigue, or eye strain, and its consequences. (Pages 470-471.)

(5) INJURIES TO OTHER ORGANS

Whenever the nature of a worker's employment or the position required by the work makes particular demands upon any organ of the body, that organ or part of the body tends to become overstrained first.

Excessive length of hours intensifies such overuse of particular organs or parts of the body in the different trades, and only the establishment of shorter hours can lessen the danger of such overstrain.

Sixth International Congress of Hygiene and Demography in Vienna, Part XIV, Vol. I-XIV. Sect. on Hygiene. 1887. Fabrikhygiene und Fabrikgesetzgebung. [Factory Hygiene and Legislation, Dr. FRIDOLIN SCHULER, Swiss Factory Inspector.] Vienna, 1887. SWITZERLAND

Far less conspicuous is a third set of factors which exert a deleterious influence on health and so threaten the well-being of workers, namely, the excessive muscular exertion demanded by modern forms of industry, the strain on special organs, the one-sided muscular activity resulting from continuous performance of the same motions. These are especially noticeable in their effect upon women. (Page 19.)

There can be no doubt that factory work for women is, broadly speaking, undesirable, and must be regarded as an evil resulting from the social adjustment. (Pages 29-30.)

Handbuch der Arbeiterwohlfahrt. Bd. I. [Handbook of the General Welfare of the Working Classes. Vol. I.] Edited by Dr. OTTO DAMMER. Beschädigung der Arbeiter bei der Arbeit. [Injuries of Occupation.] Dr. ASCHER. Stuttgart, 1902. GERMANY

Overexertion of muscles, sinews, and joints leads to rupture of muscles and ligaments, or to acute or chronic inflammations such as the "housemaid's knee," etc. Continuous overexertion of single groups of muscles induces permanent deformities of the skeleton (wry-neck, spinal curvature). (Page 493.)

General overexertion of the body, and insufficient nourishment,

GERMANY rest, and sleep, repairing only imperfectly the expended energy, lead to anæmia, or to nervous disorders and insanities. Overexertion of individual parts brings atrophy of the part in question, with or without preceding affections of the nervous system. (Page 496.)

Zeitschrift für Gewerbehygiene, Unfall Verhütung, und Arbeiterwohlfahrts Einrichtungen. Bd. XIV. 1907. Gewerbehygiene und Unfallverhütung. [Industrial Hygiene and the Prevention of Accidents.] Dr. WERNER HEFFTER, Medical Officer. Vienna, Steiner, 1907.

The injuries arising from physical overstrain are of quite another kind than those previously described (dust-poisons, etc.), as they may lead to general physical enfeeblement and also to definite local damage, as in the case of individual organs. Dangers of the kind first mentioned arise from excessive length of working hours, and are especially ruinous to youthful workers and to women. Hard work, such as lifting and carrying heavy loads, injures the body by promoting hernia, straining muscles, and bringing on cardiac disorders and lung diseases. Continuous pressure on some one part of the body induces swellings, inflammations, boils, and abscesses. A bent, or tense, or unnatural position of the body develops spinal deformities and alterations of internal organs; continuous sitting or standing result in abdominal disorders among women. (Page 56.)

Fourteenth International Congress of Hygiene and Demography in Berlin. Vol. II, Sec. IV. 1907. Ermüdung durch Berufsarbeit. [Fatigue resulting from Occupation.] Dr. EMIL ROTH. Berlin, Hirschwald, 1908.

During the activity of work the blood current is so distributed that the muscular fibres in action, also the brain and the skin, receive a larger blood supply than usual. The abdominal viscera, and especially the intestines, on the contrary, become anæmic, as the intestines part most readily with their blood supply, and the increased demands of the active muscles are met by a corresponding diminution of the intestinal circulation. It follows that, at a time of continuous physical exertion, the secretions of the intestinal glands and the processes of absorption of the contents of the digestive tract into the blood are retarded, and, if physiological limits in this process are overpassed,

permanent injury to the digestive organs results, and anæmia, chlorosis, neurasthenia, or other ills are permanently and unavoidably established. (Page 595.)

. . . We discriminate between I. Bodily activity and the exertion of strength of a non-productive character (sport, etc.); and II. Activity and the exertion of strength of a productive character (work).

In the latter the form of muscular exertion is of great importance, viz.:

I. Whether the work is predominatingly static or dynamic.

II. Whether the muscular contractions are such as to permit an equivalent distribution of blood.

III. Whether single muscles are over-exerted.

IV. Whether the posture is free or unconstrained, etc., etc. The more that abdominal and thoracic respiration is impeded by the kind of work in which the worker is engaged, and the venous circulation retarded in consequence, the more quickly will irregularities of pulse and breathing occur, with subsequent symptoms of engorgement of the heart and liver. (Pages 597-598.)

Fatigue, which, as has already been said, is the natural sequence of all exertion, shows itself first locally and then generally. The local effects are not confined entirely nor even chiefly to the muscular structures that are directly in use, but occur pre-eminently in those accessory muscles which are overstrained by work. This is to be ascribed to the fact that static work is more fatiguing than dynamic activity. The baker who has kneaded bread all night in a bent attitude, complains of pains in the legs; the shoemaker, of pain in the back; the violin player, of cramps in the left hand, etc., etc. (Page 598.)

When fatigue becomes more intense it is overfatigue. This is also, at first, of local extent. So may acute inflammatory processes result from the overuse of single muscles, tendons, and joints . . . such are the rheumatic disorders of miners. . . .

As a result of local overstrain may be found many abnormal conditions . . . here must be included dilatation and hypertrophy of the heart . . . the right side of the heart, by reason of its thinner walls, is especially affected. (Page 600.)

Finally, overfatigue involves the whole body sympathetically, manifesting itself chiefly in disturbances of the digestion, anæmia, neuroses of various forms, and chronic diseases, especially of the heart. It may also be accepted as positive that physical overwork encourages the premature development of arterio-sclerosis. (Page 601.)

GERMANY As, in the case of poisonous trades the most important thing is to recognize the earliest symptoms of poisoning, so, in regard to physical and mental strain it is of the utmost importance to detect at the outset symptoms of overstrain; first the disturbances of nutrition and of individual organs, next the anæmia, neuroses, etc., etc. (Page 611.)

BELGIUM *Thirteenth International Congress of Hygiene and Demography in Brussels. Vol. V, Section IV. 1903. Dans quelle mesure peut on par des methodes physiologiques étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? [To what extent may fatigue, its forms and degrees in different occupations, be studied by physiological methods? What arguments may physiological or medical sciences bring to bear in favor of various modes of industrial organization? Dr. JEAN DEMOOR, University of Brussels. Brussels, 1903.*

Labor accelerates greatly the respiratory processes: it produces breathlessness by a true poisoning process, and may, with more or less complete persistence of this condition, bring on pulmonary emphysema.

Muscular or neuro-muscular fatigue reacts upon the digestive tract; it provokes loss of appetite and various functional disorders; it influences thermogenesis and easily induces hyperthermia (excessive rise of body temperature). Physical overwork favors the invasion of pathogenic bacteria, as human experience proves and as Charrin and Roger's experiments have demonstrated. It also lowers human resistance to sunstroke and to the action of extreme cold. (Page 9.)

UNITED STATES *Sixty-fifth Annual Meeting of the American Institute of Instruction. The Relation of Fatigue to Social and Educational Progress. HENRY S. BAKER, Ph.D. Boston, 1895.*

In cases of long-continued and extreme fatigue the condition of the system resembles that of typhoid fever in its weakness, without, of course, the characteristic lesions of that disease. But fever may exist, and also what is known as irritable heart. Many times the fever of fatigue is erroneously classed as abortive typhoid, bilious, etc. (Pages 34-35.)

Nervous and Mental Diseases. ARCHIBALD CHURCH, M.D., and
FREDERICK PETERSON, M.D. *Philadelphia, 1901.*

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Many occupations requiring the constant repetition of certain precise muscular movements may, eventually, through overuse and fatigue, give rise to disturbances of muscular control, for the manœuvre in question. The conditions may be manifest as pain, tremor, weakness, or cramp, but usually these are variously combined in different cases. This group of motor disturbances is also called occupation spasms or occupation neuroses. (Page 544.)

Among the occupation spasms more commonly encountered are the cramps of violin and pianoforte players, telegraphers' cramp, seamstress' cramp, and hammer cramp in smiths and artisans using the hammer. Artists, flower-makers, turners, watchmakers, knitters, engravers, masons in using the trowel, sailors from pulling on ropes, treadlers, composers, enamellers, cigarette-makers, shoemakers, milkers, money-counters, letter-sorters, and players on various musical instruments including drummers, comprise the list given by Gowers.

It has been noted in a shoe salesman from the stooping position needed in putting on shoes, . . . and in various factory employees who incessantly use the same movement in feeding or attending some machines. (Page 551.)

Bulletin of the U. S. Bureau of Labor. No. 75. March, 1908. Industrial Hygiene. GEORGE M. KOBER, M.D., LL.D.

The effects of a constrained position, combined with a sedentary life, are very injurious. This is especially seen in weavers, shoemakers, engravers, watchmakers, tailors, lithographers, etc., all of whom are obliged to assume a more or less constrained attitude, which interferes with a proper distribution of the blood supply and is liable to be followed by internal congestions. But perhaps the greatest harm results from deficient movement of the chest and consequent interference with normal respiration. As a matter of fact, many of these artisans suffer from phthisis, constipation, dyspepsia, and hemorrhoids, and all have a low average duration of life. (Page 522.)

(6) RELATION BETWEEN FATIGUE AND DISEASES

(a) GENERAL PREDISPOSITION

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Exhaustion from excessive working hours not only lowers the general health and vitality of overworked persons, but renders them peculiarly susceptible to general diseases. Since immunity from disease is due chiefly to the organism's powers of resistance, it follows that overtaxed individuals must succumb more readily than those who are not handicapped by overstrain and unrepaired fatigue.

GREAT BRITAIN

British Sessional Papers. Vol. XV. 1831-32. Report from the Select Committee on the "Bill to regulate the Labour of Children in the Mills and Factories of the United Kingdom." CHARLES TURNER THACKRAH, Esq., *General Practitioner in Medicine and Surgery at Leeds, author of "On the Effects of Arts and Trades on Health and Longevity."*

. . . Mills in general do not produce immediate and direct mortality; their chief effect on the operatives, in my opinion, is the undermining the health, the destroying the constitution, and the rendering people liable to attacks of disease to which they would not have been subject, or under which they would not have succumbed if they had been in other situations. With few exceptions, the diseases developed in mills are chronic rather than acute. (Page 513.)

10487. Will you please to state to this committee what you conceive to be the general effects of labour too long continued in the atmosphere of mills and factories, generally considered, leaving out of the question any particular dusty manufacture? — I should say, a reduction of vital power proportionate to the length of that confinement, and with this reduction of vital power a series of evils to the constitution; chronic maladies, and an inability to resist acute ones, and a shortening of life. (Page 513.)

10490. And in the case of attacks of acute disease, you do not think the constitution under such circumstances is as capable of resistance? — Decidedly not. (Page 514.)

British Sessional Papers. Vol. XXI. 1833. Second Report of the Commissioners for inquiring into the Employment of Children in Factories . . . and Reports by the Medical Commissioners. Medical Reports by Dr. LOUDON. **GREAT BRITAIN**

Evidence of Francis Sharp, at Leeds, member of College of Surgeons in London, student of medical profession for fourteen years, house surgeon of Leeds Infirmary for nearly four years:

"The nervous energy of the body I consider to be weakened by the very long hours, and a foundation laid for many diseases. . . . Were it not for the individuals who join the mills from the country, the factory people would soon be deteriorated." (Pages 12, 13.)

British Sessional Papers. Vol. VI. 1901. Report from the Select Committee of the House of Lords on Early Closing of Shops.

6. . . Sir W. MacCormac stated that "There is no doubt in my mind that such long hours (it speaks of an average of fourteen hours per day) must contribute to the incidence of disease; that it must lower the general vitality of persons so engaged and render them more liable than they otherwise would be to attacks of different forms of disease. These hours, too, for the most part, are worked in an atmosphere very prejudicial to health, and we know how largely the air so contaminated contributed to the production of various forms of disease in which tubercule, for instance, and manifold forms of disease in which tubercule manifests itself, and that other disease of great cities (ricketts) has some part of its origin from this cause."

7. Furthermore, he urged on us that the evil is one which increases as time runs on; "it is gradual and progressive in its effects, and it goes on, I am afraid, in a cumulative degree."

8. Sir W. Selby Church, the president of the College of Physicians, gave similar evidence. (Pages v-vi.)

. . . Dr. Shanks writes: "Of the diseases met with in practice here amongst shopkeepers and their assistants, chest diseases are the most common. The next in order of occurrence is that of sore throats, and the third flat feet and weakening of the ankles. These three conditions are certainly aggravated by the long hours spent at work. The chest ailments are invariably tuberculosis such as apical phthisis. This condition is most obstinate to treat, and nothing short of total suspension of work enables any progress in combating this terrible

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disease. Of the cause of such a disease there can be no doubt whatever that long hours spent in shops . . . prone or not to such complaints, tend to bring about a condition of the body suitable to the inroads of the tubercule bacilli. (Pages 75-76.)

Witness, Sir W. MacCormac, President of the Royal College of Surgeons:

2466. . . . The physical fatigue, as well as other causes, induces various forms of disease, especially in younger women, which I should think such hours as you mention would largely contribute to. . . . (Page 120.)

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Revue Internationale de Sociologie. Nov. 1895. Le Travail Humain et ses Lois. [The Laws of Human Work.] FRANCESCO S. NITTI, *University of Naples. Paris, Giard and Brière.*

It may be that the workman can continue working for a long time without feeling the harmful effects of fatigue. But, after he has lost a certain amount of his organic substance he no longer possesses the necessary resistance to external conditions and he is exposed to all sorts of ills. *Fatigue constitutes a permanent predisposition to all diseases.* . . . (Page 1035.)

Many prevalent maladies arise from nothing else than a genuine overstrain, the result of exhausting and burdensome toil, which predisposes the worker to fall a victim to disease.

Too much importance has at times been attached to exterior conditions of work, and too little to the power of resistance of the worker. The reports of factory inspectors have, however, often pointed out that, wherever the work is too prolonged and degenerates into fatigue, the salubrity of the surroundings does not suffice to guard the worker against the results of overwork and exhaustion. (Page 1035.)

Crichton, even in his time, showed in what a sinister fashion fatigue acted upon the sensibility and upon alertness, and proved that it was the predisposing cause of disease. (Page 1037.)

FRANCE

De la Fatigue et de son Influence Pathogénique. [Fatigue and its Pathogenic Influence.] Dr. M. CARRIEU, *University of Montpellier. Paris, Baillière et Fils, 1878.*

The pathogenic rôle of fatigue is so imperfectly known and so differently estimated that in beginning its study it is necessary to

reach a clear idea of what fatigue is before going on to examine those diseases in whose origin it is concerned. FRANCE

Fatigue, like cold, is a pathogenic cause which may be considered trivial, but which is nevertheless none the less real: it is only a question of knowing at what point its effect may be met with. This is the purpose of our present study. (Page 59.)

Like many other causes, fatigue does not always act in an identical way in the production of disease, nor play the same pathogenic part. In brief, the result depends also on the illness that develops and upon the organism in question; it is therefore evident that it will vary according to the kind of illness and condition of the patient.

A preliminary question must now be answered. Can fatigue really cause illness? If, following the example of many writers, we had admitted that fatigue was only a painful sensation followed by more or less marked functional impotence, the answer would be easy. It would be clear that this painful sensation could not cause illness more than a number of others — for instance, hunger. . . . But we believe that fatigue must be regarded quite differently. Here we must apply those facts gained in the study of physiology (previously expounded).

It is not, indeed, that transitory state, to which the cessation of activity puts an end, that induces illness. This state simply indicates the need of rest, as hunger indicates the need of food. But if these appeals are not attended to, if these needs are not satisfied or only partly so, then it comes about that we have morbid troubles, provoked on one hand by an exaggerated functional overactivity, and on the other by defective reparation. (Page 60.)

A special pathogenic cause does not always give the same results, nor always act in the same way: an entire regiment is subjected to cold; it might be supposed that this would have an identical effect on all the men, but two will have pneumonia, ten bronchitis, fifteen rheumatism, and the greatest number will not be affected. This comparison serves to show how, under the influence of fatigue, we may expect to see a variety of diseases appear.

In some cases it will be simply a predisposing cause; its part is reduced to a minimum. Nevertheless it is there; compare for instance the resistance of the vigorous individual to malarial poison with that of the unfortunate, exhausted by severe toil; whose excessive tissue waste cannot be repaired even by an ample food supply. There we have a general predisposition. (Page 61.)

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Fatigue seems sometimes to have closer connections with the outbreak of illness, without its influence being precisely definable. Again, there are cases where the pathogenic rôle of fatigue is more precise and important, so that one may even say, given certain personal predispositions, that fatigue will determine the development of definite diseases. . . .

But in general, a thorough study of pathogenesis shows that fatigue is not one of those etiological agents whose powerful action imprints upon the organism such an injury that a definite disease is sure to follow. How far, removed, for instance, is the insidious effect that we have traced, from the active and almost certain effect of poisons? . . . That the germ of smallpox alone is capable of producing smallpox no one will deny. Yet how different are the variolas that occur in exhausted overworked individuals and those which are not complicated by fatigue or any other depressing secondary cause. (Page 63.)

If fatigue is not a powerful cause in the production of disease, it is so in engendering superadded elements which are sometimes of capital importance. . . .

Disease is not an entity always identical with itself. The simplicity of doctrinal description is often lost in the presence of the patient. And it is upon the patient and not on the illness, that fatigue exerts its action. (Page 63.)

GERMANY *Handbuch der Hygiene. Bd. 8^l. [Handbook of Hygiene. Vol. 8^l.] Edited by Dr. THEODORE WEYL. Allgemeine Gewerbehygiene und Fabrikgesetzgebung. [General Industrial Hygiene and Factory Legislation.] Dr. EMIL ROTH. Jena, 1894.*

It is an uncontested fact that all detrimental conditions of factory work — whether they arise from length of working hours or burden of work, or from the close proximity of many persons in one room, or from the special so-called occupation diseases, — become obvious just so much the sooner and so much the more permanently as the individuals in question are less resistant. Thus, of all the individuals engaged in a certain industry (no matter whether it is a question of handling poison or dust-creating materials or of working with irritants, or of the weather and bad air, or of unnatural positions or overexertion of special groups of muscles) — of all these persons some will not suffer in health, while others will suffer after the lapse of

some years. Still others in a much shorter time display all the well-known mischievous effects in typical forms, either as poisoning or as diseases of specially taxed or specially weak organs, or as characteristic crippling and deformity. GERMANY

The explanation of this is, *not* that the first and second groups were less exposed or knew better how to avoid the dangers, but that they were better protected than the last group. This protection is partly inherited and constitutional, based on the strength of individual organs, and is partly the result of the whole standard of living. . . . The more favorable these social factors and the more obedient to hygienic laws the whole mode of life, the greater the resisting power of the whole organism and its separate organs will be. The more unfavorable those conditions are, the less resistant is the organism. . . . (Pages 1-3.)

Massachusetts House Documents. 1866. No. 98.

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(Specific) cases are not necessary to show the injurious effect of constant labor at long hours. . . . There may be serious evils from constant and exhausting labor, that do not show themselves in any positive, clearly defined disease; while nevertheless the vital forces of the whole man, physical and mental, are very greatly impaired. (Pages 35-36.)

Bulletin of the United States Bureau of Labor. No. 75. March, 1908. [Industrial Hygiene.] GEO. M. KOBER, M.D.

Measures for the Protection of Wage-earners:

One of the important predisposing causes to disease is overwork or fatigue, because the accumulation of waste products in the blood, from muscular wear and tear, together with the expended nervous energy, combine to render the system more susceptible to disease. Excessive work is inimical to health, and long hours and hard work are calculated to diminish the general power of resistance, and thus bring about physical deterioration. Hence the necessity of laws regulating the hours of labor and the enforcement of a day of rest as contemplated by the Sunday laws. (Page 536.)

(b) FATIGUE AND INFECTIOUS DISEASES

Since overfatigue predisposes to the infectious as well as to general diseases, it constitutes a danger to the public health through the spread of such infections. Excessive working hours, therefore, which induce overfatigue, are a menace not only to the individual but to the public.

GERMANY *Eighth International Congress of Hygiene and Demography. Über den Einfluss der Arbeitszeit auf die Gesundheit der Arbeiter im Allgemeinen. Budapest, September, 1894. Vol. III, Sec. IV. [The Influence of Working Hours on the Health of Workers in General.]* Dr. EMIL ROTH, Potsdam: Budapest, 1895.

All overwork — no matter whether it is such by reason of its severity or excessive degree of exertion or of its continuance beyond the normal length of time — may either cause illness: (1) Directly; as shown by bad effects on the digestion or the circulation. This results in a general disturbance of nutrition with consequent impairment of function or disease of individual organs. Or (2) Indirectly, in depressing the normal power of resistance of the tissues, and thus favoring the invasion of infectious bacteria. The lowered resisting power increases predisposition to disease. (Page 94.)

Handbuch der Arbeiterwohlfahrt, Bd. I. [Handbook of the General Welfare of the Working Classes, Vol. I.] Edited by Dr. OTTO DAMMER. Beschädigung der Arbeiter bei der Arbeit. [Injuries of Occupation.] Dr. ASCHER. Stuttgart, Enke, 1902.

Such overworked individuals are not only completely incapable of obeying the laws of hygiene, they are also, on account of their lowered resistance to every form of disease, especially the infectious forms, a standing menace to society, a menace which is also serious in regard to sexual diseases (venereal diseases) both as to their immediate and remote environment. . . .

The diminution of working time is a measure of self-protection demanded by the state. The fear of lessened production under shorter hours has, moreover, never been realized, hence this argument is without force. (Page 79.)

Thirteenth International Congress of Hygiene and Demography. ITALY
 Vol. V, Sec. IV. Brussels, 1903. *Dans quelle mesure peut-on par des méthodes physiologiques étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? [To what extent may fatigue resulting from occupation be estimated by physiological methods, and what arguments can medical and physiological science present in favor of special methods of industrial organization?]* Dr. ZACCARIA TREVES, University of Turin. Brussels, 1903.

One of Lagrange's chief services has been in being one of the first to point out that the wastes due to excessive consumption or the poisonous materials due to insufficiently repaired muscular work, accumulate in the body, and that this causes a greater predisposition and a lowered resistance to disease, especially infectious maladies. In especially grave cases this accumulation may manifest its presence by a characteristic symptomatology. (Page 31.)

Il Ramazzini. Giornale Italiano di Medicina Sociale. Anno I. Fasc. I. [Italian Journal of Social Medicine. I. 1. January, 1907.] Antagonismi Igienico economici. [The Conflict between Hygiene and Industry.] Prof. ANGELO CELLI, Director of the Institute of Experimental Hygiene at Rome.

Fatigue also predisposes to infectious diseases. Typhoid for instance is much more easily taken after excessive and exhausting labor. It has even been proved that the poison of fatigue predisposes to disease individuals who might be able to resist infection under other circumstances. (Pages 36-37.)

Il Ramazzini. Giornale Italiano di Medicina Sociale. Anno I. Fasc. 12. [Italian Journal of Social Medicine. I. 12. December, 1907.] Nuove ricerche e nuove conquiste nel campo della Patologia e dell' Igiene. [New Researches and Acquisitions in the Pathology and Hygiene of Labor.] Dr. G. Y. GIGLIOLI.

The influence of overfatigue in inducing predisposition to disease even in organisms capable of resisting infection under more favorable circumstances has been again demonstrated by Ronzani in some ex-

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periments showing the diminution of bacteriocidal power exhibited by the lungs of overfatigued animals or of those exposed to other deteriorating conditions.

On the other hand the part which fatigue plays in bringing about morbid local conditions and in rendering the organism more susceptible to the influence of the poisons used in manufacture has not received as much attention as the importance of the subject demands. The fact of such increased susceptibility is confirmed by many clinical observations especially as regards toxic neuroses. (Page 2.)

FRANCE

Bulletin de l'Inspection du Travail. Fasc. 1-2. Ministère du Commerce, de l'Industrie, des Postes, et des Telegraphes. Travaux originaux des Inspecteurs. [Bulletin of the Labor Department. Leaflets, 1-2. Original Contributions of the Inspectors.] Le Repos Hebdomadaire. [The Weekly Rest Day.] M. DE LAS CASAS. Paris, Imprimerie Nationale, 1907.

Physicians and hygienists declare that the man who does not rest sins against his own health; that he is guilty of slow suicide and shortens appreciably the years of life that nature meant him to have. Doctors say, too, that the man who works but does not rest, is more susceptible than others to the epidemic diseases which are prevalent in industrial centres, and they add, finally, that such a man, if he is actually attacked by such maladies, offers less resistance to them and is more likely to succumb. (Page 146.)

Travail et Plaisir. [Work and Enjoyment.] CHARLES FÉRÉ, Doctor of Medicine. Paris, Alcan, 1904.

Fatigue, no matter how produced, plays an important rôle in the development of numerous diseases by diminishing resistance to infectious or toxic agents. (Page 442.)

(c) LIABILITY OF WORKING PEOPLE TO NERVOUS DISEASES

Overfatigue from excessive working hours not only renders overtaxed workers susceptible to general and infectious diseases, it predisposes them effectually to more subtle nervous disorders, especially neurasthenia in its various

forms. Nervous exhaustion considered until recently solely an ailment of brain workers and the well-to-do, has been found by physicians and physiologists to be alarmingly prevalent among industrial workers, subject to the strain of overlong hours. Overexertion from excessive work, combined with the strain of continuing at work after fatigue has set in, brings on such nervous derangements, which exhibit among working people exactly the same clinical appearance as among other classes of society.

Thirteenth Congress of Hygiene and Demography. Vol. V, Sec. IV, Brussels, 1903. Dans quelle mesure peut-on par des méthodes physiologiques étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? [To what extent may fatigue resulting from occupation be estimated by physiological methods, and what arguments can medical and physiological science present in favor of special methods of industrial organization?] Dr. ZACCARIA TREVES, University of Turin. ITALY

Physicians have long insisted that neurasthenia, once supposed to be exclusively characteristic of intellectual overexertion is extending widely among workers whose labor is mechanical and material. (Page 36.)

Fourteenth International Congress of Hygiene and Demography. Vol. II, Sec. IV. Berlin, 1907. Ermüdung durch Berufs Arbeit. [Fatigue as a Result of Occupation.] Dr. ZACCARIA TREVES, Turin. Berlin, Hirschwald, 1908.

Does what physicians call "exhaustion" (surmenage) really exist in the working population? This question, which was not thought of in the earliest studies of neurasthenia, since neurasthenic conditions were supposed to be ailments of the liberal professions and those engaged in intense intellectual application exclusively, has to-day been answered by the medical profession in the affirmative; the daily observation of workers in hospital and dispensary has led to this conclusion. Above all what has led us to it is that the observation of

ITALY well-established morbid conditions, the study of their etiology and course, has disclosed among workers who might easily pass for normal a variety of circumstances favorable to the invasion of these maladies and to general morbidity; circumstances, all of which are ultimately linked with the problem of fatigue.

From this knowledge have proceeded all the efforts made by hygienists to ameliorate the general conditions of existence in and out of the factory, to plan for insurance, etc. . . . to shorten hours of labor, to limit the work of women and, above all, of children.

Thence have resulted all those ameliorations which, as proved by statistics, have had substantial results for good. To-day, in fact, we possess, in the practical field of industrial enterprise, extensive proofs that it is possible to introduce along with technical improvements a more logical organization of hours and wages, which allows a certain improvement of the physical, moral, economic, and mental conditions of the worker, or, in other words, an increase of his productive capacity, and the output of industry.

The reports which we have heard (Roth and others) here prove conclusively that overstrain resulting from occupation does exist; that it is also entirely possible to combat it: there is, in short, a problem of overwork. (Pages 626-627.) This overstrain which physiologists, psychologists, clinicians, and above all nerve specialists and alienists, encounter so often as to be no longer deceived by it, does not present a well-defined morbid picture; but it is a slow deviation, often obscured by its very slowness, and predisposing to illness of any nature; it is the borderland of illness.

There are physical manifestations of general or localized muscular weakness; signs of incertitude or of awkwardness in rapid and rhythmical movements; insomnia or troubled restless sleep; atony of digestive organs, irregularity of pulse, vertigo, nausea, pain, troubles of motor and vaso-motor reflexes; there are the most capricious manifestations in the psychic realm. . . .

The differences in objective symptoms will depend on the organ that may be especially overtaxed in the overworked individual under consideration, but such differences must not deceive us as to the essence of overstrain, which is always the result of insufficient nutrition — in the earliest phases insufficient only, in the advanced stages abnormal. We must keep this general proposition before our eyes always, in order to understand the phenomenon of overstrain, especially in order to comprehend it in the working class, more par-

ticularly in those attached to highly specialized industries. For in these persons one does not observe such extreme evidences of fatigue in the physiological meaning of the word as can be experimentally exhibited in the laboratory, and consequently we shall fail to explain the chronic symptoms of fatigue in them if we do not recall their whole mode of life, as determined by their occupational environment, as well in the mill or factory as out of it. (Pages 627-628.)

We will endeavor to decide in accordance with the laws of voluntary work, what are the physiological sources of overstrain. Acute as well as chronic fatigue cannot be gauged solely by the output of workers. I agree (with a previous speaker) that one is not struck by signs of overfatigue or exhaustion among workers in shops and factories, and that such workers do not reach such a point that they absolutely cannot control their motions or concentrate their attention — excepting those in certain lines of work which demand very rapid motions. . . . But it must be recalled, from the physiological standpoint, that the production of voluntary work, whether mental or manual, follows a curve essentially different from the curve of organic fatigue. . . . The oscillations of the will (urging on a fatigued workman) varying with the interest which work inspires, have the effect of intensifying application and minimizing the sensation of effort, thus concealing fatigue. I believe that these volitional curves — oscillations of the will — which have to-day a more definite significance than formerly in experimental psychology, constitute in their entirety the complete psychic personality of the individual and the reason for different capacities of production and of resistance. In the exaltation or the depression of this personality, with resultant changes in the organs, and the subjective ills which warns the individual of these organic changes, is found the complete picture of overstrain; that is to say, of work done in a state of exertion where there is a more or less marked and persistent disproportion between the usefulness of the work in itself and in the worker's estimate, on the one hand; and the amount of energy and will power expended on it, on the other hand. When, however, in the industrial field, such a degree of fatigue is reached that the workers can appreciate it by a difference in output, it cannot be concluded that they have the power of instinctive self-protection to guard against the premonitory onset of fatigue; that depends, obviously, on the conditions of the contract of labor. As a physiologist, I believe that even if these fatigued workers produce less, this production, diminished as it is, costs the workers more dear than their previ-

ITALY ous labor; the more so because a moderate degree of fatigue has the effect, with many persons, of a general stimulus of the nervous factors involved in work. Here we have indeed the crux of the whole question. If the physical cost of the long hours and overstrain which characterize unintelligent industrial organizations were directly and proportionately evident, both in the sensation of fatigue and in the output of the industry individual and collective, the problem of fatigue, as a result of industrial labor, would in my opinion have been solved long ago, instead of being obscured by the illusory profits of long hours and insufficient wages. (Pages 629-630.)

GERMANY *Zeitschrift für pädagogische Psychologie, Pathologie und Hygiene.*
 IV. *Der Einfluss des Grossstädtischen Lebens und des Verkehrs auf das Nervensystem.* [The Influence of the Life and Rush of Great Cities on the Nervous System.] ALBERT MOLL. Berlin, 1902.

Nervous diseases are not unknown among laborers and all those whose work is with their muscles; indeed, they occur here more frequently than is often supposed. It is to be remembered that the nervous system shares in every act of muscular exertion — muscles cannot act without nerves. As, however, the ordinary day laborer does not make as intensive or as strenuous a demand upon his nervous system as does the brain worker, the more frequent occurrence of nervous diseases among the latter is readily explainable. Ordinary working men are rendered more liable to nervous disorders by being exposed to definite conditions which are harmful to the nervous system, and long hours of work must be placed in this category because, as weariness becomes more pronounced, the nervous effort induced by the will power must be constantly greater in order to overcome or resist fatigue.

Numerous cases of neurasthenia may be observed among the workers in home industries, either in town or country.

Whenever an unremitting home industry is carried on where men, women, and children toil not only all day, but part of the night in close, narrow quarters, . . . there we shall find miserable, anæmic bodies with every symptom of nervous enfeeblement, in the greatest numbers.

In general, many cases come under observation where sleep has been insufficient, or, by nature of the occupation, irregular, as with

waiters and railroad men. And also, as Möbius has correctly pointed out and emphasized, those workers are especially liable to nervous disease whose tasks require an excessive precision, excessive attention to fine details, this making exhausting demands upon the nervous centres. (Page 127.) GERMANY

Über die Ursachen der Neurasthenie und Hysterie bei Arbeitern. [The Causes of Neurasthenia and Hysteria among Working People.] PAUL SCHÖNHALS. Berlin, 1906.

The opinion that nervous affections resulting from mental overstrain are confined to the well-to-do classes has long been disproved by practical experience. It was however, for a long time, not easy to bring ample proofs that the lower working classes shared to a considerable extent in the distribution of nervous diseases, because such data lay solely in the hands of private practitioners or hospitals. The State compulsory insurance has now given the needed opportunity. (Pages 5-6.)

Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten. XXII. 1897. [Official Information from the Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1898.

Hours of work in the industrial establishments of Reuss i. L. are, on an average, 11½. Nervous diseases and lung diseases are stated to be the results of occupation. The same diseases have been observed by the officers of the sickness insurance department in Chemnitz to be the consequences of the long hours (amounting to 13) of the mill hands; in this connection a workman said that the prolonged hours of work were senseless, when one considered the inevitable destruction of strength. The establishment of a maximum day was a mandate of hygiene. (Page 242.)

Il Ramazzini. *Giornale Italiano di Medicina Sociale Anno I-Fasc.* ITALY
1. [Italian Journal of Social Medicine, I. 1. January, 1907.]
Antagonismi igienico-economici. [The Conflict between Hygiene and Industry.] Prof. ANGELO CELLI, Member of Parliament, Director of the Institute of Experimental Hygiene at Rome.

In normal work, an equal balance between assimilation and elimination is maintained in the muscular system. When this limit is

ITALY passed fatigue results. Fatigue develops an actual and active poison, and its influence is manifest not only in the muscular system, but in the respiratory, circulatory and nervous system. Excessive labor may lead to neurasthenia. It is to be noted that the result may follow excessive muscular labor, as well as intellectual effort. The nervous system is more slowly influenced by fatigue, which increases the danger of neurasthenia. In many cases indeed the effects harmful to the muscular system are combined with those affecting the nervous system when the gravest results follow. Many trades lead to muscular and nervous exhaustion, which is in fact one of the most serious evils of our civilization. (Page 36.)

Il Ramazzini. Giornale Italiano di Medicina Sociale Anno I—Fasc. 12. [Italian Journal of Social Medicine, I-12, December 1907.] Nuovo ricerche e nuove conquiste nel campo della Patologia e dell' Igiene. [New Researches and Acquisitions in the Pathology and Hygiene of Labor.] Dr. G. Y. GIGLIOLI.

In a critical study of the first International Congress on the Diseases of Labor, I have described the evolution of the medical study of health conditions as they concern the wage-earning classes. I attempted to show how the first vague Ramazzinian conception of trade diseases has developed into the wider and more definite theory of the pathology of labor. This most important division of social medicine has developed in a very short time into a well organized and distinct study. It is not, nor does it tend to become, what is popularly called a "specialty," but it has the dignity of being considered the most modern branch of medical study, and has its ardent expounders, clinics, laboratories, and students.

It is a very modern development, stimulated by the most recent scientific researches and acquisitions in hygiene, economics and politics. Through it, new methods of study have developed, by which not only the typical "diseases of labor," but all the factors which bear upon the health conditions of wage earners are estimated and studied clinically and experimentally.

. . . Modern pathology thus unites studies of fatigue and nutrition with the most recent theories of predisposition to infection induced in formerly healthy organisms. It reconciles the very latest theories of neuro-pathology with the latest ideas about the neurasthenics of

labor. While it does not attempt to invade the other branches of **ITALY** medicine, it does draw from them facts and data with which to reinforce its own postulates on social economic matters. This most modern development may appear to some too vague and general, to others too restricted, but it is certainly gaining ground and growing continually more complete and definite.

There have been many valuable contributions to the pathology and hygiene of labor of an experimental, clinical, and legislative nature in the last few months. (Page 1.)

(d) NERVOUS DISEASES AND STATISTICS OF FOREIGN SICKNESS INSURANCE SOCIETIES

The close causal relation between overfatigue and nervous diseases is illustrated by the statistics of foreign sickness insurance societies. Close medical observation of working people receiving state treatment or sick pay in Germany has shown that nervous diseases have increased alarmingly among them during the last decade. Medical study of individuals shows further that among the causes of nervous breakdown the most effective is precisely the strain of industrial occupations, characterized, as they are, by speed and monotony of repetition. The prevalence of neurasthenia and nervous disorders is so wide-spread that they are designated by physicians abroad as modern occupation diseases. Curtailment of excessive working hours is declared a physiological necessity.

Since speed and specialization are admittedly greater in American industry than in any other, it is certain that medical observation of working people in this country must disclose an even greater prevalence of nervous exhaustion.

Über die Wachsende Nervosität Unserer Zeit. [The Increase of Nervousness in our Times.] **GERMANY** DR. WILHELM ERB, Heidelberg University. Heidelberg, Koester, 1894.

In all grades of society . . . among the poor and wretched, also, neurasthenia is clearly a more widespread evil than formerly. It is

GERMANY to be found in shocking frequency not only among educated men, officials . . . railroad and telegraph employers . . . but also among factory workers, sewing women, etc. (Page 15.)

It only needs a superficial survey to teach us that everything which overstrains, fatigues, and exhausts the nervous system is capable of inducing that condition which I have characterized as a pathological fixation of fatigue, — as irritable weakness and exhaustibility. (Page 15.)

Deutsche Medizinische Wochenschrift, Nr. 21, Mai, 25, 1905. Die Neurasthenie in Arbeiterkreisen. [Neurasthenia in the Working Classes.] Dr. P. LEUFUSCHER and Dr. W. BIBROWICZ, formerly of the Beelitz Sanitarium of the State Old Age and Invalidity Department of Berlin. Berlin, 1905.

The increase of diseases of the nervous system among working people in the last decade is a fact that is now firmly established by extensive and carefully conducted statistical inquiry. This is most clearly evident in respect to the psychoses; but there is also no doubt, in the minds of the most informed authors, that neurasthenia — which, though less menacing than insanity to the efficiency and labor capacity of the worker is still sufficiently serious in this respect — is also steadily increasing in frequency and in severity. (Page 820.)

Whatever different causes of neurasthenia may be brought forward by different authors since Beard depicted its general features, there is one point on which all are agreed; namely, that the modern organization of industry with all its factors and sequels is a most prolific source of neurasthenia. Though, for some years, not only the laity, but also the chief medical experts on neurasthenia, as Löwenfeld and Binswanger, overlooked the working classes in relation to this disease, this attitude is now radically changed. On all sides, in the clinics and physicians' offices, and by the managers of the large insurance funds, proofs of the enormous increase of neurasthenia as a cause of inability to work are being presented. There are two reasons for this change: 1. The observation of chronic diseases of working people has become vastly more far-reaching and exact. 2. Altered conditions in the labor world have created an unusual liability to acquired nervous troubles. We are inclined to think that both of these factors contribute, though not in the same proportion, to the explanation of the fact.

It is certain that the question of diseases of working people has come more prominently to the front than was the case in the past. And employers are learning that the health and strength of the people is an advantage to them as well. (Page 821.)

How frequently delay in seeking medical advice may have formerly happened is of course not possible to estimate. Frequently enough, without doubt, and yet we regard our second explanation of increased neurasthenia, the altered conditions of life and labor, as of much greater weight. Work has become very different. Piece work has indeed obtained larger wages, but has developed an impetus and speed and intensity of effort that used to be unknown, and this invariably crushes the weaker workers, those for whom all work is a heavier burden than for the strong. Continuous anxiety is felt by these lest they fall behind. Then sometimes voluntarily, sometimes compulsorily, overtime is undertaken, and so it turns out that the working hours, instead of being comparatively shorter than the usual day, are really much longer, and by reason of the irregularity far more exhausting. (Page 821.)

Thorough and ample observation bearing on the forms and etiology of neurasthenia among working people has been made possible only by the creation of the great Sanitaria of the State Insurance Department. When the first one, that at Gütergotz, was built in 1894 for about 100 chronic male cases, the applications were so numerous that the large sanatorium for 220 men and 110 women at Beelitz was next erected.

Of the patients treated in these establishments on an average, 26 % have been neurasthenics, and the percentage for individual years has risen from 18 % in 1897 to about 40 % in the past few years. (Page 821.)

CLASSIFICATIONS ACCORDING TO OCCUPATION. AMONG 1564 CASES

| | | | | |
|-------------|-----|---|--------|--------------|
| Typesetters | 246 | = | 15.75% | of the cases |
| Carpenters | 148 | = | 9.45% | " " " |
| Locksmiths | 77 | = | 5.00% | " " " |
| Mechanics | 30 | = | 1.09% | " " " |

(Page 821.)

The whole number of typesetters insured is about 1 % of all insured persons; the whole number of carpenters, about 5 %. When this proportion is considered, the percentage of neurasthenic cases among typesetters — 15.75 % of all neurasthenic cases, — is most striking, while that of the carpenters, — 9.45 %, — though high, is not quite

GERMANY so disproportionate. Oppenheim also points out the frequency of neurasthenia among newspaper typesetters. (Page 822.)

We wish to suggest that a key to explain the great increase of neurasthenia among workers generally in our great cities may be found in the unusually large number of cases in the above-mentioned trades. We have here to do with classes of workmen who stand perhaps highest among their associates.

... The typesetter must follow with strained attentiveness an occupation of indescribable monotony, for the speed to which he is forced destroys all meaning of what he sets.

It is the same with the work of many mechanics, who never see a completed piece of work go out of their hands, who only make a part of some whole. But here we have to do with the best of our modern city workingmen and their growing claims, not only for material but also for spiritual things. What to the common workman is only work, should be a calling to every true craftsman, and this can no longer be the case. (Page 822.)

He who is not strong and enjoying the vigor of health must under these conditions become neurasthenic. When workingmen have an occupation which brings with it a certain pleasure there is, according to our observations, little trace of neurasthenia to be found. Such is, for instance, the case with painters, who in spite of the distinctly unfavorable circumstance of liability to lead poisoning are seldom neurotic.

The influence of uncongenial work is naturally intensified by cares, illness — troubles to which the worker and his family are constantly exposed — and yet, contrary to what one might expect, the latter causes alone have been, in our experience, insignificant in accounting for neurasthenia. But almost always in answer to the question, "What caused your illness?" comes the reply, "The hard work." (Page 822.)

We must here state plainly that as to clinical appearances we have found nothing to differentiate the neurasthenic workingman from the neurasthenic patient of any other social class. The symptoms and conditions are the same for both. (Page 824.)

The most important curative factors for our city wage-earners, as well as for the patients of the middle and higher classes, are, removal from the monotony of their work, often also from painful family conditions, the opportunity to enjoy from time to time the pleasures of a fairly comfortable existence, freedom, air, and light. (Page 824.)

The dangers threatening the health and well-being of the nation **GERMANY** from the increase in nervous diseases, though not recognized by all, have yet been emphasized by many experts, in recent years.

Pelman, Möbius, Grohmann, Laehr, Determann, Cramer, and Windscheid have energetically promoted the combating of neurasthenia among workmen, and the influence of the State Insurance Department and the large private benefit societies tends to agitate the question more and more generally. (Page 825.)

Verwaltungsbericht der Landesversicherungsanstalt Berlin für das Jahr 1906. [Report of the State Invalidity and Old Age Insurance Department for Berlin, for 1906. Report of the Physician-in-Chief of the Beelitz Sanatorium. (Tuberculosis not included.)

In the course of the year, 1655 men and 824 women were treated. . . .

By far the largest number of the patients were nervous cases, and those suffering from gouty diathesis and articular rheumatism, cardiac and stomach diseases also took an important place. Of the cardiac cases, aside from valvular troubles, most suffered from myocarditis, hypertrophy of the heart, weakness of heart, dilatation or a complication of the last two disorders, that naturally presented a markedly severe type of illness. . . .

Forty per cent showed simple, idiopathic hypertrophies, 35 per cent were neuroses of the heart, 10 per cent, dilatations, and primary weakness of the heart, 10 per cent.

Along with the major cardiac neuroses there is also seen, among the working people of Berlin, as a result of overwork, an extremely prevalent neurasthenia, which is more or less a concomitant of heart disease; the features of this latter reveal the frequency of maladies to which special trades, such as typesetters (compositors) are specially predisposed. . . .

Of the 1450 (1410) men patients who were discharged, 748 (684) or 52 (49) per cent — over one-half — were nervous cases, whose breakdown was in the majority of cases directly due to their overworking in their various occupations; . . . Of the women discharged one-fourth were anæmic or chlorotic, or, in exact figures, 176 (194) in 734 (682) patients. Nervous exhaustion and nervous diseases were even more prominent, namely, 299 (261), or over one-third of all the female patients belonged in this class. (Page 67.)

GERMANY *Zeitschrift für Klinische Medizin.* Bd. 60. *Aus dem Sanatorium der Landesversicherungsanstalt Berlin in Beelitz. Über Herzerkrankungen in der Berliner Arbeiterbevölkerung.* [Heart Disease among the Working People of Berlin.] Dr. LÜBENAU, Assistant Physician in the Beelitz Sanatorium of the Old Age and Invalidity Insurance Department of Berlin. Berlin, 1906.

. . . Of the cardiac cases here treated, the number of neuroses of the heart and of simple, idiopathic hypertrophies preponderated greatly, being 85 per cent for the former, and 40 per cent for the latter. Dilatations of the heart followed, some of them primary, a few resulting from cardiac hypertrophy, other cases of primary weakness of the heart (*Debilitas cordis*) with 10 per cent.

The essential purpose of this work is to show how cardiac diseases develop in working people as a result of injurious conditions of labor, and therefore, beside hypertrophies and dilatations, only those diseases are considered in whose origin occupational and industrial dangers play a more or less leading part, and which, therefore, according to this origin, may be properly designated as genuine working-class diseases.

Dilatations resulting from the drink habit are excluded. (Pages 134-135.)

In coming to the class of cardiac neuroses it is to be remarked that nervous affections of the heart among Berlin workmen are very common, as may be inferred from the extraordinary prevalence of neurasthenia. (Page 136.)

It has been found that when these workers are removed from the enormous competition and rush of the city, overstrained working energy soon fails. This continuous overwork is the cause of the general and often grave neurasthenia, as has been recently shown in an instructive article. (Leubuscher und Bibrowicz, "Die Neurasthenie in Arbeiterkreisen.") (Page 137.)

In most of these cases of simple neurasthenia, nervous affections of the heart are the rule. There is the sensation of palpitations, pain in the region of the heart, a feeling of great anxiety, and shortness of breath after exertion. Such diseases have serious importance for workers on account of cardiac complication. (Page 137.)

The cases described above are limited to those in which the heart symptoms of nervous origin present the dominating features and which, therefore, may be regarded purely as cases of cardiac neuroses.

The causative factors of such maladies, as in general neurasthenia, GERMANY may be admittedly of manifold kinds; yet it is worthy of especial mention, in considering cases here reported, that the cause of sickness was repeatedly ascribed to the definitely injurious influences of the patients' work, to physical or mental overstrain or anxiety of one kind or another in connection with occupation. (Page 137.)

The tendency of cases of cardiac neuroses to relapse must be pointed out: Certain of our cases show this tendency very interestingly. With some, after treatment in the sanatorium, light employment was permitted, and by the strict avoidance of physical overstrain the disease then followed a favorable course. In other cases invalidism was declared, and the invalidity pension secured. These, also, showed a gratifying improvement as the result of relief from exertion and the saving of strength.

Mental as well as physical overstrain frequently results in cardiac neuroses. The patients of this class are recruited from salesclerks, bookkeepers, secretaries, machinists, and telephone clerks.

Printers (typesetters) especially are numerous represented in this category, for the acuter forms of neurasthenia in general are extraordinarily widespread among them. The night work necessary in this occupation, and the ever more exacting piece work, exhibit a steady tendency to strain the nerve-energy of the individual to its very uttermost limit. (Page 139.)

Über die Ursachen der Neurasthenie und Hysterie bei Arbeitern.
[*The Causes of Neurasthenia and Hysteria among Working People.*] PAUL SCHÖNHALS. 1906. [*A Study of 200 Cases in the Workingman's Sanitarium at Schönow Zehlendorf.*]

... Another group of injurious factors is to be found in the work itself. In all, 45 cases, or almost 22.5 per cent, gave physical overstrain from work as the prime cause of illness, and here the piece-work system seemed to play an especially injurious part. In 15 cases I concluded that piecework was the original cause of the breakdown, and in 10 of these cases I could discover no other contributory factor. Four of the others had some slight hereditary predisposition, and the overstrain here acted as the excitant of disease. The fifth had returned to piecework after several brief illnesses, until he finally became permanently overstrained.

Thus, to repeat, 5 per cent of all the cases of neurasthenia were

GERMANY traceable entirely to the overstrain of piecework, with no other discoverable cause for illness.

This is a high figure, but whoever has been inside of a factory and has observed the prodigious rapidity of the pace of work there, and the foresight and attention which each worker must exercise, will be able to estimate correctly the wearing nature of piecework. It is not alone the physical strain, but in a high degree the psychic factor that must be taken into consideration. It is the nervous tension and strain that is felt by the workers themselves to be the hardest feature of their work. Few can long endure such work. One patient had done piecework from his eighteenth to the forty-sixth year. He was an exception. Most workers can only keep it up for four to five years, then seek something easier.

Even night work is not quite as harmful. In eight cases I found it (night work) as one cause, but only three cases where night work was the exclusive cause of disease. In the other five, it was, it is true, the chief cause, yet other slightly predisposing conditions were also present. (Page 15.)

Among twenty-two cases caused by unfavorable conditions of work, fourteen showed that overstrain in work, especially where overtime was required, was chiefly responsible for the breakdown, while other less prominent factors had also had some injurious influence, and had helped in the result. (Page 16.)

We find then three specially dangerous factors in the life of the worker: Trauma (accident), Alcohol, and Overstrain. Other dangers, such as ordinary illness, etc., threaten all classes alike.

What is to be done? The State is making provision for accident: a campaign is being waged against alcohol: there remains the question of overstrain to be dealt with. (Pages 22-23.)

It is now generally recognized that the combination of physical and mental overstrain is especially dangerous for the nervous system: Artisans will therefore show a higher percentage of nervous disease than laborers, and the skilled artisan will suffer more than the casual worker or man of all trades whose work is largely mechanical. In fact, my inquiries showed that 57 per cent of the cases were skilled artisans, to 43 per cent of the others. (Accident cases are not included.)

The difference is even sharper when we compare the liability to nervous diseases among artisans, and the more skilled workers with such liability among common laborers. The relation is then 74.0 : 26.0, as seen by the following table:

| | | | |
|-----------------------------|-----------|-------------|-------|
| 1. Artisans, highly skilled | | 57.0% | |
| 2. General Workers 43% | } skilled | 17.0% | 74.0% |
| | | } unskilled | |

GERMANY

(Page 24.)

In the endeavor to find out what employment was most injurious I distinguished between factory work and ordinary business employment; further, between public transportation, and ordinary day labor. I then found that of the artisans, 21.0 per cent of the cases of illness were in small businesses, to 36 per cent in factories. (Page 25.)

Of the general workers, again, 18 per cent were factory workers, while transportation showed 7.0 per cent, and day laboring work 6.0 per cent.

These last figures are by many writers found to be higher, but the differences may be accounted for by the localities where their observations are made. (Page 25.)

It seems indubitable that factory work considerably outweighs other occupations in the sense that it provides the greatest number of factors tending to produce the neuroses of work in the industrial populations, and I am compelled to conclude that modern industry, continually developing as it is on more and more colossal lines, constitutes a dangerous and potent cause for a continuous increase of neurasthenia and hysteria. (Page 26.)

Fourteenth International Congress of Hygiene and Demography, Berlin, September, 1907, Vol. II, Sec. IV. Ermüdung durch Berufsarbeit. [Fatigue resulting from Occupation. Dr. EMIL ROTH. Berlin, Hirschwald, 1908.

Beside the intensity of work and other factors, . . . there is still another factor to be considered, whose importance is universally underestimated: that is the psychic factor. Mosso, in his investigations of the law of fatigue has shown ergographically the influence of psychic weariness on muscular strength, by demonstrating that whenever there is fatigue of the psychic centres there is always a resultant corresponding condition of the motor centres. In proportion as physical work is, at the same time, mentally fatiguing, the greater the attentiveness that it requires, so much sooner does fatigue appear.

This is the case in all occupations which are linked with special dangers, and where especial demands are made upon the responsi-

GERMANY bility of the worker, or where an extreme and unremitting attentiveness is required. In this latter respect shop girls must again be cited, for as a result of the unfailing attention and readiness demanded of them, they often fall a prey to chronic fatigue, and this the more readily accordingly as they were, to begin with, unsuited for their duties.

The psychic factor is furthermore of decisive importance for the working capacity as such. Even the skilled workman does not work as evenly as the machine, but his capacity displays certain regular, recurrent variations due to the psychic factor. (Page 611.)

The researches of Pieraccini into the curve of work showed that, with the calling of a muscle or nerve into activity, the extent and certainty of its functioning first gradually increased, and in the second period of work was lowered. The second and third hours displayed, with manual workers (handworkers), the highest point of achievement, which was not exceeded through the rest of the whole day.

With this the results of a large steel and rolling mill agree, as it was there shown that of the average output of 40 *t.*, 23 *t.* belonged to the morning, and 17 to the rest of the day.

The psychic factor is also important in another respect. With the progressive division of labor, work has become more and more mechanical. . . . A definite share of overfatigue and its sequels, especially neurasthenia, must be ascribed to this monotony; to the absence of spontaneity or joy in work. How alarming the increase of anæmia and neurasthenia among working people has been in the past ten years is shown by the records of the sick benefit funds, the poly-clinics, and the hospitals. Many medical and scientific authorities have emphasized the increase of neurasthenia in the working classes. The ample materials of the Berlin State Insurance Sanitarium at Beelitz have more particularly served to prove the steady increase of neurasthenia, — actually from 18 per cent in 1897, to 40 per cent in 1904. Similar figures are shown by the sanitarium at Zehlendorf, where the highest percentage of neurotic patients were handworkers and skilled workers, with whom the combination of physical and mental strain reacted destructively on the nervous system. . . . (Pages 613-614.)

But that monotony is also of importance in so far as it nullifies pleasure in work, thereby favoring the onset of fatigue, must also be admitted from a part of the statistics. So, according to a factory inspector, the effect of certain light work with corset steels, admitting

of no break for several hours, was distinctly fatiguing; the remedy **GERMANY** was a periodical change of work for the employees in question. (Page 615.)

Of greater importance is the excessive overstrain of piecework, which indeed pays better, but at the cost of a speed and intensity of work which was formerly unknown. That these injurious effects first assail the weaker part of the working population is self-evident. My own observations, especially in textile mills, confirmed the frequency of anæmia and neurasthenia, especially among young women. (Page 615.)

To estimate more correctly the influence of kinds of work, we may observe the results noted as to pulse and respiration in a large electric works. Here, in no case was heightened pulse or respiration observed at the end of work. The difference between this and textile factory work is that in the latter the worker is to a great extent dependent on the machine, and must keep up with its speed, while in the electric establishment the workers are, as a rule, dependent on the machinery only to an extent which they determine for themselves. (Page 617.)

As the textile workers are dependent, at the mercy of the machine, so the clerks in the big stores are at the mercy of the public, and it is this unremitting attention, coming and going, and nerve strain that explain the high percentage of anæmia that is continually found among shop girls in these places. (Page 617.)

In a sanitarium where the members of the sick insurance included shop girls, machine sewing and dressmaking women and maids in hotels and public houses, among 145 who were chiefly suffering from anæmia, chlorosis, or neurasthenia, 110 were to be regarded as overworked.

Of the 145 cases 58, not including home workers, had a sedentary occupation; 44 of these were overworked; 87 had work involving a standing position; 66 of these were overworked. (Page 618.)

Fourteenth International Congress of Hygiene and Demography. **AUSTRIA**
Vol. III. Sec. VIII. Berlin, 1907. Berufs Morbidität und Mortalität. [The Morbidity and Mortality of Occupations.]
 ALFRED R. VON LINDHELM, Vienna. Berlin, 1908.

Sources of information: 1897-01 inclusive. The Vienna District Sickness Insurance Societies; General Workingmen's Insur-

AUSTRIA ance and Relief Society; Electric Street Railways Insurance Society; eleven Steam Railways Insurance Funds.

I have endeavored to elucidate the question of how far the increasing nervousness of modern life is connected with occupation. The question is, indeed, not a new one. (Page 1293.)

I selected two occupations, railroading and electric works. . . . The number investigated reached about 98,480 members of the sick benefit funds. . . . (Summary. The number of these investigated, 98,480 in the two modern industries, railroading and electricity — including in the latter only those whose work was in some way related to the electric current — was compared with about 388,000 members of other occupations. Relation of former to latter, 98,480; 388,000 — about 1:5.) . . . It was evident that the respiratory organs of those engaged in the railroad service were much less endangered than those of the industrial workers in more sedentary occupations in Vienna.

From various tables relating to the two occupations under examination it may be asserted that these two modern callings show a persistently greater contingent of nervous diseases than do other occupations. To this is to be added that nervous diseases must be recognized as occupation diseases in all great modern industries. (Page 1297.)

These disorders may with perfect right be truly designated as modern occupation diseases. (Page 1299.)

. . . Nervous diseases are to be recognized as most characteristic phenomena of our modern industries. (Page 1299.)

(e) AGE OF INCIDENCE

The need of protecting health by restricting working hours is often supposed to be limited to children and young girls. The greater liability of adults to neurasthenia and nervous diseases (being highest between the ages of twenty and forty-five years) shows that, as regards these diseases, adults are even more susceptible than young girls. Excessive working hours, therefore, which engender overfatigue and nervous exhaustion should be as carefully limited for mature women as for the young.

Die Pathologie und Therapie der Neurasthenie. [Pathology and Therapeutics of Neurasthenia.] Dr. OTTO BINSWANGER, Professor of Psychiatry, and Director of the Psychiatric Hospital, Jena, Fischer, 1896. GERMANY

Finally, in considering the importance of age, it is to be said that certain stages of the physical and mental development are uncommonly perilous to the nervous system in individuals with a hereditary handicap and constitutional predisposition to nervous disorders. Even healthy persons are more liable to neurasthenic ills in certain periods of life than in others. Still more important than the time of puberty, when the physical growth has increased claims made upon it, is the age between 20 and 30, for then the physical and mental strength is put forth most strenuously and incessantly in the struggle for a livelihood. Yet even in the period of mature manhood, 30 to 40, neurasthenia frequently occurs. . . .

Hosslin's statistics showed that among 828 neurasthenias 83 per cent occurred between the ages of 20 to 50 years.

My own experience is, that of 131 cases, in whom I was able to locate exactly the *starting point* of the disease as to the time it began, the relation to age was as follows:

| | | | |
|---------------------------------------|---|----|-------|
| Began in the first decade of life | — | 4 | cases |
| " " " second " " " | — | 46 | " |
| " " " third " " " | — | 43 | " |
| " " " fourth " " " | — | 32 | " |
| " " " fifth " " " | — | 3 | " |
| " " " sixth " " " | — | 2 | " |
| " " " seventh " " " | — | 1 | " |

(Page 46.)

Deutsche Medizinische Wochenschrift. Nr. 21; Mai 25, 1905. *Die Neurasthenie in Arbeiterkreisen.* [Neurasthenia in the Working Classes.] Dr. P. LEUBUSCHER and W. BIBROWICZ. Formerly of the Beelitz Sanitarium of the State Old Age and Invalidity Department of Berlin. Berlin, 1905.

Our reasons for the age groupings in our tables are as follows: Age up to 20 years is, for various reasons, unimportant in the consideration of neurasthenia, . . . We therefore end one period here. The next five years we regard as the period of completed growth. The time between 26 and 35 years seems to be the most serious

GERMANY epoch, — that of founding and supporting the family, of care and responsibility, of intensive work. Almost equally important is the period from 36th to 45th year. We chose the latter as a limit because after this the organic changes of age, arterio-sclerosis, emphysema, etc., begin to make themselves evident. Following this grouping we find the following figures:

| | | |
|------------------|-------|----------------------|
| I. (16-20 years) | 3.8% | of the Neurasthenics |
| II. (21-25 ") | 11.0% | " " " |
| III. (26-35 ") | 40.0% | " " " |
| IV. (36-45 ") | 31.0% | " " " |
| V. (over 45 ") | 14.0% | " " " |

(Page 822.)

In these statistics we have not shown the period of the onset of neurasthenia, but that stage where the gradually developing symptoms had reached a degree that seriously threatened the working capacity, a criterion that is justified by practical considerations.

Our results correspond closely with those of Löwenfeld, who found most cases fell between the years of 20 and 45. Krafft Ebbing's figures at Aethaus were also similar. (Page 822.)

Verwaltungsbericht der Landesversicherungsanstalt Berlin, für das Jahr 1906. [Report of the State Invalidity and Old Age Insurance Department for Berlin, for 1906.] Report of the Physician in Chief of the Beelitz Sanatorium (Tuberculosis not included). Berlin, Loewenthal, 1907.

As regards age most of the male patients, 59 per cent, were in the prime of manhood — between 30 to 50 years, whilst patients under 20 or over 60 were only two per cent each. (Page 72.)

The women, on the other hand, showed that the largest numbers of patients came from the age-group between 16 and 19 years, and between 20 and 29, . . . partly explainable by the withdrawal of women after marriage from industrial occupations. (Page 72.)

(f) NERVOUS DISEASE AND HEREDITY

The limitation of excessive working hours for women is required for the preservation of the race because nervous debility generated by overfatigue is transmissible, and

causes nervous weakness and predisposition to nervous disease to a marked degree in the second generation.

Die Pathologie u. Therapie der Neurasthenie. [Pathology and Therapeutics of Neurasthenia.] Dr. OTTO BINSWANGER, Prof. of Psychiatry and Director of the Psychiatric Hospital, Jena, Jena, Fischer, 1896. GERMANY

(Having studied the subject of heredity) what does this inherited predisposition signify? What influence will it have upon the future development of the individual? As we have seen that the neuro-pathic predisposition is exhibited by a general diminution of the efficiency of the nervous system as the result of, apparently, insignificant hindrances to development, its importance from the clinical standpoint is not hard to state.

Such detrimental factors as those to which human society as a whole or individual members of individual occupations or of social classes are all equally exposed, will have the effect of producing insanity and nervous diseases with distinctly greater frequency in individuals of neuropathic predisposition. (Page 37.)

Grenzfragen des Nerven und Seelenlebens, Bd. IV. [Borderland Problems of Nervous and Psychic Life.] Edited by LOEWENFELD and KURELLA. *Berufswahl und Nervenleben.* [The Choice of Occupation and Nerve Life.] Dr. AUGUST HOFFMAN. Wiesbaden, Bergmann, 1904.

It is universally agreed by physicians that diseases of the nervous system have become inordinately more frequent in the last few decades than in an earlier period. Even granting a more faulty diagnosis of nervous disorders in former years, and admitting that the attention of physicians was less drawn to such disorders than now, it is nevertheless certain that insanity and nervous diseases did not formerly take the frightfully prominent place that they take today. . . .

The causes are varied. In the foreground stands the rush of modern civilization, and, when one generation has become permeated with nervous affections, the next one suffers these ills, through inheritance, in doubly distilled strength. (Page 5.)

GERMANY *Deutsche Medizinische Wochenschrift* Nr. 21. Mai 25, 1905. *Die Neurasthenie in Arbeiterkreisen.* [*Neurasthenia in the Working Classes.*] Dr. P. LEUBUSCHER and W. BIBROWICZ, formerly of the Beelitz Sanitarium of State Old Age and Invalidity Department, Berlin.

Neurotic diseases, if not counteracted, are often the first step in the direction of organic disease or severe mental disorders.

But our generation is not alone in being menaced with the grave dangers of these diseases. A terrible question is involved, that concerns the future—the question of heredity. We shall not attempt here to answer the query as to the inheritance of acquired characteristics. . . . But one thing is undeniable; the influence exerted upon the sensitive and impressionable natures of children by neurotic parents is inexpressibly unfavorable. (Page 825.)

Verwaltungsbericht der Landesversicherungsanstalt Berlin für das Jahr 1906. [*Report of the State Invalidity and Old Age Insurance Department for Berlin, for the year 1906.*] *Report of the Physician in Chief of the Beelitz Sanitarium.* (Tuberculosis not included.) Berlin, Loewenthal, 1907.

A considerable proportion of the cases, of both sexes, and especially those belonging in the category of nervous patients, were handicapped by inherited disease on one or on both sides of their parentage. Such cases usually exhibited the gravest symptoms, ran the most unsatisfactory course, and showed a uniform tendency to relapse. The inherited taint was evidenced by epilepsy, insanity, love of drink, general nervousness or migraine. (Page 70.)

According to our tables as shown, out of 5538 (4665) men, there were 1859 (1596) or over one-third (34 per cent) who had inherited taints, and of 1128 (816) women there were 729 (565), or 65 (69) per cent with inherited taints.

Of those suffering from diseases of the lungs, 14–15 per cent had inherited the diathesis; of the nervous patients, 20–29 per cent; of those suffering from cancer, ulcers, and abscesses, 5–7 per cent, and of gouty-rheumatic cases, 6–11 per cent. (Page 71.)

Über die Ursachen der Neurasthenie und Hysterie bei Arbeitern. **GERMANY**
 [The Causes of Neurasthenia and Hysteria among Working
 People.] PAUL SCHÖNHALS. Berlin, 1906.

Predisposition plays an important part in all internal diseases, but is specially menacing in the case of nervous diseases. Those persons in whose families nervous diseases have occurred are more inclined to similar disorders than those who are not hereditarily so burdened.

Such predisposition may be variously described. Binswanger defines it as "a molecular inferiority of the nervous system." Inherited weakness being present, some external exciting factor is usually required to precipitate actual disease. (Page 7.)

It is clear that the more pronounced the heredity, the more easily will an insignificant cause be capable of bringing on illness; and *vice versa*, in a person of better heredity, external influences must be more intense and harmful to cause illness. (Page 8.)

Such hereditary handicap I found beyond question in 9.5 per cent of 200 cases in the Workingman's Sanatorium at Schönow Zehlendorff. This figure is without a doubt too low, but the difficulty of getting family histories from these patients is great. Binswanger gives 49 per cent of men and 35.5 of women as hereditarily predisposed. Binswanger's figures are not confined to working people. Leubuscher and Bibrowicz state it at 21.5 per cent. (Page 8.)

(g) NERVOUS DISEASES AND OVERSTIMULATION

The onset of nervous exhaustion is often unperceived. A special danger to health arises when, after excessive work, this form of overfatigue shows itself in unnatural stimulation, which conceals fatigue and creates a false exhilaration. Only after health is seriously threatened, does the overstrain become apparent, overstimulation being succeeded by reaction and exhaustion.

Thirteenth Congress of Hygiene and Demography. Vol. V, Ser. IV. **ITALY**
 Brussels, Sept. 1903. Dans quelle Mesure peut on Étudier la
 Fatigue, etc. [How to Study Fatigue as a Result of Overwork,
 etc.] Dr. ZACCARIA TREVES, Turin.

Lagrange observes that the intensity and rapidity of modern industry are attained rather by making excessive drains on nervous

ITALY force than by the use of muscular power. "There results a special form of fatigue" (says Lagrange), "not that kind which inclines us frankly to rest, — which gives a sensation of well-being or content after work well and thoroughly done, with sufficient time to do it in, but a species of exhaustion accompanied by an abnormal nervous irritability, — an enervation — perhaps appearing in the form of depression, perhaps as excitation and impressionability!"

GERMANY *Die Pathologie und Therapie der Neurasthenie.* [Pathology and Therapeutics of Neurasthenia.] Dr. OTTO BINSWANGER, Prof. of Psychiatry and Director of the Psychiatric Hospital at Jena. Jena, Fisher, 1896.

Simple fatigue is the natural consequence of every considerable expenditure of energy. . . . If this simple weariness is intensified beyond a certain limit . . . as in climbing mountains, a condition of overstimulation occurs.

One is temporarily capable, apparently, of a still more considerable exertion, the sensation of fatigue disappears, the general flagging gives way to an unnatural elasticity of movement, so that one pursues his aim with accelerated speed. As soon, however, as the wished-for goal is reached, the artificial tension vanishes, the unstrung condition asserts itself. In this state, it is often impossible to sleep, for the overfatigue is combined with a peculiar unnatural overstimulation of the senses. . . . But with healthy individuals, also such symptoms disappear after a short time (1 to 2 hours) and deep sleep finally banishes all trace of fatigue. (Page 20.)

AUSTRIA *Fourteenth International Congress of Hygiene and Demography.* Vol. III, Sec. VIII. Berlin, 1907. *Berufs Morbidität und Mortalität.* [The Morbidity and Mortality of Occupations.] ALFRED R. VON LINDHEIM, Vienna. Berlin, Hirschwald, 1908.

Of these victims of modern speed and rush, the neurasthenics, Professor Erb has rightly said, "They appear to be capable of doing everything that the robust can do; but as soon as they are tired, exhaustion comes on, and their incessantly increasing irritability intensifies their fatigue." (Page 1300.)

The Mental Symptoms of Fatigue. (Reprinted from the Transactions of the New York State Medical Association.) EDWARD COWLES, M.D., Medical Superintendent of the McLean Hospital, Somerville, Mass., 1893.

The sensory function by which the complex normal feelings of fatigue are appreciated, may itself be over-exercised to exhaustion. There is *tire* of the power to *feel the tire*. This condition may be called *fatigue anaesthesia*, and, beginning with the early stages of pathological fatigue, there is usually some degree of it. Every physician has experienced this when, after a night of anxious professional work, with loss of sleep, he has had a day of excitable alertness of mind and body, and there is a sense of nervous strain, with, perhaps, undue mental facility and physical irritability. Many hours' sleep may be gained in the following night, but instead of feeling refreshed he has a sense of *malaise*, languor, and fatigue. The real fatigue was greater the day before, but he could not feel it as such. It is not until the second day after the excessive effort that he has recovered his exhausted power to feel the fatigue. In a lesser degree this fatigue anaesthesia becomes a constant accompaniment of the neurasthenic condition. Overworked women, professional and business men "work on their nerves" and say they don't feel tired, and "nothing is the matter." They "feel better" when actively exercised in their customary labors.

This condition comes on insidiously and is a most dangerous one. The patient is neurasthenic before any one suspects it. (Pages 23-24.)

The Harvey Lectures — Fatigue. FREDERICK S. LEE, Ph.D. Philadelphia, Lippincott, 1906.

The chief sign of fatigue is, in a word, depression — depression of irritability, wherein a given stimulus calls forth a response of less intensity than before; and depression for the total capacity for work, whatever the intensity of the stimulus; its early stages may show, however, a temporary heightened irritability and an apparent, not real, heightened capacity for work. (Page 169.)

(h) FATIGUE AND NERVOUS DISEASES

Neurasthenia and other nervous diseases are due to overstrain of the nervous system. Since the central nervous system regulates all the vital functions, nervous exhaustion or neurasthenia may affect all organs and functions of the body.

Intense and long lasting fatigue is a characteristic of the disease. Disorders of the heart, circulation, the special senses and the digestive apparatus are common symptoms. When nervously overtaxed persons continue to work for excessive hours the functional mechanisms may become totally impaired.

† *Über die Wachsende Nervosität Unserer Zeit.* [The Increase of Nervousness in Our Times.] Dr. WILHELM ERB, Professor of Medicine, Heidelberg University. Heidelberg, Koester, 1894.

The neurasthenic may appear at first to be as capable as a healthy person, but he wearies quickly, is easily exhausted, and cannot shake off his fatigue; moreover, he is unduly susceptible to all stimuli, and this in turn reacts unfavorably upon his fatigue and capacity for exhaustion.

Thus it is quite relevant . . . to compare neurasthenia with fatigue and to define it as a pathological excess and fixity of fatigue. (Page 11.)

Heightened irritability, then, on the one hand, and great weakness, fatigue, and tendency to exhaustion, with the resultant loss of efficiency, on the other, make up the picture of neurasthenia.

These conditions may affect every part of the nervous system — brain, mind and spirit, organs of sense, spinal cord and sympathetic nerves, circulatory, digestive, and generative organs — in short, the entire body; but as they are by no means of identical extent in all organs, there results the inexhaustible variety of symptoms of neurasthenia. (Page 11.)

Without a doubt, one of the most important fundamental requirements of health is found in the correct alternations of work and rest. (Pages 28-29.)

Die Pathologie und Therapie der Neurasthenie. [Pathology and Therapeutics of Neurasthenia.] DR. OTTO BINSWANGER, Professor of Psychiatry and Director of the Psychiatric Hospital at Jena. Jena, Fischer, 1896. GERMANY

(To the comprehension of neurasthenia) we must first clearly define a process which absolutely controls the pathogenesis of neurasthenia. This is fatigue, which, under pathological conditions, may be characterized by the terms "chronic fatigue" (Dauerermüdung) and exhaustion. . . .

There will be complete reparation of the state of overfatigue which has not gone beyond physiological limits, while complete reparation or compensation for chronic fatigue can only be attained with difficulty after long periods of recuperation or, in many cases, it can never be fully attained. (Page 20.)

If exertions are demanded of the chronically fatigued persons which bear no relation to his remaining supply of energy, a condition finally comes on in which the functional mechanism involved absolutely refuses to work. This condition we call exhaustion. It may be only transitory, or may remain fixed for a long time. (Page 21.)

Pathological conditions of activity of the nervous system rest upon disturbances of the molecular mechanism which are capable of injuring, either temporarily or permanently, the legitimate play of forces — the physiological equilibrium between synthetic processes and those of oxidation. (Page 23.)

Diseases of the Nervous System. H. OPPENHEIM, M.D., University of Berlin. Authorized translation by EDWARD E. MAYER, A.M., M.D. Philadelphia and London, J. B. Lippincott Company, 1900.

Neurasthenia, or Nervous Exhaustion, is a very common disease to-day, especially in the large cities. Even though it may have occurred at all times (and had been known for a long time as nervousness), it has without doubt increased in extent in the last years by the extra demands that have been made on man in his struggle for existence and in his social life. (Page 703.)

Those who work at night, even though they have plenty of time during the day for sleep, very often become neurasthenic. This refers to telegraph operators, night watchmen, composers, etc. Working in overheated rooms is also a cause. (Page 704.)

GERMANY Symptomatology. — The chief symptom of neurasthenia is the irritable weakness, — *i. e.*, the abnormal excitability accompanied by exhaustion, the latter being predominant. The patient is irritable and easily excited; but the excitement, whether pleasurable or otherwise, soon leads to exhaustion, producing and leaving a feeling of weakness and apathy. (Page 704.)

Fatigue, however, easily results, his ability for work is markedly abridged, and the least exertion exhausts him. The intensity and duration of this fatigue are characteristic. It may be so marked that all mental work is rendered impossible. Occasionally the ability to conduct visual memory pictures to the brain, to remember the appearance of a certain person, place, or object, is greatly impaired. (Page 705.)

Disorders of the special senses are also found and likewise bear the marks of increased sensitiveness and exhaustion. The eye and ear are particularly often affected. Seeing stars or spots (*mouches volantes*), a mist before the eyes, fatigue in reading ("the letters seem to swim or run together or dance before the eyes"), increased sensitiveness to noises, buzzing in the ears, ringing, whistling, or murmuring in front of the ears, etc., are frequent and painful and stubborn disorders. (Page 706.)

Many of the "asthenopic disorders" — especially the onset of fatigue of the sight — are probably to a great extent due to an increased exhaustion of the muscles of accommodation and of the *recti interni*. Sight and hearing are not weakened, and an ophthalmoscopic examination never reveals any disease of the optic nerves. A moderate contraction of the visual field is also occasionally observed in cases of pure neurasthenia. A neurotic impairment of hearing may likewise be combined with it. (Page 707.)

Of the motor disorders, the common symptoms are weakness (not paralysis), tremor, and slight fatigue. (Page 707.)

The vasomotor disorders deserve special attention, being found in many patients. . . . The disturbances of the heart are closely allied to these vasomotor disorders. They may be subjective or objective. Palpitation of the heart is an important subjective symptom. . . . Acceleration of the heart may also be recognized objectively. (Page 709.)

Digestive Disorders. — These are prominent symptoms. *Nervous dyspepsia* is not an independent disease, but one of the most frequent forms in which neurasthenia expresses itself. (Page 712.)

Proceedings of the First International Convention on Industrial Diseases. Milan, 1906. Frenastenia e delinquenza in rapporto a taluni ordinamenti del lavoro. [Imbecility and Criminality in relation to certain forms of Labor.] PROF. CRISAFULLI. **ITALY**

Mental fatigue with its two fundamental factors (excess of work and of excitation; insufficiency of rest and of recuperation) contributes largely to the pathogenesis of nervous industrial diseases.

Excess of work (overwork) surrounds the nervous cellular tissue with the products of disintegration accentuating the auto-poisoning phenomena and, with them, the functional exhaustion and insufficient reintegration of the nerve cells: in such a condition the whole metabolism changes, with evil consequences to the entire nervous organization especially because the gray matter of the nerve centres "in the physiological state has a most active material metabolism." (Luciani.) (Page 151.)

The Mental Symptoms of Fatigue. (Reprinted from the Transactions of the New York State Medical Association.) EDWARD COWLES, M.D., *Medical Superintendent of the McLean Hospital. Somerville, Mass., 1893.* **UNITED STATES**

Normal fatigue from the discharge of tissue energy is shown to be inseparably accompanied by toxic products that contribute to the effects of fatigue.

Pathological fatigue represents a further development and persistence of this condition in the organism. Stimulation too soon repeated, without giving time for rest and repair, finds nerve cells in fatigued areas having less power to act because of inanition from deficient rest and nourishment; they are also hindered in action by the incomplete removal of the toxic products of previous action. Then assimilation is further hindered, first, by the lessened nutritive quality of the blood from the presence of non-eliminated toxic materials; and second, by the probable toxic weakening of the cells' power to assimilate the nutrition that is furnished to them. The development of a manifestly morbid condition may be very slow and insidious, or more rapid, according as the balance of the processes of constructive and regressive metabolism are more or less on the side of impoverishment, exhaustion, and weakness. From the gradually failing elimination, the local inanition may become more general, and the first results are an

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increased excitability from weakened resistance and inhibition, with a quick exhaustion of the nervous system under exercise. These are the constant characteristics of neurasthenia. Thus, as Knowalewsky says, "a locally limited over-strain of a certain part of the nervous system may lead to general exhaustion and neurasthenia." Hence neurasthenia has been defined by Ziemssen as a functional weakness of the nervous system, varying from the slightest degrees in simple localities to entire loss of strength in the whole nervous system " Arndt states the characteristics of neurasthenia to be "increased excitability with a tendency to rapid fatigue, especially of the muscular system." (Page 7.)

D. *Bad Effect of Long Hours on Safety*

(1) INCIDENCE OF ACCIDENTS

Emphasis is laid upon the need of limiting excessive working hours for women by the increased danger from accidents during the late hours of work.

The statistics of all countries which have recorded the hours in which industrial accidents occur, prove that such accidents take place most frequently in the late hours of morning and afternoon work, after the workers have become fatigued.

FRANCE *Revue Scientifique. 4^e Juin, 1904. Les Accidents du Travail et les Compagnies d'Assurances. [Industrial Accidents and Insurance.] Prof. A. IMBERT, University of Montpellier. Paris, 1904.*

The law of 1898 upon the accidents of industry is now six years old . . . it is one of the most beneficent of the Republic . . . and should aid in solving social questions. (Page 711.)

The number of accidents, as a matter of fact, does not depend only on the number of workmen or the kind of work, but, it must be reiterated, depends also in large measure on the organization of labor and the qualities of the human machine. More explicitly, many accidents result from the physical or mental fatigue of the workman at the moment, and this assertion can easily be proved by innumerable instances. (Page 715.)

The imminence of an accident is usually made manifest to workmen by some occurrence, which, by the peripheral excitation of sight, sound, or sensation, is made known to the brain. There is often only an inappreciable time in which this message is conveyed to the brain and the necessary stimulus sent forth to the muscles to execute by rapid and energetic contractions the movements necessary for defence or retreat.

The exact time necessary for each of these successive acts has never been precisely estimated, but enough is known to demonstrate that a workman who is in a condition of mental or physical fatigue does not respond as quickly to such stimuli, but that each such act takes a longer time than would otherwise be true. Certain elements of the whole phenomenon may be studied separately. Thus one knows that that rapidity of muscular contractility and consequently the quickness of the motion made by a muscle diminishes with the time during which the muscle is made to contract, while the intensity of the contraction also diminishes proportionately.

One result of this fact is that fatigue renders the workman less apt to avoid accident, since he cannot make as intense an effort as usual nor execute movements of his normal rapidity. (Page 715.)

In order to find corroboration of the theory that the number of accidents would increase with fatigue I asked M. Mestre, inspector of labor in the department of Hérault, to record the accidents in his district during 1903 by the hours of the day in which they occurred.

These statistics are to be published soon, and it is enough to say here that they all, without exception, verify what has been said, as shown by this table:

TRANSPORTATION

Total number employed, 6695 workmen. Whole number of accidents in 1903, 660.

| Accidents in the morning. | | Accidents in the afternoon. | |
|---------------------------|-----------------|-----------------------------|-----------------|
| <i>Hours.</i> | <i>Numbers.</i> | <i>Hours.</i> | <i>Numbers.</i> |
| 7 A. M. | 25 | 1 P. M. | 18 |
| 8 " | 30 | 2 " | 40 |
| 9 " | 20 | 3 " | 45 |
| 10 " | 57 | 4 " | 105 |
| 11 " | 63 | 5 " | 118 |

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Two facts are shown very clearly by this table of figures, namely, the considerable share played by fatigue in producing accidents and the equally important influence, in the inverse sense, of the midday hour of rest. (Page 716.)

Revue Scientifique. Paris, 24^e Septembre, 1904. Statistiques d'Accidents du Travail. [Statistics of Industrial Accidents.] Prof. A. IMBERT, University of Montpellier, and M. MESTRE, Factory Inspector, Hérault. Paris, 1904.

The law requires notice to be given of every accident that necessitates more than four days' loss of work. These records are kept in Hérault, 1903

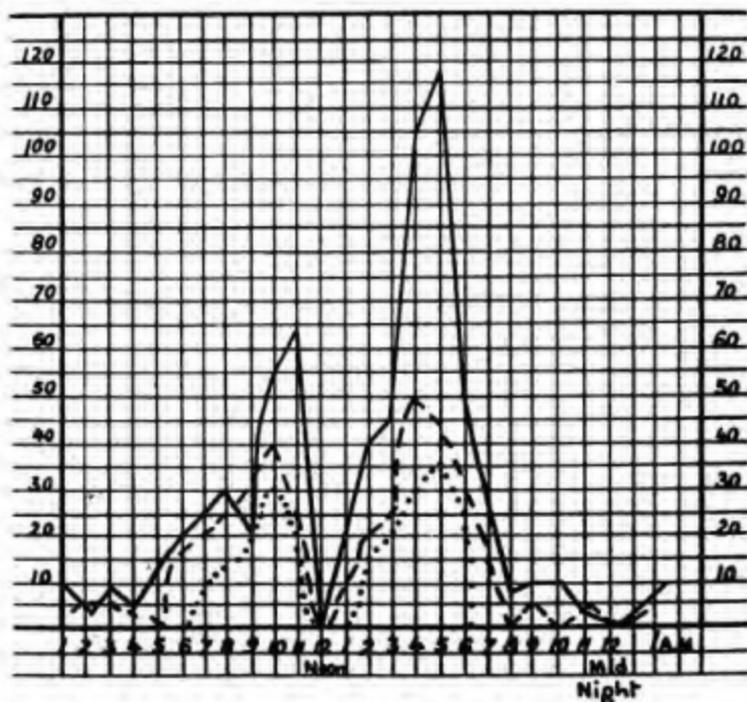


FIG. 63.

The heavy line represents 660 accidents and 6,695 workmen in transportation. These men are licensed.

The broken line shows 326 accidents and 1,453 workmen in chemical works.

The dotted line shows 189 accidents and 4,528 men in woodworking industries.

(Page 388.)

the official headquarters for each department, and we have utilized **FRANCE** these official figures for our chart.

Figure 63 shows in the heavy line, the 660 accidents that happened only in the occupations of Transportation, comprising 6,695 workmen.

General indications of this curve are:

1. The number of accidents increases progressively from hour to hour during the first half day.
2. The number of accidents in the first part of the second half-day, after the noon rest, is noticeably less than that of the final hour of the first half-day.
3. In the course of the second half-day accidents become progressively more numerous with every hour.
4. The maximum number of accidents per hour is notably greater in the latter part of the second half-day than in the latter part of the first half-day.

Hérault, 1908

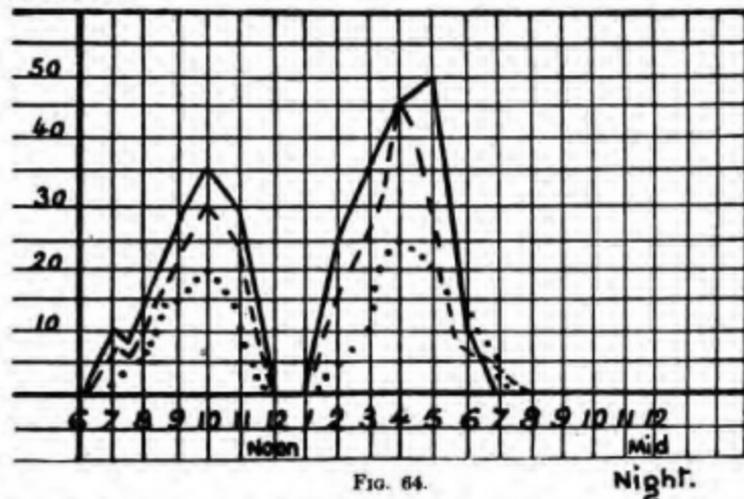


FIG. 64.

Night.

Here the heavy line shows building trades and stone work: 280 accidents, 4,686 workmen.

The broken line shows the ordinary metal trades: 149 accidents, 3,237 workmen.

The dotted line shows commerce and banking: 237 accidents and 15,567 men.

(Page 387.)

In order to verify the conclusions suggested by this chart we inquired into the proportion of accidents in other industries.

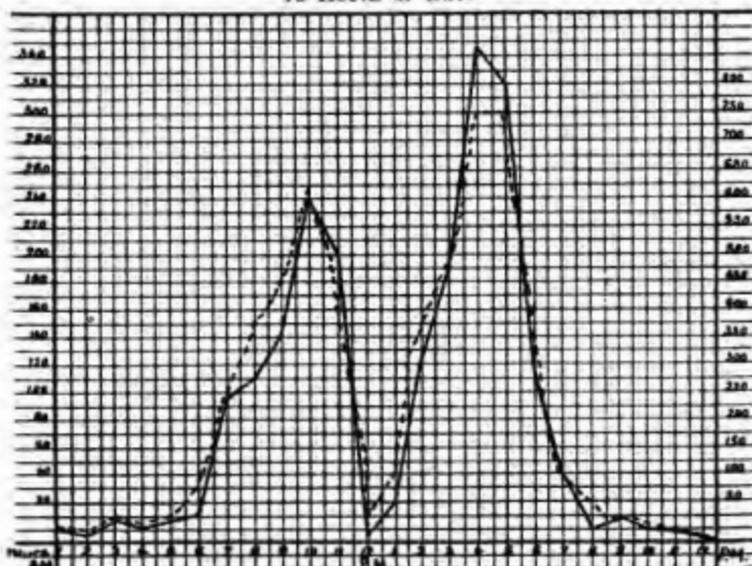
FRANCE

M. Leroy, the division inspector of labor at Toulouse, then voluntarily sent us the result of similar statistics which he had had made by the departmental inspectors under his orders, viz., Aude, Ariège, etc., etc. Without reproducing here all the curves which show these various statistics it is sufficient to state that all, without exception, presented the general characteristics which are displayed by the charts here shown. (Page 387.)

Since fatigue is the inevitable accompaniment of all expended energy, and as it cannot be suppressed without at the same time suppressing all labor, it is at least important to limit it and not allow it to attain that degree at which its influence in producing accidents is eminently evil. (Page 388.)

Figure 65 shows, in heavy line 2,065 accidents among 56,458 workmen of Hérault, and the dotted line shows 5,534 accidents among 140,407 workmen of 9 departments in the region of Toulouse, drawn according to hours. (Page 388.)

FIG. 65.—CHART SHOWING THE OCCURRENCE OF ACCIDENTS ACCORDING TO HOURS OF DAY.



The heavy line shows one Department of France with 56,458 workers and 2,065 accidents.

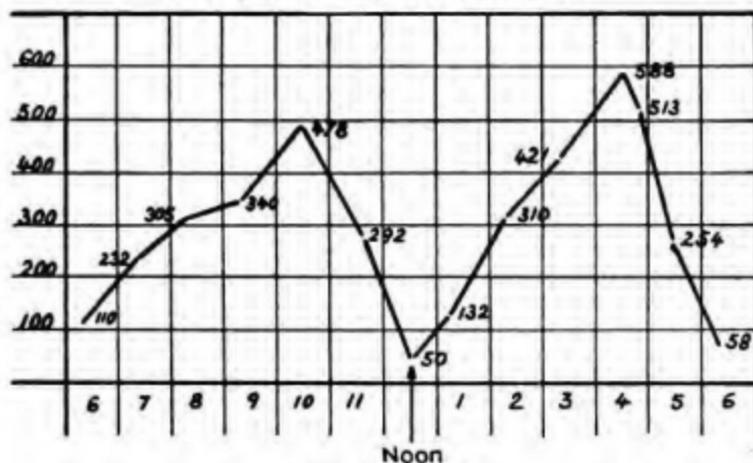
The dotted line shows nine (9) Departments of France with 140,407 workmen and 5,534 accidents.

Revue Scientifique, 21^e Octobre, 1905. *Hygiène Publique. Nouvelles Statistiques d'Accidents du Travail.* [Public Hygiene. New Statistics of Industrial Accidents.] M. A. IMBERT, University of Montpellier, and M. MESTRE, Factory Inspector in Hérault.

Fatigue being the inevitable consequence of work, accidents must inexorably increase from hour to hour. It remains only to investigate the rapidity of this increase, in order to find out whether or no it is clearly to the general interest to modify in any way the division of working hours. If our figures have come as the revelation of an unexpected fact to those who are little informed as to the functioning of the human motor machine, they nevertheless gave only one indication that was really new, and that is, that in most trades the conditions of work cause a *rapid* rise in the number of accidents to the hour, from the beginning to the end of each half day. . . . Of the objections made to our charts only one has some truth, viz., that it is too simple to consider fatigue only as the cause of accidents in industry. To this we answer that we have never said that fatigue alone intervened to bring on accidents. It is quite possible that, aside from pure chance, other causes would act on parallel lines. However, either such other existing causes would have a gradual influence, and we cannot then see how they would exercise their activity except by engendering a more precocious and intense fatigue; or, they would make themselves felt in a relatively short time, and could then only bring about some irregularity in some limited sections of our charts. (Page 520.) . . . As to the causes of the second order, it was to eliminate their irregularities that we drew the line representing all of the 5,534 accidents befalling the 140,407 workmen who, in 1903, were affected by the accident compensation law of 1898. Irregularities found upon the charts showing single trades would then disappear, as (they disappear) on chart No. 74, which represents the division according to hours of the 3,352 accidents that occurred in 1904 in the department of Hérault, Aveyron, Lozère, Cantal and Tarn, and we simply stated that the general features of the chart were strictly explainable by the action of fatigue. . . . As to the proposal to bring a half hour of rest into each of the two halves of the working day, it seems to us that, in all trades where the workman is not in charge of a steadily running machine, this should not be difficult. As to trades where it would present serious difficulties, there is another remedy that might be proposed, and which should not be rejected until its

FRANCE probable effects had been well considered; that is, cutting off the last hour of the working day, or even the establishment of the eight-hour day. (Page 521.)

FIG. 74. — NUMBER OF ACCIDENTS BY HOURS OF THE DAY.
Year 1904. All Industries. Total Accidents, 3,352.



SCALE OF ACCIDENTS.

From 1 to 5 A. M., 118 Accidents.

After 6 to Midnight, 151 accidents

(Page 521.)

We are led to this view by the physiological study of occupation fatigue, and do not intend to discuss thoroughly this urgent social problem of reducing hours of labor which must be approached from many points of view, but we will simply show one side of it. . . . Observe in the first place that the plan of dropping off the last hour of the day's work, crude and simple though it may be, would have as its minimum effect the prevention of all those accidents that would otherwise occur in the final hour of work. Now, according to one general chart for September, 1904, these accidents form 1/7 (one-seventh) or 1/8 (one-eighth) of all (750 in 5,534), and the proportion is substantially the same for the year 1904 according to chart 1. This immediate effect, then, would be considerable. It would mean an important reduction in the loss of social energy, — a loss which is partly temporary and partly permanent. (Page 521.)

Bulletin de l'Inspection du Travail. Fasc. 3-4. Ministère du Commerce, de l'Industrie, des Postes, et des Télégraphes. Travaux originaux des Inspecteurs. [Bulletin of the Labor Department. Leaflets, 3-4. Original Contributions of the Inspectors.] Étude sur les Accidents du Travail. [A Study of Industrial Accidents.]
M. LÉ ROY, *Division Factory Inspector, Toulouse. Paris, 1907.*

FRANCE

In a report made in 1903 by M. Mestre, he said: . . . Accidents were divided into two categories, viz.:

1. Those that might have been foreseen; preventible. 2. Those which could not be foreseen; not preventible.

"It seems to me, however, that it is proper to take another factor into account, a factor which is so much more serious in that it dominates in all accidents augmenting their frequency, or sometimes aggravating their effects. This factor is fatigue.

It is indisputable in fact, that the more fatigued a worker is the more liable he is to accident. The accident is then the consequence of the combined results of physical depression, relaxed attention and less rapid movements." (Page 219.)

Struck by the statements and charts of Dr. Imbert . . . I secured data from the various inspectors of my district during two years. . . . My conclusions were identical with those arrived at by M. Mestre. I prepared charts for 1903 and 1904, first for each separate industry and then for all together, and the results to my mind leave no doubt of the merits of the conclusions draw by Imbert and Mestre from their inquiries. I am familiar with the objection that, as fewer men are at work at certain hours than others it is not surprising there should be more accidents at one time than another. . . . However, between 7 and 11 A. M. and 2 and 5 P. M. all workmen who work by day, either summer or winter, are at work, so that the record of those hours must be of real importance.

In the charts, the hours form the abscisses and the accidents represent the ordinates. . . . We then find that the number of accidents increased progressively from hour to hour in each of the two working periods, forenoon and afternoon, reaching their maxima at 10 A. M. and 4 P. M. We find also that accidents are more frequent in the second half than in the first half of the day, and that they are much less numerous in the morning and after the rest pause than at the end of the preceding periods. (Page 221.)

Leaving out of consideration those groups of but few workmen . . . and those where the possibilities of accidents are slight . . .

FRANCE and those textiles where, thanks to legal requirements of safety devices, accidents formerly so frequent have been reduced from 1.4 per cent in 1903 to 1.1 per cent in 1904 . . . we have left those groups whose members are obliged to exert physical force. . . . In 1904, when the statistics were absolutely complete, we find, in transportation, from 7 to 11 A. M., an increasing progression up to 10 o'clock, that is 71, 75, 117, and 140 accidents; and in the afternoon from 1 to 5 o'clock, the same thing up to 4 o'clock, viz., 50, 79, 143, 196. At 5, the number fell to 162 accidents.

In building and masonry, etc., we find, in short, a maximum of 187 accidents in 1903 and 160 in 1904 attained progressively by 10 A. M., and, on resumption of work, 227 (maximum) in 1903 at 5 P. M. and 194 (maximum) in 1904 at 4 P. M. . . . All these data bring us necessarily to a consideration of fatigue as one of the chief causes of accidents . . . and the data of the metal trades, showing higher figures in the morning only confirm this view because by the division of labor here into three shifts the hours at which the men change bring the same proofs as to the effects of fatigue (one shift works by day and the others change at midnight and noon).

But physical fatigue is not the only thing to consider. We must remember also the cerebral fatigue of the workman who is constrained to long daily hours of work at monotonous tasks. This fatigue induces a nervous depression which is betrayed by inattention, very often resulting in accident. It is precisely this form of fatigue that explains the increasing progression of accidents with the progress of working hours in industries where work is most often limited to watching the machinery. (Page 222.)

The anomaly of the last hour being less heavily charged with accidents is explainable in two ways :

1. In many industries, as is well known, there is a certain slackening of activity and the last hour is the least productive.

2. In others, the workman has a spurt of energy as the closing time approaches.

. . . The plan adopted in Austria, where each working period is divided by a half-hour's rest, has, if we may judge by the statistics that are published, resulted in a sensible diminution of the number of accidents in the hour following the resting time.

France also should try some organization of industry which would tend to eliminate that vast number of accidents due to the physical and cerebral fatigue of the worker. (Page 223.)

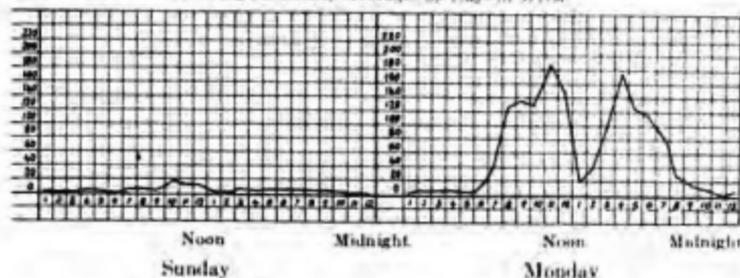
Ministère de l'Industrie et du Travail. Royaume de Belgique. Rapports Annuels de l'Inspection du Travail, 1907. [Annual Reports of the Belgian Factory Inspection, 1907.] Brussels, Lebegue, 1908.

BELGIUM

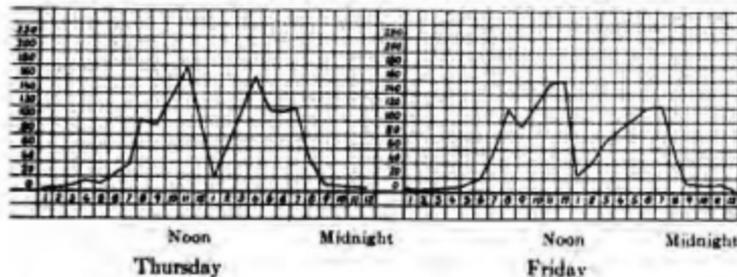
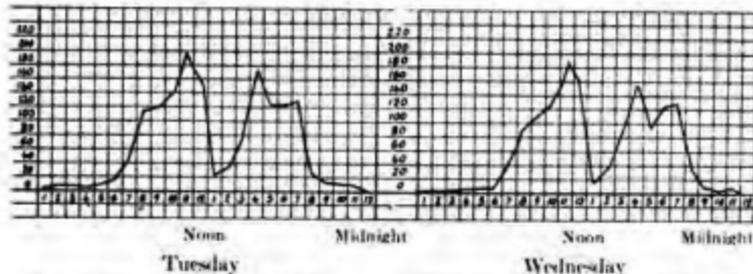
The accompanying charts show the proportion of accidents according to the days of the week and the hours of the day. (Page 204.) (4th District: Ghent.)

Textile industries cause 39.6 per cent of all the accidents in industrial establishments . . . and the whole number of accidents in industrial establishments forms 72 per cent of all accidents. (Page 206.)

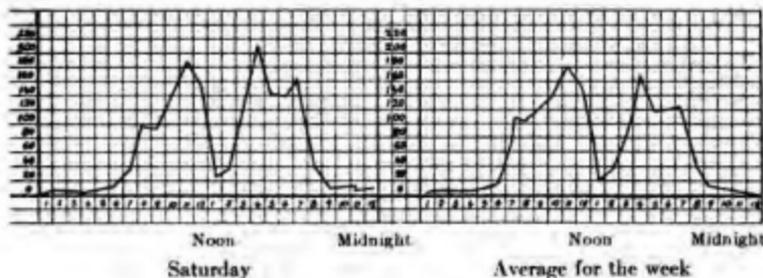
Accidents for the Year, 1907
Showing the Hourly Averages by Days of Week



Annual Report of the Belgian Factory Inspectors for 1907. Brussels, 1908. (Pages 204, 205.)



BELGIUM

GREAT
BRITAIN

British Sessional Papers. Vol. XV. 1831-32. Report from the Select Committee on the "Bill to regulate the Labour of Children in the Mills and Factories of the United Kingdom."

James Blundell, Esq., M.D. . . . Lecturer on Physiology and Midwifery in the School of Guy's Hospital:

10881. May not the numerous and afflicting accidents which occur more particularly at the end of the day, and are observed to increase toward the termination of the week, be fairly attributed to this overfatigue and lassitude? I think they may. (Page 125.)

[See also 2590, p. 99. 6944, p. 293. 6975, p. 294. 7488, p. 325. 4328, p. 165. 5010, p. 270. 10881, p. 545. 10945, p. 550. 11494, p. 596. 11579, p. 604.]

Hansard's Parliamentary Debates. Vol. LXXIII. 1844.

Lord Ashley:

"Those honourable gentlemen who have been in the habit of perusing the melancholy details of mill accidents should know that a large proportion of those accidents—particularly those which may be denominated the minor class, such as loss of fingers and the like—occur in the last hours of the evening, when the people become so tired that they absolutely get reckless of the danger. I state this on the authority of several practical spinners. Hence arise many serious evils to the working classes, none greater than the early prostration of their strength." (Page 1082.)

British Sessional Papers. Vol. X. 1901. Report of the Chief Inspector of Factories and Workshops.

One can only feel surprise that accidents are not more numerous (in laundries), when one realizes that the slightest carelessness or

inattention may result in the fingers or hand being drawn between the hot cylinders, and when one considers how easily such inattention may arise in the case of the over-tired young workers. (Page 383.)

British Sessional Papers. Vol. X. 1904. Report of the Chief Inspector of Factories and Workshops.

The comparative immunity from accidents in the laundries in the West Riding of Yorkshire may be possibly due in some measure to the moderate hours of employment.

The incidence of accidents according to time of day is somewhat surprising, the most dangerous hours apparently being 11 A. M. to 12 noon and 4 to 6 P. M. . . . Probably 11 A. M. to 12 noon is more generally than any other time the last tiring hour of a day five hours' spell; 4-6 P. M. covers the time when most generally the transition is from daylight to artificial light. (Pages 210-211.)

Reference was also made (in the Thirteenth International Congress of Hygiene and Demography), although figures were not adduced, to the alleged increase in the number of accidents which occur late in the working day when the effects of intellectual and physical fatigue have made themselves apparent. (Page 298.)

British Sessional Papers. Vol. X. 1905. Report of Chief Inspector of Factories and Workshops.

Again I think the effect of fatigue is shown in the last hour before midday and during 12 to 1 o'clock. Fatigue again appears to be a cause of accidents in the later period of the afternoon spell. (Page 250.)

Infant Mortality: A Social Problem. GEORGE NEWMAN, M.D., F.R.S.E., Med. Officer of Health, Metropolitan Borough, Finsbury. London, 1906.

The results of fatigue become manifest in various ways, not the least being the occurrence of accidents or of physical breakdown. The former, as is now well recognized, occur most frequently in fatigued workers. For example, since 1900 there has been a steady, though not marked, increase in the number of accidents to women over eighteen years of age in laundries. In 1900 such accidents numbered 131; in 1904, 157. Now it has been shown that whilst the first half of the day yields about the same number of accidents as the second half, more accidents, amounting to nearly double the

GREAT
BRITAIN

number, occur between the hours of 11 A. M. and 1 P. M. and between 4 P. M. and 7 P. M. than at any other time of the day. (Page 112.)

Diseases of Occupation from the Legislative, Social, and Medical Points of View. THOMAS OLIVER, M.A., M.D., F.R.C.P. *Medical Expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the British Home Office.* New York, Dutton, 1908.

It is largely owing to the influence of fatigue that, as the day proceeds, the workers, becoming tired in mind and body, become careless, and as a consequence the number of accidents increases with the hours of toil. (Page 2.)

AUSTRIA

Eighth International Congress of Hygiene and Demography in Budapest, 1894. Vol. VII, Sec. V. Über das Verhältniss der Dauer des Arbeitstages zur Gesundheit des Arbeiters und dessen Einfluss auf die Öffentliche Gesundheit. [The Length of the Working Day in its Relation to the Workman's Health and its Influence upon Public Health.] Dr. E. R. J. KREJCSI, *Vice-Secretary of the Chamber of Commerce in Budapest.* Budapest, 1896.

The most valuable special statistics bearing upon the subject of fatigue are those of the trade-accidents kept by the accident insurance offices. The ones that chiefly merit notice are those of the German Imperial Insurance Department published in 1890, of the accidents for 1887 distributed over the hours of the day when they occurred.

From these data it may be seen how greatly accidents increase as the fatigue of the worker increases. (Page 327.)

(Amtliche Nachrichten des Reichs-Versicherungs Amtes VI. Jahrg., Berlin, 1890. P. 280 et seq.)

DAYWORK

| Morning. | Whole No. of accidents. | Percentage. | Afternoon. | Whole No. of accidents. | Percentage. |
|------------|-------------------------|-------------|------------|-------------------------|-------------|
| 6-7 A. M. | 435 | 2.83 | 12-1 P. M. | 587 | 3.74 |
| 7-8 " | 794 | 5.16 | 1-2 " | 745 | 4.84 |
| 8-9 " | 815 | 5.29 | 2-3 " | 1037 | 6.73 |
| 9-10 " | 1069 | 6.94 | 3-4 " | 1243 | 8.07 |
| 10-11 " | 1598 | 10.38 | 4-5 " | 1178 | 7.65 |
| 11-12 noon | 1590 | 10.32 | 5-6 " | 1306 | 8.48 |

Similar figures are shown by the General Workman's Sickness and Relief Insurance in Vienna, and some recent tables have been communicated to me by Dr. Leo Verkauf before their publication.

They are as follows:

{ DAYWORK

| Morning. | Whole No. of accidents. | Percentage. | Afternoon. | Whole No. of accidents. | Percentage. |
|-------------|-------------------------|-------------|------------|-------------------------|-------------|
| 6-7 A. M. | 187 | 3.01 | 12-1 P. M. | 82 | 1.32 |
| 7-8 " | 437 | 7.03 | 1-2 " | 331 | 5.32 |
| 8-9 " | 517 | 8.31 | 2-3 " | 538 | 8.65 |
| 9-10 " | 716 | 11.51 | 3-4 " | 700 | 11.25 |
| 10-11 pause | 505 | 8.12 | 4-5 pause | 508 | 8.17 |
| 11-12 noon | 338 | 5.43 | 5-6 " | 418 | 6.72 |

Fourteenth International Congress of Hygiene and Demography in Berlin, Sept. 1907. Vol. II, Sec. IV. Die Ermüdung durch Berufsarbeit. [Fatigue resulting from Occupation.] Dr. ROTH. Berlin, Hirschwald, 1908.

That the fluctuations of the mental tone in course of working hours influence not only the worker's capacity but render him more liable to accident by producing a mental apathy or indifference as a result of weariness is also a fact too seldom understood or acknowledged.

It is readily explained, for the fatigued workman cannot give that close attention to safety appliances and machine guards that a normally resistant worker can give. In regard to the frequency of accidents, proof of the statement made above is furnished by the statistics of the Imperial Insurance Department for 1887 and 1897. Here the relation between the length of working time and progressive uncertainty of control over muscles, as well as the relaxation of mental tone, is made clear in the statistics of 1897, which noted the hours when accidents occurred. The three final morning hours show twice as many accidents as the first ones, and the final afternoon hours, from 3 to 6, were also more disastrous than the first part of the afternoon. Taking the authentic statement that, on an average, an accident occurs in every three hours throughout the year, the following tables show the variations:

GERMANY

| | | | |
|-----------------|--------|--------|-----------|
| A.M. hours from | 6 to 9 | — 1.10 | accidents |
| " " " | 9 " 12 | — 2.36 | " |
| P.M. " " " | 12 " 3 | — 1.02 | " |
| " " " | 3 " 6 | — 2.11 | " |

(Page 618.)

Professor Imbert has also stated that his observations show that accidents occur in parallel lines with the extent of working time and reach the highest proportion at the end of overtime. (Page 619.)

Fourteenth International Congress of Hygiene and Demography in Berlin, 1907. Vol. IV. Discussions on Section IV.

Dr. Roth (Potsdam):

We know by the imperial statistics that most accidents happen in the final hours of work, and I have no doubt at all that, if it were possible to make similar computations in the matter of illness, we should find that most cases of sickness, especially those of poisonous origin, have their starting point in the final working hours. That which is often ascribed to the carelessness of the worker is in reality in numberless cases the result of oncoming fatigue. (Page 290.)

Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of Political Science, Vol. I.] Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen, and EDG. LOENING, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

The exhausted workman no longer has full control over his muscles. His results are less exact. Danger by accident increases. If it is reckoned that, on an average, one accident takes place every 3 hours throughout the year, then, according to the German Accident Statistics of 1887 and 1897, the numbers of accidents between the hours 6 to 9 A. M. form 1.10%; from 9 to noon, 2.36%; from noon to 3 P. M., 1.02%; and from 3 to 6 P. M., 2.11%.

Professor Imbert has also shown that in the occupations noted by him the numbers of accidents reached their highest point near the end of working hours. (Page 1214.)

Jahres Berichte der Gewerbe Aufsichtsbeamten: Amtliche Mittheilungen. 1895. [Annual Reports of the (German) Factory Inspectors.] Berlin, 1896. GERMANY

The ten-hour day, with the exceptions necessary for certain trades, is a measure which can be introduced without great difficulty, and which would prevent many dangers threatening the health of workers. Many accidents are no doubt due to the relaxed vigilance and lessening of bodily strength following excessive hours of work. (Page 369.)

Amtliche Mittheilungen aus den Jahres-Berichten der Gewerbe Aufsichtsbeamten. XXII. 1897. [Official Information from the Reports of the (German) Factory Inspectors, 1897.] Berlin, Bruer, 1898.

Many accidents are peculiar to their special trades, and also depend largely upon the length of working hours. (Magdeburg.) (Page 211.)

Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten. XXIII. 1898. [Official Information from the German Factory Inspectors' Reports, 1898.] Berlin, 1899.

The inspector for Württemberg remarks that some accidents are doubtless incurred by the extreme demands made upon the endurance of the men: it is readily conceivable that overtired workers easily commit mistakes resulting in accidents. (Page 182.)

The inspector for Württemberg II, amongst a number of explanations of accidents, mentions overstrain of the workman as one cause. (Page 182.)

Jahresberichte der Grossherzoglichen Badischen Fabrikinspektion für das Jahr 1900. [Reports of the Factory Inspectors of Baden, 1900.] Carlsruhe, Thiergarten, 1901.

It would seem superfluous to speak of the increase in the numbers of accidents due to overfatigue which is brought on by excessive working hours, for the thing is self-evident. (Page 30.)

GERMANY *Jahresberichte der Grossherzoglichen Badischen Fabrikinspektion für das Jahr 1903.* [Reports of the Factory Inspectors of Baden, 1903.] *Carlsruhe, Thiergarten, 1904.*

Positive deductions as to accidents can only be made if the statistics for a number of years show a certain uniformity. At present it looks as if Monday (because Sunday is not always used for real rest), and Saturday, on account of the physical overtension caused by the week's work, were especially liable to accidents.

The accidents that occur between 6 and 8 P. M. are, as a rule, not in the beginning of night shifts but at the end of day shifts. The unfavorable influence of the final hours of work is, therefore, greater than is shown in the tables which make the day's work appear to close at 6 P. M. (Page 66.)

Jahresberichte der Gewerbeaufsichtsbeamten und Bergbehörden für das Jahr 1904. [Reports of the (German) Factory and Mine Inspectors for 1904. Vol. I.] *Prussia. Berlin, Decker, 1905.*

A workman's arm was crushed in an accident. . . . It was the belief of the inspector that this accident was directly traceable to overfatigue, brought on by the excessive length of the hours during which this man had been kept at his post. . . . (Page 123.)

Jahresberichte der Grossherzoglichen Badischen Fabrikinspektion für das Jahr 1905. [Reports of the Factory Inspectors of Baden, 1905.] *Carlsruhe, Thiergarten, 1906.*

The readily explainable preponderance of accidents on Mondays and Saturdays is evident in this, as in former reports. . . . The evening hours seem to be especially favorable for the occurrence of accidents. (Page 90.)

SWITZERLAND *Sixth International Congress of Hygiene and Demography in Vienna, 1887. Part XIV. Fabrikhygiene und Gesetzgebung.* [Factory Hygiene and Legislation.] *Dr. FRIDOLIN SCHULER, Swiss Factory Inspector. Vienna, 1887.*

. . . Excessive work and fatigue leads to dulness, nerve tension, relaxes. Observation grows dull and accidents result. . . . (Page 36.)

Il Ramazzini, Giornali Italiano, di Medicina Sociale. Anno I, Fasc. 10-11. [Italian Journal of Social Medicine, October to November, 1907.] Le stagioni, i giorni, le ore degli infortuni del lavoro. [Seasons, Days, and Hours when Industrial Accidents Occur.] Professor G. PIERACCINI and Dr. R. MAFFEI, *Head Physicians in the Royal Main Hospital of S. M. Nuova in Florence.* ITALY

We made an investigation of the *workmen employed in the machine shops of the railways of Italy and the accidents incident to their work in the five years, from 1901 to 1905.*

Florence, accidents 2509; Verona, 1671; Bologna, 214; Foggia, 229; Naples, 173; Rimini, 170; Lucca, 100; Pontassieve, 71; Rome, 62; Ancona, 40; Milan, 38; Venice, 43; Pistoja, 32; Lecco, 30; Sulmona, 25; Castellamare, 22; Brescia, 15; Forte, 14; Bari, 12; other cities, such as Foligno, Forni, Cremona, Udine, Vicenza, Padova, etc., a number less than 10.

We divided the accidents into two groups, one of which comprises only the accidents in the machine shops of Florence, while the other includes all the scattered shops in the above-mentioned cities.

In our deductions we find the greatest number of accidents in the Florentine group, because it has fewer heterogeneous elements. But since this group is numerically too small (2509) to allow of accurate deductions, we add to this first group the other larger one (3058), of accidents in the other machine shops of the Italian railways.

The combined numbers of the two groups are sufficiently homogeneous: first, because they include the same dangerous work or groups of related work; secondly, because the workers are all of the same sex (male); thirdly, because no worker is under 16 years, only a few from 16 to 20, while very few are more than 60; fourthly, because they live and work under conditions similar, or nearly so, to their usual life and customs as regards education and culture, temperature, and social surroundings. (Pages 548-549.)

Industrial accidents are more numerous in the morning hours than in the afternoon, and have a marked tendency to increase in direct proportion to the lengthening of the working day. Omitting the first and last hours of work for reasons already mentioned (*i. e.* because fewer workmen are present), so as to be exact in our conclusions, it is evident that there is an increase as follows:

ITALY

| | | | | |
|------|-----------|--------|-----|------|
| 206½ | accidents | in the | 2nd | hour |
| 258 | " | " | 3rd | " |
| 324½ | " | " | 4th | " |
| 323 | " | " | 5th | " |

(Page 580.)

The protraction of the hours of labor raises the number of accidents with each successive hour, in both the first and in the second half of the day. It remains now to trace the causal element, or elements, of the phenomenon.

There is no doubt that in brain or muscle work, as in any energetic action of our organism, there is a consumption of dynamogenic material, while the products of normal organic metabolism, which increase during work, act on the animal economy as poisons.

This condition of things, which only food and rest can correct and remove, and which occurs regularly in the daily work of the toiler, will, as time progresses, after a few hours of work, show its effect on the worker.

These facts are scientifically demonstrated by a complete series of experiments with the ergograph, among which are those of Kronecker, Mosso, Maggiore, Treves, Joteiko, Casarini, etc.

: : : We must admit a destruction of oxydizable material in our organism, a corresponding condition of anto-intoxication, or a febrile, painful condition proportioned to the duration and intensity of a mental or physical task. . . . And since the work of a machinist is both brain and muscle work, as it requires muscular strength, close attention, and diligent application, and also sometimes mental effort, we may reasonably admit that a protraction of the hours of labor raises the figure of accidents; because, with the protraction of the work, the worker becomes first fatigued, and then exhausted. (Pages 580-582.)

UNITED STATES

Report of the New York Bureau of Labor Statistics. 1900.

The statistics of accidents show that the organism imperceptibly reaches in the fifth hour of work such a degree of exhaustion that the power of observation is considerably diminished; accidents occur two or three times as frequently during this fifth hour as in the first hours of work. (Pages 65-66.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics, **UNITED STATES**
 1909-1910, Part II, Industrial Accidents in Wisconsin. (Second Report.)

Hour of the day. — It will be seen from Table XI that the largest number occurred from 10 to 11 o'clock A. M. and 4 to 5 o'clock P. M. This may indicate that fatigue has something to do with the number of accidents, but the question arises why the largest number did not occur in the last hour of work.¹ To enable the reader to speculate further upon this point, the variation by hours is given separately for the leading branches of industry.

TABLE XI

| Occurrence by hour. | Agriculture. | Lumbering in woods. | Mining. | Quarrying. | Personal and domestic service. | Manufacturing. | Building. | Trade. | Transportation. | Public utilities. | Public service. | Industry N. S. | Total. | Per cent. |
|---------------------------|--------------|---------------------|---------|------------|--------------------------------|----------------|-----------|--------|-----------------|-------------------|-----------------|----------------|--------|-----------|
| Before 7 a. m. | 2 | 2 | 9 | .. | .. | 22 | .. | 6 | 73 | 7 | 4 | 3 | 128 | 3.2 |
| 7 a. m. to 7:59 a. m. . . | 5 | 14 | 2 | 2 | 2 | 76 | 2 | 17 | 32 | 1 | 1 | 2 | 156 | 3.8 |
| 8 a. m. to 8:59 a. m. . . | 7 | 18 | 5 | 1 | 1 | 126 | 10 | 15 | 44 | 1 | 7 | 9 | 244 | 6.0 |
| 9 a. m. to 9:59 a. m. . . | 20 | 29 | 16 | 2 | 6 | 227 | 16 | 37 | 52 | 3 | 6 | 13 | 427 | 10.6 |
| 10 a. m. to 10:59 a. m. . | 17 | 30 | 25 | 1 | 6 | 245 | 20 | 46 | 73 | 7 | 8 | 8 | 486 | 12.0 |
| 11 a. m. to 11:59 a. m. . | 17 | 15 | 16 | 4 | 2 | 208 | 26 | 30 | 43 | 1 | 6 | 8 | 376 | 9.3 |
| 12 m. to 12:59 p. m. . . | 4 | 3 | 7 | 2 | .. | 40 | 5 | 6 | 13 | 2 | 2 | 1 | 94 | 2.3 |
| 1 p. m. to 1:59 p. m. . . | 11 | 16 | 10 | .. | 1 | 126 | 15 | 25 | 33 | 4 | 2 | 4 | 247 | 6.1 |
| 2 p. m. to 2:59 p. m. . . | 28 | 21 | 10 | 6 | 4 | 213 | 20 | 26 | 59 | 8 | 3 | 9 | 407 | 10.1 |
| 3 p. m. to 3:59 p. m. . . | 11 | 24 | 13 | 5 | 3 | 240 | 21 | 49 | 45 | 8 | 4 | 12 | 435 | 10.8 |
| 4 p. m. to 4:59 p. m. . . | 15 | 16 | 17 | 3 | 6 | 229 | 21 | 42 | 63 | 14 | 4 | 16 | 446 | 11.0 |
| 5 p. m. to 5:59 p. m. . . | 8 | 20 | 8 | 2 | 3 | 151 | 10 | 22 | 36 | 5 | 5 | 7 | 277 | 6.9 |
| 6 p. m. to 6:57 p. m. . . | 7 | 5 | 3 | 3 | 8 | 39 | 3 | 5 | 21 | 1 | 1 | 3 | 98 | 2.4 |
| 7 p. m. to 12 p. m. . . . | 5 | 2 | 27 | .. | 10 | 58 | 1 | 12 | 88 | 9 | 6 | 4 | 222 | 5.5 |
| Total | 157 | 215 | 168 | 31 | 52 | 2009 | 170 | 338 | 675 | 70 | 59 | 99 | 4043 | 100.0 |
| Not stated | 21 | 59 | 12 | 2 | 7 | 219 | 8 | 34 | 569 | 2 | 6 | 21 | 960 | .. |
| | 178 | 274 | 180 | 33 | 59 | 2228 | 178 | 372 | 1244 | 72 | 65 | 120 | 5003 | .. |

(Pages 77-78.)

¹ For an explanation of this fact see p. 242.

2. FATIGUE OF ATTENTION

After fatigue has set in, the faculty of attention is in inverse ratio to the duration and intensity of work undertaken. Attention is always accompanied by a sensation of effort, and fatigue of attention is due to the continuance of the effort and the difficulty of sustaining it.

Physiological reaction time is the name given to the interval between the occurrence of some external phenomenon and the signal of its having been perceived by any given individual. This interval is greatly influenced by fatigue. When the brain is fatigued, attention flags and reaction time is retarded. Hence, after over-exertion fatigued workmen are subject to increased danger when reaction time is slowest and attention at its minimum.

ITALY

Revue Internationale de Sociologie. November, 1895. Le Travail Humain et ses Lois. [The Laws of Human Work.] FRANCESCO S. NITTI, *University of Naples. Paris, Giard and Brière, 1895.*

Certain writers have observed that accidents are more frequent in the later than in the first hours of work. Ordinarily this significant fact is attributed entirely to psychic causes — to the lack of interest and assiduity of the workman — whilst it actually arises from a purely physiological fact, namely, that attention is always in an inverse ratio to the duration and intensity of work. It may be taken as a fixed law that *all work has a limit beyond which, if effort continues, attention decreases and tends to disappear completely.* (Page 1030.)

This is a fact that every one can prove.

A captain tells me that at the beginning of a march the soldiers are prompt and attentive, but, at the end of a certain number of hours, attention decreases little by little; it is then difficult to maintain order: the men stumble against obstacles, walk at hazard, fall into ditches. If they are forced to still greater exertion they advance unevenly, without seeing anything, indifferent even to danger. Attention is gradually dissipated until quite lost.

The workman is at first cautious and attentive: he avoids danger because his attention is alert: as sensibility decreases with the onset of fatigue his attention diminishes; he does not see danger. Accidents of labor, unhappily called "accidental," are more numerous with men subjected to exhausting labors, precisely for the same reason that they are more frequent in the later part of the working hours. "The number of accidents," says the Imperial German Insurance Office, "increase with extraordinary rapidity in proportion as the fatigue and weariness of the workmen insensibly increase." (Page 1031.)

It is then a fixed fact that fatigue blunts sensibility little by little, and destroys attention. (Page 1032.)

"With fatigued subjects," says Féré, "the eyelids relax, the convergence of the eyes becomes difficult, the position of the eyes lack steadiness, the gaze is vague and appears to be fixed on vacant space. Convergence being one of the conditions necessary for concentration of the attention, the defect here coincides with incapacity for mental work." (Page 1032.)

The fact that fatigue destroys attention was brought out a century ago by A. Crichton.

Now, the faculty of attention, as Darwin has so admirably shown, is the most important of all faculties for the development of human intelligence. ("Descent of Man," Vol. I, page 44.) (Page 1033.)

Excess of muscular labor, by suppressing attention, prevents the development of intelligence. (Page 1033.)

Féré, who has studied this question, has been able to state positively that excessive muscular labor always hinders the development of the intellectual faculties. (Page 1033.)

Fatigue. A. MOSSO, Professor of Physiology, University of Turin. 1896. Translated by MARGARET DRUMMOND, M.A., and W. B. DRUMMOND, M.B., Extra Physician, Royal Hospital for Sick Children, Edinburgh. New York, 1904.

In 1850, Hermann V. Helmholtz made out exactly the rapidity with which the mandates of the brain are sent along the nerves to the muscles, and measured the velocity with which impressions made on the surface of the body reach the brain. Everyone has noticed that scarcely do we feel ourselves pricked before we instinctively withdraw our hand.

Helmholtz measured the time which elapses (1) between a prick

ITALY and the perception of the pain; (2) between the perception of the pain and the muscular contraction in response. He found that in man the nerve current passes along the motor nerves with a velocity of 30 metres per second. The rapidity with which stimuli are propagated along the sensory nerves, which conduct impressions from the periphery of the body to the nervous centres is very similar. Some writers have found that the rate of propagation along the nerves may be as slow as 20 metres per second. (Page 76.)

Physiologists, especially the pupils of Wundt, have extended to all the senses their investigations of the phenomena of attention. One of the most singular facts — one of which we have all had practical demonstration when fencing or playing at ball or at any game of skill — is that attention increases the promptitude of reaction; when we are off our guard we require a longer time to get into the proper position and hit back.

. . . The difference is not in the rapidity of the movement, but in that of the psychic processes. The time of physiological reaction, or simply physiological time, is the name given to the interval between the occurrence of an electric spark, for instance, and our giving some sign of having perceived it, say, by touching an electric button on which our hand rests. This short space of time varies in different individuals, and represents the delay which takes place before we take account of one of the most simple forms of perception. Great individual differences are found in this as well as in the more complex forms of perception. . . . Fatigue has a great influence on the duration of this reaction time. When such measurements are repeated without an interval for rest, the time before the response is given gradually increases.

Most people take about 134 thousandths of a second before responding with the hand to a touch on the foot; but fatigue of the attention may prolong the interval to 200 or 250 thousandths of a second.

Obersteiner showed that noises and all causes which tend to distract the attention lengthen the time of physiological reaction. One example will suffice to show how much better our brain functions in silence. Obersteiner had an organ placed in the room where, by means of Hipp's chronometer, he was measuring reaction time. When there was silence, the subject of the experiment took 100 thousandths of a second before with his right hand he gave a sign of having felt a touch on his left; but when the organ was played, the time was

prolonged to 140 or even 144 thousandths of a second. This retardation took place in spite of the greater intensity of the attention, and whenever the music ceased, the time of physiological reaction became as before. (Page 205.)

In weak and nervous people, especially in women, a very prolonged strain on the attention may give rise to serious ailments. (Page 188.)

If the brain is fatigued, it is almost impossible to be attentive. (Page 198.)

The best example of the incapacity for attention produced by muscular fatigue is given by Alpine ascents. Only with great difficulty could Saussure do a little intellectual work on Mt. Blanc. "When I wished to fix my attention for a few consecutive moments, I had to stop and take breath for two or three moments."

In my own case I have observed that great muscular fatigue takes away all power of attention and weakens the memory. I have made several ascents. I have been once on the summit of Monte Viso and twice on that of Monte Rosa, yet I do not remember anything of what I saw from those summits. My recollection of the incidents of the ascents becomes more and more dim in proportion to the height attained. It seems that the physical conditions of thought and memory become less favorable as the blood is poisoned by the products of fatigue, and the energy of the nervous system consumed. . . . Several Alpinists whom I consulted agreed with me that the last part of an ascent was least distinctly remembered. (Page 200.)

Professor Gibelli told me that in botanical excursions his memory diminishes as soon as he begins to be fatigued, and eventually he becomes unable to recall the names of even the commonest plants. Rest very soon causes this phenomenon of fatigue to disappear. Delboeuf, in his very valuable study on the measurement of sensations, calls to mind the fact that short-sighted persons wear spectacles in order to see better, because thus they diminish the fatigue arising from confused vision. (Page 201.)

Thirteenth International Congress of Hygiene and Demography.
Vol. V, Sec. IV. Dans quelle mesure peut-on par des méthodes physiologiques, étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? [To what ex-

ITALY

tent may fatigue resulting from occupation be estimated by physiological methods, and what argument can medical and physiological science present that will influence favorably certain methods of industrial organization?] Dr. ZACCARIA TREVES, *University of Turin. Brussels, 1903.*

The examination of psychic functions in individuals profoundly fatigued by walking shows that preceding fatigue makes the subject more susceptible to subsequent fatigue, and that physical ailments or insufficient sleep have the same effect.

After fatigue a delay in promptness of reaction and a greater number of faults of memory and attention are noticeable, whilst moderate work has a favorable influence upon these functions. (Page 27.)

FRANCE

The Psychology of Attention (authorized translation). THE RIBOT. *Chicago, Open Court, 1894.*

Under the general head of exhaustion we include a very numerous group of states in which attention cannot pass beyond a very weak stage. . . .

Examples are found in . . . extreme physical or mental fatigue. . . . In exhaustion it is impossible or extremely difficult to fix the attention. (Page 97.)

La Fatigue et l'Entraînement Physique. [Fatigue and Physical Training.] Dr. PHIL. TISSIÉ. *Paris, Alcan, 1897.*

Attention exhausts a weak brain and puts it in a state of the least resistance, exactly as an illness would do. (Page 125.)

Binet and Courtier established by observation of the capillary pulse, noted by a delicate instrument, that the mental effort required for fixed attention excited a vaso-constrictor reflex with acceleration of the heart, respiration, often vaso-motor irregularity or fluttering at this phase of excitation; then came a stage of depression, with slowed pulse and respiration, and a general weakening of diastole of the capillary pulsation, which is, they state, a symptom of fatigue. (Page 125.)

The power of attention is variable with individuals: it is proportioned to the physical development and age; it is rudimentary with degenerates . . . and weak persons; it is little developed in children. (Page 125.)

Every impression is a memory in formation or which may be evoked when once formed; now, childhood is spent in accumulating memories for all the rest of life, and, as there are few impressions which do not cause muscular functioning, it follows that the more numerous the impressions, so are the motions more numerous, and, *vice versa*, the more numerous the movements are, so are the impressions and the stores of memory more numerous. This is one of the reasons for the physical activity of childhood, which seeks to adapt itself to its environment by the intermediary of its sensory organs. (Page 127.)

Attention exhausts the psycho-dynamic forces necessary for motion, and, conversely, motion attenuates or suppresses attention. (Page 128.)

The power of attention is limited and intermittent because each fixation of attention is accompanied by a sensation of effort. (Page 131.)

Etude sur l'Influence de la Durée du Travail Quotidien sur la Santé générale de l'Adulte. [Study of the Effect of the Length of Working Hours upon the General Health of Adults.] ILIA SACHNINE. 1900.

Attention is always accompanied by a sensation of effort, and fatigue resulting from attention is in direct proportion to the continuance of the effort and the difficulty of sustaining it. If one attempts to fix his attention unwaveringly upon one object, he is soon conscious that the object is less keenly realized, then becomes clearer; in a word, attentiveness has a kind of rhythm; it oscillates. (Page 135.)

Every one knows by experience that if attention or mental work be prolonged beyond measure there results a sort of mental cloudiness which tends to become more and more severe and may be accompanied by vertigo. The mental activity diminishes; under fatigue, attention and memory are weakened, the association of ideas becomes difficult and distraction augments. (Page 138.)

Travail et Plaisir. [Work and Enjoyment.] CHARLES FÉRÉ, Doctor of Medicine. Paris, Alcan, 1904.

Fatigue, which is shown in lessened energy of voluntary motions and also in their slackening and loss of precision, brings also a diminu-

FRANCE tion of muscular tonicity. There is a fatigue of tone (Tonus). The cramps which often coincide with other signs of motor weakness may be considered as due to a sort of ataxy of tone. This means, in other words, that the physical conditions of attention are profoundly altered; involuntary attention is diminished as well as voluntary attention. (Pages 446-447.)

Defect of attention hinders receptivity. At the same time memory undergoes a rapid disintegration. Depression of attention and of memory is evinced in practical life by mistakes, errors, troubles of association, etc. (Page 447.)

BELGIUM *Thirteenth International Congress of Hygiene and Demography, in Brussels, 1903. Vol. V, Sec. IV. Dans quelle mesure peut-on par des méthodes physiologiques, étudier la fatigue, ses modalités et ses degrés dans les diverses professions? Quels sont les arguments que les sciences physiologiques et médicales peuvent ou pourraient faire valoir en faveur de tel ou tel mode d'organisation du travail? [To what extent may fatigue resulting from occupation be estimated by physiological methods, and what arguments can medical and physiological science present in favor of special methods of industrial organization?]* Dr. JEAN DE MOOR, University of Brussels. Brussels, 1903.

An excess of physical labor extends its depressing influence to all nervous functions. It diminishes the precision of movements and the exactness of their rhythm, and promotes trembling. It diminishes cutaneous sensibility and blunts all the psychic activities. (Page 9.)

Labor always involves to a certain degree the intervention of the higher mental activities; more and more, in our era, the share of mental work grows in every department. It is thus certain that in many occupations men exhaust not only the muscles employed but also the functions of attention and association which are incessantly brought into action. (Page 9.)

GERMANY *Über die Ursachen der Neurasthenie und Hysterie bei Arbeitern. [The Causes of Neurasthenia and Hysteria among Working People.]* PAUL SCHÖNHALS. Berlin, 1906.

In the development of nervous disorders, overstrain of the faculty of attention, which is concentrated on the work, is of the most decisive influence. (Page 27.)

Medizinische Klinik. Bd. 3^e Nr. 30, 1907. Die Ermüdung des Nervensystems und der Muskeln. [Nervous and Muscular Fatigue.] Dr. JENO KOLLARITIS, Professor of Neurology, Buda-Pesth. Berlin, 1907. GERMANY

. . . Fatigue, like a shadow, attends every manifestation of life. . . . stimulation modifies tissue change and promotes disassimilation. Thereupon should follow a process of active assimilation.

Symptoms of fatigue are caused by the progress of disassimilation as it takes place in the living and working tissues. If the organism, as a whole, is incapable, even with the help of accelerated heart action and deep rapid respirations of replacing the loss to tissues through consumption of their material, then we speak of exhaustion. (Pages 894-895.)

Fatigue of the nervous system embraces mental fatigue, or weariness from thought, — fatigue of motion, and fatigue of feeling or sensation. Every one knows that continuous thought is fatiguing. No one can read indefinitely — sooner or later the mind refuses to follow the words. A complete restoration from such fatigue is only to be attained by a complete release from work.

It is important to know how long one cell or cell group of the brain may remain active in mental work . . . (experiments described of calling faces of acquaintances before mental vision, etc.). It is probable that disturbance of attention is nothing else than the speedy wearying of the brain cells that are called directly into action; to be sure the heightened irritability of the nervous system under the stimulus of attention also comes into play. (Page 897.)

The Mental Symptoms of Fatigue. Reprinted from the Transactions of the New York State Medical Association. EDWARD COWLES, M.D., Medical Superintendent of the McLean Hospital, Somerville, Mass. New York, Fless and Ridge, 1893. UNITED STATES

Every exercise of the will in attention is accompanied by the expenditure of energy, and by the "sense of effort" that occurs, particularly when attention works against some resisting motive, interest, or feeling. This directing and inhibitory control is at its best in the equilibrium of health of mind and body, and therefore it is a most important means of estimating mental health and vigor; mental disorder is commonly attended with disturbances of the normal process of attention. (Page 13.)

Sixty-fifth Annual Meeting of the American Institute of Instruction.
The Relation of Fatigue to Social and Educational Progress.
 HENRY S. BAKER, Ph.D. Boston, 1895.

The grand law of fatigue, as related to the mind, is that the highest faculties are the first to weaken from general fatigue, and become dull, inactive, or useless. (Page 38.)

Continued attention to one subject cannot be given by a tired person for, being a higher faculty, it tires among the first. (Page 38.)

The will is one of the first things to feel the effect of general fatigue. A tired man is lazy, physically and mentally. His higher brain cells have "struck," as it were for a holiday, and more brain food and time to eat it, so to speak. (Page 39.)

Charities and the Commons, March 6, 1909. Vol. XVI, No. 23.
New York. A Year's Work Accidents and their Cost. CRYSTAL
 EASTMAN, Secretary New York State Branch American Association
 for Labour Legislation.

. . . Human powers of attention are naturally limited . . . we can give our attention to any one thing but for a limited time. And in the condition of things in "dangerous occupations" there are often influences working to loosen the powers of attention. The speed and intensity of the work, the heat and noise of the working place, the weariness of the workers, — all these things tend to numb the faculties most needed for protection. (Page 1151.)

E. Bad Effect of Fatigue upon Morals

The dangers attendant upon excessive working hours are shown also by the moral degeneration which results from over-fatigue. Laxity of moral fibre follows physical debility. When the working day is so long that no time is left for a minimum of leisure and recreation, relief from the strain of work is often sought in alcoholic stimulants. In extreme cases the moral breakdown leads to mental degeneracy and criminal acts.

(1) GENERAL LOSS OF MORAL RESTRAINTS

British Sessional Papers. Vol. XXII. 1842. Reports of Inspectors of Factories. GREAT
BRITAIN

There can be little doubt that working 10 hours a day would be more favourable to health and the enjoyment of life than 12 hours a day can be; but without entering into the question of health, no one will hesitate, I think, to admit that, in a moral point of view, so entire an absorption of the time of the working classes . . . must be extremely prejudicial, and is an evil greatly to be deplored. Some there are, undoubtedly, who, by more than ordinary natural energy, overcome this disadvantage; but with the great mass it has the effect of rendering them ignorant, prejudiced, addicted to coarse sensual indulgences, and susceptible of being led into mischief and violence by any appeal to their passions or prejudices. With so few opportunities of mental culture, and of moral and religious training, it is surprising that there should be so many virtuous and respectable people among them. For the sake, therefore, of public morals, of bringing up an orderly population, and of giving the great body of the people a reasonable enjoyment of life, it is much to be desired that in all trades some portion of every working day should be reserved for rest and leisure. (Page 30.)

British Sessional Papers. Vol. VI. 1901. Report from the Select Committee of the House of Lords on Early Closing of Shops.

Witness, Sir W. MacCormac, President of the Royal College of Surgeons:

2466. . . . I have a strong opinion that moral and physical well-being depend largely one upon the other, and that if from any cause the physical condition of men and women is lowered the moral nature must to some extent suffer too. . . . I quite agree with the opinions of my predecessors that such long hours are very grievous, and are calculated to do the community in which they largely prevail serious harm. (Page 120.)

The Pioneer of Progress. JOHN DENNIS, London, 1860. Hamilton Adams.

Overwork is one of the most pregnant evils of the present day. It destroys health, weakens the intellect, produces a nation in favour of vicious pleasures, and often upsets altogether the mental equilib-

rium. When its results are less obviously injurious, it proves an invincible barrier to intellectual or spiritual growth, and obstructs the calm enjoyment of domestic life. Perhaps, in the majority of instances, the work itself, however indispensable, is too monotonous to create a healthy activity of thought, or to require much beyond a certain system of official routine. In such cases the burden is felt still more acutely when the labour is spread over many hours in each day. (Pages 4-5.)

The Case for the Factory Acts. Edited by Mrs. SIDNEY WEBB. London, Richards, 1901.

If working long and irregular hours, accepting a bare subsistence wage, and enduring insanitary conditions tended to increase women's physical strength and industrial skill — if these conditions of unregulated industry even left unimpaired the woman's natural stock of strength and skill — we might regard factory legislation as irrelevant. But as a matter of fact a whole century of evidence proves exactly the contrary. To leave women's labour unregulated by law means inevitably to leave it exposed to terribly deteriorating influences. The woman's lack of skill and lack of strength is made worse by lack of regulation. And there is still a further deterioration. Any one who has read the evidence given in the various inquiries into the Sweating System will have been struck by the invariable coincidence of a low standard of regularity, sobriety, and morality, with the conditions to which women, under free competition, are exposed. (Pages 209-210.)

Diseases of Occupation from the Legislative, Social, and Medical Points of View. THOMAS OLIVER, M.A., M.D., F.R.C.P., Medical Expert on the White Lead, Dangerous Trades, Pottery and Lucifer Match Committees of the British Home Office. New York, Dutton Co., 1908.

The cheerless days, too, spent in a textile factory amid the din of machinery, and the monotonous character of the work, are not such as of themselves to quicken the intellect and promote the higher interests of life. Is it not rather that they tend, through the strain they cause, to encourage a craving for that form of recreation which seeks an outlet in excitement and pleasure, and, on the other hand, to dishearten men and women, who, as factory operatives, feel that

they cannot rise to a higher occupation than that of minding machinery? The despotism of some branches of modern labour is overpowering. Factory legislation has done something to minimise this. . . . To be of helpful service factory legislation must be progressive and keep pace with the industrial problems special to each succeeding age. (Page xii.)

GREAT
BRITAIN

Revue Internationale de Sociologie. Nov. 1895. *Le Travail Humain et ses Lois.* [The Laws of Human Work.] FRANCESCO S. NITTI, Professor, University of Naples. Paris, Giard et Brière, 1895.

ITALY

A fact of no less importance affirmed by physicians everywhere and which explains why people subjected to long hours of work are often very excitable without displaying real resistance in industrial struggles, is that fatigue causes in individuals and races subjected to it, an irritable weakness, an excessive excitation, and almost always a feeble will. (Page 1038.)

Fatigue. A. MOSSO, Professor of Physiology, University of Turin, 1896. Translated by MARGARET DRUMMOND, M.A., and W. B. DRUMMOND, M.B., Extra Physician Royal Hospital for Sick Children, Edinburgh. New York, Putnam, 1904.

Extreme fatigue, whether intellectual or muscular, produces a change in our temper, causing us to become more irritable; it seems to consume our noblest qualities — those which distinguish the brain of civilized from that of savage man. When we are fatigued we can no longer govern ourselves, and our passions attain to such violence that we can no longer master them by reason.

Education, which is wont to curb our reflex movements, slackens the reins, and we seem to sink several degrees in the social hierarchy. We lose the ability to bear intellectual work, the curiosity, and the power of attention, which are the most important distinguishing characteristics of the superior races of man. (Page 238.)

Proceedings of the First International Convention on Industrial Diseases. Milan, 1906. *Frenastenia e delinquenza in rapporto a taluni ordinamenti del lavoro.* [Imbecility and Criminality in Relation to certain Forms of Labor.] Prof. CRISAFULLI.

Every overfatigued worker is subject to a kind of poisoning derived not alone from the insalubrity of his place of work and surrounding conditions, but also from exhaustion.

ITALY

The symptoms of this abnormal condition are always more apparent in the last hours of the working day. Muscular weariness produces cerebral weariness. In a word, it is exhaustion which is often followed by nervous overexcitability, by hypersensitiveness, melancholy, sullenness, etc., all of which urge the individual to impulsive and conscienceless acts. From this to crime is but a step. (Page 149.)

Muscular work influences the nervous system, for good or ill. The brain is profoundly affected by muscular overfatigue. The excessive weariness and lassitude of the overworked man can no longer be considered the immediate result of his work, but rather the index of anomalies in metabolism from which auto-poisoning inevitably results. Prof. Mosso found that the brains of carrier pigeons, after a flight of 500 kilos, were pale and anæmic; likewise the brains of quails, which, flying from the African coast, fell exhausted upon our shores. (Page 150.)

It is true that among malefactors there are many who, wearied and tormented by overwork and exhaustion, suffer persistent changes of the organic metabolism to the detriment of the inhibitory centres, numbing the conscience, enfeebling moral and discriminatory powers, with irresponsible resultant actions often positively instinctive.

It is an established fact that overfatigued workmen, through the actual poisoning of fatigue, become unsettled in their mental equilibrium, remaining almost paretics in mental associations and discriminations, in the inhibitory powers and in the sentiments. (Page 157.)

FRANCE

Travail et Plaisir. [Work and Enjoyment.] CHARLES FÉRÉ, Doctor of Medicine. Paris, Alcan, 1904.

It is said that laziness is the mother of all vices, but fatigue is no less fertile; it increases desires and lessens self-control. (Page 451.)

GERMANY

Amtliche Mittheilungen aus den Jahresberichten der Gewerbe Aufsichtsbeamten. 1896. [Official Information from Reports of the (German) Factory Inspectors.] Berlin, 1897.

Inspector for Baden:

Then, too, physical overexhaustion cannot promote morality, for with lowered bodily resistance goes enfeeblement of will power. (Page 251.)

Massachusetts House Document. No. 98. 1866.

Overwork is the fruitful source of innumerable evils. Ten and eleven hours daily of hard labor are more than the human system can bear, save in a few exceptional cases. . . . It cripples the body, ruins health, shortens life. It stunts the mind, gives no time for culture, no opportunity for reading, study, or mental improvement. It leaves the system jaded and worn, with no ability to study. . . . It tends to dissipation in various forms. The exhausted system craves stimulants. This opens the door to other indulgences, from which flow not only the degeneracy of individuals, but the degeneracy of the race. (Page 24.)

Massachusetts House Document. No. 44. 1867. Report of Special Commission on the Hours of Labor.

It is certain that men may labor so severely and incessantly as in the long run to impair the vital energies, and thus reduce the powers of production; and it may be further true that too great amount of toil may not only injure the physical powers, but depress or impair the mental faculties, so that in this way the productive capacity of a people may be greatly lessened. And, still further, not only the physical and mental but the moral nature of man may be imbruted by severe and unreasonably protracted toil.

The hours devoted to labor should not be so extended as not to leave sufficient time and strength to engage in those pursuits which will qualify the laborer for the discharge of his duties to himself, his family, and his government. (Pages 22-23.)

Evidence Submitted to the Massachusetts Legislature in Favor of the Enactment of a Ten-Hour Law. Lawrence, 1870.

After many years of careful observation, I think I can say, with truth, that the results of the eleven-hour system are evil, and only evil, physically, intellectually, and morally.

Overtasking all the powers of men, women, and children; pressing them in all their labors, and long, weary, exhausting hours of toil to a mere subsistence. . . . Any system of labor which thus tramples upon and treats with contempt man's higher nature, requiring of the father, mother, and children a constant battle to secure a bare living, leaves no time to cultivate the intellectual or moral nature; every

energy of mind and body is crushed. Crime treads on the heels of crime as a natural result, driving multitudes to the intoxicating cup with all the attendant miseries. I. DUNCAN. (Pages 13-14.)

Report of Massachusetts Bureau of Statistics of Labor. 1870-1871.

Reduced hours of labor have a great tendency to improve one morally, mentally, and physically — a person will, under continual long hours, either succumb from want of physical power, or become a mere brute, not having time to think, visit, or do anything that would tend to personal improvement. Under such circumstances, it is nothing but work and sleep, if there is a family to support. (Page 591.)

Report of the Maine Bureau of Industrial and Labor Statistics. 1892.

Employers should realize that long hours at a severe tension are a cause of irritation among their employees, and they become ripe for almost any trouble, and trifles are often sufficient to precipitate violent strikes. The real cause of many of these strikes is overwork. (Page 12.)

Report of New York State Factory Inspectors. 1899.

Long hours of hard manual labor destroy the mental appetite in almost every instance.

The man is unfitted for reading or study — he is physically tired — and his intellect is inactive. The drain upon his vitality has been continuous and heavy, and he must needs sleep in order to recuperate. This continues indefinitely — each succeeding day being but a repetition of the former. (Pages 16-17.)

Report of the Nebraska Bureau of Labor and Industrial Statistics. 1907-1908.

Girls in factories are expected to keep up a certain "pace" while at work, and ten hours of driving work at a hot pace are not to be considered conducive to good health physically or to leave the worker in any humor for applying herself to educational improvement.

Dances and shows will be the most attractive things to be indulged in after work, if the chance offer. (Pages 33-34.)

UNITED
STATES

Sixty-fifth Annual Meeting of the American Institute of Instruction.
The Relation of Fatigue to Social and Educational Progress.
HENRY S. BAKER, Ph.D. Boston, 1895.

Among the higher functions of certain brain tracts is that of inhibition. These tracts are called "inhibitory centres," and their function is like that of brakes on a wagon, or like the governor on an engine, or like that of a coachman who holds a tight rein when his spirited team is going down hill or along a crowded street. The effect of fatigue on these centres is seen very quickly in any prolonged effort. . . . In general, self-control is lost, and the lower, the baser, and the more selfish faculties of our nature run riot. . . . In short, the fatigued person is very sure to fly off on a tangent in one or more lines. In other words, his inhibitory centres have ceased to act, i.e. has little self-control. Most crimes of all kinds are committed at night, when men are tired, ugly, and possessed of little judgment, comparatively, and less conscience. . . . The rested boy or man can resist temptation, but the tired one cannot. His will and conscience are both too weak. (Page 41.)

The relation of the science of fatigue to the religious development . . . is very close. Extreme or long-continued fatigue militates against morality and spiritual growth. (Page 49.)

Sabbath breaking, because it precludes complete rest of the cells of the higher faculties, lowers the moral tone in all lives, and is a cause of crime. The morality, business, and social tone of a community usually rises and falls with respect for the Sabbath. The intellectual activity, also, follows the same rule, and the esthetic sentiment as well. (Page 50.)

The facts of fatigue settle scientifically and beyond appeal some social and religious questions. Dr. C. F. Hodge, of Clark University, proved that, while eight or ten hours of rest restored the tired nerve cells to a condition nearly normal, at least thirty or thirty-six hours is needed for an absolutely complete recuperation. That means that a Sabbath, giving so long a rest, is a necessity, if man is to do his best work physically and intellectually or live at his best esthetically, morally and religiously. (Pages 51-52.)

UNITED
STATES

Charities and the Commons. March 6, 1909. Vol. XXI. No. 23. New York. The Industrial Environment of Pittsburgh's Working Women. ELIZABETH BEARDSLEY BUTLER, Former Secretary New Jersey Consumers' League.

Dulled senses demand powerful stimuli; exhaustion leads to a desire for crude or violent excitation. Little time is left for recreation after a ten-hour day. In such circumstances, culture of hand or brain seems unattainable, and the sharing of our general heritage, a remote dream. A consideration of even more immediate importance is that such circumstances impel undisciplined girls toward vicious or criminal behavior. Craving for excitement is the last symptom of a starved imagination. At that point, discrimination has become too great an effort; foresight and social judgment have become impossible. Any excitation, destructive or not, is acceptable, if only it be strong and drug the senses with desire for a continuously stronger stimulus. Roller-skating rinks, dance halls, questionable cafés, may figure only temporarily in the worker's life, or by increasing the demand for excitement, may lead to sexual license. (Page 1134.)

(2) GROWTH OF INTEMPERANCE

GREAT
BRITAIN

British Sessional Papers. Vol. XXI. 1833. Second Report of . . . the Commissioners for inquiring into the Employment of Children in Factories and . . . Reports by the Medical Commissioners. Dr. HAWKINS (Lancashire district).

Intemperance, debauchery, and improvidence are the chief blemishes on the character of the factory workpeople, and those evils may easily be traced to habits formed under the present system, and springing from it almost inevitably. . . . On all sides it is admitted that indigestion, hypochondriasis, and languor affect this class of the population very widely. After twelve hours of monotonous labour and confinement, it is but too natural to seek for stimulants of one kind or another; but when we superadd the morbid states above alluded to, the transition to spirits is rapid and perpetual. (Page 4.)

Hansard's Parliamentary Debates. Vol. LXXIII. 1844.

Mr. Robertson, a distinguished surgeon at Manchester, says, in a published essay:

I regard it as a misfortune for an operative to be obliged to labour

for so long hours at an exhausting occupation, and often in an impure atmosphere. I consider this circumstance as one of the chief causes of the astounding inebriety of our population.

GREAT
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Many females state, that the labour induces an intolerable thirst; they can drink, but not eat. (Page 1095.)

Mr. V. Smith:

. . . Overwork, with disproportionate wages, was often productive of immorality. The reason was obvious; overwork produces exhaustion and a craving for excitement, which led to immorality.

. . . High wages paid for work very laborious were apt to make workmen dissipated. Over-exertion required corresponding periods of idleness. (Pages 1501-1502.)

British Sessional Papers. Vol. XXIII. 1877. Report of Inspectors of Factories for Half-year ending April 30, 1877.

Overtime induces drinking; it will be found in all the occupations in which overtime is worked there is more or less drinking. In trades like brickmaking, where there is a considerable strain upon the muscles, there is on that account a tendency to think it necessary to replace the waste by exciting drink, and this is, of course, intensified when work is continued longer than the body can properly sustain. (Page 15.)

British Sessional Papers. Vol. XXXIV. 1893. Royal Commission on Labour. Group C.

Mr. George Mitchell, chemical workers of Glasgow, Imrie, and Rutherglenn:

21,250. And you are satisfied that that is an accurate statement that, year in and year out, 60 per cent of the men employed in the chemical works work seven days a week, 12 hours per day? — No. It is not the case that they do it, from the very fact that the physical strain is too great for them.

For instance, as a general rule, they are paid every fortnight, and generally on the Saturday on which the pay occurs, you will find, if you take a visit through the chemical works, that the furnaces are in a great number of cases out, for the simple reason that the men's exhaustion is so great that they generally get drunk immediately after

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getting their pay, and consequently are unable to come to their work that afternoon. . . .

21,252. You say in consequence of the physical exhaustion entailed by their labour, that on the pay days the men generally get drunk? — Yes. (Page 3.)

British Sessional Papers. Vol. XII. 1903. Report of the Chief Inspector of Factories and Workshops.

The result is disastrous, even from the point of view of the industry itself, which if properly organized would be capable of offering really desirable employment to skilled workers instead of being, as it too often is, the last resort of the idle and intemperate. . . . I would add that too often the very intemperance is created by the conditions of employment, by the excessive overstrain of endurance. (Page 174.)

British Sessional Papers. Vol. XXXII. 1904. Report of the Inter-Departmental Committee on Physical Deterioration. Vols. I, II, III.

Committee report:

160. . . . The close connection between a craving for drink and bad housing, bad feeding, a polluted and depressing atmosphere, long hours of work in overheated and often ill-ventilated rooms, only relieved by the excitements of town life, is too self-evident to need demonstration. (Page 30.)

164. The tendency of the evidence was to show that drinking habits among the women of the working classes are certainly growing, with consequences extremely prejudicial to the care of the offspring, not to speak of the possibility of children being born permanently disabled. Factory labour is mentioned as a predisposing cause. (Page 31.)

The Case of the Journeymen Bakers. Evils of Night-work and Long Hours of Work. WILLIAM AUGUSTUS GUY, M.B., Fellow of the Royal College of Physicians, Professor of Forensic Medicine, King's College; Physician to King's College Hospital, etc. London, Renshaw, 1848.

But we must look at night-work and overwork in another light. We must look at it, not merely as the cause of sickness and premature

decay, but as an unwholesome influence, acting day by day directly upon the body and indirectly upon the mind. Bodily exhaustion is evidently unfavourable to the exercise of self-control. It produces a feverishness, a restlessness, an excited state of mind, which is very apt to lead to excessive indulgence in spirituous liquors. The mind cannot settle to anything even to sleep, and craves excitement and exciting amusements; and thus bad habits are formed, which grow upon a man until it becomes very difficult to throw them off. (Page 12.)

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Dangerous Trades. THOMAS OLIVER, M.A., M.D., F.R.C.P., *Medical Expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the Home Office.* London, Murray, 1902.

It is frequently asserted that laundry women as a class are intemperate and rougher than most industrial workers. That they are peculiarly irregular in their habits it is impossible to deny; and the long hours, the discomfort and exhaustion due to constant standing in wet and heat, discourage the entrance into the trade of a better class of workers is certain. . . . The prevalence of the drink habit among many of them, of which so much is said, is not difficult to account for: the heat of an atmosphere often laden with particles of soda, ammonia, and other chemicals has a remarkably thirst-inducing effect; the work is for the most part exhausting, even apart from the conditions, and the pernicious habit of quenching the thirst, and stimulating an overtired physical condition, with beer. (Page 672.)

Jahresberichte der Gewerbeaufsichtsbeamten und Bergbehörden für das Jahr 1907, Bd. I. Preussen. [Reports of the (German) Factory and Mine Inspectors for 1907.] Vol. I. Prussia. Berlin, 1908.

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Wherever night shifts or excessively long hours are the rule, alcoholic stimulants are taken constantly as a means for keeping up the energies . . . it is then doubly harmful. (Page 240.)

A definite decrease in the consumption of alcoholic drinks is to be hoped for as a result of the slowly progressing movement for shorter hours, better economic conditions, etc. . . . because the physical strain will then be lessened, nutrition better, etc. (Page 241.)

GERMANY *Handbuch der Arbeiterwohlfahrt, Bd. I.* [*Handbook of the General Welfare of the Working Classes, Vol. I.*] Edited by Dr. OTTO DAMMER. *Beschädigung der Arbeiter bei der Arbeit.* [*Injuries of Occupation.*] Dr. ASCHER. Stuttgart, Enke, 1902.

That the over-exhaustion of brain and nerves not only is frequent among employees in responsible posts, as on railroads, etc., but has also cost many innocent lives as well, is too well known to need referring to here. Of no less importance is the indirect influence of working time on the worker. A rest so short that it actually only suffices for sleep degrades man to a beast of burden, undermines family life, when such exists, demoralizes the individual, who is allowed only the possibility of satisfying sensual wants, drives the man to drink and the woman to prostitution. (Page 79.)

Verwaltungsbericht der Landesversicherungsanstalt Berlin für das Jahr 1906. [*Report of the State Invalidity and Old Age Insurance Department for Berlin for 1906. Report of the Physician in Chief of the Beelitz Sanitarium.*] (*Tuberculosis not included.*) Berlin, Loewenthal, 1907.

It is self-evident that the organism of the workman, overstrained by claims which often force him beyond the limit of his natural capacity, has urgent need of abundant and suitable nourishment. (Pages 61-62.) . . . That a body so ill-nourished must with time lose its capacity for work, is undeniable, and it is only too readily conceivable that its possessor first intermittently, and then regularly, resorts to stimulants to brace himself, either not knowing or not apprehending the greater injury that it will do him. (Page 63.)

Fourteenth International Congress of Hygiene and Demography in Berlin, 1907. Vol. II. Sec. II. Die Ursachen des Alkoholismus. [*Causes of Alcoholism.*] Dr. H. VOGT, Germany. Berlin, 1908.

By far the most important factors in alcoholism are the power and effect of external conditions . . . the influence of the surroundings . . . dangers encountered in occupations; then, too, the repeated exertions required by work, often far exceeding, whether momentarily or continuously, the strength of the worker. (Page 376.)

Among external factors encouraging alcoholism different kinds of

working conditions present very special temptations, sometimes because of the intensity of strain involved in them, or it may be because they are repulsive to the worker and so call for a special effort. (Page 379.) GERMANY

Handwörterbuch der Staatswissenschaften. Bd. I. [Compendium of Political Science. Vol. I.] Edited by Drs. J. CONRAD, Professor of Political Science in Halle: L. ELSTER, Ober Reg. Rath in Berlin: W. LEXIS, Professor of Political Science in Göttingen and EDG. LOENING, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

Often the overtaxed workman seeks to relieve this tension, to keep up by the stimulus of drink. The enhanced capacity temporarily gained by such means, especially by alcohol, which plays a fatal part, only sinks later, however, into a more pronounced fatigue. (Page 1216.)

Berichte über die Fabrikinspektion in der Schweiz im Jahre 1879. [Reports of the Swiss Factory Inspectors. 1879]. Berne, Stämpfische Printing House, 1880. SWITZERLAND

Dr. Fridolin Schuler, Inspector of 1st District:

One hears much complaint of the drunkenness . . . immorality of the workmen, but, surprisingly enough, only in those industrial regions where excessive hours of work are regularly the rule. An employer . . . whose men worked from early morning until far into the night did not seem to realize that this was the real reason for what he called their "laziness." For who can fail to perceive that a workman who is kept at crushingly hard work early and late must become tired out — must need artificial stimulants to keep him going? (Page 14.)

It seems that, in general, the entire discussion of the normal work-day has been confined too exclusively to the commercial standpoint and that an all-round examination of the subject on the basis of the suggestions here made is greatly to be desired. (Page 14.)

Débats et Documents Parlementaires, Chambre des Députés, 23^e Mars, 1881. [Parliamentary Debates and Documents (French), Chamber of Deputies, Mar. 23, 1881.] Suite de la discussion des propositions de loi concernant la durée des heures de travail dans FRANCE

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les usines et les manufactures. [Discussion of the sections of the law relating to the length of hours of work in workshops and factories.]

Senator Waddington :

As far back as 1848, General Castellane said, "The workers have no time to sleep. When one cannot sleep, one must keep up his strength by extra food. They cannot do that, so they have recourse to alcoholic drinks to produce a fictitious strength." (Page 616.)

Archives Générales de Médecine. Vol. I. La journée de huit heures. [The 8-hour Day.] Dr. P. CORNEILLE. Paris, 1906.

Dr. Verhaeghe, in *la Médecine Sociale*, regards the long working day as an obvious cause of overstrain and sees in this overstrain the primary cause of alcoholism, tuberculosis, and physical degeneracy in all its forms.

The same opinion is held by Dr. Gley of the Faculty of Medicine.

Like Imbert, he sees in fatigue the chief causes of labor accidents, and, like Verhaeghe, he holds that excess of labor leads to alcoholism. (Page 1199.)

ITALY

Proceedings of the 1st International Convention on Industrial Diseases. Milan, 1906. Frenastenia e delinquenza in rapporto a taluni ordinamenti del lavoro. [Imbecility and Criminality in Relation to certain Forms of Labor.] Prof. CRISAFULLI.

In the bitter competition of the age, the organism of workmen quickly succumbs to fatigue; they must therefore be looked after with all due care to ward off the many incurable ailments that threaten the life of both manual and brain workers.

... In many cases this poisoning produced by fatigue drives the working man to drink, by means of which he hopes to restore his exhausted energy.

The consequences are, then, serious indeed, there being a double poisoning at work, that of fatigue and that of alcohol. (Page 150.)

UNITED STATES

Evidence Submitted to the Massachusetts Legislature in Favor of the Enactment of a Ten-Hour Law. Lawrence, 1870.

G. S. Weaver, Pastor of Universalist Church, Lawrence :

I beg leave to state, after ten years' observation in this community, that in my judgment our people are so overworked as to materially

hinder their intellectual and spiritual improvement. Their excessive labor quite unfits them for serious thought and for seeking the advantages of Christian improvement. I seriously question whether their exhausted condition does not create a desire for stimulants, which is even a greater evil than overwork among our laboring people. Anything which legislators can do to preserve the physical force of our people and temperate habits will be work in the right direction, and nothing is clearer than that the mothers and children are the class specially needing legislative care.

I could say much from observation on these two points, *Overwork* and *Intemperance*. (Pages 20-21.)

Report of Massachusetts Bureau of Statistics of Labor. 1871.

Labor excessively protracted defeats its own end — the maximum of production — by the exhaustion and sickness engendered, and by the drunkenness, dissipation, and idleness of which it is the efficient cause.

The evils resulting from the excessive labor of factory men, women, and children, especially the latter two classes, produce marked results of a detrimental nature. (Page 573.)

Massachusetts Senate Documents, No. 33. 1874.

The Committee on the Labor Question to whom was referred so much of the Governor's address as relates to Labor Reform, having considered so much thereof as pertains to the enactment of a ten-hour law, and having also considered the petition of Wendell Phillips and others for the passage of such a law, report: . . . that working eleven and twelve hours a day in these factories saps the energies and produces a depression of spirits that find relief only in the indulgence of intoxicants. (Page 1.)

Relations between Labor and Capital. United States Senate Committee on Education and Labor. Vol. 1. 1885. Testimony of ROBERT HOWARD, Mule-spinner in Fall River Cotton Mills.

I have noticed that the hard, slavish overwork is driving those girls into the saloons, after they leave the mills evenings . . . good, respectable girls, but they come out so tired and so thirsty and so ex-

hausted . . . from working along steadily from hour to hour and breathing the noxious effluvia from the grease and other ingredients used in the mill.

Wherever you go . . . near the abodes of people who are over-worked, you will always find the sign of the rum-shop.

Drinking is most prevalent among working-people where the hours of labor are long. (Page 647.)

Report of the New York Bureau of Labor Statistics. 1900.

Excessive work and long hours are the causes that have powerfully promoted the use of stimulants and intoxicating liquors. The harmful influence of a long working day acts not only directly upon those who work, but also upon future generations and threatens the vigor and full development of the human race. (Page 66.)

Wealth and Progress. GEORGE GUNTON. New York, Appleton, 1897.

The inevitable tendency of these conditions is to cause the laborer to gravitate toward the saloon rather than to the reading-room, lecture-hall, museum, and theatre for his instruction and entertainment. Persons who have to be subject to such long hours of continued toil from childhood, amid . . . the sweltering heat and stifling atmosphere of mills and factories, cannot be expected to develop the ambition and force of character necessary to inspire and elevate their domestic and social relations.

And the effect of these conditions upon the women and children is even worse. (Page 360.)

Fourteenth and Fifteenth Annual Convention of the International Association of Factory Inspectors of America. Indianapolis, 1900. Niagara Falls, 1901; (Bound in New York Department of Labor Report, 1901.) The Shorter Workday in its Effect upon the Personal Character of the Worker. JOHN HOLBROOK, Deputy Commissioner of Labor, Michigan.

There is such a thing as the moralization of time in reference to its effects upon personal character. The worker who formerly toiled long hours from morning till night and six days in the week, left idle on the seventh day, was under great temptation to make a brute of himself on that day. Too tired to do anything, jaded body, starved

brain, brutalized soul, there could be no Sunday rest for such; there was nothing left to do but get drunk as the natural result of a tired and brutalized body and soul.

More leisure has given opportunities for thought and the growth of intelligence which eager minds have not been slow to improve; the newspaper, work of science, and a quiet Sunday in which more than a small minority attend worship, have been wonderfully helpful and elevating.

Under the old order of things no man could avail himself of Sunday rest and worship. He was too tired and too weary to enjoy them, even if he had the capacity, which was very doubtful; nor was he fitted for home life and its duties, and consequently missed its moralizing effects. (Pages 564-565.)

National Civic Federation, New York, 1903. Industrial Conference.

Prof. GEORGE GUNTON, of the *Institute of Social Economics*.
The Winthrop Press.

So long as the laborer works to the point of being exhausted, so far is the possibility of this educational opportunity destroyed. To work in the factory till exhausted disqualifies a laborer for reading a book, for instance, and for enjoying the social influences of family and friends. It fits him for the saloon, it fits him for the need of stimulants; he comes to the point where he wants the quickest relief, and, unfortunately, that is too frequently the saloon. (Pages 172-173.)

American Academy of Political and Social Science. Vol. XXVII,

*No. 3. 1906. The Manhood Tribute to the Modern Machine;
Influences Determining the Length of the Trade Life among
Machinists.*

James O'Connell, President International Association of Machinists:

In searching for something to brace up his nerves the worker has no idea he is taking great risks, or running any danger of becoming a victim to the drug habit. Unfortunately, it often happens that he strikes something which for the time seems to renew the health and vigor of the years gone by, but the relief is only temporary. He must repeat and increase the dose, and before he knows it — he perhaps never realizes it — he becomes the slave of some derivative of coal tar, alkaloid or alcohol. (Page 494.)

F. *Bad Effect of Long Hours on General Welfare*

(1) STATE'S NEED OF PRESERVING HEALTH

The experience of manufacturing countries has illustrated the evil effect of overwork upon the general welfare. Health is the foundation of the State. No nation can progress if its workers are crippled by continuous overexertion. The loss of human energy, due to excessive working hours, is a national loss, and must inevitably result in lowering the nation's prosperity.

**GREAT
BRITAIN**

Hansard's Parliamentary Debates. Vol. LXXIV. 1844.

Viscount HOWICK:

I contend that you altogether misapply the maxim of leaving industry to itself when you use it as an argument against regulations of which the object is not to increase the productive power of the country, or to take the fruits of a man's labour from himself and give it to another, but, on the contrary, to guard the labourer himself and the community from evils against which the mere pursuit of wealth affords us no security. The mere increase of a nation's wealth is not the only — it ought not even to be the first and highest — object of a Government. The welfare, both moral and physical, of the great body of the people I conceive to be the true concern of the Government . . . In the too eager pursuit of wealth, a nation, like an individual, may neglect what is of infinitely higher importance. (Page 642.)

History of the Factory Movement from the Year 1802, to the Enactment of the Ten Hours' Bill in 1847. "Alfred." London, Simpkin, Marshall, 1857.

In a national as in an individual sense, health of body ought to be a primary consideration. . . . In considering manufacturing or any other kind of industry, the labourers employed should not be considered only as a means to an end; they are human beings, endowed with faculties and feelings, and no branch of national industry can be, in a national sense, advantageous which does not directly contribute to their elevation. Vol. I. (Page 310.)

The Pioneer of Progress. JOHN DENNIS, *London, Hamilton Adams, 1860.* GREAT BRITAIN

But, nevertheless, health is such an inestimable blessing, that it cannot be too keenly prized; and any occupation in which it becomes impossible to maintain it, is fraught with injury not only to the individuals who engage in it, but to society itself. (Pages 9-10.)

Factory Act Legislation. The Cobden Prize Essay for 1891. VICTORINE JEANS. *London, T. Fisher Unwin, 1892.*

The bodily and intellectual energy of the individual workman is, after all, the only true basis of any kind of national greatness. . . . Long experience teaches this: that no law which promotes the physical, intellectual, and moral good of the working classes can in the long run prove economically unsound. (Page 91.)

The Case for the Factory Acts. Edited by Mrs. SIDNEY WEBB. *London, Richard, 1901.*

The question arises, however, whether on philanthropic grounds alone individuals of mature years can be denied the right to work as long and as unhealthily as they like. The Acts of 1891 and 1895 show signs of a recognition, if a tardy one, that the real grounds of interference with industry are considerations of public health and safety. The old idea of protecting certain classes of workers because they are not "free agents" is more and more felt to be irrelevant, if not meaningless. There are still those who ask in astonishment, "May not a man, may not a woman, employ their capital or their labour as they choose?" But the State says, with a less and less hesitating sound, "Not under conditions wasteful of the life, or destructive of the efficiency, of those employed, or dangerous to the safety and well-being of the community." To this conclusion it has been driven by inquiry into the conditions of public health. (Page 123.)

Handbuch der Hygiene. Bd. 8¹. [Handbook of Hygiene, Vol. 8¹.] GERMANY
Edited by Dr. THEODORE WEYL. Allgemeine Gewerbehygiene und Fabrikgesetzgebung. [General Industrial Hygiene and Factory Legislation.] Dr. EMIL ROTH. Jena, 1894.

In no field have State and society greater duties to perform than in industrial hygiene and the prevention of accidents, and these

GERMANY duties become more serious as the difficulty and dangers of occupation increase.

. . . And yet no one can deny that the present industrial labor of women and children betokens a misdirection of working strength which, by dint of premature and unnatural drains upon and exhaustion of labor capacity, is capable of inflicting moral and physical injury upon the family. Obviously also, the preservation and vigor of the family are the first essentials of all social reforms. . . . The protection of labor is not only a postulate of humanity and of morals, but above all else, of the national health.

The aim and purpose of our work is to benefit the whole race, by bringing the egoistic desires of individuals into harmony with the purposes of a unified society. (Pages 1-3.)

Die Pathologie und Therapie der Neurasthenie. [Pathology and Therapeutics of Neurasthenia.] Dr. OTTO BINSWANGER, Professor of Psychiatry and Director of the Psychiatric Hospital at Jena. Jena, Fischer, 1896.

General prophylaxis will find its most pressing duty to lie in the protection of those members of society who are still healthy, from immoderate demands upon their strength. As, on account of the competition in all classes of society, it is hardly possible to relax intensity of work for any one individual without destroying his chances for success, a general plan of hygienic regulation of work must be adopted with a view to the preservation of racial vigor, and the working energy demanded shall be reduced enough to allow rest and recreation in ample extent for every one. (Page 358.)

Archiv für Unfallheilkunde, Gewerbehygiene und Gewerbekrankheiten. Bd. I. *Über den Gesundheitsschutz der Gewerblichen Arbeiter.* [Protection of the Workingman's Health.] Dr. SCHAEFER. Stuttgart, Enke, 1896.

There is scarcely a single industrial occupation in which one or more of the above influences (results of excessive standing, sitting, etc.) is not prominent. We include them therefore in the general dangers of occupation to which factory workers especially are exposed. (Page 202.)

The claim for a shorter working day, which has been pressed in **GERMANY** all civilized countries within the past few decades, and which may be defined as an absolute social need, can not be urgently enough supported in the interest of the public health. (Page 204.)

Gesammelte Abhandlungen. Bd. III. [Complete Works, Vol. III.] Die Volkswirtschaftliche Bedeutung der Verkürzung des Industriellen Arbeitstages. [The Economic Significance of a Shorter Working Day. ERNST ABBÉ. Paper read before the Political Society, Jena, 1901]. Jena, Fischer, 1906.

As the expenditure of power due to the machines running idle amounts to a useless consumption of 30-40 millions of marks of coal, wasted in Germany, so, even more important, is the waste of energy in the loss of efficiency of 3 or 4 million men. And the question then arises: what is the sense of this undoubted waste of strength, when it is possible for men to produce the same in the 8 hours that they do in 10? And whose loss is it? Is it only the loss of individual convenience to men who would find it more agreeable to spend only 8 hours at work, or is it a loss that has a general social and economic significance? I hold it is the latter.

This squandering of human strength means a loss to the intelligence and mental activity of the human race; it means that a valuable capital which Germany possesses in the intelligence of her workers is lying idle, because the conditions are not such as to permit this intelligence to expand to its full value. (Page 237.)

Grenzfragen des Nerven und Seelenlebens. Bd. VI. [Borderland Problems of Nervous and Psychic Life. Vol. VI.] Edited by LOEWENFELD and KURELLA. Über die geistige Arbeitskraft und ihre Hygiene. [On Mental Working Power and its Hygiene.] Dr. L. LOEWENFELD. Wiesbaden, Bergmann, 1906.

The efficiency of the individual is a part of the national efficiency. If one considers how rushing and incessant the commercial rivalry of civilized states is to-day, and realizes how closely the results of this struggle depend upon the intellectual capital which the nations have at their command, one is obliged to admit what a great significance for national welfare there is in the mental working capacity of the

GERMANY individual. But among those most concerned there has been, as yet, by no means adequate recognition of this fact. . . . We are still far from being able to say that all is done that can be done, by private initiative and by the state, to preserve and develop the brain power of the nation. (Page 68.)

Fourteenth International Congress of Hygiene and Demography
Vol. I. Berlin, 1907. Opening Addresses. Prince SCHONAICH
CARALATH, President of Congress. Berlin, Hirschwald, 1908.

Our aim is to restore health . . . we know that health, for mankind, goes hand in hand with strength to labor and with joy in creative work. . . . The extraordinary growth of vast cities with their nerve-racking din and driving industries, our factories with their insatiable wheels rolling by day and night, the dangers to health which threaten the workers in factories, mills, mines, and other industrial establishments and which claim innumerable and infinitely lamentable sacrifices, offer new, and in the highest degree difficult, problems.

With the advancing complexity of life, of earning, and of the people's needs, the difficulties also become more complex for those who are endeavoring to lay a firm basis and secure order for the pursuits and the conditions of life of the people. Without exaggeration it may be said: Every occupation, — our entire public life, cries daily louder and more impressively for hygiene; our workers, numbered by millions, our artisans, the small merchant and tradesman, the working class and the middle class, knowing and desiring a different mode of life from the old, desire the fruits of our endeavors. (Pages 160-161.)

Handwörterbuch der Staatswissenschaften. Bd. I. [The Compendium of Political Science. Vol. I.] Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

But there is one time when politico-economic doubts (as to the industrial results of restriction) must take second place. Wherever

the length of working hours is responsible for injury to health or morals, then the state is justified in interfering, even although the results from the economic point of view cannot be clearly determined. It conflicts with the moral sense of modern nations to permit the robbery of human working power and to allow men to be used simply as means of enriching other men. Such parasitic industries present no elements of strength, but only disease and weakness. (Page 1207.)

GERMANY

Berichte über die Fabrikinspektion in der Schweiz. 1894, 1895. [Reports of the Swiss Factory Inspectors. 1894 and 1895.] Aarau, Säuerländer, 1896.

SWITZERLAND

Among the social questions of the day the reduction of hours holds first rank. . . . It cannot be denied that one who abuses his strength by excessive labor, loses his health and frequently becomes a worn-out and useless man before his time, often indeed a charge upon society. The interest of the workman and the interest of society are at one in demanding a just and rational limit of the hours of work. (Page 129.)

Proceedings of the Eleventh International Congress of Medicine, Rome, 1895. Vol. I. Die Stellung des Staates zur Modernen Bacteriologischen Forschung. [The Attitude of States to Modern Bacteriological Investigation.] Dr. V. BABES, University of Bucharest. Rome, 1895.

ROUMANIA

There should be physicians specially trained, and free from the claims of general practice, who could make widely known in responsible circles and especially among statesmen, all the achievements of medical science and the lines of practical application on which their vast importance for the health of nations might be utilized. . . .

Men so trained must then, before all, agitate strongly for a fundamental reconstruction of society in the interest of an international and social reform based upon the following principles, namely: that individual health cannot be separated from the general health; that the health of one class is decided by that of another class; and that precisely the health of the lower classes possesses the highest socio-economical value of all. (Page 244.)

- AUSTRIA** *Eighth International Congress of Hygiene and Demography. Budapest, 1894. Vol. VII. Sec. V. Über das Verhältniss der Dauer des Arbeitstages zur Gesundheit des Arbeiters und dessen Einfluss auf die Öffentliche Gesundheit. [The Length of the Working Day in its Relation to the Workman's Health and Influence upon Public Health.]* Dr. E. R. J. KRÉCSI, Vice-Secretary of the Chamber of Commerce, Budapest. Budapest, 1896.

One of the most important, most pressing questions is the regulation of working hours, and this question cannot be considered to be settled even in those states which have already established a "normal" working day. In the face of all the facts, of the dangers threatening the public health through overexertion arising from too long working hours, it becomes the duty of States to give continuous attention to the claims made for a hygienic and therefore an allowable working time, and to lower the duration of working hours progressively, . . . in accordance with the findings of authorized physiological and socio-economic investigations. The scruples which have been loudest heard in opposition are gradually being silenced, and experience will prove that the factory hand will be able to attain a higher efficiency by practice and training. We do not know, today, at what point in production, as gauged by the working time, a permanent inferiority of capacity comes on. It is possible that it may appear after a number of hours that would seem to us, with our present ideas, very small indeed.

Only experiment can teach us this. The technique of machinery, however, will keep pace with all legislative regulation, so that neither industry as a whole nor the worker as an individual need suffer thereby. (Page 331.)

- FRANCE** *Tenth International Congress of Hygiene and Demography. Paris, 1900. In one volume. Address of M. Waldeck Rousseau, President of the Council, Minister of the Interior, France. Paris, Masson, 1900.*

More and more do democracies realize that the laws of hygiene are an integral part of their programme.

They are recognizing that the working classes — to whom the means of obeying the claims of private sanitation are too often lacking — have the right to demand a minimum guarantee from public hygiene; that laws are necessary to enforce this; that such laws are a debt of society toward its members. (Page 15.)

Revue d'Economie Politique. T. XVI. 1902. *La Protection légale des Travailleurs, est-elle Necessaire?* [*Is Legal Protection for Working People Necessary?*] M. RAOUL JAY, *Professor of Law, University of Paris.* FRANCE

We must never forget that the lasting and general interest of the nation is endangered by the living conditions of the individual no less than the individual workingman by the circumstances of the latter.

The strength of the nation is the strength of the individuals that compose it. No one contests the terrible consequences that a nation must expect which subjects its children to labor which checks their physical and mental development. . . . But to safeguard the nation's interest it does not suffice merely to regulate child labor. "To protect the child and not to protect the mother is an absurdity." Said Jules Simon . . . What good is gained if — even supposing the child is protected — the strength of the adult is wrecked in a few years by excessive or unhealthy labor; — if the adult is not given the leisure necessary to develop his human qualities? . . .

To secure the necessary "national minimum" is, for some countries, an imperative duty. I am thinking of the military service, where the strength of all is the guaranty of national independence. (Page 149.)

Revue d'Economie Politique, T. XV. 1901. *La Nouvelle Réglementation de la Journée de Travail.* [*The New Labor Legislation.*] M. BOURGUIN, *Professor of Political Economy, Lille.*

The whole movement of modern civilization tends in the direction of a progressive reduction of the hours of labor. . . . The future of the race must not be compromised, family life destroyed, the physical energy of the worker shattered, or his intellectual or moral development stunted by excessive toil. (Page 344.)

Les Projets de Limitation de la Durée du Travail des Adultes en Belgique. [*Proposals regarding Limitation of Hours of Work for Adults in Belgium.*] HECTOR DENIS. [*No. X of the Publications of the Belgian Section of the International Association for Labor Legislation.*] Liège, Bernard, 1908. BELGIUM

In the debate, M. Dejacque attributed a police power to the State by which it might properly intervene not only to restrain, but also to

BELGIUM prevent abuses. As serious exploitation compromises not only the existence of the worker but also the very future of the race, this, to his mind, was sufficient ground, and the only legitimate ground, for preventive intervention by Government. (Page 18.)

M. Denis held that state regulation is not only justified when the actual existence of the worker and of the race is threatened, but further that it is justifiable in securing the necessary conditions for the conservation and development of the laboring classes physically, intellectually, morally, socially, and politically. (Page 19.)

Psychology furnishes a justification of restrictive law, in demonstrating the defectiveness and slow development of the consciousness of fatigue. The social consciousness, then, must supplement that of the individual. (Page 20.)

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Report of the Massachusetts State Board of Health. 1873. EDWARD JARVIS, M.D.

All additions to the physical, moral, or intellectual power of individuals in any individual are, to that extent, additions to the energy and the productive force — the effectiveness of the State; and on the contrary, all deductions from these forces, whether of mind or body — every sickness, and injury or disability, every impairment of energy — take so much from the mental force, the safe administration of the body politic.

The State thus has an interest not only in the prosperity, but also in the health and strength and effective power of each one of its members. (Page 336.)

National Convention of Factory Inspectors in the United States. Philadelphia, 1887. (Bound with New York Report of Factory Inspectors, 1887.)

Rufus R. Wade, Chief Factory Inspector of Massachusetts:

The history of what is called our Ten-hour Law was a record of constant, feverish struggle, maintained year after year, passed in one branch of the Legislature and defeated in the other, and it was not until several annual sessions had elapsed that the bill so earnestly and bitterly fought over became a law. It is well that such bills are enacted; it is well that the producers of wealth have been recognized. (Page 199.)

. . . In our State the policy has been of conserving manhood. The eye, the hand, the brain of the worker are finer machines than any produced by his labor and skill. So we think it is wiser to improve our people than to increase the productive capacity of our machinery. (Page 200.)

Report of the Michigan Bureau of Labor Statistics. 1898.

A shorter working day for these classes of laborers seems an imperative necessity if we would increase the true value of the State; for we believe that a nation, state or community, has but one value, and that is human life and happiness. Any system which depreciates or robs us of the wealth of the human is an injury to the best interests of the State. (Page 77.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics. Part III. 1907-1908. Industrial Hygiene and the Police Power; Being a Reprint of A Paper on the Legitimate Exercise of the Police Power for the Protection of Health, by HENRY BARRI FAVILL, M.D.

In the industrial world, health is the foundation of productiveness and the bulwark of economy. That society and progress depend utterly upon these factors can hardly be questioned. It is hence only necessary to reach a conclusion as to the fundamental importance of health as related to the product of any individual or to have a comprehensive grasp of the elements of waste and dissipation in social affairs to at once put the question of public health as a thing apart to be dealt with as a social problem irrespective of its particular bearing upon any class of citizens. (Page 480.)

We must study the relation of health to labor. — It needs no argument to maintain that abundant data and well considered demonstration will be necessary to bring to pass this great reform. It is not the purpose of this discussion to go into the detail of the research leading to this end. It is agreed that labor legislation must have its foundation in clear economic advantage. It is perhaps not so well agreed, but the idea is rapidly growing, that of all the factors of an economic advantage, health is the most crucial. Upon this hypothesis, therefore, the conclusion may rest, that the logical primary step is the establishment of broad and effective study of health as related to laboring conditions. (Pages 485-486.)

American Academy of Political and Social Science. Vol. XXVII. No. 3, 1906. Physical and Medical Aspects of Labor and Industry. FREDERICK L. HOFFMANN, Statistician Prudential Insurance Co. of America, Newark, N. J.

The most valuable possessions of a workman are his health, strength, and intelligence. The conservation of health and strength, the prolongation of life and prevention of disease, are important economic factors which more or less determine the success of nations in the struggle for commercial supremacy and race survival. A gain in longevity, an increase in vitality, a decrease in disease liability, are all economic elements of the greatest possible economic importance.

They lie at the root of the true problem, for they determine in the long run the real and enduring progress, prosperity and well-being of the masses. (Page 465.)

The period of industrial activity of wage-earners generally, but chiefly of men employed in mechanical and manufacturing industries, it may be assumed, should properly commence with the age of fifteen and terminate at sixty-five. (Page 465.)

. . . There is an economic value inherent in every year of a workman's life, and . . . every gain in human longevity above the age of fifteen and below the age of sixty-five represents a corresponding gain to the nation at large and a distinct contribution to the accumulated wealth and capital of the nation. (Page 466.)

. . . If on the basis of an average net gain to society of 300 dollars per annum, the 50 active years of a working man's life represent a total of 15,000 dollars, then if death should occur at the age of 25, the economic loss to society would be 13,695 dollars; if at the age of 35, it would be 10,593 dollars; if at the age of 50, 4495 dollars; and, finally, if at the age of 60, the loss would still be 1090 dollars. Of course, the values would vary considerably in different employments, but the broad principle is fairly well illustrated and with approximate accuracy in this calculation. (Page 467.)

If this theory is applied to the problem of preventive medicine and vital statistics, some extremely suggestive conclusions result from a careful study of the facts. Out of every 1000 males living at the age of fifteen . . . by the last English life table 464 will survive to the age of sixty-five, while 536 will have fallen out, or have died, in the meantime, as the result of either accidents or disease. The present consideration takes into account only the 536 out of every

1000 who die between the age of fifteen and sixty-five from causes which, by modern standards of medicine and hygiene, are largely of a preventable nature. This theory is readily susceptible of statistical proof, but it needs merely to be pointed out that the mortality from some of the most important of these causes, such as consumption, typhoid fever, and industrial accidents, is more or less decreasing in all civilized countries. (Page 468.)

... There are numerous other causes of lesser importance . . . the problem of disease prevention rests, therefore, primarily upon a clear recognition of the principal causes conducive to ill-health and short life and an intelligent study of the methods and means by which such causes can be most effectively removed. (Page 469.)

... If the duration of life has, on the average, the considerable economic value referred to at the outset, then it manifestly must be to the advantage of the state and the employers of labor that nothing within reason be left undone to raise to the highest possible standard the level of national physique and of health and industrial efficiency.

... The interests of the nation, of wage earners as a class, and of society as a whole, transcend the narrow and selfish interests of the short-sighted employers of labor who, disregarding the teachings of medical and other sciences, manage industry and permit the existence of conditions contrary to a sound industrial economy and a rational humanitarianism. There can be no question of doubt but that at the present time the average life and industrial efficiency of a workingman in the United States is not what it should be, and it is manifestly the duty of the State, of employers of labor, of labor associations, and of workingmen themselves to take the facts of the problem into consideration and by intelligent co-operation raise to the maximum the standard of life and health in American industry. (Pages 483-484.)

National Child Labor Committee. New York. Proceedings of the Fifth Annual Conference. Chicago, Ill., 1909. The Federal Children's Bureau. HENRY B. FAYLL, M.D. Chicago, Ill.

Absolute control of the health of the individual can never be the function of the State. Control of the conditions under which the lives of the people shall be lived and their energies expended is an inevitable necessity. The State will approach this problem from the standpoint of self-preservation. Defective health is the foundation of

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crime, pauperism, and degeneracy as well as that widespread inefficiency due to obvious disease.

All sociologic forces have come to recognize this fact. The physical well-being of the people is the deepest interest of the State. (Pages 37-38.)

(2) STATE'S NEED OF PRESERVING HEALTH OF WOMEN

The health of the race is conditioned upon preserving the health of women, the future mothers of the Republic.

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British Sessional Papers. Vol. XIV. 1868-1869. Reports of Inspectors of Factories for Half-year ending 30th April, 1869.

The question of the cheapening of labor by the extended employment of women and children from home, is one of ever deepening interest in a country like ours. . . . Whatever affects the female character, its influence on society, on her own life as well as on the conditions of life in her offspring, is being gradually encircled with contingencies, the result of which, to those who see them in their various phases, it is not possible to regard without considerable anxiety. . . . The time seems, indeed, to be fast approaching when the cheapness of production with a certain amount of excellence only is to be the trader's great highway to prosperity, and when whatever relates to social life is to succumb to the competition which is running to and fro upon it. (Page 75.)

Problems of Poverty. JOHN A. HOBSON, M.A. London, Methuen, 1891.

Surely, from the large standpoint of true national economy, no wiser use could be made of the vast expansion of the wealth-producing power of the nation under the reign of machinery, than to secure for every woman destined to be a wife and a mother, that relief from the physical strain of industrial toil which shall enable her to bring forth healthy offspring, and to employ her time and attention in their nurture. . . . (Page 168.)

Women's Work and Wages. EDWARD CADBURY, M. CECILE MATHE-
SON, and GEORGE SHANN. London, T. Fisher Unwin, 1906.

The employer is responsible for the hours passed inside his place of business, and if the conditions are such that the average worker is

checked in development, or is actually deteriorating, the employer is running into debt to the country. **GREAT BRITAIN**

If he uses up human capital instead of the interest in energy, etc., which can be repaired daily by an average constitution, his business is aided either by the worker's relatives or by the rates which must provide for those who are prematurely disabled. Women especially fall off in capacity in consequence of early overstrain, and this has a disastrous effect on their offspring; while many in middle life drag on a miserable existence on the diminished wages they are able to earn. In so much as this is due to work and not to home life, our labor conditions need reform, and employers and the consuming public must be held jointly responsible. (Pages 198-199.)

Report of the Royal Commission on a Dispute respecting Hours of Employment. The Bell Telephone Company of Canada, Ltd., and Operators at Toronto, Ont. The Department of Labor. Ottawa, Canada, 1907. **CANADA**

Conclusions and Recommendations:

We believe that where it is a question between the money-making devices of a large corporation and the health of young girls and women, business cupidity should be compelled to make way. The evidence given before us, and the facts of experience, as cited, go to prove that this is a matter which cannot with safety be entrusted to the parties concerned, but is one which in the interest of the protection of the health and well-being of persons engaged in this form of industrial pursuit calls for legislative interference on the part of the State. (Page 97.)

Jahresberichte der Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr 1902. [Reports of the Factory Inspectors in the Kingdom of Württemberg. 1902.] Stuttgart, Lindemann, 1903. **GERMANY**

As in the long run the commercial success of a nation depends upon its possessing a healthy, skilled, and mentally alert population, a reduction of working-women's hours, intelligently systematized, can only be advantageous to industry. (Page 188.)

The ten-hour day for working women can be introduced into all branches of industry without real difficulty, and considering the con-

GERMANY tinually greater demands that are being made on the physical and mental elasticity of workers in general and women in particular, it will be in the interests of the maintenance of a healthy working class. (Page 211.)

Handbuch der Hygiene. Bd. 8^t. [Handbook of Hygiene. Vol. 8^t.] Edited by Dr. TH. WEYL. Hygienische Fürsorge für Arbeiterinnen und deren Kinder. [Hygienic Care of Working Women and their Children.] Dr. AGNES BLUMH, Berlin. Jena, 1894.

Two leading reasons exist for the newly developing codes of protective laws relating to women in industry. She requires special care because:

1. She is physically not as strong as man.
2. She is the bearer of the future race whose health and vigor will be markedly influenced by hers, and the State must therefore feel the keenest interest in securing a vigorous and efficient posterity. (Page 83.)

FRANCE *Documents Parlementaires. Sénat. 7^e Juillet, 1891. [Proceedings of the French Senate, July 7, 1891.] Rapport sur le travail des enfants, des filles mineures, et des femmes dans les établissements industriels. [Report on the Industrial Employment of Children, Young Girls and Women.]*

It is impossible for me not to tell the Senate what I think of the position of women in industry, and that I may gain your favor, gentlemen, I ask permission to tell you that for at least forty years I have applied myself to this question. (Page 573.)

When I ask, when we ask, for a lessening of the daily toil of women, it is not only of the women that we think, it is not principally of the women, it is of the whole human race. It is of the father, it is of the child, it is of society, which we wish to re-establish on its foundation, from which we believe it has perhaps swerved a little. (Page 575.)

ITALY *Proceedings of the First International Convention on Industrial Diseases. Frenastenia e delinquenza in rapporto a taluni ordinamenti del lavoro. [Imbecility and Criminality in Relation to certain Forms of Labor.] Professor CRISAFULL. Milan, 1906.*

Uninterrupted social progress cannot be dissociated from social and moral betterment.

This can be obtained only when the physical and mental welfare of the worker shall be protected through rational and efficacious measures; when the children shall be shielded through the elimination of all danger of degeneration; when woman shall be protected, so that during girlhood she shall not enfeeble her natural powers of resistance, and as a mother shall be able to perform her duties. (Page 158.)

ITALY

Massachusetts Legislative Documents. House. No. 44. 1867. Report of Special Commission on the Hours of Labor.

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Eleven hours' toil each day for six days in each week is more than women and children ought to be required to perform. We are certain that they cannot do this without impairing, sooner or later, their vital powers, and shortening the duration of life. We are confident that it is a most uneconomical waste of life, which it is the interest of the State to prevent. (Page 8.)

Report of the Ohio Inspector of Workshops and Factories. 1890.

. . . It must be remembered that these female factory employees will in all probability at some time become mothers, and to be broken down in health when that important period of their life arrives, would certainly be conducive to evil results, and a condition we should strenuously endeavor to avoid. (Pages 37-38.)

Report of the Michigan Bureau of Labor Statistics. 1897.

. . . Is it not high time that so far as law can effect the labor of the "Nation's wards" — the women and children — the hours of labor should be limited and regulated; and that so far as governmental power and influence can be exerted, it should be upon the side of those who are the bone and sinew, the foundation and the mainspring of a country's greatness, prosperity, and progress. (Page 213.)

Report of the Nebraska Bureau of Labor and Industrial Statistics. 1907-1908.

Scientists and thinkers have pointed out that health and vitality are the capital of society. It follows, then, that any lessening or weak-

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ening of the natural power of womanhood over the race will be distinctly injurious. To lower the standard of bodily strength will bring a disastrous reaction on society later. To deprive her of mental training means simply a retrogression to serfdom — slow, perhaps, but sure. Prevention of these things is the object of about all of the laws passed in recent years by progressive States and Nations. In too many instances the laws are crude and give too wide a latitude for transgressors. (Page 33.)

Report of the Minnesota Bureau of Labor, Industries, and Commerce. 1907-1908.

In Europe, where large standing armies are maintained and the physical condition of the race as a race is more minutely noted, there has long been an appreciation of the importance of maintaining the health of the mother. . . . The long period of standing on their feet, the shortened time for meals, all combine to militate strongly against, not only her own health, but the health of those who shall come after her. (Pages 243-244.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics. 1907-1908. Part VII. Women Workers in Milwaukee Tanneries. IRENE OSGOOD, Special Agent.

Unless we change the present demoralizing condition we will continue to see women, worn out by the work of their youth, unable to do their part in making happy and successful homes. Their children, if not given better opportunities, go through the same course and keep up the circle of vicious inefficiency. We can look for better conditions only with the increased intelligence and efficiency of the more fully developed girl, working in co-operation with an employer who recognizes that she is entitled in the workshop to cleanliness, to good sanitation, light, and air; to protection from dangerous machinery; to the removal of all brutalizing conditions, and of all conditions which place undue strain upon her moral character, even to excluding her from employment in certain industries. She should be entitled to every safeguard to health, such as shortening the work period, the opportunity for a nourishing noon meal; the prevention of undue strain upon her body, and breaks during the working hours for bodily rest. (Pages 1111-1112.)

(3) THE DOUBLE BURDEN OF WORKING WOMEN

Overlong working hours are particularly injurious to women because their sex doubles the claims made upon them. After working hours domestic duties must be performed. The unmarried as well as the married woman cannot avoid home work for herself or her family, the performance of which, after the regular day's labor, lengthens her working time by several hours. With shorter working hours the unavoidable domestic duties may be performed without exhausting the workers.

Hansard's Parliamentary Debates. Vol. LXXIV. 1844.

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BRITAIN

Sir R. Peel:

Robert Sutcliffe, an operative, said: . . . "with regard to their own families . . . If they did not wish their daughters to grow up completely unfit for every domestic duty which, as wives and mothers, they would be called on in after life to discharge, they must insist on a curtailment of the present excessive and protracted toil they endured in the factories. He had daughters at work in the factory — they were required to get up at five in the morning and they did not get home till eight in the evening, and they were then in such a state of exhaustion, both of body and mind, they were altogether unfit to learn anything of household economy." (Pages 676-677.)

British Sessional Papers. Vol. XXVIII. 1844. Reports of Inspectors of Factories for Half-year ending 31st Dec., 1843.

The substitution of female for male labour, which has increased to so great an extent of late years, is attended with the worst consequences to the social condition of the working classes, by the women being withdrawn from domestic duties; and diminished comforts at home have the most corrupting influence upon the men. All these evils are much aggravated, when the women are worked so excessively that their life must be passed between the workshop and bed. The subject has been repeatedly mentioned to me by some considerate and humane mill owners, who know the evils of such a system, and wish to see it put down. (Page 4.)

British Sessional Papers. Vol. XVIII. 1856. Reports of Inspectors of Factories for Half-year ending 31st Oct., 1855.

The necessity of some restriction of labour, for the mitigation of the evils of the excessive labour of women and young persons, cannot be doubted; and the effect of such restriction upon their physical and moral condition is a matter of serious importance and of vital moment. . . . Women were deprived of those hours so requisite to the head of a family for her home, and the performance of domestic duties. (Page 81.)

British Sessional Papers, Vol. XIV. 1868-1869. Reports of Inspectors of Factories.

It has been, for instance, the strongest plea for all kinds of relaxations under the Factories Acts Extension Act, 1867, during the past year that the working classes are beginning to reside 1, 2, or 3 miles from their places of work, and in several instances that they come and go by railway. On that account, if for no other, the hours of work ought not to be extended to 7, 8, or 9 o'clock at night, *i. e.*, to the time of starting the last train outward. Nothing could be much worse in a social point of view than, for women especially, to have to return home from work at 8, 9, or 10 o'clock at night to their families, in all weathers, and out of every degree of temperature, if they may ride 2 or 3 miles, to complete their days' work in neglected domestic duties. (Page 293.)

History of the Factory Movement from the Year 1802, to the Enactment of the Ten Hours' Bill in 1847. "Alfred." London, Simpkin, Marshall, 1802.

The Rev. J. Cooper affirmed, from his own experience, "that long hours of labour seriously affected all the domestic relations of life, and left the labourers so worn out, both bodily and mentally, that they had not the power, nor had they the time, for moral and religious improvement." (Vol. II., page 212.)

Problems of Poverty. JOHN A. HOBSON, M.A. London, Methuen, 1891.

In estimating the quantity of work which falls to the lot of industrial women-workers, we must not forget to add to the wage-work that

domestic work which few of them can wholly avoid, and which is represented by no wages. Looking at the problem in a broad human light, it is difficult to say which is the graver evil, the additional burden of the domestic work, as far as it is done, or the habitual neglect of it, where it is evaded. . . . To the long hours of the factory worker or the shop-woman, we must often add the irksome duties which to a weary wife must make the return home a pain rather than a pleasure. (Page 156.)

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Women's Work. AMY A. BULLEY and MARGARET WHITLEY. London, Methuen, 1894.

. . . If the arguments in favour of a general reduction of the hours of labour are strong anywhere, they are peculiarly strong in the case of women, for in a vast number of cases a woman, when she leaves her daily work, has to begin a second spell of work at home. (Page 163.)

Workers on their Industries. Edited with Introduction by FRANK W. GALTON. London, Sonnenschein, 1896.

Need of Organization among Women.

Emilie A. Holyoake. Sec. of the Women's Trade Union League:

Shorter hours are most essential to women, as without them there is no comfort in their homes, and little health in their families. They have no time to prepare proper food, without which health cannot be maintained. (Page 206.)

Verhandlungen des Deutschen Reichstags, 101 Sitzung, April 16. 1891. GERMANY
[Proceedings of the German Reichstag, 101st Session, April 16, 1891.]

Representative Hirsch:

"The arguments in favor of limiting the hours of factory work for married women so that they are enabled to give some care to their families, are unanswerable, but further, a limitation of working hours for young women is desirable. Young girls are going more and more into the factories, and hence arise many wrong conditions both in business and moral life. Industrial life prevents the young woman from preparing for future homemaking, and separates her for years from household knowledge, so that, if she finally marries she is likely

GERMANY to fail entirely in managing a home. If such young women were protected by the law in the extent of their working hours and given the necessary time, they could take advantage of the opportunities for education in homemaking that are offered in increasing extent by voluntary associations and housekeeping schools. For this weighty reason I definitely urge the passage of the 10-hour maximum working day for all women without exception." (Page 2409.)

Jahresberichte der Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr, 1899. [Reports of the Factory Inspectors in the Kingdom of Württemberg. 1899. Stuttgart, Lindemann, 1900.]

The majority of women are employed about 10 hours a day. But taking this as the usual working day and adding to it the time which a married woman must give to her family cares, there results a total working day of 13 or 14 hours for her, an amount of labor that is usually not required of a single woman. (Page 19.)

Overfatigue of the nervous system is a result of the work of married women in factories; only very strong constitutions are able to bear such exertion without harm. (Page 20.)

Jahresberichte der Grossherzoglichen Badischen Fabrikinspektion für das Jahr 1902. [Reports of the Factory Inspectors of Baden, 1902. Karlsruhe, Thiergarten, 1903.]

Special Report on length of hours of women.

In the report for 1899 it was exhaustively shown how greatly a reduction of hours was needed for the health, not only of married women, but of all women, and it was pointed out that housework and homekeeping require time and strength which women, after eleven hours in the factory were quite unable to give. Many times did working women tell the inspectors how exhausting the long work-day was, and how greatly they desired a shorter day. In opposition to them, employers often declared that the women would make no good use of longer leisure, but would only idle it away.

Such ideas have certainly not proved to be correct, nor have they been shared by all employers. For instance, the owner of a large factory, forced by competition to an 11-hour day, declared that the legal establishment of 10 hours would be a blessing for the women. (Page 73.)

Die Arbeitszeit der Fabrikarbeiterinnen. Nach Berichten der Gewerbeaufsichtsbeamten bearbeitet im Reichsamt des Innern. [The Working Hours of Women in Factories.] From the Reports of the (German) Factory Inspectors, Compiled in the Imperial Home Office. Berlin, Decker, 1905. GERMANY

From Cassel:

It is important to remember what a shortening of working hours means to the working woman who has to go a long distance to and from her work. Often an hour is spent thus, making it, not 10 hours, but 12 hours that the worker is compelled to be away from home. (Page 109.)

It was frequently pointed out that the interests of working women require a shorter day because of the necessary household duties which they often have to perform after working hours. The inspector from Württemberg said: "It often happens that married and unmarried women must work for hours at home before and after going out to the mill or shop, whereas the stronger man is entirely exempt from this additional labor." (Page 110.)

The inspector for Upper Bavaria dwells upon the advantage accruing to the health of working-girls as follows:

"In the matter of health the shortening of the working hours is of unusual value, because for them free time is not resting-time, as it is for a man. For the working-girl on her return from the factory there is a variety of work waiting. She has her room to keep clean and in order, her laundry work to do, clothes to repair and clean, and, besides this, she should be learning to keep house if her future household is not to be disorderly and a failure." (Page 111.)

Many inspectors urge the need of shortening the hours of labor on grounds of morality. From Offenbach it is reported: "The period before marriage is the time for learning the future profession, but during this period the factory worker is exposed to strain and fatigue, which hinder her bodily development and deprive her of educational opportunity. Desirable, therefore, would be a reduction of the working hours which should give to married women more time for their housework and family life, and to the younger unmarried women the opportunity to learn the art of home-making, because upon this the health, welfare, and prosperity of her whole family will depend." (Page 113.)

GERMANY *Schriften der Gesellschaft für Soziale Reform, Heft 7-8.* [Publications of the Social Reform Society. Nos. 7 and 8.] *Die Herabsetzung der Arbeitszeit für Frauen und die Erhöhung des Schutzalters für jugendliche Arbeiter in Fabriken.* [The Reduction of Women's Working Hours and the Raising of the Legal Working Age for Young Factory Employees.] Dr. AUGUST PIEPER and HÉLÈNE SIMON. *Jena, Fischer, 1903.*

The protection of health takes precedence over everything else. The health of women is more quickly undermined in wage-earning occupations than that of men, partly because they are less strong and resistant and partly because they are burdened with domestic as well as industrial labor — more especially when, as married women, they have to care for a family. (Page 4.)

Whether the working woman as such is less resistant to injurious conditions than the working man is immaterial. What is important to remember is that her sex doubles the claims made upon her, and it is this that undermines her vital resistance. To the physiological burdens and the overwork due to a combination of housework and industrial toil, imperfect nutrition, and deficient recreation are often to be added — she has, in short, distinctly, an average standard of living that is inferior to that of men. (Page 91.)

The reports of 1899 (Germany) upon factory work for married women gave the inspectors occasion to advocate — as they did in almost every part of the country — a progressive reduction of working hours to 10 and 9 hours, and, especially for girls under 18, to 8 hours. Their investigations amply exposed the vicious circle of destructive influences that the working-woman traverses. As a young girl, her health is early sacrificed; as a grown woman, she is driven between home duties and wage-earning. She succumbs without having been able to guide the life of her family to a prosperous development. (Page 109.)

Handbuch der Medizinischen Statistik. [Handbook of Medical Statistics.] Dr. FRIEDRICH PRINZING, *Ulm. Jena, Fischer, 1906.*

The injurious effects of factory work on married women are noticeable in many ways. Factory work is chiefly detrimental to married women because of the unreasonable demands made upon their strength by the combination of factory with housework. On social grounds the prohibition of factory work for married women is not

practicable, but much may be done to protect the health of such **GERMANY** women by legal restriction and regulation of working hours, ample rest legally secured, and special provisions for pregnancy and the period of lactation. (Page 129.)

Documents Parlementaires. Sénat. 9^e Juillet, 1891. [Proceedings of the French Senate, July 9, 1891.] *Rapport sur le travail des enfants, des filles mineures, et des femmes dans les établissements industriels.* [Report on the industrial employment of children, young girls, and women.] **FRANCE**

The woman wage-earner, gentlemen, does not always live at the mill-gates; she is therefore obliged to make a half or three-quarters' hour journey before she arrives; consequently she will leave home at half-past five in the morning, only to return at half-past eight or nine o'clock in the evening. Is that living? Under such circumstances can a woman truly care for her children and her home? (Page 581.)

La Protection Légale des Travailleurs. [Legal Protection of Working People.] *Discussions of the French Section of the International Association for Labor Legislation, 3rd Series, 1905-1906.* Paris, Alcan, 1907.

After the woman has worked the same number of hours in mill or shop that men have done, she goes home and has to do more work there. (Page 182.)

Colorado Bureau of Labor Statistics. 1887-1888.

UNITED STATES

I think ten hours a day too long for female workers. Many of them have to cook, clean, wash, and sometimes care for some sick person in their family, and also do many other things too numerous to mention, after a hard day's work. They cannot afford to have such work done for them; their pay is far too small. (Page 336.)

Report of the Maine Bureau of Industrial and Labor Statistics. 1888.

I think that if Saturday afternoons were given to the working women for recreation, the amount of good done would more than compensate for the loss of labor or money. Considering the vari-

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ous demands upon the working woman's time outside of work hours, — in caring for her room and clothes and numerous other duties, — it seems that this provision should be made for her. (A worker.) (Page 101.)

Report of the Ohio Bureau of Statistics of Labor. 1889.

Working women even more than working men suffer because of long hours of labor. Generally speaking, they work many more hours every day than men, because after the day in the workshops is ended many of them must be occupied with household cares, which men may rest. Ten hours a day to at least one-third of the working women means oftener fifteen. (Page 47.)

Report of the Illinois Factory Inspectors. 1893.

In many cases the shortening of the day has been in the morning, so that women and children who have had a long walk or ride before reaching the factory at 7 o'clock, now sleep an hour later and reach their work at 8. The mother of the family, who rises still earlier to cook the breakfast and put up the lunch, also profits by this added hour of rest. (Page 19.)

Report of the Michigan Bureau of Labor Statistics. 1899.

Where is the man who dare say regulation by law is not necessary . . . in case of public works of females? It is idle to say they are able to take care of themselves; they cannot, and while legal restrictions must not be made to hinder women from earning an honest living under suitable conditions, there is one principle which must be applied as a test of suitability in all situations — the proved tendency of their occupation under certain conditions to destroy health and unfit them for their duties as wives and mothers. And what will happen to a home when the mother is compelled to work in a factory ten hours, toiling all day, coming back after dark to her children, weary, jaded, fretful, almost desperate? Tidiness, cleanliness, and happiness are impossible. (Page 61.)

Report of the New York Bureau of Labor Statistics. 1900.

The wife's life is darkened even more by the long-hour day, especially if she also be a working woman. Even if the day be one

of only ten hours, she must arise as early as five o'clock to prepare breakfast for her husband and herself, so that they may be at their work places at seven. Beginning at that early hour her day will be a very long one. (Page 70.)

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Report of the Illinois Bureau of Labor Statistics. Part II. 1906.

Time leaving home for work and reaching home from work, ride or walk, car fare.

Table 15 shows the record obtained from those (working women) reporting as to the hours when leaving home for work and the hours reaching home after the day's work; 2535 reported as to the time leaving home for work, of this number 20.8 per cent had to leave home in the morning before 6.30 o'clock; 54.6 per cent from 6.30 to 7.00 and 24.6 per cent at 7.00 A.M. or later.

The number reporting the time arriving home from work was 2486, of this number 9.1 per cent reached home in the evening before 5.00 to 5.30; 20 per cent from 5.30 to 6.00; 49.2 per cent from 6.00 to 6.30, and 21.7 per cent 6.30 and later.

Car fare is an expense incident to the working girl, especially in larger cities, where factories and other places are liable to be located remote from residence districts. The record here shown is for 2484 women or girls, 60.7 per cent walk to and from their work; 35.4 per cent use the cars, and 3.9 per cent both ride and walk. (Page 195.)

(4) EFFECT OF WOMEN'S OVERWORK ON FUTURE GENERATIONS

When the health of women has been injured by long hours, not only is the working efficiency of the community impaired, but the deterioration is handed down to succeeding generations. The overwork of future mothers thus directly menaces the welfare of the State.

British Sessional Papers. Vol. XXI. 1833. Second Report of the . . . Commissioners for inquiring into the employment of Children in Factories, . . . and Reports by the Medical Commissioners.

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Sir David Barry's report (Scotland):

Having on one occasion given a certificate to the effect that I believed that persons occupied in factories were not more subject

to disease than those engaged in other occupations, and having, on further experience had reason to doubt the correctness of the views I then held, . . . On a similar certificate being presented to me last year, I declined to sign it. . . I believe it will be found to be the case that nearly all the wives of weavers and many of those of labourers, formerly worked in factories; and even giving the circumstances of low wages, and consequent domestic privations, their due weight, I think we have reason to fear that the descendants of those people are physically deteriorating. . . A. C. Kilgour, M.D. (Page 30.)

British Sessional Papers. Vol. XII. 1886. Report from Select Committee on Shop Hours Regulation Bill.

Witness, W. Abbotts, M.D.:

2000. Does their employment injuriously affect them as child-bearing women in after years? According to all scientific facts it would do so; it leads to pelvic diseases, and would affect them in after years when they become mothers. . . .

2007. And you, as a medical man of a considerable number of years' experience would not look to girls who have been worked so many hours in one position, standing, as the bearers of healthy, strong children? — I should not.

2008. Then it naturally follows, does it not, that this is a very serious matter in the interests of the nation as a whole, apart from the immediate injury to the person concerned? — Yes, as regards the physical condition of the future race. (Page 102.)

British Sessional Papers. Vol. XVII. 1892. Select Committee on Shop Hours Bill.

Witness, Mr. Sutherst, Barrister and author of "Disease and Death behind the Counter."

1861. You have stated . . . that the women are handicapped by their physical inequalities? — Decidedly; they are expected to become mothers, and the very long standing and overwork prevents them from rearing subsequently a healthy progeny. (Page 90.)

British Sessional Papers. Vol. XXXIX. 1893. Report of Royal Commission on Labour. GREAT
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Mr. Henry Mayers Hyndman:

8409. . . . Under present conditions, especially in the case of women, . . . the hours of work are injurious to them; it is directly injurious to them in every shape and way, and helps to enfeeble the coming generation owing to the weakness of mothers after those long periods of standing and toiling. (Page 595.)

British Sessional Papers. Vol. XXXVII. 1893. The Royal Commission on Labour: Employment of Women. Reports by Misses Orme, Collet, etc.

Dr. Edmestown adds that not only is the health of the women themselves impaired by the conditions of their work but the evil results of these are to be traced in the children of women who have been employed as shop assistants. He concludes by saying that the medical men of our large cities could furnish further evidence of the evil effects of long hours, and expresses his opinion as to the need for immediate attention to this matter. . . . Several other medical men consulted have given general testimony to the same effect, the points chiefly dwelt upon by them as objectionable being the long hours, close confinement, want of regular and sufficient time for meals, bad air, want of seats, and absence of sanitary accommodation. (Page 287.) . . . Again if we look at the children of women who have worked under the conditions mentioned, the evil effects are, if anything, more pronounced. Mothers with children from 1 to 10 or 12 years of age frequently come to us wondering why their children are so delicate. Neither of the parents nor any of their forbears are or were delicate and they cannot see why their children should be. But on inquiry it is found that the mothers worked either in shops, mills, or warehouses under conditions not suitable to sound health, and debility, slight and unnoticed, takes hold of the constitution and it is only after some years of married life that the mischief shows itself in mother and children, and as an unhealthy tree cannot bring forth healthy fruit, no more can unhealthy mothers bring forth healthy children. Lung troubles are frequently seen. The main complaints that have come before me are anæmia, muscular weakness, nervous

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prostitution, and uterine, stomach, and intestinal troubles. These complaints, which are very common and most damaging to the system, are interdependent and traceable to the few causes before mentioned. (Page 318.)

British Sessional Papers. Vol. VI. 1901. Report from the Select Committee of the House of Lords on Early Closing of Shops.

Witness, Sir W. MacCormac, President of the Royal College of Surgeons:

2467. And you can hardly expect that women who have been suffering from such long hours should become the mothers of healthy children? That is what I ventured to hint. It must have an influence on their offspring undoubtedly.

2468. . . . It is gradual and progressive in its effect, and it goes on, I am afraid, in a cumulative degree.

2469. You mean that from generation to generation the population will become feebler and feebler, and less able to resist disease? It must suffer from the influence of it, no doubt. (Page 120.)

British Sessional Papers. Vol. XXXII. 1904. Report of the Inter-Departmental Committee on Physical Deterioration. Vols. I, II, III.

Committee report:

251. A very general agreement was expressed that the factory employment of mothers had a bad effect on the offspring, both direct and indirect.

253. The three ladies quoted by Miss Anderson (Principal Lady Inspector of Factories) were unanimous as to the stress and strain involved in the "employment of women from girlhood, all through married life, and through child-bearing." (Vol. I, page 47.)

Ibid. Memorandum on Employment of Mothers in Factories and Workshops. By Miss A. M. ANDERSON, H. M. Principal Lady Inspector of Factories.

30. As to the general effect of these conditions on the health of the women and their children, Miss Squire for Lancashire, and Miss Paterson for Dundee report similarly:

"That it is the employment of women from childhood, all through married life, and through child-bearing, that impresses itself upon the mind . . . that it is useless for medical men and others not familiar with the conditions of mill life there to pronounce any opinion on the effect of factory work upon the mother and infant; they have no conception of the stress and strain and of the general conditions of life and work in these mills. (Vol. I, page 124.)

Miss Paterson expressly points to cases showing that it is the stress and strain of the work, and the necessity of maintaining a high standard, coupled with decreasing physical capacity of the child-bearing woman under such conditions that generally determine the moment when the manager in a jute mill sends her home. . . . Sometimes a neighbor will take her place in the mill of the woman who has been sent home on account of her physical inability to maintain her output, in return for her taking charge of that neighbour's children for a small sum. (Vol. I, page 124.)

. . . Great harm is done and suffering occasioned to the women by their remaining at work too long before confinement, as well as by their returning too soon after it. . . . Two of the doctors with whom Miss Squire conferred in Preston attributed the large number of premature births to continued work in the mill during pregnancy and all considered that an exceptional number of cases of uterine trouble existed and was attributable to too early return to work. (Vol. I, page 124.)

Dr. W. Leslie Mackenzie, M.A., M.D., M.R.C.P.E., Medical Inspector to the Local Government Board for Scotland:

6749. If the mother suffers from insufficient food or from exhaustion or over-work, or disease, the result is that disease is shown in the child?— That is my opinion. . . .

6752. And precautions should be taken that she should not suffer from overwork during the period of child-bearing?— Yes; before and after child-bearing. (Vol. II, page 266.)

6897. Now, in your memorandum, I note this passage. You say, "If inherited characters are to mature, therefore, the mother must remain (a) capable of maintaining her own physical equilibrium, (b) capable of giving her excess of nourishment to the embryo. If she fails in (a) or (b) the embryo either dies or suffers in rate of growth, or in ultimate size." Well, then, I suppose, from that we should draw the conclusion that in your opinion

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the child of a slum mother would be born defective in growth? — It may be so.

6899. And the same with the factory worker? — Yes, I think so. (Vol. II, page 272.)

The Factory System. WILLIAM DODD. London, John Murray, 1842.

Of the evil tendency of factory life on women and children, Mr. Greg speaks thus:

The fourth cause of ill-health, which prevails among the manufacturing population may be traced to the injurious influence which the weakened and vitiated constitution of women has upon their children.

They are often employed in factories some years after their marriage, and during their pregnancy, and up to the very period of their confinement, which all who have attended to the physiology of this subject know must send their offspring into the world with a debilitated and unhealthy frame, which the circumstances of their infancy are ill-calculated to renovate. Hence, when these children begin to work themselves, they are prepared at once to succumb to the evil influences by which they are surrounded. (Page 139-40.)

Infant Mortality: A Social Problem. GEO. NEWMAN, M.D., F.R.S.E., Med. Officer of Health, Metropolitan Borough Finsbury. London, Methuen, 1906.

Physical fatigue, particularly if accompanied by a strain and stress, are likely to exert a decided effect in the production of premature birth, particularly if these conditions are accompanied by long hours of work and poor or insufficient nourishment. (Page 80.)

The direct injuries to women and girls employed in factories and workshops are: (c) Injury through fatigue and strain, long hours and insufficient periods of rest for food, . . . and (e) Too short a period of rest at the time of childbirth.

Over and over again, in the official reports of factory inspectors or medical officers of health, does one meet with evidences of these injuries. Where the conditions resulting in these evils, coupled

with the absence of the mother from home, are present, the infant mortality is high; where they are not present, it is usually low. (Page 131.)

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In consequence of the fact that while there has been a steady and continuous decline in the general mortality of Preston during the past thirty years, the infant mortality has shown an increase, a sub-committee was appointed to inquire into the causes (1902), and submitted certain conclusions:

(1) First among these causes is the employment of female labor in mills. An occupation requiring a woman to stand during the greater part of the day when continued up to within a few days or even hours of the time of parturition, must act to the detriment of the offspring, and there is less chance of the latter coming into the world fully grown, well formed, and in good health. Many deaths taking place during the first month, which are returned as due to premature birth, immaturity, congenital debility, convulsions, and the like, may safely be ascribed to this cause.

In a general way it may be said that it is the employment of women from girlhood all through married life and through the period of child-bearing, the continual stress and strain of the work and hours, and general conditions prevailing in women's labor, that is exerting its baneful influence on the individual and on the home. (Page 134.)

Verhandlungen des Deutschen Reichstags, 101. Sitzung, 16. April, 1891. [Proceedings of the German Reichstag, 101st Session, April 16, 1891.]

GERMANY

Representative Ulrich:

All the reasons that can be offered in support of a shortened work day in general, hold with double force in favor of shortening the working time of women. For the danger of degeneration of the race is actually greater on the mother's than on the father's side. . . . On the one hand excessive work breaks down the woman personally, on the other hand, through her break-down, it destroys the home. For this reason chiefly the dark side of female labor is extraordinarily more significant than is usually realized. (Page 2410.)

GERMANY *Die Arbeitszeit der Fabrikarbeiterinnen. Nach Berichten der Gewerbeaufsichtsbeamten bearbeitet im Reichsamt des Innern. [The Working Hours of Women in Factories. From the Reports of the German Factory Inspectors. Compiled in the Imperial Home Office.] Berlin, Decker, 1905.*

The reports from Marseburg, Erfurt, Breslau, Hanover, Wurtemberg, and Offenbach dwell upon the dependence of future generations — their total efficiency and value — upon the protection of working women and girls. (Page 111.)

The report for Würtemberg says, in regard to the injurious effect of factory work: "The children of such mothers — according to the unanimous testimony of nurses, physicians, and others who were interrogated on this important subject — are mostly pale and weakly; when these in turn, as usually happens, must enter upon factory work immediately upon leaving school, to contribute to the support of the family, it is impossible for a sound, sturdy, enduring race to develop." (Page 113.)

Handbuch der Hygiene. Bd. 8¹. [Handbook of Hygiene. Vol. 8¹.] Edited by Dr. THEODORE WEYL. Allgemeine Gewerbehygiene und Fabrikgesetzgebung. [General Industrial Hygiene and Factory Legislation.] Dr. EMIL ROTH. Jena, 1894.

Women bear the following generation whose health is essentially influenced by that of the mothers, and the State has a vital interest in securing for itself future generations capable of living and maintaining it. (Page 84.)

Le Travail de Nuit des Femmes dans l'Industrie. Rapports sur son importance et sa réglementation légale. Préface par Prof. ETIENNE BAUER. [The Nightwork of Women in Industry. Reports on its importance and legal regulation.] Interdiction du travail de nuit des femmes en Allemagne. [Prohibition of nightwork for women in Germany.] Dr. MAX HIRSCH. Jena, Fischer, 1903.

The influence of improper factory labor . . . on future generations is exerted both before and after child birth. Great importance is attached to the general effect of labor on the sexual organs, even on the general health of the female worker, and that at a

very early period. A woman with an enfeebled and emaciated body, . . . is, according to experience, less capable, or even absolutely incapable of producing healthy and robust offspring. The ailments of both a special and a general sort, due to unsuitable work, weigh heavily and in advance of birth, in many cases, on the descendants. Aside from the fact that female factory workers are frequently deprived of children, as a result of complete sterility or frequent abortions or still births, the surviving infants suffer much of the time from feebleness and sicknesses of all kinds, so that they bear with them from the cradle the causes of premature death, to which must be added the effective evils and dangers of a durable character which are manifested during the period of lactation and up to the last period of infant life. (Page 26.)

A very considerable number of reports indicate as a cause of the excessive mortality of suckling infants, besides insufficient nourishment, the insufficient care given to them, since the mother is prevented by work at the factory from devoting herself sufficiently to her children when they are in good health, and even when they are sick. . . . It is indeed sad for innumerable women to be injured in health, in vitality, and robbed of the full pleasure of living, through the conditions of industrial labor: but the crime of society takes on huge proportions when, for the love of additional gain, very often extremely small, the flower of the new generation is crushed and blighted.

But if such are the effects of normal work by women during the day, they are very much worse in the case of the prolongation of the hours of work, above all when the work continues late in the evening and into the night. Not only that the fatigue and exhaustion of the mother increases in a progressive ratio with each additional hour, but also that she is kept from exercising her motherhood precisely at the time when her care is most indispensable to her little ones. (Pages 27-28.)

Revue d'Hygiène et de Police Sanitaire. T. XVIII. 1896.

FRANCE

All the world knows well that there is much to do, and that, if our legislation has already bettered conditions, new ameliorations are desirable, but they will come, I think, only through the pressure of public opinion, . . . which will become exacting . . . when doctors have made clear the utility of a protection which regards not only the woman, but, secondarily, the child to be born by her; when it

FRANCE knows better that to protect the mother is an absolute necessity for the future of the race. (Page 193.)

ITALY *Proceedings of the 1st International Convention on Industrial Diseases. Milan, 1906. Frenastenia e delinquenza in rapporto a taluni ordinamenti del lavoro. [Imbecility and Criminality in relation to certain forms of labor.] Prof. CRISAFULLI.*

A great number of born deficient are the offspring of mothers worn out by work from girlhood; work not alone precocious but also over-fatiguing and unhealthful; and these mothers were tortured by toil even during the period of their pregnancy. The ailments of the pregnant woman which react painfully upon the fœtus, the hardships of childbirth, the sicknesses of infancy, etc., can easily be traced, among certain classes of workers; in the majority of cases they are recognized as direct and essential causes of imbecility; arrested or deficient mental development, at least in great measure, can also be traced to such causes. (Page 146.)

. . . On the other hand, over-fatigue often generates hereditary weakness, both physical and moral, by reason of which many unfortunates never attain their full development, and, in course of time they commit essentially instinctive acts that, if not absolutely criminal, are certainly irrational. (Page 149.)

UNITED STATES

Evidence submitted to the Massachusetts Legislature in favor of the enactment of a Ten-Hour Law. Lawrence, 1870.

I have no hesitation in saying that I am fully satisfied that the long hours of confinement in the atmosphere of the mills is very injurious to health, and of such an enervating nature, as to operate very unfavorably upon the offspring — for of course if the parents are feeble, the offspring must inevitably be of a feeble and sickly nature. (Page 8.) John B. Whitaker, M.D.

Report of the Massachusetts Bureau of Statistics of Labor. 1870.

It debilitates them, and makes them unfit for the reproduction of their kind. Young women, as a general rule, do not make good housekeepers when brought up in a cotton mill, not having opportunity enough to initiate themselves into such duties on account of the long hour system. (Pages 312-313.) Employee.

*Report of the Maryland Bureau of Industrial Statistics. 1896.*UNITED
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Once inside the walls of the factory a weary day's work of ten hours' duration is begun, with an intermission for lunch at noon. . . .

When the day's work is at last over, the wearied crowd trooping from their place of employment hasten in all directions to their homes, which in many instances are in the extreme suburbs of the city. Once home, they swallow a hasty supper and soon retire to a needed and deserved rest, with no pleasant anticipations for the morrow.

What lives are these for future wives and mothers? Future generations will answer. (Page 52.)

Report of the Michigan Bureau of Labor. 1908.

It is a matter of common knowledge that the consequences to the citizenship of the state, both at the time and in the future, are more grave if women work in the wrong trades, or too many hours or under improper conditions. First, it injures the women themselves, and our chivalry revolts at it; second, it injures the mothers of our citizens, so that infants are born to die young, or grow into men weak and sickly — which is bad for the state as well as themselves; third, it injures the homes which mothers absent at work cannot make, and ignorant, sick or exhausted mothers cannot make well — cannot make so well that the boys and girls who grow up in them will be trained to be honest and industrious and intelligent. . . . We shall begin to see that . . . for the injury to the women, the mothers, the homes, and the rising generation, there must be special laws for the conditions under which women work. (Page 337.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics. 1907-1908. Part VII. Women Workers in Milwaukee Tanneries. By IRENE OSGOOD, Special Agent.

The effect upon the home and upon society of the woman who has been forced to run the gauntlet of industrial or occupational diseases, has never been measured. Her lack of knowledge of domestic affairs consequent upon her former enforced freedom from household cares, and her ignorance concerning the welfare

of children, must necessarily make for domestic unhappiness, and for another race of children poorly prepared to meet the hardships of working class life. (Page 1061.)

Journal of Political Economy. Vol. XIV. 1906. Legislative Control of Women's Work. By S. P. BRECKINRIDGE.

The assumption of control over the conditions under which industrial women are employed is one of the most significant features of recent legislative policy. In many of the advanced industrial communities the State not only undertakes to prescribe a minimum of decency, safety, and healthfulness, below which its wage-earners may not be asked to go, but takes cognizance in several ways of sex differences and sex relationships. . . . In the third place, the State sometimes takes cognizance of the peculiarly close relationship which exists between the health of its women citizens and the physical vigor of future generations. . . . It has been declared a matter of public concern that no group of its women workers should be allowed to unfit themselves by excessive hours of work, by standing, or other physical strain, for the burden of motherhood which each of them should be able to assume. (Page 107.)

The object of such control is the protection of the physical well-being of the community by setting a limit to the exploitation of the improvident, unworkmanlike, unorganized women who are yet the mothers, actual or prospective, of the coming generation. (Pages 108, 109.)

(5) INFANT MORTALITY

Experience and medical observation show that overwork before as well as after marriage has a disastrous effect upon childbirth. The death rate is high among children of women who have overworked during girlhood as well as among children of working mothers.

Overwork during pregnancy and too soon after childbirth, together with the inevitable neglect of infants by mothers who are kept away from home by overlong working hours, are further contributing causes to a high infant mortality.

Besides their high death rate at birth and during the first years of infancy, the children of exhausted workers are below the normal in size and weight.

British Sessional Papers. Vol. XIX. 1873. Reports of the Inspectors of Factories for the Half-year ending 31st October, 1872. GREAT
BRITAIN

Mr. R. H. Leach, certifying surgeon for upwards of thirty years, says:

Shorten their hours of labor, for I believe that scores of infants are annually lost under the present system. As things now stand, a mother leaves her infant (say of two months old) at 6 A. M., often asleep in bed, at 8 she nurses it, then until 12.30 the child is bottle fed, or stuffed with indigestible food. On her return at noon, overheated and exhausted, her milk is unfit for the child's nourishment, and this state of things is again repeated until 6 P. M.; the consequence is, that the child suffers from spasmodic diarrhœa, often complicated with convulsions and ending in death. (Page 56.)

British Sessional Papers. Vol. LV. 1873. Report to the Local Government Board on Proposed Changes in Hours and Ages of Employment in Textile Factories. By J. H. BRIDGES, M.D., and T. HOLMES.

Experience afforded by residence in the worsted manufacturing town of Bradford, and extensive practise among its population during periods of from one to thirty-five years:

Q. Has the labor any tendency to increase the rate of infant mortality?

A. Yes. The evils occurring in women . . . indirectly affect the more perfect growth of the child in utero, and dispose it when born more easily to become diseased.

Signed on behalf of the Bradford Medico Chirurgical Society, at a meeting held February 4, 1873.

Sub-Committee.

President, J. H. BELL, M.D.

P. E. MIALL, M.R.C.S.

Secretary, DAVID GOYDER, M.D.

(Pages 39, 40.)

British Sessional Papers. Vol. XXXII. 1904. Report of the Inter-Departmental Committee on Physical Deterioration. Vols. I, II, III. 1904.

English Mortality among Infants under One Year of Age. Prepared under Dr. Tatham's direction, from the Official Returns in the General Register Office.

. . . In the years 1873-77 the rates in the urban countries were higher than those in the rural by 26 per cent among male and by 29 per cent among female children, while in the years 1898-1902 the differences had increased to 30 per cent and 34 per cent respectively. . . .

Taking together diarrhœal diseases and diseases of the stomach and liver, the recent five years show an increase of more than 70 per cent in the urban and of nearly 70 per cent in the rural countries.

. . . The increased mortality from diarrhœal diseases is probably attributable in great part to the prevalence of artificial infant feeding, and this view appears to be consistent with the fact that the increase has been greater in the urban than in the rural countries. (Vol. I, page 130.)

Anthropometric Report of the Committee of the British Association of 1883.

It would appear, therefore, that the physical (and most probably the mental) proportions of a race, and their uniformity within certain limits are largely dependent upon the size of the female pelvis, which acts as a gauge as it were of the race, and eliminates the largest infants, especially those with large heads (and presumably more brains) by preventing their survival at birth. . . .

. . . Note. It is probably in this direction that we must look for an explanation of the degenerative influences of . . . sedentary occupations, as they . . . favour the production of . . . imperfectly developed bodies of women. (Vol. II, page 98.)

Transactions of the National Association for the Promotion of Social Science. Vol. 26. 1892. Infant Mortality. THOMAS M. DOLAN, F.R.C.S. London.

We can produce statistics which prove that the death rate of infants, the offspring of women who are engaged as operatives, is

so high as to require some special explanation to account for it; and still more we can furnish evidence which seems to connect this high death rate with the employment of women in factories. . . . I . . . asked several practitioners . . . who attended a large number of operatives, "Could you fix the annual number of infantile deaths during the last five years attributable in your opinion to the employment of the mothers in factories before or too soon after labour?" Five replied fixing the mortality at 15 to 20 per annum, two were of opinion that 20 per cent of infantile deaths should be assigned to this cause. . . . Since 1872 I have . . . attended over 2800 cases of midwifery among that class. My increased experience convinces me of the correctness of my views. (Page 358.)

In further confirmation of them it is singular how unanimous all medical officers of health are in assigning the employment of women in factories as a cause of infant mortality.

. . . Dr. Harris Butterfield, Medical Officer of Health for Bradford . . . comments on the excessive mortality of infants in our large towns. This mortality he attributes in great measure to the too early weaning of infants by mothers employed in factories. . . .

Dr. Dudley, Medical Officer of Health, Staleybridge . . . calls the attention of the authorities to the excessive infant mortality to the district. This he attributes to the same causes. . . .

M. Jean Dolphus, one of the largest manufacturers in Alsatia, found that the women employed in his factory lost 40 per cent of their children in the first year, the average mortality at that age being there 18. (Pages 358-363.)

Infant Mortality. A Social Problem. GEORGE NEWMAN, M.D., F.R.S.E., *Medical Officer of Metropolitan Borough Finsbury.* London, Methuen, 1906.

A nation grows out of its children, and if its children die in infancy, it means that the sources of a nation's population are being sapped, and further that the conditions that kill such a large proportion of infants injure many of those which survive. Last year, 1905, there was a loss to the nation of 120,000 dead infants, in England and Wales alone, a figure which is almost exactly one quarter of all the deaths in England and Wales in that year. (Page 2.)

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And this enormous sacrifice of human life is being repeated year by year and is not growing less. (Page 7.)

Nor is England alone. . . . The birth rate is declining in civilized nations with few exceptions; and the same may be said of the death rate. But the infant mortality rate, as a rule, is stationary or even increasing.

There are two features, however, which appear to be common to the high infant mortality districts, namely, a high density of population and a considerable degree of manufacturing industry. (Page 26.)

SWITZER-
LAND

Le Travail de Nuit des Femmes dans l'Industrie. Rapports sur son importance et sa réglementation légale. Préface par ETIENNE BAUER. [Nightwork of Women in Industry. Its importance and legal regulation. Preface by ETIENNE BAUER.] Jena, Fischer, 1903.

Moreover and above all we observe in all countries where woman is protected a lessening of female and also of infant mortality. In England the convincing argument drawn from this fact has often been cited. There among 100 new-born the proportion of infants dying in the first year of their existence was 15 per cent from 1873 to 1875 in England and Wales and 12.8 per cent in Scotland; by contrast, the percentages were respectively only 14.6 and 12.2 from 1884 to 1893. From 1873 to 1875 the percentage rose to 16.75 in seven great centres of industry. In Switzerland there was noted a similar reduction in infant mortality, which averaged from 1871 to 1880, 19.3 per cent, and from 1881 to 1890, only 16.5 per cent. . . . (Pages xxxvii, xxxviii.)

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Annalen des Deutschen Reichs, Bd. 21, 1888. [Records of the German Empire, Vol. 21, 1888.] Der internationale Schutz der Arbeiter. [International Labor Legislation.] Dr. GEORGE ADLER, University of Freiburg. Berlin, 1888.

The worst physiological effects of factory work for women were shown by the increased number of still-births. In the district of Mülhausen, between 1875-79, not less than 58 still-born infants to 1000 births were reported, whilst in country regions the proportion was only 30-40 per 1000.

The death rate of infants in their first year also increased

startlingly as a result of industrial toil for women. Thus for **GERMANY** Mülhausen and its district, between 1873-82, infant mortality was, on an average, 240 to 1000 infants born living. Naturally also, this region furnished a smaller quota of military recruits than the numbers of its population should have warranted. (Page 470.)

Verhandlungen des Deutschen Reichstags, 101. Sitzung, 16. April, 1891. [Proceedings of the German Reichstag, 101st Session.]

Representative Bebel:

The effect of the excessive industrial labor of women upon the death rate of infants is shown by some statistics of Saxony, which comprise the period from 1880 to 1885, and show the death rate of children in their first year in the industrial towns and districts. The mortality of infants under a year old in the cities of the whole empire averaged 28.5 per cent, while in those cities of pre-eminently manufacturing importance, it rose from 36 to 45 per cent, and in those where women were employed in the highest numbers, as in the vicinity of Chemnitz, it rose from 40 to over 50 per cent. (Page 2420.)

Zeitschrift der Soziale Wissenschaft, Bd. VIII, Nr. 10, 1905. Die Fruchtbarkeit selbst arbeitender und den arbeitenden Ständen angehöriger Frauen. [The fertility of women of the working classes and of those personally engaged in industry.]

This subject has been investigated by Prof. Ugo Broggi, who, in an article in the *Zeitschrift für Versicherungswissenschaft* (1 July, 1905) states that of 172,365 Italian women between the ages of 15 and 54 years who were employed in industrial occupations the average child-bearing co-efficient was only 45 per cent, or about one-third of the general fertility of Italian women (120 per cent). The investigation, in detail, included 7029 working women in chemical industries and collieries. The average fertility was 46 per cent. 1595 women in food factories showed an average fertility of 39 per cent; 134,770 women in the textile trades, 39 per cent; and 28,971 in varied industries such as paper, wood, clothing, tobacco factories, etc., 73 per cent. Thus, throughout, a lower fertility than the normal. One exception only

GERMANY was noted, in the women employed by the state in the state tobacco manufactories, who, with a fertility of 104 per cent came nearest in their child-bearing capacity to the average of the entire female population. (Pages 663-664.)

BELGIUM *Royaume de Belgique. Commission du Travail Institutée par Arrêté Royal du 15 Avril, 1886. Réponses au Questionnaire Concernant le Travail Industriel. T. I. [Belgian Royal Labor Commission. Queries and Answers on Industrial Labor. Vol. I.] Brussels, Lesigne, 1887.*

Answers: 101. There are tasks which women could perform without any detriment to their health if only working time was shorter and workplaces more sanitary. . . .

The number of still-born infants recorded at Verviers is a justification and proof of our reasons in demanding that women's work should be restricted wherever it is detrimental to their health and physical strength. (Page 15.) (Group of Workers of Verviers.)

Royaume de Belgique. Conseil Supérieur du Travail, T. I, 1904. [Belgian Higher Council of Labor. Vol. I.] Réglementation du Travail des Femmes, des Adolescents et des Enfants. [Regulation of the Labor of Women, Young Persons, and Children.] Brussels, 1904.

Letter from the Committee of Socialist workmen:

The terrible consequences of the exaggerated hours of work have been sufficiently demonstrated by the governmental figures on infant mortality. (62 per cent dead to 38 per cent living infants among the linen workers.) (Page 46.)

FRANCE *Fourteenth International Congress of Hygiene and Demography, in Berlin. 1907. Vol. II. Sec. IV. Ermüdung durch Beruf-sarbeit. [Overwork as a result of occupation.] Dr. IMBERT, University of Montpellier. Berlin, Hirschwald, 1908.*

Pinard and his pupils have shown that the period of gestation is of shorter duration in working classes than it is in well-to-do classes.

Again, the average weight of infants at birth is inferior accordingly as the mother has labored up to the time of delivery or when her work has been very hard. (Page 641.)

Report of the New York Bureau of Statistics of Labor. 1890.

In his report to the federal government of Switzerland, dated Berne, 1889, Dr. Decurtins, states that in the few years since a law was passed in his country forbidding the employment of women for six weeks after their confinement, the mortality of children, including the still-born, decreased from twenty-nine per cent to five per cent. The same decrease was observed in Mülhausen, the great manufacturing city of Alsace, where, owing to the efforts of some philanthropic employers, a general voluntary observance of similar rules prevails, and adequate provision is made for the care of the mother during her absence from the factory. But Dr. Decurtius makes, furthermore, the important statement that, while the mortality of such children is not sensibly greater than that of the children of artisans and farm laborers, so long as the mothers are thus kept from factory work and taken care of, it immediately increases as soon as they return to work. (Pages 81, 82.)

According to Dr. Otto Pringsheim, while the average mortality of children in the Netherlands is 18.88 per cent, it is twenty-one, thirty and thirty-three per cent in the manufacturing cities of Maestricht, Eindhoven and Gonda, respectively. This higher rate in the cities named he attributes, emphatically, to the hard labor of female workers and the dissolution of family life by the factory system. (Page 82.)

Bulletin of the United States Bureau of Labor. No. 80. January, 1909. Woman and Child Wage-Earners in Great Britain.

VICTOR S. CLARK, Ph.D.

The Dundee investigations suggest, though sufficient statistics were not obtained to confirm the point, that the employment of women in factories before childbirth may cause their children to be of light weight; and the deaths due to a number of causes attributable to the general condition of prematurity are probably larger than the average among the infants of this class of workers.

The relation of the factory employment of women to infant mortality seems well established, though there must be other important factors in the problem. In Bradford the mortality of children under 1 year is 160 per 1000 among working mothers, as compared with 40.8 per 1000 among those of mothers who are not working. (Page 77.)

The higher death rate of infants whose mothers are employed in industrial work may be ascribed broadly to two general causes, (1) prenatal conditions and (2) neglect after birth. Where mothers work unfavorable prenatal conditions are nearly constant from year to year, but neglect after birth causes deaths to fluctuate accordingly as the season is more or less favorable for the survival of infants receiving improper care. In Dundee the deaths within a week of birth are very large, and those due to "immaturity" are more frequent than in cities where fewer mothers work. "It is impossible to apportion the cases of immaturity to definite causes, but it may be broadly stated that premature birth and other causes of death classified with it under the head of immaturity are due to congenital weakness in the infant, and this congenital weakness it is usual to attribute to prenatal causes." One of the leading English experts reports: "The effects of poverty and hard work while the child is being formed in the womb do undoubtedly have the effect of producing weakly children, who either grow up weakly or die."

The first phase of material neglect, after the child is born, forced upon the mother by the necessity of working in a factory, is the cessation of breast feeding. And the relative mortality of infants not fed at the breast appears to be higher in case of women engaged in industrial work, even in their homes, than in case of other mothers. (Pages 78, 79.)

Yet even the most enthusiastic social reformers do not call for amendments to the law to prevent women — or even to prevent mothers — from working in factories. This employment is recognized as an economic necessity for the working people at present. It is a condition that it would be far better for a country never to reach — even at the expense of less wealth and so-called industrial progress — but once incurred it can not be remedied abruptly. However, amendments forbidding the employment of mothers immediately before and for two or three months after childbirth, combined if necessary with temporary pensions to working mothers, to carry them over this critical period, are advocated by men who would not be called extremists. Meanwhile the municipal authorities, through their lady health visitors and private associations, are doing something to meet the worst evils arising from these causes. (Page 81.)

(6) RACE DEGENERATION

Deterioration of any large portion of the population inevitably lowers the entire community, physically, mentally, and morally. In communities where excessive working hours have long prevailed, one generation after another has suffered from overwork, inherited weakness, and the loss of all family decencies, until actual race degeneration has resulted. Progressive decline in stature, strength, and efficiency becomes markedly evident. This is conspicuously shown by the large percentage of persons necessarily excluded from military service for physical unfitness.

Hansard's Parliamentary Debates. Vol. 73. 1844.

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Lord Ashley:

By the system we permit, the laws of nature are absolutely outraged, but not with impunity. The slow but certain penalty is exacted in the physical degradation of the human race, including, as it does, the ruin of the body, and the still more fatal corruption of the moral part. (Page 1086.)

Mr. M. Geachy:

On one Member of the Government, at last a Ten Hours' Bill has an hereditary claim. Five-and-twenty years ago the first Sir Robert Peel said before a Committee of the House of Commons in speaking of a Ten Hours' Bill:

"Such an unlimited and indiscriminate employment of the poor consisting of a great proportion of the inhabitants of the trading districts, will be attended with effects to the rising generation, so ruinous and alarming, that I cannot contemplate them without dismay, and thus the great effort of British ingenuity, whereby the machinery of our manufactures has been brought to such perfection, instead of being a blessing to the nation, will be converted into the bitterest curse." (Page 1217.)

Mr. C. Buller:

In Wiltshire the average duration of life was 33 years, in Manchester it was only 17. . . . Now, it could not be doubted that the evils of this physical condition were calculated to grow worse in

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every succeeding generation. A people whose life was reduced to one half of the usual average of the labouring class by no accident, no sudden disaster, no chance epidemic, but by the constant action of circumstances unfavorable to health and longevity, were not likely to propagate a vigorous and healthy race. He thought that no legislature could view with indifference a state of things that thus shortened human life, and tended to deteriorate the species. (Page 1435.)

Hansard's Parliamentary Debates. Vol. 74. 1844.

Viscount Howick:

. . . And of all the points on which such regulations are required there is none which appears to me to be more pressing than that of restricting to a reasonable time the hours of labour of women and children. . . . I believe that looking to the future welfare of the labouring classes, it is most important that we should take measures to prevent excessive competition from driving females and young persons into the performance of an amount of labour which is utterly inconsistent with the due discharge of their domestic duties, with the maintenance of health, and with education. Our interference . . . is most urgently required; and I am persuaded that if we would avoid some fearful catastrophe which sooner or later will overtake us if we persevere in our present course of passive helplessness, we must resolve to deal much more boldly and much more decisively than we have hitherto thought of doing with the evils of our actual social state. (Page 648.)

Sir R. Peel:

Mr. John Moor, surgeon, stated, unless something was done to improve the condition of the factory workers, the rising generations in the manufacturing districts would be debilitated more than the present, and so generation would go on until the human species would be everything but extinguished. As a medical man of 40 years' standing in the town of Bolton, he had no hesitation in making this declaration. The ravages which, in his capacity of surgeon, he had witnessed from scrofula and other diseases, consequent upon confinement to the mills, had been so disastrous that he did not hesitate to say that if the system of confinement in mills for so long a period each day was continued much longer, there would be but few engaged in factory labour who would escape

deformity. In many cases which came under his own knowledge, inflammation of the feet and legs ensued, which had to be followed by amputation. From these and many other considerations, he was decidedly of opinion that 10 hours' labour in factories was even more than could be endured without injury to the human constitution. (Page 679.)

One other of his (Lord Ashley's) statements . . . had been called in question. He had made it on the authority of a medical man in Lancashire, that long protracted labour had a most injurious effect, especially in cases of pregnancy, that varicose veins had formed and bursting, ended in death. (Page 679.)

Hansard's Parliamentary Debates. Vol. 73. 1844.

Bishop of London:

The evils of the present system, . . . the debility of frame, the shattered strength, the exhausted spirit, the early death. . . . It was proved that the exhaustless process of factory labour did tend to shorten life in the manufacturing districts. . . . The average duration of life of the factory operative was somewhat less than one half that of other operatives in the same districts. . . . The evils which were now sought to be remedied were of the most serious kind; they were nothing less than the physical deterioration and moral degradation of a large portion of the most helpless classes of the community. Unless there were some improvement in the moral condition of those classes, the country would be thrown into a situation of the greatest danger. . . . He saw great danger in turning a deaf ear to the petitions of so large a portion of their fellow-creatures . . . praying for a more enlarged relaxation of the incessant and wearisome toil of the factory labourers, which was injurious and hurtful, not only to them, but to their children, who were to form the future manufacturing population of this country. (Pages 925-931.)

British Sessional Papers. Vol. XV. 1870. Reports of Inspectors of Factories.

This condition of the factory population has . . . been brought under my notice by one of my certifying surgeons. . . . Dr. Ferguson writes thus:

"Within my short experience . . . I see a marked degeneration

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in the height and general development of children presented for examination, especially in those of 18 years and upwards, and have had to reject during the last 2 years more than 200, because those coming to pass had not more than the average strength and appearance of 11 years. I attribute this degeneration mainly to the intemperate and improvident habits which prevail extensively amongst the parents. Boys of 15 and 16 years old come before me almost every week, not having more than the average height and development of 13 years, their lips pale and the muscles flabby. I fear drunkenness is on the increase among factory hands, especially among the women." . . . (Pages 156, 157.)

British Sessional Papers. Vol. XVI. 1875. Reports of Inspectors of Factories. For half-year ending 30th April, 1875.

It was during this period that the factory hand became changed from the healthy labourer to the weakly, anæmic, and frequently decrepit operative. Doubtless, from the cost of the introduction of steam, and the desire to run the machinery as long as possible, the factory hands did degenerate from the sturdy labourer and operative in the valleys and on the hill sides of Lancashire and Yorkshire to the wasted and down-trodden operative of the purely manufacturing town, working daily and all day long, and possibly part of the night also, in a close, hot, ill-ventilated factory, returning from work to a dwelling more unhealthy than the factory, until the factory population appeared to have become a distinct race, that was known at a glance, so defined had the effects of overwork and unhealthy dwellings become upon the physical appearance and condition of the people. (Page 23.)

British Sessional Papers. Vol. XVI. 1876. Reports of Inspectors of Factories. For half year ending 31st Oct., 1875.

Testimony of certifying surgeon:

No doubt height is not so much affected as physique, although contrasted with an agricultural population, height is perceptibly less in the factory population. The physical strength and appearance suffer much in factories from confined heated atmospheres, loaded with fine cotton fibres, fine flinty sand, and cutaneous exhalations. The number of gaslights, each light destroying oxygen equal to one man, and transitions from the mills and their tempera-

tures to their dwellings. Diet and drinks adapted to a heated employment and stimulants to sooth an excited nervous tension. In short the skin secretes the quantity of an Indian climate. Vision is always on the move. Perception and volition, from the nature of their work, always in action. The weight of liquid thrown off from the skin is compensated by drinks of tea, coffee, and water. The very tension caused by their work is best allayed after hours of labour by resources always at hand. But unfortunately, drink stimulants and mental excitement are resorted to, and want, improvidence, the poorest houses, and bad food tell against healthy offspring. (Page 103.)

Transactions of the National Association for the Promotion of Social Science. Vol. I. The Early Closing Movement. JOHN LILWALL. London, John Parker, 1858.

Mr. Stevens, of St. Luke's Lunatic Asylum, observes: It may be stated with great confidence that a prolific cause for the rapid and extensive increase of insanity in this country is to be found in the unceasing toil and anxiety to which the working classes are subjected. This cause developing the disease in the existing generation, or what is quite as frequently the case, transmitting to the offspring idiocy, insanity, or some imperfectly developed sensorium or nervous system. The agitated, over-worked, and harassed parent is not in a condition to transmit a healthy brain to his child. (Pages 554-555.)

A Shorter Working Day. R. A. HADFIELD and H. DE B. GIBBINS. London, Methuen, 1892.

Those who have studied the history of the Factory Acts are simply aghast at the fearful conditions of labor therein disclosed and at the same time amazed at the endurance of which the workers of that day were capable. The penalty has been paid by their descendants, as those who live in the factory districts can testify. (Page 88.)

The Case for the Factory Acts. Edited by Mrs. SIDNEY WEBB. London, Richard, 1901.

It may be enough for the individual employer if his workpeople remain alive during the period for which he hires them. But for

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the continued efficiency of the nation's industry, it is indispensable that its citizens should not merely continue to exist for a few months or years, but should be well brought up as children, and maintained for their full normal life unimpaired in health, strength, and character. The human beings of a community form as truly a portion of its working capital as its land, its machinery, or its cattle. If the employers in a particular trade are able to take such advantage of the necessities of their workpeople as to hire them for wages actually insufficient to provide enough food, clothing, and shelter to maintain them and their children in health; if they are able to work them for hours so long as to deprive them of adequate rest and recreation; or if they subject them to conditions so dangerous or insanitary as positively to shorten their lives, that trade is clearly using up and destroying a part of the nation's working capital. (Pages 20-21.)

. . . Industries yielding only a bare minimum of momentary subsistence are therefore not really self-supporting. In deteriorating the physique, intelligence, and character of their operatives, they are drawing on the capital stock of the nation. And even if the using up is not actually so rapid as to prevent the "sweated" workers from producing a new generation to replace them, the trade is none the less parasitic. In persistently deteriorating the stock it employs, it is subtly draining away the vital energy of the community. It is taking from these workers, week by week, more than its wages can restore to them. A whole community might conceivably thus become parasitic on itself, or, rather, upon its future. (Page 22.)

FRANCE | *Débats et Documents Parlementaires, Chambre des Députés, 23^e Mars, 1881. [Parliamentary Debates and Documents (French) Chamber of Deputies, Mar. 23, 1881.] Suite de la discussion des propositions de loi concernant la durée des heures de travail dans les usines et les manufactures. [Discussion of the sections of the law relating to the length of hours of work in workshops and factories.]*

Senator Waddington (quoting M. Vanzuppe, a cotton-spinner, who said):

"What is the inevitable result of the silence of the law as to a generally efficacious restrictive regulation of the hours of labor, settled in accordance with human strength?"

It is: higher mortality; decreased birthrate; physical and moral degeneration of the industrial masses;

It is: in the last analysis, the loss of many whose intelligence and whose robust arms might have well served the state.

An industrial population tends to destroy itself, and the immigrant must be looked to to fill the vacant places created by our industrial system.

The foundation of free citizenship is education, but by a bitter irony the workers are deprived of the facilities for obtaining it. Exhausted by excessive labor, can they read, or study? (Page 618.)

Tenth International Congress of Hygiene and Demography. Paris, 1900. In one vol. Législation et Règlementation du Travail au point de vue de l'Hygiène. [Labor Legislation and Restriction from the standpoint of Hygiene.] M. EDOUARD VAILLANT. M. R. C. S. Engl. Paris, Masson, 1900.

The insufficiency of labor legislation is plain before our eyes: at 40 or 45 years the laborer, used up by overwork, is unfit for the shop. He went to work too soon; his growth was checked; his organism was enfeebled, and he is replaced in his work by his puny children, destined to a fate like his own.

Misery and degeneration of a modern type appear with modern machines of industry and with the employment of women and children. The different industrial countries, feeling their strength sapped at its sources, have sought counsel from hygiene. This is the origin of the earliest protective laws for children, then those for the adolescent and the woman.

In less than a half century the evil has made frightful progress.

Lack of health, depression, and degeneracy have followed upon physiological poverty resulting from overwork and under nutrition.

Since the end of the last century (1800) the testimony of historians, travellers . . . and medico-hygienists has been uniform on this question. With the introduction of machinery and of the factory, displacing handwork, methods of work have been transformed. Daylight no longer limits the working day. Artificial light allows the longest possible use of motor devices, and these are attended by an army of women and children. (Page 503.)

GERMANY *Verhandlungen des Deutschen Reichstags. 103 Sitzung. April 18, 1891. [Proceedings of the German Reichstag. 103rd Session. April 18th, 1891.]*

Representative Bebel:

"The vast change in social and family life which is portended by the increasing pressure of women into industry has been strongly emphasized . . . there can be no doubt that the physique of the woman is not adapted to the same degree of muscular exertion and development as the man's. That the sound and healthy development of the race depends in large measure upon the strength and health of the mother is acknowledged, and no one can deny that the health of women to-day is seriously endangered by factory work. The one fact alone, that the military recruiting offices all over Germany have found that from decade to decade the number of physically fit recruits in factory and manufacturing districts is diminishing to an appalling extent, so that it is necessary to draw more and more heavily upon the country regions — shows clear and plainly what kind of process is at work upon the development of the national physique, and the more extensive our industry becomes, and the more it invades the country regions, the more and more certainly will it exhaust those sources of strength which are now the only sources to look to for military defence.

For these reasons it is absolutely essential that the laws should promptly provide ample means for overcoming this tendency to deterioration of race in every way. (Page 2420.)

Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten, 1897. [Official Information from the Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1898.

It is repeatedly shown in the reports that in certain branches of industry in specific regions the working classes deteriorate in health from one generation to another, as they become hereditarily more predisposed to fall victims to the special injuries induced by their calling. Certain work is regarded as an inherited occupation, even though its unwholesome effect is known and though the bad health of whole families engaged therein becomes ever more clearly evident. (Page 208.)

Of first importance is it to shorten the hours of work. (In-GERMANY spector in Potsdam.) (Page 210.)

Die Sociale Reform als Gebot des Wirthschaftlichen Fortschrittes.

[*Social Reform as a Condition of Socio-Political Progress.*]

Dr. HEINRICH HERKNER. Leipzig, Duncker, 1891.

The results of excessive work, insufficient wages and deficient nutrition appear with a distinctness that cannot be ignored in the reports of the recruiting statistics. A military examining physician of the empire (German) reported from a factory region: "In the factory villages, where every one works from youth up in the factories, almost all recruits were unfit for service, and I believe that, if this goes on, it will be useless to send recruiting commissions to these communities." (Page 4.) (Quoted from Archiv für Öffentliche Gesundheitspflege in Elsass-Lothringen VII, 107.)

Hours and Wages in Relation to Production. Lujo Brentano.

Translated by Mrs. WILLIAM ARNOLD. London, Sonnenschein, 1894.

It was said — that machinery had made labour easy which had been arduous; that it even rendered possible the employment of little children where formerly grown-up people had been indispensable; and that as the work was no longer arduous, a prolongation of working days could do no harm. The actual consequence of this easier but longer labour was a complete deterioration of the working classes, physically, mentally, and morally — especially of the women and children whose labour replaced that of male adults. "And so it came to pass," to use the words of the first Sir Robert Peel, "that that great achievement of British ingenuity, by means of which factory machinery attained to such perfection, became, instead of a blessing to the nation, its bitterest curse." (Pages 21-22.)

Jahrbuch für Gesetzgebung, Verwaltung, und Volkswirtschaft im Deutschen Reich. Vol. 25, 1.2. 1901. *Die Wehrfähigkeit der Ländlichen und Städtischen Bevölkerung.* [The Arms-Bearing Capacity of Country and City Populations.] Dr. GEORGE BINDEWALD.

It is certain, according to medical testimony, that factory work for women, and work behind the counter in shop and store, takes

GERMANY vengeance upon the young working woman when she becomes a mother; and not only upon her, but even more upon her offspring.

This is just as certain as that healthy, vigorous mothers who have not been subjected to the strain of a struggle for existence, bequeath health to their posterity. (Page 188.)

It is unquestionable that industry cannot be entirely deprived of women's work, but, for the sake of a sturdy race, it appears to be a stringent necessity to restrict such labor to its minimum. (Page 191.)

The work of women in industry should be limited: this may be done chiefly by reducing the length of the working hours, and also by lengthening the periods of rest at the time of childbirth. (Page 192.)

Handwörterbuch der Staatswissenschaften. Bd. I. Jena, Fischer, 1909. [Compendium of Political Science.] Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen, and EDG. LOENING, Professor of Law in Halle. Arbeitszeit. [Hours of Work.] Dr. H. HERKNER, Berlin.

The state approaches the question of working time from another standpoint than does the church. The state is above all the organ of perception of national interests. The bedrock of national strength is an able, loyal, intelligent people. It is therefore important for the state to see that this foundation is not shattered by the prolongation of working hours. First of all the fatal influence of excessive hours of work came to light in the inferior military fitness of the factory population. After that it was only in obedience to the most elementary law of self-preservation that states regulated the hours of work of the least resistant classes, the children, young people, and women. According as the proportion of the industrial classes to the whole community is larger, so much more urgently necessary does it become to lessen the serious dangers to health which inhere in industrial as opposed to agricultural occupations, by a wise limitation of the hours of work.

The state needs not only soldiers, but citizens capable and ready to share in public life. Wage-earning must leave some time free for such duties. (Page 1206.)

Massachusetts House Documents. No. 153. 1850. Minority report re limitation of hours of work. UNITED STATES

They fully believe, and think that nearly all intelligent persons, who have thought upon the subject, will admit that the present hours of labor in the manufactories of this State, are too many, for the moral welfare and physical health of the operatives, and that this system of labor is a great evil, which, not only immediately affects the laborers themselves, but is diffused into society, and will entail serious effects upon posterity. (Page 6.)

Evidence Submitted to the Massachusetts Legislature in favor of the enactment of a Ten-Hour Law. Lawrence, 1870.

I have observed with regret the premature decay of the youth of our city, who are confined, long hours, in an unhealthy atmosphere in our mills, and believe that disease is being nourished in our organisms for an ultimate weakened and miserable race. I believe the cause of humanity demands redress in the matter of time,— the young and female portion of the community, at least, are to be confined in our mills, if we desire a healthy and happy community. Isaac Smith, Jr., M. D. (Page 18.)

Report of the Massachusetts Bureau of Statistics of Labor, 1871.

14. Progressive physical deterioration produced by family labor in factories. It is well known that like begets like, and if the parents are feeble in constitution, the children must also inevitably be feeble. Hence, among that class of people, you find many puny, sickly, partly developed children; every generation growing more and more so.

15. Connection between continuous factory labor and premature old age. It is a fact, patent to every one, that premature old age is fully developed, in consequence of long hours of labor and close confinement. Very few live to be old that work in a factory. (Page 507.)

Massachusetts Senate Documents. No. 33. 1874.

The Committee on the Labor Question to whom was referred so much of the Governor's address as relates to Labor Reform, hav-

ing considered so much thereof as pertains to the enactment of a ten-hour law, and having also considered the petition of Wendell Phillips and others for the passage of such a law, Report: That the advocates of a reduction of the present hours of labor in textile manufactories claim, and produce evidence to show, that ten hours is as long as females or children should be required, or allowed, to work in the close confinement of the mills, if the Commonwealth has any interest in insuring a healthy and intelligent posterity. (Page 1.)

Report of North Carolina Bureau of Labor. 1895.

. . . Long hours in this day of fast machinery is seriously impairing the constitutions and health of the youths of our land. A few more generations and we will be a nation of dwarfs. (Page 70.) (Wm. Entwistle, Supt. Pee Dee Mfg. Co., Rockingham, N. C.)

Report of the United States Industrial Commission, Vol. XIX, 1901.

Factory life brings incidentally new and depressing effects, which those whose experience has been wholly agricultural do not appreciate. But the experience of States which have pushed their way from agricultural to manufacturing industries, and have found that their delay in protecting their factory employees has weakened the physical and moral strength of the new generation of working people, would seem to be an experience which the citizens of new manufacturing States should hope to avoid. (Page 788.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics. 1903-1904.

In certain fields of industry, like the manufacture of cotton goods or hosiery and knit goods, we may find the establishments paying the lowest wages, working their employees the longest hours, and under the worst sanitary conditions, temporarily driving out of the field of competition those establishments paying the best wages, working their employees a reasonable length of time surrounded by the best sanitary conditions; but if the process is allowed to con-

tinue, the nation tolerating it will certainly revert to a state of discontent, poverty, and crime, which no agency or force can overcome so well as wise factory legislation strictly and judiciously enforced. (Page 137.)

Besides this many eminent students of social conditions maintain that in countries where industries have been allowed to run for centuries without any form of regulation, pauperism, and crime are more prevalent than in those countries where regulation exists. Also, in countries where regulations have been imposed and withdrawn, misery and want have risen and fallen in almost direct proportion to the imposition and withdrawal of such regulation, and poor relief has ebbed and flowed in almost the same proportion. (Pages 140-141.)

Popular Science Monthly. Vol XXIV. 1884. Female Education from a Medical Point of View. J. S. CLOUSTON, M.D.

There is another vital fact in the constitution of human nature that needs to be taken into account. . . . It is this, that one generation may, by living at high pressure, or under specially unfavorable conditions, exhaust and use up more than its share of energy. That is, one may draw a bill on posterity and transmit to the next generation not enough to pay for it. I believe many of us are having the benefit of the calm, unexciting, lazy lives of our forefathers of the last generation. They stored up energy for us; now we are using it. The question is, can we begin at adolescence, work at high pressure, keep this up during our lives (which in that case will be on an average rather short), and yet transmit to our posterity enough vital energy for their needs? (Page 218.)

Another fact in the body and mind history of human beings is this, that there are certain physiological eras or periods in life, each of which has a certain meaning.

The chief of such eras are childhood, puberty, adolescence, maturity, the climateric, and senility. . . . No one of these periods can be studied from a bodily point of view alone, or from a mental point of view alone. They must be regarded from the point of view of the whole living being, with all its powers and faculties, bodily and mental. Those eras of life cannot be fully understood, looked at, with reference to the individual. Their meaning is only seen when the social life, the ancestral life, and the life of the future

race are all taken into account. And this is what makes some proper attention to those eras so very important from the social as well as the physician's point of view. If they are not misunderstood, and are so mismanaged, not only the individual suffers, but society and the race of the future. (Page 219.)

II. BENEFITS OF SHORT HOURS

A. *Good Effect on Morals: Growth of Temperance*

The good effect of shorter working hours on the use of leisure is conspicuously shown in the growth of temperance where working hours have been reduced. With better health and a higher moral tone due to the shorter working day, temperance in the use of stimulants results automatically.

United States Congress, House Report No. 1793 (4405). Hours of Laborers on Public Works of the U. S. Report from the Committee on Labor, 57th Congress, 1st Session, 1901-1902.

It is contended by the advocates of the shorter day that the additional leisure given to labor in every instance of the shortening of the work day, as it has been shortened step by step from sixteen hours to fourteen, twelve, eleven, ten, nine, and in many instances eight, has resulted in a decrease of intemperance among laborers, the acquirement of better taste and new and better desires, resulting in better homes, greater domestic felicity, and higher degree of intelligence with an increase of laudable pride as to the clothing of themselves and those dependent upon them. In a word, has increased their interests in home and better social relations, raising their moral status, and has made them much better consumers of the products of labor, and hence resulted in increased production.

The proposition that without variation the elimination of intemperance, poverty, pauperism, ignorance, crime and their accompanying evils move parallel with and proportionate to the increase of the social opportunities of the laboring class stands without impeachment of its historical accuracy. (Page 8.)

National Civic Federation Review. Vol. I, No. 7. Sept., 1904.
Will Labor Make Concessions for a Shorter Work-Day? Answers to Question: Do you believe that a shorter work-day lessens production or increases the labor cost of production?

UNITED STATES

Thomas M. Noland, Editor of the Union Label Magazine, Boston:

. . . Another important point is that the general morale of the craft has advanced as the hours have decreased. Temperance, morality, and a general uplifting tendency has been observed to a greater extent among the rank and file of the printing crafts. (Page 7.)

The National Civic Federation Review. Vol. II, No. 8. Jan.-Feb., 1906. The first annual meeting of the New England Civic Federation, Boston, Jan. 11, 1906.

James Duncan, of Quincy, General Secretary of the Granite Cutters' International Union:

You may take any locality in this or any other country where the hours of labor have changed from ten to nine, or nine to eight, and I say that temperance has increased in accordance with that reduction. I had the honor to speak in a meeting in Georgia a short time ago, where the mayor of the town was the presiding officer, and he told me when he first became a municipal officer a great part of the revenue of the town came from fines for drunkenness and disorderly conduct of the working people of the vicinity. The granite industry, with which I am proud to be connected, became busy in that locality, and we began the agitation for the shorter work day. The mayor told me that after we had introduced the eight-hour day — and we were successful, and the other trades working nine hours were afterwards reduced to eight — disorderly conduct and intemperance became so little known in the community that the town had to look for taxation in other directions than the saloons in order to meet its necessary expenses. (Page 9.)

Hansard's Parliamentary Debates. Vol. LXXIV. 1844.

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Lord Ashley:

Your own inspectors have told you that without such a limitation of the hours of toil there can be no hopes of the social or moral improvement of the working classes. (Page 912.)

British Sessional Papers. Vol. XXV. 1845. Reports of Inspectors of Factories.

All the Sub-Inspectors in my district concur with me in bearing testimony to the important fact that the reduction in the hours of labour, both of women and children, has commended itself to many who had previously entertained doubts as to its expediency and practicability.

It is impossible to estimate too highly the moral and social advantages which result from these two amendments of the law; and none but those who have witnessed the proceedings to which the former license to employ women long hours and all night gave rise . . . can fully appreciate the simple provisions that now protect both classes. (Page 40.)

British Sessional Papers. Vol. XXVI. 1847-8. Reports of Inspectors of Factories.

It has, on many occasions, been stated to me by masters, that they consider 12 hours' work more than is consistent with the welfare and a desirable social condition of their people; that a reduction of 1 hour a day would have effected a great improvement; and that although it would have occasioned a reduction of income both to the employers and the employed, it would not have been to such an amount as to be felt to be too great a sacrifice for the object by either party. . . . I have recently had a letter from the proprietor of one of the largest cotton mills in my district . . . in which he says, "I think that there are evident general indications that the shortening of the hours of labour in factories will prove to be a great moral benefit to our laboring classes." (Pages 2-7.)

The Case of the Journeymen Bakers. Evils of Night-work and Long Hours of Work. WILLIAM AUGUSTUS GUY, M.B., *Fellow of the Royal College of Physicians, Professor of Forensic Medicine, King's College; Physician to King's College Hospital, etc.* London, Renshaw, 1848.

Health on the other hand, like cleanliness, is an ally of virtue and sobriety. It is favourable to self-control, and to quiet and

rational enjoyments. It has the same effect on the mind as it has on the palate; it enables it to relish plain and homely fare, and to dispense with unwholesome stimulants. By abolishing nightwork, and shortening your hours of labour, you would be placed in possession, not merely of new faculties of enjoyment, but of time to use them. (Pages 12-13.)

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Eight Hours for Work. JOHN RAE. London, Macmillan, 1894.

(West Cumberland blast furnaces, experiment tried.) There seems to be every reason to expect better results next year, because the men were showing decisive signs of both physical and moral improvement. Their temperance societies had increased in membership 50 per cent during the year, and the provident and trade societies had spent 20 or 25 per cent less on sick allowances, both results being attributed to the relief from the undue fatigue from which all had suffered before. (Page 92.)

Archives Générales de Médecine. 1906. I. *La journée de huit heures.* [The 8 Hours Day.] Dr. P. CORNEILLE. Paris, 1906.

FRANCE

Data obtainable in West Cumberland, England, as to the results of the 8 hour day show that temperance has gained 50 per cent and that mutual aid societies spent from 20 to 25 per cent less in sick pay.

The gasworks in London say:

Drunkennes used to be the rule. . . . The workingmen are sober since we have the 8 hour day.

The same reports come from Königsberg, in Germany, and from Mayence. (Page 1199.)

B. *Good Effect on General Welfare*

(1) GENERAL BENEFIT TO SOCIETY

History, which has illustrated the deterioration due to long hours, bears witness no less clearly to the regeneration due to the shorter working day. To the individual and society alike, shorter hours have been a benefit wherever

introduced. Wherever sufficient time has elapsed since the establishment of the shorter working day, the succeeding generation has shown extraordinary improvement in physique and morals.

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British Sessional Papers. Vol. XXXIV. 1860. Reports of Inspectors of Factories. For Half-year ending 31st October, 1859.

I think I can show that the Factory Acts have put an end to the premature decrepitude of the former long-hour workers, that they have enlarged their social and intellectual privileges, that by making them masters of their own time they have given them a moral energy which is directing them to the eventual possession of political power, and that they have lifted them up high in the scale of rational beings, compared with that which they had attained in 1833, moreover I think I can further prove that all this has been accomplished without any prejudice whatever to our commercial prosperity, as it was asserted there would be; that wages have not been diminished. (Page 47.)

There were in 1833 at least 200,000 females employed within the factories of the limited kingdom. "They were," says Mr. Smith, the eminent surgeon of Leeds, writing on this subject in August last, "a poor, emaciated and down-hearted looking race, with angular shoulders and stooping heads, and altogether destitute of the rounded form of healthy women." There are now 400,000, and they are "fair and florid, stout and muscular, cheerful and happy, and all the outlines are admirable." Such is the concurrent testimony of nine of the certifying surgeons who certify for mills which employ 70,000 persons in the various branches of textile labor, of whom 40,000 are women and children. (Pages 48-49.)

British Sessional Papers. Vol. XIV. 1868-1869. Reports of Inspectors of Factories. For Half-year ending 31st Oct., 1868.

The physical condition of the operative classes has, from the shortening of the hours of labour, and from other causes, been greatly ameliorated. (Page 30.)

Undoubtedly the Textile Factory Acts embodied in the Act of

1867, notwithstanding their previous success in the textile districts, have been put upon their trial; nor can we be surprised that a question should have arisen in many minds whether Acts originally for textile works only would be found adequate for every trade, so as to bring all under one form of discipline . . . it was scarcely possible but that fictile and metallurgic trades should possess constitutional elements widely different from those of textile trades; the habits of the people being also different, their indulgences different, their expenditure different, themselves not yet accustomed to compulsion of any kind, and open only to the slowest and most careful approaches.

That it has met and conquered most of these and many such obstacles so remarkably . . . is a sufficient proof of the soundness of this kind of legislation. . . . Take, for example, the thousand and one trades carried on in such a place as Birmingham, where the domestic habits of the workers in respect of their employments, their general arrangements and associations, their laissez aller, had all been uncontrolled by any legal discipline down to the 1st of January, 1868, . . . where so many married women were and are yet employed away from their homes and families, and where the custom of leaving all social comforts to chance or opportunity had become perpetual rather than accidental, and the difficulty of entering on a contest with such habits, or of attempting to persuade all the persons whose feelings and interests were to be affected by that change that it would be far better for their physical and moral health than heretofore, and that their longevity, as well as their social comforts, depended on a regard to sanitary laws which had never hitherto been respected by them, may be imagined. What prejudices to overcome! . . . And yet, I have little doubt but time will show . . . masters as well as workers wondering how they ever formerly submitted to long hours, now that they can rejoice in earlier ones, which have given them the glorious fresh air in the summer evenings, and the additional glory of intellect advanced in the scientific institutions of the winter. (Pages 83-84.)

British Sessional Papers. Vol. XV. 1870. Reports of Inspectors of Factories. For Half-year ending 30th April, 1870.

There is a generous feeling springing up on the part of many employers that the act (i. e. 1867) is a proper one; that its enact-

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ments are salutary; that though it binds them to certain provisions, they are provisions that are useful both in a social and business point of view; that long hours never produce the best work . . . there is a general improvement in our work people, and their habits of life are changed. There are fewer hours in the factory, and they have more time at home; besides which, when in the factory they are obliged to be clean, quiet, and industrious, and these habits tend beneficially on their home life. They are more intelligent, and it is remarkable that while they work fewer hours they earn more money. We have found that longer hours mean listlessness and loss of power. (Pages 44-45.)

British Sessional Papers. Vol. XXIX-XXX. 1876. Factories and Workshops Acts Commission. Vol. XXIX. Report.

Mr. Roberts . . . shows that in the last 40 years there has been a general improvement in the physical development of factory children, so that at each period of employment they measure 1 inch more round the chest than children of the same age did 40 years since. . . . We hope that . . . the shortened hours which now prevail in almost every industry will show in the course of another generation results as progressive and satisfactory as those which have already followed upon the regulation of women and employment of children in factories and workshops. (Page lxxii.)

British Sessional Papers. Vol. XX. 1878. Reports of the Inspectors of Factories and Workshops.

Ten years ago, when I made the first effort to introduce the Factory Acts in London, I was frequently met with the statement on the part of employers that the tendency of the Act would be to encourage prostitution, because by giving the women an enforced leisure they would be exposed to additional temptation. I was loath to believe any such theory, and I am glad to say that, so far as my experience during the last ten years goes, the fears thus expressed have never been realized. There has been quite a revolution during that period in the conditions on which seamstress work is carried on in the metropolis. The employment of them in workshops and factories has increased enormously, but I can find no employer willing to commit himself to the opinion that in their

respective classes there has been any deterioration in the character and the conduct of the workpeople. All the evidence, indeed, which I have obtained goes to establish the contrary. (Page 15.)

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British Sessional Papers. Vol. XVIII. 1882. Report of Chief Inspector of Factories.

All our experience goes to show that employers prefer moderate hours under reasonable restrictions to unlimited labor. Very few employers of any class are to be found in occupations under the operation of the Factory Act prepared to say they would willingly return to the old system . . . those who prophesied the dismissal of young persons from their occupation and the substitution of male adult labor acknowledge that they were mistaken, and are loud in their acknowledgment of the advantages to themselves, as well as their employees, of moderate hours of work. (Page 41.)

British Sessional Papers. Vol. XII. 1886. Report from Select Committee on Shop Hours' Regulation Bill.

Witness, W. Cooke-Taylor, Inspector of Factories:

3897. What is the result of your observations of the working generally now of the Factories as to the health of the young persons and women?—I think there is very little doubt the effect of the Acts has been to improve the health of young persons and women, and to make their lives very much happier.

3898. And without any corresponding disadvantage to those who employ them?—I think that all statistics on the subject and all experience show that the corresponding disadvantage has not occurred to all; it was supposed that it would occur, but experience has proved that it has not. (Page 183.)

British Sessional Papers. Vol. XXI. 1894. Report of the Chief Inspector of Factories and Workshops.

In factory legislation there has been steady progress, and whilst Royal Commissions and Trade Congresses have commended what has been accomplished and the mode of administration of the Factory Acts, they have always pointed to further reforms. Bills have been passed which could not have been introduced had not

manufacturers, who were formerly opponents of such legislation, been convinced of its benefits by the results. (Page 5.)

Labour Laws for Women. Their Reason and their Result. Independent Labour Party. London, 1900.

The real reason why shorter hours, of course within limits, do not mean for men and women that the workers do less work and get less pay, is, that proper time for rest and recreation ensures better work. The individual employer may afford to overwork his employees, and then cast them off for the new ones, who cost him nothing; but even for him it is really a bad bargain, and for the worker and the community, we need not point out its harmfulness. (Page 17.)

The Case for the Factory Acts. Edited by Mrs. SIDNEY WEBB. London, Richard, 1901.

The two great industries which, at the beginning of the nineteenth century, were conspicuous for the worst horrors of sweating were the textile manufactures and coal-mining. Between 1830 and 1850 the parliamentary inquiries into these trades disclosed sickening details of starvation wages, incredibly long hours, and conditions of work degrading to decency and health. The remedy applied was the substitution, for individual bargaining between employer and operative, of a compulsory minimum set forth in common rules prescribing standard conditions of employment. (Page 36.)

... What was the result? Fortunately, there is no dispute. Every one who knows these great industries agrees in declaring that the horrors which used to prevail under individual bargaining have been brought to an end. The terms "cotton-operative" and "coal-miner," instead of denoting typically degraded workers, as they did in 1830, are now used to designate the very aristocracy of our labor. And when, to-day, those who are interested in the industrial progress of women need an example of a free and self-reliant class of female wage-earners, earning full subsistence, enjoying adequate leisure, and capable of effective organization, they are compelled to turn to the great body of Lancashire cotton-weavers, now for half a century "restricted" in every feature of their contract. (Page 37.)

History of Factory Legislation. B. L. HUTCHINS and AMY HARRISON. *Westminster, King, 1903.* GREAT BRITAIN

In 1861 the president of the Economic Section of the British Association could say in his address that the results of that bill (ten-hour bill) were "something of which all parties might well be proud. There is in truth a general assent that if there has been one change which more than another has strengthened and consolidated the social fabric in this part of the island, has cleared away a mass of depravity and discontent, has placed the manufacturing enterprise of the country on a safe basis, and has conferred upon us resources against the effects of foreign competitions which can scarcely be overvalued, it is precisely the changes which have been brought about by the sagacious and persevering and successful efforts to establish in manufacturing occupations a sound system of legal interference with the hours of labor." (Page 122.)

Handbuch der Hygiene. Bd. 8^f. [*Handbook of Hygiene. Vol. 8^f.*] GERMANY
 Edited by Dr. THEODORE WEYL. *Allgemeine Gewerbehygiene und Fabrikgesetzgebung.* [*General Industrial Hygiene and Factory Legislation.*] Dr. EMIL ROTH. *Jena, 1894.*

As the experience of every country daily confirms the fact that the reduction of working hours neither lessens nor deteriorates the working efficiency, nor lowers wages necessarily, there has been in all the civilized countries of Europe during the past ten years a steady tendency to shorten working hours, — a tendency which cannot be too emphatically encouraged in behalf of racial health. (Pages 26-27.)

Royaume de Belgique, Conseil Supérieur du Travail, 9^e Session, 1907. [*Higher Council of Labor, Belgium, 9th Session, 1907.*] BELGIUM
Règlementation de la Durée du Travail des Adultes. [*Regulation of Hours of Work for Adults.*] *Brussels, 1907.*

M. G. Helleputte:

To assure the workman his weekly rest: to prevent his being . . . subjected to excessive daily hours of work which injure his health and prematurely lessen his working capacity, — often his only wealth; to secure a robust, vigorous, and prosperous popula-

BELGIUM tion, — this is an attractive ideal. From the physical or moral or intellectual view-point alike the reduction of the hours of labor can have none but excellent results. (Page 3.)

UNITED STATES *Report of the Massachusetts Bureau of Statistics of Labor, 1870.*

The influence of the ten-hour law in England was to raise the educational condition of the laborers, as was at once shown in their increased attendance on public lectures, public meetings, mechanics' institutes, in the establishment of agricultural and horticultural shows, where were exhibited products raised on grounds hired and worked during the time thus gained. . . . No greater boon was ever given to a people than this ten-hour law, and could a laborer of 20 years before it have come back to England, he would be amazed at the improved condition of the working people. (Pages 113-114.)

Report of the Massachusetts Bureau of Statistics of Labor. 1872.

The testimony of those who have adopted the shorter time is almost unanimous in its favor. Many reported an improved condition of the employees. No instance is given of decreased wages, though many report an increase, not only in wages, but in production. All of the arguments against reduction made by those working eleven hours and over are answered by those who have adopted the shorter time, and worked under that system for years. The advocates of eleven hours have utterly failed to sustain themselves in their continued adhesion to a system that England outgrew twenty-two years ago, — a system unworthy of our State and nation, and one that would not last a month if the victims of it were men instead of women and children, as most of them are. (Page 240.)

Report of the Massachusetts Bureau of Statistics of Labor. On Results of Ten-hour Labor Law in England. 1873.

Lord Ashley said: "Upon the good moral and social influence of the change, the testimony is most favorable from the clergymen and school teachers throughout Yorkshire and Lancaster. How have the women used their time? Hundreds of them are attending evening school, — learning to read and write and to knit and sew,

things that they could not have learned under the twelve-hour system.

"A burial society testifies to the diminution of burial although the cholera was upon the town, and that the diminution was among children under five years of age, and he assumes as a reason that mothers can get home earlier and give that attention to children which no hired nurse can ensure.

"The Catholic priests at Stockport and Bolton testify that the number of factory workers attending schools has more than doubled, and that there was not the slightest doubt that the moral, social, and physical condition of the people had improved." (Page 492.)

Report of the Nebraska Bureau of Labor Statistics. 1887-1888.

The reduction of the number of hours required for a week's work has proved to be quite as beneficial to the men and women employed in this establishment as was expected. This change . . . "is worth all the time, expense, and labor involved in the controversy." (Page 122.)

Report of the Connecticut Bureau of Labor Statistics. 1888.

. . . Their main argument (for 10 hours) is . . . that the interests of society justify and require the adoption of such regulations as will promote the moral, physical, and intellectual development of the laboring people, and that the hours of labor of mothers, daughters, sisters, and of children generally have a vital bearing on this subject of such deep interest to our entire people, and ought to be legally restricted. (Pages 26-27.)

Report of the Massachusetts Chief of the District of Police. 1889.

The good results of shortening the hours of labor were soon apparent, in the substantial disappearance of discontent among those affected thereby; in the maintenance of the standard of factory productions, both as to quantity and quality; and in placing Massachusetts in the lead, where, by her history and her aspirations, she rightfully belonged.

. . . If experience has shown anything in this matter, it has been the wisdom and statesmanship of the body of laws in our

Public Statutes and additions thereto, which are known as industrial legislation. It is sixteen years since the ten-hour law was enacted; and it is entirely safe to say that, if it were stricken from the statutes to-day, not an influential voice would be raised within our borders in favor of the restoration of the order of things which that law changed. The increase of public interest in matters of this kind is a very significant fact. (Page 7.)

Report of the New Jersey Bureau of Labor Statistics. 1890.

The agitation for shorter hours of labor, for improvement in the sanitary condition of factories and workshops, the restriction of child and women's labor are evidence of a tendency to improve their surroundings and to mitigate some of the evils which have grown up under our changing methods of production. (Page 364.)

The utility of State interference is well shown in the operation of the laws to restrict the employment of children and to regulate the work hours of women and young persons in factories and workshops, now in operation in nearly every State and industrial country in the world, and very generally regarded as among the wisest and most humane acts of modern legislation. (Page 366.)

Report of the Illinois Factory Inspectors. 1895.

In France, Germany, and every other continental country, and in the more progressive States of this country, legislative regulation of the hours of labor has been found an effective measure for the protection of the health of the women and children employed in factories and workshops. (Page 5.)

In England the principle of the regulation of the hours of work of women and children has been established for more than a generation; and the regeneration of the working class in that country, from the degradation in which it was sunk in 1844, is attributed to the Factory Acts, and especially to this essential feature of them. (Page 5.)

Report of the New York Bureau of Labor Statistics. 1900.

But the good accomplished by each successive factory law was so clearly apparent, that even capitalistic Parliament could not refuse to continue the policy of labor protection. The evidence

that this policy wrought a revolutionary change in the amount of crime, pauperism, and misery is superabundant; but it is too familiar to warrant repetition now. (Page 49.)

UNITED
STATES

The best evidence of the overwhelming success of the short-hour law from all points of view is afforded by the complete conversion of its opponents. Thus it came to pass that in 1860, when a bill was introduced to extend the ten-hour law to other branches of the textile industry, J. A. Roebuck, who had originally opposed with bitterness this kind of legislation, made the following recantation:

"I am about to speak on this question under somewhat peculiar circumstances. Very early in my parliamentary career Lord Ashley, now the Earl of Shaftesbury, introduced a bill of this description. I, being an ardent political economist, as I am now, opposed the measure, . . . and was very much influenced in my opposition by what the gentlemen of Lancashire said. They declared that it was the last half-hour of the work performed by their operatives which made all their profits, and that if we took away that last half-hour we should ruin the manufacturers of England. I listened to that statement and trembled for the manufacturers of England [a laugh]; but Lord Ashley persevered. Parliament passed the bill which he brought in. From that time down to the present the factories of this country have been under State control, and I appeal to this House whether the manufacturers of England have suffered by this legislation." (Page 50.)

Sir James Graham, another persistent antagonist of the short-hour laws, followed Mr. Roebuck with a similar recantation:

"I am sorry once more to be involved in a short-time discussion. I have, however, a confession to make to the House. . . . Experience has shown to my satisfaction that many of the predictions formerly made against the factory bill have not been verified by the result, as, on the whole, that great measure of relief for women and children has contributed to the well-being and comfort of the working classes, while it has not injured their masters. The enactment of the present bill ought to approach as nearly as possible the Factory Act. . . . By the vote I shall give to-night, I will endeavor to make some amends for the course I pursued in earlier life in opposing the factory bill." (Page 51.)

All travellers unite in testifying to the wonderful energy displayed in their work by the wage-earners of Australia. Such energy is a product not so much of the stimulating climate as the

high standard of comfort made possible by the short working-day. Considerable evidence might be adduced in support of the following enthusiastic opinion of John Rae ("Eight Hours for Work," page 312).

"The more we examine the subject the more irresistibly is the impression borne in from all sides that there is growing up in Australia, and very largely in consequence of the eight-hour day, a working class who for general morale, intelligence, and industrial efficiency is probably already superior to that of any other branch of our Anglo-Saxon race, and for happiness, cheerfulness, and all-around comfort of life has never had its equal in the world before." (Page 59.)

Report of the United States Industrial Commission. Vol. XIX. 1901.

Lessening of hours leaves more opportunity and more vigor for the betterment of character, the improvement of the home. . . . For these reasons the short work-day for working people brings an advantage to the entire community. (Page 773.)

Report of the Wisconsin Bureau of Labor Statistics. 1903-1904.

No private individual has any more moral right to exhaust the working energy and working capital of a nation without giving "value received" than he has to take the life of an employee outright. The only difference is that one is a slower criminal process than the other. It is not enough that workmen should obtain barely enough for their labor to enable them to live, but they should receive a competency. They should receive as much energy from their employers in food, clothing, homes, and furnishings amid healthful surroundings as they give to their employers in the articles they produce.

The stronger, healthier, and more intelligent a laborer is, the more wealth he represents. The laborers of a nation represent its working capital just as the hands of the farmer, his horse, or his ox represent his working capital. And the stronger and healthier either may be, the more capital it represents. The more efficient this capital becomes, the more wealth will be produced. Machinery operators represent the working capital of the manufacturer, and

he owes it to the nation which protects him in his business to do everything in his power to increase this working capital and keep it in the highest possible state of efficiency. (Page 130.)

The regulation of factories either by law or by special agreement worked marvellous changes in England. In the course of half a century the "sweated" laborers of this great country whose course of life seemed almost run became energetic, self-reliant, intelligent, and efficient workers, owning their own homes, amid wholesome surroundings, and working a reasonable number of hours for a day's work.

Not only is factory legislation sound in principle, but wherever put to the test it has been found sound in practice as well. (Page 138.)

Fourteenth and Fifteenth Annual Conventions of the International Association of Factory Inspectors of America. Indianapolis, 1900. Niagara Falls, 1901. (Bound in New York Department of Labor Report, 1901.) Problems of Factory Inspection. The Social Interest of Statistics of Factory Inspection. A. F. WEBER, Chief Statistician, New York State Department of Labor.

Scarcely any upward movement of the century overshadows in its importance to the moral and material welfare of human society, the progressive shortening of man's working time. If one country be compared with another, it will be found that with hardly an exception the rule holds that the shorter the hours of labor, the higher the civilization. (Page 519.)

Bulletin of the United States Bureau of Labor. No. 80. January, 1909. Woman and Child Wage-Earners in Great Britain. VICTOR S. CLARK, Ph.D.

Because the modern factory system began in Great Britain and, together with material blessings, brought social evils, the first factory laws were enacted in that country. Since then constant conflict has continued between the destructive forces of untrammelled industry, sacrificing its servants to its dominant end, production, and the protective intervention of society, staying those forces in the interest of humanity. This conflict has resulted in a highly developed system of factory legislation, based on over a century of experience. But

many evils still afflict workers for which remedies remain to be discovered. (Page 1.)

In Great Britain there is now no such opposition to factory legislation as still evidences itself in some parts of America. No employer or representative of employers was heard to criticise the act as a whole, and there was but mild objection to any of its details. Undoubtedly among smaller works and in the sweatshop districts one might encounter struggling proprietors competing with large manufacturers under the disadvantage of insufficient capital and amid un-economic conditions, who see in the demands for modern sanitation and regulated employment extortions that foreshadow their own ruin. But these people are few and growing fewer, and do not make public opinion outside their class. The great main current of thought and sympathy among the mass of the nation, including both employers and workers, not only favours present regulations but is not averse to extending them. (Page 11.)

Apart from wages and hours of work, both of which fundamental conditions of workers' welfare have improved while the factory acts have been in force, and partly on account of them, some less direct and more general effects can be traced to these statutes. (Pages 71-72.)

Employers and Employees. Full Text of the Addresses before the National Convention of Employers and Employees. Minneapolis, Minn. September 22-25, 1902. The Economic Effects of the Eight-Hours' Day. FRANK L. McVEY, Professor of Political Economy in the University of Minnesota.

The whole tendency of modern industry, even with the shortening of hours, is in the direction of increased exertion. The essential element in the machine organization is the human one, the most precious and the most difficult to replace. The energy of a worker in any industry should always be equal to that of the day before. If the pains of labor are heavy the tone of the workman is lowered and his surplus energy disappears, while he tends to become a mere automaton valuable to society for the net surplus he creates for others. The round of production of energy into goods, goods into utilities, and utilities into energy, is broken down by any such heavy burden. We must therefore hail, certainly from the view-point of the community, any movement likely to increase its working power. (Page 194.)

The community desires the highest good and greatest energies of its workers through long periods of time. This can be accomplished in most industries without any accompanying loss of productive power, by shorter hours of work, as has been proven in the experience of many industries.

. . . In some industries where labor is not employed continuously, but periodically and gathered from any and all sources, the employer finds it to his advantage to push the hours of work to the longest possible limit. Human energies can stand a pace of this kind for a time, and as the employer does not worry about a future supply of workers he expects to win an increased profit by such a policy. These industries have come to be called parasitic. (Page 194.)

(2) BENEFIT OF LEISURE AND RECREATION

After continuous work, a certain amount of leisure and recreation is a physiological necessity. While the over-taxed worker is left stupefied or inclined only to coarse pleasures after excessive labor, the worker who has not exhausted all energies by overexertion turns instinctively to a better use of leisure and recreation. License is replaced by ambition for self-improvement or the enjoyment of legitimate pleasures which react favorably upon the entire organism. Introduction of the shorter working day, therefore, raises the standards of the individual and the community.

The Eight-Hours' Movement. TOM MANN. London, 1889.

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Clearly, then, what is required is to develop the mental powers of the workers, and to give them leisure and capacity to assimilate knowledge. Stupidly slaving away like cattle will not give our country any chance in the competition with others. In that struggle, as long as it lasts, the victory will be with the nation that has the most energetic, intelligent, and capable workers — those, in fact, who work the shortest hours and have the highest standard of comfort. (Page 12.)

The Problem of the Unemployed. JOHN A. HOBSON. London, Methuen, 1896.

The indirect effects of a shorter working-day are not less important. Provided the increased leisure is not purchased by an injurious overstrain in the shorter working-day the increased opportunities it will afford for the cultivation of unused faculties and the satisfaction of new tastes, will furnish an ever growing stimulus towards an elevation of the standard of life. By yielding a continuous demand for the satisfaction of new, strong desires it will supply the moral force which, allied with improved intelligence and the more effective means of organization which modern conditions of industry and of life afford, makes powerfully and persistently for enforcing the claims of the working classes to a larger share of the aggregate consuming power of the community. (Pages 109-110.)

Diseases of Occupation from the Legislative, Social, and Medical Points of View. THOMAS OLIVER, M.A., M.D., F.R.C.P., *Medical Expert on the White Lead, Dangerous Trades, Pottery, and Lucifer Match Committees of the British Home Office.* New York, Dutton, 1908.

... It is held that no employer has the right to utilize the whole of the working part of a man's day, and thus deprive him of the leisure to which he as a human being is entitled. Since his whole nature has to be developed, it is claimed that the intellectual, moral, and physical powers of man cannot be developed if the hours of employment are too long, the work too hard and of a grinding nature. (Page xi.)

GERMANY *Jahresberichte der Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr 1902.* [Reports of the Factory Inspectors in the Kingdom of Württemberg for 1902.] Stuttgart, Lindemann, 1903.

A reduction of working hours appears to be also needed on moral and spiritual grounds. A widespread craving for improved education has in recent years developed in the masses of workers and demands satisfaction. Likewise the desire for family life has become stronger. (Page 209.)

The Relation of Labor to the Law of To-day. Translated from the **GERMANY** German by PORTER SHERMAN. LUJO BRENTANO. New York, Putnam, 1891.

Why then does an increase in wages and a decrease in the time of work in general lead to a greater capability for work? Because higher wages and a shorter day's work make it possible for labourers to increase and satisfy their physical and spiritual needs; because better food, more careful fostering, greater and more moral recreation increase the power to work, and because they increase the pleasure in labor. . . . In other words, an increase in wages and a decrease in the time of work lead to a greater performance, because they elevate the standard of living of the laborer, a higher standard of living necessarily spurs to greater intensity of labor, and at the same time makes the same possible. (Pages 233, 234.)

Handbuch der Arbeiterwohlfahrt. Bd. I. [*Handbook of the General Welfare of the Working Classes, Vol. I.* Edited by Dr. OTTO DAMMER.] *Beschädigung der Arbeiter bei der Arbeit.* [*Injuries of Occupation.*] Dr. ASCHER. Stuttgart, Enke, 1902.

It is natural that a workman, in the broad sense of the word, who has only a short rest period at his command, should chiefly use that in sleep, to restore his exhausted physical energy; also natural, that, if he has a little free time to spare, as on Sunday, holidays, he should spend it in coarse pleasures. Thus results the weariness of Monday, physical and brain fatigue. . . . If the workman had, instead, enough free time in the week to be able to come home to his family without being tired out — to read, to hear lectures, work in a garden, and so rebuild and restore bodily energy, he would not so misuse the leisure of Sunday. (Page 69.)

Handwörterbuch der Staatswissenschaft. Bd. I. [*Compendium of Political Science. Vol. I.*] Edited by Drs. J. CONRAD, Professor of Political Science in Halle; L. ELSTER, Ober Reg. Rath in Berlin; W. LEXIS, Professor of Political Science in Göttingen; and EDG. LOENING, Professor of Law in Halle. *Arbeitszeit.* [*Hours of Work.*] Dr. H. HERKNER, Berlin. Jena, Fischer, 1909.

3. The workman perceives that high wages can bring him real family life, a greater share in the gifts of civilization only when re-

GERMANY duced working hours shall have enabled him to command some leisure and to retain a certain amount of mental buoyancy. For married working women especially a moderate working day offers the *sine qua non* for useful activity at home. (Page 1204.)

5. The shorter the hours of work, the more time there is for other opportunities, such as participation in public life, general or technical educational courses, and such opportunities are of the greatest value in the social position of the worker. (Page 1204.)

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Evidence Submitted to the Massachusetts Legislature in Favor of the Enactment of a Ten-Hour Law. Laurence, 1870.

The workpeople of this State as a body have no desire to disturb industrial operations. Their lot is labor; but in toiling for bodily sustenance they desire leisure to feed the *mind*. The evidence of mill-operatives is confirmatory of the truth that, in their case, physical exhaustion renders impossible diligent application to mental improvement. (Pages 4-5.)

Report of the Massachusetts Bureau of Statistics of Labor, 1870.

As to the hours of labor, I believe they are too long, for I know from my own experience in the cotton mill, that when I worked more than nine or ten hours in a day I was used up, and fit for little or nothing the rest of the day, and I have never, so far, recruited from the effects of working long hours; and I believe if the hours of labor were shortened, it would have a good effect upon the minds and lives of the people. . . . Man needs time for study and recreation; he needs it for family devotion. (Pages 358-359.) (Employee.)

Report of the United States Industrial Commission. Vol. VII. 1900.

Mr. Rufus R. Wade, Chief of District Police, Massachusetts:

The question may well be asked, what has been the effect upon those operatives whose hours of labor have been lessened and to the children obliged to work in factories whose school privileges have been secured? The benefit to adults, comprising the laboring classes, by the reduction of the hours of labor has been to lift them up in the level of their manhood to thoughts of better things and to an organized demand for the same. It has given needed time for leisure to the operative, it has encouraged self-culture, it has afforded additional

opportunity for recreation, and has given the debating school, lecture room, and library an impetus in every city and manufacturing town in Massachusetts. The large circulation which the daily papers have obtained, in my opinion, is due in part to the fact that the laboring people are considering the questions of public movement.

From an experience which has extended many years, not only through the medium of official duty but from personal observation, I would say, with much confidence, that there has been a gradual yet steady change in the conditions once existing, which has operated to the benefit and well-being of the laboring classes in the opportunities for mental and social culture. (Pages 79-80.)

United States Congress. House Report. No. 1793 (4405). Hours of Laborers on Public Works of the United States. Report from the Committee on Labor. 57th Congress, 1st Session. 1901-1902.

No recognized authority to-day combats the proposition that the condition of the laborer has improved with every reduction in the hours of daily service that has up to this time been made. Nobody is disputing that he has become a better consumer with each reduction. . . .

Economists contend with great plausibility that the shorter day results in an increase of wages without an increase of price, as consumption enlarges production, and the larger the scale of production the cheaper the given article is produced; that the laborer, when he has the leisure resulting from the shorter hours, has new aspirations, ambitions, and a greater personal self-respect, and, as before stated, wants a better house, better furniture, better clothes, better food, and becomes a great deal better consumer. (Pages 8-9.)

United States Congress. Senate Report 2321. The Eight-Hour Law: Report from the Committee on Education and Labor. Fifty-seventh Congress. Second Session. 1902-1903.

Commissioner Carroll D. Wright well says:

The policy of this class of legislation has therefore been settled by Congress, and I need not discuss this phase of the question. All such laws are enacted for the purpose of protecting the laboring man from the injurious consequences of prolonged physical effort, giving him more time for his personal affairs and more time and energy to devote

to the cultivation of his moral and mental powers. It has always been expected that they would aid him in the acquisition of knowledge, thus tending to make him a better and more contented citizen. This policy must be admitted by all to be a good one. . . . The Federal government has long been committed to this policy. (Page 2.)

Report of West Virginia Bureau of Labor. 1903-1904.

Mr. James Killourne, Jacobs Mfg. Co., Dayton, O., before Nat. Convention of Employers and Employees:

One thing which can and should be done to better the condition of workingmen, is to shorten the hours of labor. "Man does not live by bread alone," and workingmen should have greater opportunity for recreation, for sports, and for reading and study.

It is their just due and one which they have a right to demand from society. . . .

Just men, whatever their position in life, will oppose child labor and excessive hours of work, not only for the reasons already given, but for the sake of a happy home, without which neither virtue nor religion thrive. (Pages 192-193.)

Report of the Michigan Bureau of Labor. 1907.

I would again most heartily recommend that we do something toward obtaining a shorter day for the working girls of our State. . . . When a girl works from 8 A. M. until 8.30 or 9 P. M. she is missing the best part of her life, that part that stands for self-culture, education, and recreation. (Pages 4-5.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics. 1907-1908. Part VII. Women Workers in Milwaukee Tanneries. IRENE OSGOOD, Special Agent.

Another group much larger . . . is made up of girls who have held on to the good but who have been crushed and deadened by their burdens. The routine of factory work, the home cares that fall to them after work, and the crowded and unhealthful living conditions have dissipated the natural and healthful cravings which stir and arouse bodily and natural activities.

They live a machine-like existence and indifferently perform the functions of labor. They have no leisure for the interests and stim-

ulating activities which they as human beings have a right to enjoy. In no way do they get connected up with the life of the community. Their own home is crowded and offers no place for the entertainment of friends. This is the class of girls that most arouses one's sympathy. They have retained the fundamental virtues. But they and the community are heavy losers because of this dead-level and joyless existence. Either their few years in school failed to make them aware of the stimulation of social and commercial life, or, more likely, it is the after years that have robbed them of all spirit. Their only hope is for more leisure, less wearying work in the shop, fewer home cares, and an opportunity for recreation. They need to be re-created, to enjoy the pleasures, and to share in the broader intelligence of the church, the school, and the settlement. (Page 1107.)

Finance and Hours of Labor. ROWLAND GIBSON HAZARD. *New York, Scribner's, 1868.*

Hours of Labor:

It was always true that intelligence added much to the efficiency of the laborer; but it is more emphatically so now that so large a portion of the work requiring mere force is performed by the action of steam and water power upon machinery demanding intelligence to design and construct it, and then to superintend its movements. The intellectual improvement of the laborer is, then, of great importance, even in the merely economic aspect of the subject which we are considering. This improvement requires not only time, but mental effort, to which physical exhaustion by labor too long continued is very unfavorable, while a very considerable amount of bodily exercise gives tone and vigor to the mind's action. It is, then, good economy to combine the two, and unwise to task all the powers of a man in mere muscular drudgery, to the exclusion of the mental effort which his intellectual health and progress demand. (Pages 37-38.)

The Economic and Social Importance of the Eight-Hour Movement.
GEORGE GUNTON. *New York, Amer. Federation of Labor, 1889.*

It is one of the characteristic features of modern industrial life that by its division and specialization of labor, it tends to increase the intensity of the strain upon the nervous energies of the laborer. In no country in the world is this fact more prevalent than in America. The persistency with which industrial energies are intensified in this

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country have come to be almost regarded as a national characteristic. It has become a recognized fact by medical science that the first step toward remedying this condition is more leisure, more physical and mental repose, more and longer periods of relief from the strain which the specialized industrial life imposes. This has become absolutely necessary for both physical and social reasons. For physical reasons, because it makes wholesome living and normal physical health possible, and socially because without it frequent social contact is prevented or the susceptibility to the socializing influence is destroyed. The great mass of laborers are compelled to work all the year round under the same monotonous condition. This is made indispensable by the very nature of modern methods in industry. Under the factory system the laborers become mere wheels in a colossal machine, in which the presence of all is necessary to the efficient labor of any. (Pages 12-13.)

Discussions in Economics and Statistics. Vol. II. FRANCIS A. WALKER, Ph.D., LL.D. *The Eight-Hour Law Agitation.* New York, Holt, 1899.

. . . I have small sympathy with the views so frequently, and it seems to me brutally, expressed, that the working classes have no need for leisure, beyond the bare necessities of physical rest and repose, to get ready for the morrow's work; that they do not know what to do with vacant hours; and that a shortening of the term of labor would, in the great majority of cases, lead to an increase of dissipation and drunkenness. Is it our fellow-beings, our own countrymen, of whom we are speaking? It seems to me this talk . . . is the poorest sort of pessimistic nonsense. It is closely akin to what we used to hear about slavery being a humane and beneficent institution. . . .

. . . We may well desire that somewhat more, and much more, of leisure and of recreation should mingle with the daily life of our fellows than is now known to most of them. It is a pity, it is a great pity, that working men should not see more of their families by daylight; should not have more time for friendly converse or for distinct amusements; should not have larger opportunities for social and public affairs. Doubtless many would always, and still more would at first, put the newly acquired leisure to uses that were lower than the best. . . . were even, in instances, mischievous and injurious.

But the larger part of this would be due to the fact, not that the time now granted was too great, but that the time previously granted

had been too small . . . But such men, who might, it is conceded, become even worse men with more leisure, are not to furnish the rule for the great majority, who are decent, sober, and careful, fearing God, and loving their families. (Pages 383-385.)

Fourteenth and Fifteenth Annual Conventions of the International Association of Factory Inspectors of America. Indianapolis, 1900, Niagara Falls, 1901. (Bound in New York Department of Labor Report, 1901.) The Shorter Workday in its Effect upon the Personal Character of the Worker. JOHN HOLBROOK, Deputy Commissioner of Labor, Michigan.

. . . Quality of product may be improved by a shorter day, and by this improvement in quality of the product has come to be considered the improvement of the quality of the laborer himself. The greatest capital invested in any enterprise, commercial or industrial, is not of buildings, machinery, and plants, but in the character of the men and women employed, and on this later capital stock there is no return possible of large profits without improvement of personal character.

. . . We reached the second stage of this agitation when the privilege was asked to have opportunities for leisure, for the enlargement of mental grasp, for the cultivation of the home and home life, and for freedom for self-culture. (Pages 562-563.)

A reduction in the hours of labor means for the hand-workers leisure for self-culture and the arts, moralities and the refinements of life. Many causes have contributed toward the elevation of the lot of labor, but one great concurrent cause has been the shortening of the hours. . . .

It has not been shown that the workers' use of leisure has been less wise and moral than the use of leisure by the so-called leisured classes. They have learned to use their leisure hours just as rationally and beneficially as have the wealthier classes, and it would astonish an old-time advocate of constant work for labor, lest Satan should find mischief for idle hands to do, how wisely and well these very classes have used their spare hours; they have come to be constant and intelligent readers of scientific and mechanical journals. They have formed a disposition to read the best books and literature, and as a rule the working people are reading more serious and thoughtful books than any other class of society. (Pages 564-565.)

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National Civic Federation, New York, 1903. Industrial Conference.
Prof. GEORGE GUNTON, of the Institute of Social Economics.
New York, The Winthrop Press.

. . . But the masses cannot go to college; they can go to school only for a little while; they must get their education for citizenship in the daily life, alongside of and contemporaneously with earning their living. It must be a part of their daily existence, and for this there must be opportunity, and opportunity here means *time*. It means some release from the pressure of getting a living. (Pages 172-173.)

. . . To quit work before exhaustion sets in, before the really tired feeling has taken possession, is to relieve him with some vitality, some ambition to touch the other side of life, to be like others. Under all these lines, economic, educational, and physical opportunity means more leisure, and more leisure means a shortening of the working day. (Pages 172-173.)

The National Civic Federation Review, Vol. II, No. 8, Jan.-Feb., 1906. The first Annual meeting of the New England Civic Federation, Boston, Jan. 11, 1906.

Marcus M. Marks, President, National Association of Clothing Manufacturers:

There is another consideration which prompts the demand on the part of labor for a shorter work-day; it is the greater desire for self-improvement.

This has been encouraged by the advance in the public school of the system which affects our younger workmen in particular; also by the multiplication of popular free lectures, public libraries, cheap books and newspapers, etc., that have awakened in the workmen's minds the ambition to lead a better life, possible only in the enjoyment of a reasonable amount of leisure. (Page 8.)

Charities and the Commons, March 6, 1909. Vol. XXI, No. 23.
New York. The Industrial Environment of Pittsburgh's Working Women. ELIZABETH BEARDSLEY BUTLER, Former Sec'y
New Jersey State Consumers' League.

The relation of working hours to capacity for recreation is perhaps the most important consideration of all. Not only health, but mental

alertness must be renewed by the evening's leisure. In so far as hours of work tend to dull and stupefy the worker, they are longer than the community can afford. (Page 1134.)

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(3) SPECIAL BENEFIT OF EVENING LEISURE FOR FAMILY LIFE,
EDUCATION, ETC.

In all communities where the regular working day of reasonable length has been established the workers have benefited particularly by the regular evening leisure afforded. Leisure in the evenings, after the day's work, affords the only opportunity for necessary home-life, education, and recreation.

British Sessional Papers. Vol. XXVI. 1847-1848. Reports of Inspectors of Factories.

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Mr. Fishwick (Mill-owner), on this occasion, voluntarily bore testimony to the good effects which have been produced by the legislative protection. . . . He mentioned another fact which, although an isolated case, I cannot consider otherwise than as a proof, and one very early shown, of the improvement in the social state of the women employed in factories, which may fairly be expected from their being saved from that excess of daily labour, which cut them off from the duties and enjoyments of domestic life, and by an entire absorption of their time, rendered their lives a mere alternation of work and sleep. Mr. Fishwick stated to me that a young woman who had resided some years in the village, following the trade of a dress-maker, lately came to him and told him that she was going to remove; and on his asking the reason of her so doing, she replied, that her employment had fallen off since the hours in the factory had been reduced to 11, for the young women, in place of getting dresses made by her, now make them themselves at home. (Page 9.)

British Sessional Papers. Vol. XXII. 1849. Reports of Inspectors of Factories for Half-year ending 31st October, 1848.

The object of those who wish to be allowed to work with relays of young persons and women is to extend the working of the mill beyond 10 hours, and if they worked by relays the same number of hours as some are now doing with adult males, one set of the young

persons and women might be employed as late as half-past 8 in the evening. All such young persons and women, even if they were honestly limited to 10 hours a day, would therefore be deprived of that which is generally held to be one of the greatest boons to the factory operatives in the 'Ten Hours' Act, *viz.*, the cessation from work at an early hour in the evening. It is vain to say that they would have the same amount of leisure at their disposal at other times of the day; 2 hours before breakfast, or in the middle of the day, might certainly be employed by some of the women in domestic matters, but to the young men and most of the young women they would be worse than useless. The young persons would be deprived of the advantages of evening schools, and it is not to be supposed that they would go to morning schools, among children. When their day's work is over at an early hour in the evening, and they have 3 hours at their disposal before it is time to go to bed, the factory workers then feel the full value of the shortened hours of labour; they can then take advantage of evening schools or other places of instruction, and turn their leisure to good account in many ways, both for moral improvement and for social and domestic comfort. (Page 7.)

Opinions of the Factory Operatives respecting the Ten Hours' Act:

It must be remembered, too, that there has been more than 2 years of great suffering among the factory operatives, from many mills having worked short time, and many being altogether closed. A considerable number of the operatives must therefore be in very narrow circumstances, many, it is to be feared, in debt; so that it might fairly have been presumed that at the present time they would prefer working the longer time, in order to make up for past losses, perhaps to pay off debts, or get their furniture out of pawn, or replace that sold, or to get a new supply of clothes for themselves and their families. . . . I have been very much surprised to find so large a proportion of those receiving very moderate wages, and still more of those receiving very scanty wages, preferring to work 10 hours. The reason for their preference assigned by so many young persons and even adults, that it enabled them to attend evening schools, is a gratifying circumstance, as affording a good sign of the character of the factory population. (Pages 16-17.)

Under the present mode of working the 10 hours, according to which the working day of young persons and women, and of the greater portion of adults also, is brought to a close at half-past 5 in

the afternoon, the employed may derive the greatest benefit from the curtailment of their labour in the evening; for they are then enabled not only to cultivate the domestic affections, to learn domestic habits and so to elevate the character of the working classes, but to avail themselves of those opportunities of mental culture. (Page 99.)

British Sessional Papers. Vol. XXII. 1849. Reports of Inspectors of Factories for the Half-year ending 30th April, 1849. Appendix. Evidence of the Opinions of Persons Employed in Factories Respecting the Ten Hours' Act, Collected in September, October, and November, 1848.

Letter from Messrs. Sidgwick, Mill-owners: We consider the plan most conducive to the comfort and advantage of the people employed in factories, is such an arrangement of the working time, in which they have to earn a livelihood, as will leave to them the longest possible space of disengaged time, between ceasing work in an evening and resuming it a morning for recreation, improvement, or their private business. (Page 14.)

To the elder females no portion of the day can be more valuable for recreation or attendance to domestic duties than the regular and continuous period this plan (*i. e.*, closing mill at end of 10 hours' work) gives them, at the end of their daily factory labour. (Page 20.)

British Sessional Papers. Vol. XXIII. 1850. Reports of Inspectors of Factories for the Half-year ending 31st October, 1849.

Among those who have carefully watched the operation of each successive restriction, the number, I am satisfied, is now large, who would declare themselves content to work only 10 hours a day, . . . and this I believe to be especially the case among mill-occupiers and managers who can from their own experience compare the state and condition of the operative class under the present factory system with their state and condition under the hours of work during which they laboured 20 years ago.

It would be impossible to trace, in the working of a system but recently brought into operation, any considerable improvement in a class of persons long habituated to such labour as to preclude them from devoting any time to other pursuits. I am, however, assured, that the attendance of young persons at night-schools, and the de-

mand for garden allotments, bear powerful testimony to the advantages of a reduction in the number of working hours, and to the readiness with which the best disposed are willing to make a beneficial use of the additional hours, the present restriction leaves them for recreation and improvement. (Page 41.)

British Sessional Papers. Vol. XXIII. 1850. Reports of Inspectors of Factories for the Half-year ending 31st October, 1849.

It is an early stopping in the evening that the work people chiefly value; and if the free evening hours from 6 to 9 be secured the great object sought for by the Ten Hours' Act will be attained; for then the factory workers will be in what may be called the normal state of the operatives in the generality of trades, and will, like them, have leisure for domestic arrangements, for improving themselves by attending evening schools, with opportunities for healthful and reasonable recreations. . . . Where the law is fully carried out, according to its true intention, the work people appear to value the limitation more and more in proportion as they have longer experience of its effects; and the masters appear to be getting daily better reconciled to it; partly by finding that, by the increased alertness of their work people, by the closer application they are now enabled to give, together with some additional speeding of the machinery not before tried, the produce is much nearer to that of 12 hours than it was conceived possible it could be brought to, but partly also by the marked change for the better which they see in the health, appearance, and contentment of their work people. (Page 5.)

In one of the letters sent to me the following interesting statement was given, representing, as I believe correctly, a picture of domestic life almost unknown in the manufacturing district, especially of a large town like Bradford, until the hours of labor were reduced and regulated by the Legislature. The comfort and feelings here described, though naturally of slow growth, are I hope daily extending their influence, and may be either much encouraged or much retarded, according as the Government and Legislature of the Country exercise a paternal care for the different classes who look up to them for protection:

... "I called in to see an old factory weaver; it was very interesting and delightful to behold the old man sitting with his youngest son; they had a basket of potatoes for sets, and both seemed at a loss, being new gardeners, but were very glad to have an opportunity of learn-

ing; he had 3 daughters, and 2 young women lodgers, very busy sewing and knitting, and all teaching each other. . . . I asked the old mother how she liked the Ten Hour Bill. She said very well, she did not know how she must do if the girls worked any longer, they assisted her all they could, and were learning to do household work, and could sew and knit better than she could, and could read very nicely too; they could not do with any more than ten hours. The old father said it was a grand thing, the Ten Hours Bill; he was learning to be a gardener, and would not like to give it up, which he would have to do if they worked any more hours. (Pages 48-49.)

British Sessional Papers. Vol. XVI. 1867. Reports of Inspectors of Factories for the Half-year ending 30th April, 1867.

No exigency of trade can offer any compensation whatever, for the evils of long hours of work, for the wives of the industrial classes. I mention this feeling of the bleachers and dyers, not as their advocate for uniform working hours with factory workers, but as a sincere advocate for uniformity of time for all labour limited by legal restrictions; and from a conviction that, all efforts at night school instruction for adolescents and adults, for their social improvement, and all attempts at closing public houses and beer houses after reasonable hours must be abortive, so long as the great bulk of the wives and daughters of the working men are unable, from sheer ignorance, to render their homes attractive by domestic qualifications; and by a higher standard of moral feeling, to appreciate the value of virtue and self-respect, of which, I am afraid, they are so commonly ignorant. If all labour in factories and workshops had been restricted in future to 6 o'clock at night and to 2 o'clock on Saturdays, the next generation would have repaid the present by a morality which the past has never dreamt of. (Pages 25-26.)

British Sessional Papers. Vol. XIV. 1868-1869. Reports of Inspectors of Factories for the Half-year ending 30th April, 1868.

Nevertheless, the Act has shown itself, as initiating a moral obligation at least upon the employers of juvenile and female labour, in rendering it uniform in its hours; and thus bringing within the ordinary reach of those who have already made some advances in elementary knowledge, either independently of factory labour or in connection with it, various institutions for intellectual purposes, hitherto languishing for want of pupils, in consequence of their hours of work

preventing them from, or unfitting them for, enjoying the privileges such institutions were intended to afford. (Page 83.)

Assuredly the usefulness of the first hours of rational freedom from late employment has not been overrated. The power which the working classes now possess of making arrangements for out-door enjoyments in the summer, and for intellectual advancement of every kind during the winter months, is fully appreciated, and would be most reluctantly parted with. It is indeed spoken of as a boon which they longed to possess years ago, and is most thankfully acknowledged. (Page 277.)

British Sessional Papers. Vol. XIII. 1874. Report of Inspector of Factories for the Half-year ending 30th April, 1874.

It is for the public good that our girls and women shall not be overworked and shall have some leisure in the evening, without which this work would degenerate into slavery, pernicious to mind and body. (Page 58.)

British Sessional Papers. Vol. XVI. 1875. Reports of Inspectors of Factories for the Half-year ending 30th April, 1875.

At the commencement of the year, many manufacturers, on consideration of the health of women, were determined to begin work half an hour later in the morning than they had previously been accustomed to. . . . But it soon became apparent that the employed, as a rule, were opposed to the alteration and dissatisfied; and preferred the additional half-hour's relaxation in the evening . . . the half hour at night increased the opportunities for recreation, improvement and social or domestic duties. (Pages 63-65.)

British Sessional Papers. Vol. XII. 1895. Report from the Select Committee on Shops (Early Closing) Bill.

Witness. T. Flint, Rep. Scottish Shopkeepers' Association:

1178. Do you think a part of the necessity for early closing is based on the fact that later hours in shops mean degeneration in the health of the shop assistants? . . . It certainly affects their life as a whole. They do not enjoy the same privileges that other people enjoy, they have not the same time for improving their mental condition, or enjoying the other different phases of life that other people have who are off duty earlier in the day. (Page 50.)

Witness. J. Jamieson, Rep. Scottish Shopkeepers' Union:

3183. I approve of it (the bill) chiefly in the direction of earlier hours in the evening; I think there would be greater mental and physical benefits from that than from anything else. (Page 131.)

**GREAT
BRITAIN**

The Economic Journal, Vol. XIV. London's Tailoresses. CLEMEN-
TINA BLACK. London, Macmillan, 1904.

This prevalence of long- and late-working hours virtually cuts off the young tailoress from the advantages of any technical training that might be carried on in evening hours. She, like other working people — may I not say like other human beings? — is not disposed after a ten-hour's working day for further exertion either of brain or hand. (Page 566.)

Jahres Berichte der Gewerbe Aufsichtsbeamten: Amtliche Mittheilungen, 1893. [Annual Reports of the (German) Factory Inspectors, 1893.] Berlin, 1894.

GERMANY

Leipzig:

There can be no doubt whatever, that the shortening of the daily toil of women in factories has a most beneficial effect upon the workers. They can attend better to their homes, cultivate their housekeeping and home-making powers. (Page 148.)

Report of the New Jersey Inspector of Factories and Workshops. 1893.

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In conformity with the principle of regulation the legislature has sought to promote the safety, health, happiness and welfare of the persons designated, by regulating their employment in this State, and in accordance with an enlightened and humane policy, especially towards young persons and females.

It says to the employer, whether a person or a corporation: "you may take all you can fairly get of the labor, skill and industry of your employes, within ten hours of every day and for five hours every Saturday. Beyond that you shall not go. The remainder of the day and night, and the Saturday half-holiday, belong to your employer himself, his family and the community. He may use that time for leisure, rest, recreation, reading, study, travel, or in any lawful manner whatever that he pleases, or in doing nothing at all."

We venture to suggest that it is an erroneous notion in these days to suppose that the wage-work in manufacturing establishments

was somehow created for the sole and exclusive benefit of his employer, with the privilege of remaining on this planet for a few years, to be practically attached to swift moving machinery for a large portion of nearly every day during that time, almost as much a part of it as if he were made of inanimate instead of animate matter, with power to think and feel, enjoy and suffer. (Page 114.)

Report of the New York Bureau of Labor Statistics, 1900.

The family furnishes the really fundamental education of the growing generation — the education of character; and the family life thus really determines the quality of the rising generation as efficient or non-efficient wealth producers. If a reduction in the hours of labor does promote the growth of a purer and better family life, it will unquestionably result in the production of greater material wealth on the part of the generation trained under its influence; nothing else in fact will so effectively diminish the vast number of criminals, paupers, and idlers, who, in the present generation, consume the people's substance. When one or both parents are away from home for twelve or thirteen hours (the necessary period for those who work ten hours) a day, the children receive comparatively little attention. What was said in the opening paragraph of this section in discussing the importance of a good family life in the training of character needs repeated emphasis, for it is the fundamental argument for a shorter working day. (Pages 70-73.)

United States Congress Senate Document, No. 141. Eight hours for laborers on government work. Hearings before the Committee on education and labor of the United States Senate, 1st session, 57th Congress. 1901-1902.

James O'Connell, President of International Association of Machinists:

The history of the movement in this country where the hours of labor have been reduced show a higher standard of manhood and a higher standard of intelligence and of excellency in work and in life, a higher and a better home, a happier and better family life, and a more comfortable and better home. In every trade and industry where the hours of labor have been reduced there has been no reduction of the output. (Page 522.)

III. SHORTER HOURS THE ONLY POSSIBLE PROTECTION

A. *Overlong Hours make Lightest Work Injurious*

The length of working hours, irrespective of the kind of occupation, is in itself, a menace to health. Even the lightest work becomes totally exhausting when carried on for an excessive length of time.

British Sessional Papers, Vol. XV. 1831-1832. Report from the Select Committee on the "Bill to regulate the Labour of Children in the Mills and Factories of the United Kingdom." THOMAS YOUNG, Esq., M.D., *Physician at Bolton.* 18th July, 1832.

GREAT
BRITAIN

10572. This work in factories is now and then attempted to be justified by being denominated "light and easy"; will you state whether it would obviate those effects even if the work were proved to be, as it is denominated, "light and easy"? — I think not. The employment cannot be considered a laborious one in itself or for a short period; but it is one which requires constant attention, it is irksome and fatiguing from its uniformity, the length of time it is followed, and the postures of the body required; it may rather be denominated fatiguing than laborious; it is not hard labour. To illustrate it, let us suppose a female doomed to thread needles as fast as possible, in constant succession and incessantly for twelve hours a day; to thread a needle is by no means laborious operation, but the continued and unvaried employment would be irksome and fatiguing in the extreme. (Page 520.)

10573. Would it not in some measure exhaust the nervous energies or at least fatigue the mind as well as the body, and occasion consequently as pernicious an effect upon the health, and sometime more so, than if the labour were more strenuous, and at the same time more varied? — It certainly would. (Page 520.)

Sir Anthony Carlisle, F.R.S., Surgeon in the Westminster Hospital:

11049. Is not that employment which has been sometimes denominated "light and easy," but being one of uniform and tedious, though not very strenuous exertion, but still producing great fatigue

of mind as well as body, more exhausting and injurious to the constitution than changeable locomotive exercise, when endured only for a moderate length of time, with due intermission?— I am convinced of that; because the sensorial powers being exhausted by an uninterrupted succession of muscular actions, must necessarily weaken or exhaust the powers of life: and therefore such exertions cannot be followed without a violation of the laws of animal nature.

11050. So you would not consider it a sufficient apology for this exceedingly long continued labour, if it were alleged truly, that abstractly considered, it demanded very little muscular exertion?— No, I would say, in such instances, it would still be a violation of the powers of nature. (Page 559.)

Sir William Blizard, F.R.S., Surgeon to the London Hospital and lecturer on surgery, anatomy, and physiology:

11199. Is not the employment in question, though it may, if contemplated for a moment, seem light or easy, yet when continued for such a length of time as to induce much fatigue to mind and body, as it is asserted it does, likely to be more prejudicial than even more strenuous labour pursued for a moderate length of time, and with due intervals for rest and refreshment?— I am clearly of that opinion; however light it may be, yet extended as it has been described, the consequences must in my opinion be as stated. (Page 572.)

John Elliottson, Esq., M.D., F.R.S., Physician to St. Thomas's Hospital:

11258. Should you not conceive that labour, sometimes denominated "light and easy" considered in itself, and apparently demanding but little muscular exertion, but continued for so great a length of time as to produce much fatigue of mind and body, and ultimately great exhaustion, is more injurious than a still greater exertion endured for a less length of time, and with longer intermission?— Certainly. (Page 577.)

Charles Aston Key, Esq., Surgeon at Guy's Hospital:

11418. It is alleged by the witnesses, that the labour in question is very fatiguing and exhausting; it is nevertheless stated by some who apologize for this length of labour, that it is "light and easy"; may I ask you, whether an employment which demands such constant and excessive attention for so long a period of time, and mainly in an erect position of the body, has not a more prejudicial effect than more natural exertions, pursued for a moderate length of time, and with due intermissions?— I should consider it matters not of what

nature the labour may be, if it is persisted in under an extreme state of exhaustion and fatigue of mind and body; if it be so persisted in, in an erect position, I consider it to be exceedingly injurious to the growth and development of the powers of the body. (Page 591.)

GREAT
BRITAIN

British Sessional Papers. Vol. XII, 1895 Report from the Select Committee on Shops (Early Closing) Bill.

Witness, Dr. Percy Kidd, M.D., of University of Oxford, Fellow of College of Physicians and Member of the College of Surgeons. Attached to London Hospital and Brompton Hospital.

5352. Would this be a fair way of putting it: it is not the actual work of people in shops, but having to be there and standing about and sitting about in bad air; it is the long hours which is the injurious part of it? — Quite so, the prolonged tension. (Page 218.)

British Sessional Papers. Vol. VI, 1901. Report from the Select Committee of the House of Lords on Early Closing of Shops.

Witness, Sir William S. Church, President of the Royal College of Physicians:

2306. . . . The evils which arise, I think, in these cases are those which arise rather from the long hours of attendance than from the severity of the labour. (Page 108.)

Evils of the Factory System. CHARLES WING. London, Saunders and Otely, 1837.

We must judge of the nature of any employment by its effects. Many employments require considerable exertion of strength, and yet, from being less monotonous, from requiring less of continued attentiveness, and from being carried on in daylight and in the open air, may be much less injurious than factory labour.

However light, however easy, however healthy an employment may be it may be so protracted as to become neither light, nor easy, nor healthy, and that this has been the case with the factory labour no one who reads the evidence brought before the several committees that have from time to time been appointed can for a moment doubt. (Page xxx.)

**GREAT
BRITAIN**

The Pioneer of Progress. JOHN DENNIS. London, Hamilton Adams, 1860.

. . . But while the nature of the employment is in a few instances highly deleterious, the extent to which labour is carried in comparatively healthy occupations is a greater cause for alarm. (Pages 9-10.)

The Eight Hours Day. SIDNEY WEBB and HAROLD COX. London, Methuen, 1891.

The human body needs frequent change of surroundings, change of exercise, to keep it in perfect condition. A man, and still more a woman, will suffer from protracted occupation at one particular task, even if that task in itself is healthy enough. And of all the manual work done in an advanced industrial community to-day, how much is healthy in its nature or done under healthy conditions? (Pages 6-7.)

GERMANY

Verhandlungen des Deutschen Reichstags, 101 Sitzung, 16 April, 1891.
[Proceedings of the German Reichstag, 101 Session, April 16, 1891.]

If I am told that the laws already protect men from over-long hours in dangerous employments or those which injure the health of the employee, I reply that therein is a proof of our correctness in demanding a general legal working day. The health of the worker is bound to be injured by over-long hours in any line of work, no matter what it is, and if the Bundesrath wishes to be logical, then it must take the position that the principle already acknowledged in that section of the law must be extended uniformly. It will be more rational to regulate conditions with foresight, by the law, than to leave them to work themselves out by slower methods. (Page 2364.)

Jahresberichte der Gewerbeaufsichtsbeamten und Bergbehörden für das Jahr 1907. Bd. I. Preussen. [Reports of the (German) Factory and Mine Inspectors for 1907. Vol. I. Prussia.] Berlin, Decker, 1908.

Bremen.

Women and young workers often fail to obtain the care and consideration for their physical well-being and working powers that

should be given them by their employers, the reason being, in general, that the work they do is regarded as "light work," and therefore not harmful. GERMANY

While it is quite true that in most cases their work is, by itself, not unreasonable in its demands upon their strength, yet when even easy tasks are performed in connection with highly perfected, rapidly speeded machinery, and are continued for hours and repeated thousands of times, they then constitute work that makes very great demands not only upon the physical endurance, but also upon the nervous system. (Pages 24-25.)

Die Krankheiten der Arbeiter. Bd. 2. [The Diseases of Working People. Vol. 2.] Dr. LUDWIG HIRT. Leipzig, 1878.

In the second place the working time must be considered, because in this factor of work lies the greatest possibility of exhausting the strength by forced exertion. (Page 266.)

No attitude of the body is harmful in itself; only in prolonging it until it produces harmful results; all the well-known disturbances, such as varicose veins, etc., etc., arise, not through sitting or standing, but through excessively prolonged sitting or standing. (Page 268.)

Handbuch der Hygiene. Bd. 8¹. [Handbook of Hygiene. Vol. 8¹.] Edited by Dr. THEODORE WEYL. *Allgemeine Gewerbehygiene und Fabrikgesetzgebung. [General Industrial Hygiene and Factory Legislation.]* Dr. EMIL ROTH. Jena, 1894.

When we take up the question of the effect of special trades upon morbidity and mortality, it must be premised that the idea of industrial diseases or occupation diseases in the ordinary sense of the term is an inaccuracy, for the specific so-called dangers of trades as such are not inseparably bound up with those trades, as the special hygiene of the factory proves daily. Only in so far as the length of working time, and severity of physical or mental labor are concerned in the various trades, or the necessarily close crowding in closed rooms in one or another occupation, can we speak of the different effects of different kinds of occupation upon the organism. (Page 8.)

GERMANY *Proceedings of the Fifth Meeting of the International Association for Labor Legislation. Lucerne, 1908. Jena, Fischer, 1909.*

Factory Inspector Furst:

A celebrated hygienist of Germany, Prof. Sommerfeld, says: "Overstrain may be either the result of unreasonably hard work, or of hours of work that are too long even though the processes of work do not make special demands upon muscular strength. In both cases the same results appear in course of time, sooner, in proportion as other dangers are involved in the occupation, or the organism of the worker is younger and less resistant, or the social conditions of the workers more wretched. (Pages 124-125.)

ITALY

Révue Internationale de Sociologie, Nov.-Dec. 1895. Le Travail Humain et ses Lois. [The Laws of Human Work.] FRANCESCO S. NITTI, University of Naples. Paris, Giard and Brière, 1895.

But, says Lagrange, it is not solely the occupation demanding great muscular exertion that produces exhaustion, but it is often, and, in industrial life, almost always, the occupation requiring a great number of hours of work. In such cases, combustion is not very active and its wastes have time to be eliminated; the products of disassimilation do not necessarily accumulate in the organism and there is no auto-intoxication, but what does happen is that much organic material is used up and the organism suffers extensive losses. (Page 1034.)

UNITED STATES

Report of the Illinois Factory Inspectors. 1893.

The lightest occupations are rendered injurious by long hours of labor. (Page 8.)

Journal of Social Science. The Working Women in New York. ELIZABETH STOWE BROWN, M.D. Boston, Damrell, 1888.

It must be remembered, also, that a comparatively harmless industry may be carried to a degree that is alarmingly injurious. . . . Eight or ten hours should be the limit of a woman's day of steady application. (Page 36.)

Charities and the Commons, March 6, 1909. Vol. XXI. No. 23.
New York. Factory Inspection in Pittsburgh. FLORENCE
 KELLEY, *Secretary National Consumers' League, Former Chief*
Factory Inspector, Illinois. UNITED STATES

Injurious conditions of work.

Industries may be injurious by reason of the nature of the machinery or of the material used (lead, sulphur, acid, etc.) or of dust produced in the process (steel, brass, cork, etc.) or of strain due to heat, cold, glare, darkness, or speed. Finally, an industry not intrinsically injurious may become so in a high degree by sheer lengthening of working hours, particularly when the workers are required to stand. (Page 1112.)

Even where the . . . work was as simple as wrapping caramels or packing crackers, the long hours combined with enforced standing made a harmless process highly injurious. (Page 1115.)

Charities and the Commons, March 6, 1909. Vol. XXI. No. 23.
New York. The Industrial Environment of Pittsburgh's
Working Women. ELIZABETH BEARDSLEY BUTLER, *Former*
Secretary New Jersey State Consumers' League.

The relation of hours to health needs only to be indicated. In the first place, long hours at one occupation are in themselves inimical to health. Neither brain nor body can endure unaffected the continual repetition of a single process. In the second place, by reason of long hours, the specific evils attendant on standing or sitting in a cramped position, operating heavy machinery, or continuously repeating a light but undiversified motion, are intensified. (Page 1133.)

B. *The Remedy: Shorter Hours*

A decrease of the intensity of exertion in industry is not feasible. The needed protection to working women, therefore, can be afforded only through shortening the hours of labor.

Hansard's Parliamentary Debates. Vol. 73. 1844.

Sir G. GREY:

I am equally well satisfied that persons are employed as adults for very long hours, physically unfit for the work they are called upon to do, and often unwillingly on their part.

He thought that in connection with other physical and moral ameliorations of the condition of the people the proposal of the noble lord (Ashley) would produce most beneficial results, and he seriously apprehended that without it all other means of amelioration with respect to this large class of the population would be comparatively useless. (Pages 1196-1198.)

Hansard's Parliamentary Debates. Vol. 74. 1844.

Lord Ashley quoted from a letter from Mr. Kenworthy, who was a partner in the great house of Hornby and Kenworthy:

... Let us release from our confined mills and factories, after a reasonable period of labour, the suffering thousands who are rendered weak and emaciated by long and excessive toil, in atmospheres loaded with noxious gases, which experience has demonstrated to be that most detrimental to the health of the human species. . . . Justice and humanity call aloud for a legislative act to remedy the evils of the long hour system. (Page 675.)

British Sessional Papers. Vol. XXVIII. 1844. Reports of Inspectors of Factories for the Half-year ending 31st December, 1843.

A theorist may say that these people (i. e. factory or mill operators who are females 18 and over) are old enough to take care of themselves; but practically there can be no such thing as freedom of labour, when from the redundancy of population, there is such a competition for employment. (Page 4.)

British Sessional Papers. Vol. XX. 1846. Reports of Inspectors of Factories for the Half-year ending 31st October, 1845.

The system involved in these two alterations (i. e. restriction on the labour of female adults and on children), and now so generally, I may say universally approved, as practically beneficial as well to employers as employed had been long practised by a

large and influential body of mill-occupiers; nevertheless, I do not believe there is a single individual who has been acquainted with the proceedings in these cases, but will allow that it would have been vain to hope either the restriction on children or on women would have become general, or could have been enforced, without a legislative provision on the subject. (Page 24.)

British Sessional Papers. Vol. XXII. 1849. Reports of Inspectors of Factories for the Half-year ending 31st October, 1848.

No one doubts that the longer manufacturing machinery is kept in motion, the greater will be the produce; and if it could be kept going all the 24 hours of each day, without compromising the physical and moral health of the human beings by which it is worked, no one would dream of interfering with it. But the far greater proportion of mills cannot work without the aid of children, or young persons, or women, and the Legislature has decided that such persons shall be protected against the temptations held out to them by the capitalist to work in a manner that is inconsistent with a sound healthy state of the population morally and physically. That is the whole question; it is a legislative interference demanded by a strong, overruling moral necessity, superior to all considerations of wealth. (Page 7.)

British Sessional Papers. Vol. XX. 1865. Reports of Inspectors of Factories for the Half-year ending 31st October, 1864.

The condition of the persons employed — shows the absolute necessity for supervision, and has strengthened my opinion — that free labour (if so it may be termed) even in a free country, requires the strong arm of the law to protect it from the cupidity and ignorance of parents; on all hands there appears the evidence that most of the workshops of this great commercial country are found to have fallen into the inevitable track of competitive industry when unrestricted by law, namely, to cheapen prices by the employment of women and children in the first instance, and then to increase production by protracted hours of work without much regard to age, sex, or physical capability, or to the need of social requirements. (Page 34.)

GREAT
BRITAIN

Evils of the Factory System. CHARLES WING. London, Saunders and Otley, 1837.

It is stated by witness after witness, that from the nature of the employment, the factory workmen, at a period when others are in full capacity for labour, are incapable of any very gainful employment, from impaired eyesight and general debility. . . . It is a spurious kind of humanity which would protect the child and leave the adult unprotected, upon the futile plea that he is able to protect himself. How have those fared who have sought to protect themselves? A candid answer to this question would abundantly show the fallacy of the pretext, that they are able to protect themselves. (Page 27.)

AUSTRA-
LIA

New South Wales. Legislative Assembly. Report of the Working of the Factories' and Shops' Act. 1904.

That factory life is on the whole, distinctly inimical to the physical and nervous well-being of women seems to me very probable, if not certain; but as it appears to be an inevitable condition of life in highly populated cities, . . . and as it is unlikely that we can ever escape from the system, in view of the increasing difficulty of making a living, the only remedy seems to be to minimize as far as possible the evils which the factory system brings in its train. (Page 13.)

Jahres Berichte der Gewerbe Aufsichtsbeamten: Amtliche Mittheilungen. 1889. [Annual Reports of the (German) Factory Inspectors. 1889.] Berlin, 1890.

As to the efforts being made in some directions to abolish factory work entirely for women, it has not been found that the workers themselves, even the married ones wish for complete restriction, but they wish for reasonable limitations for the abolition of night work and Sunday work, and for a working day of not more than 10 hours. (Page 93.)

GERMANY

Verhandlungen des Deutschen Reichstags, 101 Sitzung. 16. April. 1891. [Proceedings of the German Reichstag, 101st Session. April 16, 1891.]

Representative Bebel:

Such facts (growth of infant mortality) speak for themselves

of the fundamental need of legal protection to put a stop to these evils. . . . That we should take women out of industry is impossible . . . it would also be a catastrophe . . . but, that we are called upon to provide that industry shall not, in its use of the labor of its working women, overstep those bounds which must be preserved if the physical development of women is not to be injured to the utmost limit, is, in my opinion, self-evident. (Page 2420.)

There is this to be remembered, that we owe it to our women and young girls, remembering their inestimable importance to the physical and spiritual progress of the race, as the mothers and teachers of children, to establish laws which shall afford them ample protection for their own physical and intellectual health and development. (Page 2423.)

Die Jahres Berichte der k. bayerischen Fabrik-und Gewerbe Inspektoren für das Jahr 1899. [Report of the Royal Bavarian Factory Inspectors for 1899.] Munich, 1900.

Factory work for women seems to be, under our present social organization, an industrial necessity, and it is only possible, at present, by passing specific protective measures, to ward off from working women those special dangers to health and morals which they would otherwise encounter. (Page 24. Preface.)

Die Beschäftigung Verheiratheter Frauen in Fabriken. Nach den Jahresberichten der Gewerbeaufsichtsbeamten für das Jahr 1899 bearbeitet im Reichsamt des Innern. [The Employment of Married Women in Factories. From Reports of the (German) Factory Inspectors for 1899, compiled in the Imperial Home Office.] Berlin, 1901.

“And yet” (wrote one inspector) “the limitation of working hours appears to be the only solution for securing to women enough time to care for their families and for preventing the premature exhaustion of their physical strength. It is also to be hoped that the great usefulness of women in factory work will not permit of their general dismissal.” (Page 174.)

GERMANY *Jahresberichte des Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr 1902.* [Reports of the Factory Inspectors in the Kingdom of Württemberg for 1902.] Stuttgart, Lindemann, 1903.

. . . Reduction of hours does not keep pace with advances in technique . . . where there is an obvious tendency to make use of human power to the fullest possible extent. This is especially true in the textile mills, where certain older processes are modified by new contrivances. The result now is that, while the wages of skilled spinners (women) have risen about 12 or 13 per cent, the number of spindles on which they must concentrate attention for 11 hours has been raised from 500 to 750, an increase of 50 per cent. This is not quite the same as saying that the strain upon the spinners is 50 per cent greater, since a certain number of helpers are provided. Nevertheless the attention and skill demanded are much greater than was formerly the case. Such examples make it plain that, with this increasing intensity of strain in work, the hours of work must be correspondingly shortened if the people are to be protected from ruin of their health. (Pages 74-5.)

Jahresberichte der Gewerbeaufsichtsbeamten im Königreich Württemberg für das Jahr 1903. [Reports of the Factory Inspectors in the Kingdom of Württemberg, 1903.] Stuttgart, Lindemann, 1904.

This uncontested fact of rising claims upon the physical and mental capacity of the workman, which is more or less strikingly evident in every department of labor, has in recent years brought the question of shorter hours to the front. The necessity of compensation through shorter hours is not only recognized by the inspectors, but by many employers as well. (Page 96.)

Handbuch der Arbeiterwohlfahrt, Bd. I. [Handbook of the General Welfare of the Working Classes. Vol. I.] Edited by Dr. OTTO DAMMER. *Beschädigung der Arbeiter bei der Arbeit.* [Injuries of Occupation.] Dr. ASCHER. Stuttgart, Enke, 1902.

The long working hours also explain the well-known fact that waiters and waitresses are "used up" at a comparatively early

age. . . . The effect of work carried on during long hours in badly ventilated places is also important. . . . It is clear that many of these evils can be remedied only by shortening the working hours. (Page 70.)

Gesammelte Abhandlungen. Bd. III. [Complete Works. Vol. III.] Die Volkswirtschaftliche Bedeutung der Verkürzung des Industriellen Arbeitstages. [The Economic Significance of a Shorter Working Day.] ERNST ABUE. (Paper read before the Political Society at Jena in 1901.) Jena, Fischer, 1906.

On the one hand, it must be admitted that daily monotonous labor has a stupefying influence; on the other, that technical and scientific demands create a continuous strain upon intelligence; hence there is only one way to restore a balance:—by giving some opportunity for natural intelligence to develop, by concentrating daily toil into the shortest possible time and leaving the longest possible time for rest and intellectual stimulus, that people may not be made stupid, but, in spite of the monotony of their daily tasks, may retain the capacity for interest in other things. (Page 238.)

Labor Laws for Women in Germany. DR. ALICE SALOMON. Published by the Women's Industrial Council. London, 1907.

A study of the laws relating to female labor reveals that it has been the special aim of the legislators to protect and preserve the health of the women in their character as wives and as the mothers of future generations. On the one hand, the regulations are intended to prevent injury to health through over-long hours, or the resumption of work too soon after confinement, often the cause of serious illness which may render the patient incapable of bearing healthy offspring. . . . But if work in the factory be a necessity for women — even for married ones — it is all the more desirable that protective legislation should be so extended and worked out in such detail as to ensure the fullest attainment of its object, viz.: protection for the health of the female working population, as well as for the family and the home. (Page 5.)

SWITZER-
LAND

Sixth International Congress of Hygiene and Demography, Vienna, 1887. Part XIV. Vol. I. Fabrikhygiene und Gesetzgebung. [Factory Hygiene and Legislation.] Dr. FRIDOLIN SCHULER, *Swiss Factory Inspector. Vienna, 1887.*

The late evening hours of work running into the night are bitterly complained of, . . . But however desirable, exclusion of women from factories is impossible. . . . One thing, however, is certain, — the need of special protection for women, as well as for children, becomes more and more pressing. (Pages 29-30.)

Untersuchungen über die Gesundheitsverhältnisse der Fabrikbevölkerung der Schweiz. [Investigations into the Conditions of Health of the Swiss Factory Workers.] Dr. FRIDOLIN SCHULER, *Swiss Factory Inspector, and Dr. A. E. BURCKHARDT, Professor of Hygiene in Basle. Aarau, Säuerländer, 1889.*

There are quite definite types of illness which are prominent in women workers. First of all are to be mentioned constitutional ailments, anæmia, chlorosis, general weakness. They are especially characteristic of working women under 30 years and are frequent also in later years, giving an average of 10 per cent to 17 per cent of all disabilities. It is true that the physique of woman predisposes her more readily to these disorders, but besides that, her generally inferior power of resistance to unhealthy influences must not be overlooked. When it is remembered how long may be the duration of constitutional disease, it almost seems as if women should be excluded from mills and factories, or at least their entrance to them made more difficult. As to shut them out is a social impossibility, it follows that their conditions must be improved, and they themselves must be protected, whether this shall be done by raising the working age, or by lowering the maximum hours per day, or by earlier Saturday closing is not to be superficially decided. (Page 170.)

UNITED
STATES

Massachusetts Senate Documents. No. 33. 1874.

The Committee on the Labor Question, to whom was referred so much of the Governor's address as relates to Labor Reform, having considered so much thereof as pertains to the enactment of

a ten-hour law, and having also considered the petition of Wendell Phillips and others for the passage of such a law, Report:

That the advocates of a reduction of the present hours of labor in textile manufactories claim, and produce evidence to show, that ten hours is as long as females or children should be required, or allowed, to work in the close confinement of the mills, if the Commonwealth has any interest in insuring a healthy and intelligent posterity; that working eleven and twelve hours a day in these factories saps the energies and produces a depression of spirits that find relief only in the indulgence of intoxicants.

They claim that the only remedy for these evils is to diminish the hours of labor. (Page 1.)

Report of the United States Industrial Commission. Vol. XIX. 1901.

It is certain that any programme for reducing this intensity of exertion must fail. The entire tendency of industry is in the direction of an increased exertion. Any restrictions on output must work to the disadvantage of American industry, and the employers are often right in their demand, usually successful, that such restrictions be abandoned. This being true, there is but one alternative if the working population is to be protected in its health and trade longevity, namely, a reduction of the hours of labor. (Page 763.)

Wealth and Progress. GEORGE GUNTON. New York, Appleton, 1897.

In proportion as the use of improved machinery is extended, and the specialization of labor is increased, does this labor become physically and nervously more exhausting; and in proportion as this pressure increases, unless the working time is correspondingly reduced, the laborer's susceptibility to the refining and elevating influences of his social environment is lessened and his leisure moments find him dull and indifferent to all moral and political influences. (Page 360.)

Industrial Conference under the Auspices of the National Civic Federation. New York, 1902.

The factory system makes this (shortening hours) more and more necessary in proportion as it is perfected in its mechanism.

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It becomes all the time more and more exacting. The greater the perfection of the machinery or the method, the more attention is required. (Page 173.)

And whatever is necessary to make the most of the machinery is important to the successful conduct of the industry. If that makes the laborers tired, then, so far as the employer is concerned, they must be tired; if it calls for too much strenuous attention, too much nerve exhaustion, then the nerve exhaustion must come or the machinery is a failure. The remedy for this cannot be found in slackening up on the demands for economic output and effectiveness in the machinery. . . . The remedy for that must come on the other side, shortening the day, not slackening the effort. The tension may not be lessened, but the hours may be reduced. The exhaustion on the laborer must be avoided, but it cannot be avoided by reducing production . . . they (employers) find that modern business is more exacting than ever and . . . that to slacken is to fail. Consequently they find that long vacations are necessary to avoid physical exhaustion. But long vacations are impossible for laborers . . . they must have relief by lessening the duration of the pressure every day. (Pages 174-175.)

C. *The Method: Legislation*

Experience has shown that legislation is necessary to protect women from excessive working hours; and that such legal limitation of hours is the most direct, most effective and most satisfactory method of protection, for all concerned.

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British Sessional Papers. Vol. XII. 1886. Report from Select Committee on Shop Hours Regulation Bill. Special Report.

The great majority of witnesses expressed their opinion that though voluntary action had effected much improvement, little could be expected from it in the poorer neighborhood and that nothing short of legislation would be effective. . . .

Witness, Thomas Sutherst:

441. Are you acquainted with the Early Closing Association, so called? — Yes.

442. . . . — I believe that that Association has done a considerable deal of good; but why, I think, their efforts are inadequate to cope with the evil is, because they have been in existence for 40 years, and have not called in the aid of legislation, and the hours have not been permanently curtailed to any appreciable extent, whilst in the case of the artizans and mechanics whose labour has directly or indirectly been influenced by legislation, their hours have been reduced to 56 per week. Therefore I argue from that, that with the best intentions, and after working very hard the Early Closing Association has failed to effect that curtailment of the hours which is necessary to meet the evils resulting from them. . . .

444. And the shortening of the hours of the artizan has been from trade associations, has it not? — Yes, and from operation of the Factory Acts. (Pages 27, 28.)

591. Then is it not a fact that wherever female labour is employed to any extent, that industry is practically impossible of organization to the extent to which trade unions are organized, and that wherever their labour has been curtailed it has been by law and not by voluntary action? — That is so.

592. The competition of young girls and women in the shop assistant business is so enormous, I suppose that practically it is impossible to organize them to protect their own interests? — That is so. (Page 35.)

The Hygiene Diseases, and Mortality of Occupation. J. T. AR-
LIDGE, M.D., A.B., F.R.C.P. London, Percival, 1892.

. . . When labor is performed in factories and shops with overheated and impure air, where the workmen are subjected to excessive heat, to steam and noxious vapors and gases, to abounding dust, to industrial details involving strain upon the attention and mental wear, then what may be called an artificial limit to the duration of labour is called for, inasmuch as muscular fatigue has conjoined with it incidents which add an intensity to it as a health factor. (Pages 49–50.)

Workers on their Industries. Edited with introduction by Frank
W. Galton. London, Sonnenschein, 1896.

Frank W. Galton:

One other point remains upon which the authors of these essays display so remarkable a unanimity of opinion that I cannot refrain

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from drawing attention to it. The need for further and very considerable legislative protection and control over their industries, and the conditions of their working lives, is one upon which every one of these authors is thoroughly agreed. (Page 13.)

CANADA

Reports of the Inspectors of Factories, Ontario, Canada. 1895.

... There is nothing so effective as good legislation. It is through this source that work has been made less burdensome for the laboring people. It is not only occupation that is needed for females, but employment that is hedged round with wise laws, so that the least possible harm can follow. (Page 25.)

Reports of the Inspectors of Factories, Ontario, Canada. 1900.

The law regulating the hours of labor for women and girls requires close attention, if under existing circumstances women and girls must take their places as laborers in factories and workshops, their health, safety, and comfort must not be left to chance. Here, if anywhere, the shield of the law must be invoked against all preventable causes of evil and danger incidental to such employment. (Page 21.)

GERMANY *Verhandlungen des Deutschen Reichstags. 43. Sitzung, 8. Mai, 1878. [Proceedings of the German Reichstag, 43d Session, May 8, 1878.]*

Representative Motteler:

In 1869, in discussing labor legislation in the North-German Reichstag, Herr von Schweizer, one of the representatives, had said. "We claim the normal day not only for minors, we also demand it as a fundamental need of adult workers. . . . To fix a normal day for laboring women, by legal limitation of working hours, is a duty of the greatest importance for which we must enter the lists at the earliest possible opportunity." (Page 1147.)

Annalen des Deutschen Reichs. Bd. 21. 1888. [Annals of the German Empire. Vol. 21.] Der internationale Schutz der Arbeiter. [International Labor Legislation.] Dr. GEORGE ADLER, University of Freiburg. Berlin, 1888.

It is no longer necessary, fortunately, to bring forward lengthy proofs of the need for legal protection of labor. It is now almost

universally admitted that modern conditions of industry lead to lamentable consequences for the workers unless the state interferes for their protection. In the course of modern industrial development, evils arose in every nation which, for millions of the working classes, jeopardized all the attainments of civilization. (Page 465.)

Verhandlungen des Deutschen Reichstags, 101 Sitzung. 16. April, 1891. [Proceedings of the German Reichstag, 101st Session. April 16, 1891.]

Representative Ulrich:

The right of organization does not suffice. . . . England, the classic land of industry, shows most plainly that the struggle between capital and labor has increased in intensity and that, in spite of the right of combination little has been gained except by legislation. Women are at present far less in position to protect themselves through organization than men, and consequently we redouble our efforts to obtain legal regulation of their labor without exception. . . . Female labor has assumed enormous dimensions, and it should be the duty of government to establish a normal day, wherewith to resist an increasing exploitation of working women. (Page 2412.)

Amtliche Mittheilungen aus den Jahres Berichten der Gewerbe Aufsichtsbeamten. XXI. 1896. [Official Information from Reports of the (German) Factory Inspectors.] Berlin, Bruer, 1897.

The disadvantages resulting from the fact that legal protection is not extended to workers outside the factory are constantly becoming more conspicuous in the textile and clothing trades. It is becoming obvious that this is only an advantage to those employers and middle men who do nothing for the benefit of their employees, and it will be most unfortunate for restrictive legislation in this field to be so long delayed that the present exploitation of women's health and strength shall have gained the upper hand and be systematically carried on. Düsseldorf. (Page 265.)

. . . The existing conditions call urgently for protective legislation for all young persons and women who are engaged in industry, without exception. Bayern. (Page 265.)

GERMANY *Die Arbeiterfrage.* [*The Labor Question.*] Dr. HEINRICH HERKNER, *Professor of Political Economy in Karlsruhe.* Berlin, Guttentag, 1894.

If it is concluded that it be urgent to reduce the hours of work for social, politico-economic, and moral reasons, then it is obviously most effective to bring this reduction about by the simpler and safer method of state intervention. True, well organized workmen are able to win favorable working hours for themselves, better possibly than may be obtained by legislation. Yet, because it is unnecessary to resort to legislative protection for a highly favored élite among workers, it cannot therefore be held as justifiable to withhold this protection from that incomparably larger number who stand in much more urgent need of protection. A legal reduction of hours of work will give many such laborers the first opportunity they have ever had to try to advance themselves. . . .

Not only that . . . but it is more directly conservative of public interests that reduction of hours of work should be brought about by legal enactment than by the bitter, weary and destructive method of industrial war. (Page 248.)

BELGIUM *Royaume de Belgique. Commission du Travail. Institutée par Arrêté royal du Avril 15, 1886.* [*Royal Belgian Labor Commission, 1886.*] *Réponses au Questionnaire concernant le Travail Industriel. T. I.* [*Questions and Answers on Industrial Work. Vol. I.*] Brussels, 1887.

Question 15. As to length of hours and regulation of work of women and children, etc.

Answer: 1194. . . . For many years the need of regulating the labor of women, children, and even adult men, in factories, mills, and workplaces, has been acknowledged. . . . Even giving full weight to objections interposed on grounds of liberty . . . I believe that such legislation is becoming more indispensable every day. . . . Without interfering with the needs of industry, could we not advantageously fix intervals of rest for adult workers, and above all for youthful workers, women and children. . . . (The Governor of West Flanders.) (Pages 153 and 154.)

1195. We need legal restrictions. Simple justice demands it.

Above all we need to prevent by legislation the excess of work to which I have (previously) alluded. (Countess de Stainlein-Saalenstein.) (Page 154.)

Royaume de Belgique, Conseil Supérieur du Travail, 9e Séance. 1907. [Belgian Higher Council of Labor. 1907.] Règlementation de la Durée du Travail des Adultes. [Regulation of Hours of Work for Adults.] Brussels, 1907. BELOIUM

M. G. Helleputte:

Many wish that private initiative should effect a general reduction of hours. We shall not hesitate to contest this. . . .

Private initiative, however well meaning, is not sufficient to shorten hours of work. For isolated efforts are naturally powerless to act successfully in opposition to competing interests and even if they could oppose the majority without injury, prejudices and timidity often prevent them from assuming the risk. The first employer, who, merely for his own profit, compelled his workmen to work at night, deprived them of the weekly day of rest and imposed exhausting hours of work on them was guilty of treason to humanity; but those who came after him were not always free to do otherwise than he did. . . . Private initiative being powerless, must we resign ourselves to the existence of social wrongs: May we not rather appeal to the social power whose business it is to watch over the general interests? (Page 7.)

The academic argument concerning the liberty of the individual would have much strength if the laboring man were really free to regulate the length of his working hours as he wished. Such liberty may be enjoyed by the isolated workman working for himself, but wherever men work in common, and above all where they work at different parts of the same product, the length of their working hours is regulated by the length of hours of their comrades, and this in turn by competition. . . .

The single workman then has, in reality, no power to decide as to the length of his working day. (Page 10.)

Les Projets de Limitation de la Durée du Travail des Adultes en Belgique. [Proposals regarding Limitation of Hours of Work for Adults in Belgium.] HECTOR DENIS. [No. X of the publications of the Belgian Section of the International Association for Labor Legislation.] Liège, Benard, 1908.

Agreement (in the discussion in Parliament, 1896, on the report made by M. Van Cauwenberg on labor legislation) was unanimous as to the principle underlying the intervention of law in labor

BELGIUM agreements. It was recognized as legitimate to prevent abuse of the laborer's strength. (Page 6.)

It was recognized that the individual workman's position is less independent than that of the employer . . . that, therefore, contract is not entirely free . . . it was generally admitted that organization is not yet sufficiently well developed to equalize the workman's freedom in contract and no one wished to delay (until organization should become so developed) a reform which is held to be indispensable to the conservation of health and to the physical and moral progress of the working population. (Page 6.)

SWITZERLAND *Berichte der Eidgenössischen Fabrik und Bergwerksinspektoren über ihre Amtstätigkeit, 1902:1903.* [Reports of the Swiss Factory and Mine Inspectors. 1902-3.] Aarau, Säuerländer, 1904.

Women and children have profited least from the rapidly progressing voluntary reduction of working hours. Here it seems to me, is a sign pointing plainly in the direction that legislators need to take and that they must take. (Page 68.)

Proceedings of the Fifth Meeting of the International Association for Labor Legislation. Lucerne, 1908. Proposition of the Commission on the Maximum Day. HERR GRIESBERTS. Jena, Fischer, 1909.

2. In addition to the gains secured or likely to be secured by organization, the intervention of legislation is essential in order to make possible the general establishment of a maximum working day. (Page 82.)

UNITED STATES *Maine. Senate Document No. 19. 1848. Report on Petition praying passage of law making 10 hours legal day's work.*

It is in vain that men endeavor to fix the hours by agreement; for (however unreasonable and preposterous such a course may be) employers claim that any such agreement is an infringement on their rights, and instances are not wanting in which men have been refused contracts for job work where the prices asked were satisfactory, unless they would consent to work as long as they could see. (Page 2.)

Massachusetts. House Document No. 185. 1852. Minority report on sundry petitions for legislation limiting hours of labor. **UNITED STATES**

While the *men*, employed in machine shops, have political power, which makes them feared and enables them to *demand* justice, the *women* of the factories have none of this influence, and consequently are at the mercy of their employers. . . . The legislation of this State is nobly distinguished for the regard which it has paid to the infirm, the insane, the idiotic, and the criminal. But it has done very little to preserve the health and strength of its own people. (Page 9.)

Massachusetts House Document. No. 122. 1853. Minority report on regulation of hours of labor in establishments of incorporated corporations.

The vast inequality of condition, as to power and influence, between the corporate employers and their employees, leaves no possible ground for hope that the hours of labor can ever be reduced by the efforts of the operative classes, unaided by the legislature. (Page 4.)

In considering the expediency of the proposed legislation, it should be borne in mind, that the corporations are creatures of the legislature, — that the promotion of the public welfare was the end and aim of their creation, and that the stockholders have by no means an exclusive interest in their management and control. The power that created corporations is in duty bound to control them, and put them under such regulations and restrictions as will best promote the public welfare. (Page 5.)

Report of Pennsylvania Industrial Statistics (being Vol. III. of Penn. Internal Affairs). 1882-1883.

Should it not be the duty of the Government to watch the health and condition of its people, or is it the duty of Government to tax labor and give nothing in return in the way of protection? I deem that the time has come demanding the hours of labor be limited by law, as the strain upon the vital force is too great, having the effect to weaken mind and body, ruining health and shortening life. (Carpenter.) (Page 118.)

Report of the New Jersey Inspector of Factories and Workshops.
1885.

Regulation of Women's Labor. A legal regulation of the employment of women in manufactories has become a pressing necessity in the interest of justice and humanity. (Page 44.)

Report of the New York State Factory Inspectors. 1887.

. . . As the law does not fortify them in their objections to overtime, they dare not openly protest. We think that an investigation would satisfy any one that ninety-five per cent of the females working in the State, who are over twenty-one years of age, favor a limitation, by law, of their hours of labor to sixty a week, and were they organized that would be one of the first rules they would adopt and enforce. (Page 27.)

New Hampshire. Governor's Message, 1887. GOVERNOR CHAS.
H. SAWYER.

While it would be unwise and contrary to the spirit of our institutions for the State to make laws that would interfere with the freedom of individuals, in the transaction of a lawful business, to buy or sell when or where, with whom and upon such conditions as may suit their own will and convenience, yet it is right and proper to establish such limitations by general and practical laws and regulations as will serve to protect the worker from undue hardships, which often result from business competition. (Page 8.)

Report of the New York Factory Inspector. 1893.

James Connolly, Factory Inspector:

The tendency of the age is toward a shorter work-day for all classes of workers. The employees of the State and of several cities in the State have had eight-hour laws passed for their benefit, and the trade organizations, composed mainly of men, are agitating for the establishment of an eight-hour work-day, and some of them have already succeeded in getting it. The others will no doubt succeed in time. But the women, who are a constantly increasing element in industrial life, and the children, who are certainly entitled to all the legal benefits possible to bestow, cannot

organize successfully to obtain a reduction of their hours of labor, although from a physical standpoint, at least, they are more entitled to consideration in this direction than are the members of the trades unions as a rule. An illustration of the need of legislative assistance to obtain for women and children an equal work-day with the organized members of the same trades is seen in the cigar-making business.

The Cigarmakers' Union has for a number of years enforced an eight-hour work-day among its membership, which comprises a vast majority of the journeymen of that trade. The women and children, who are employed as strippers, however, who have no union, and who are the poorest paid workers in the trade, must work for the same employers two hours longer each day. Their work is just as laborious and confining as the actual making of cigars, and, to them, comparatively more unhealthy than cigar-making is to cigarmakers.

It will be seen from this that the women and children can only look to the legislature to obtain the relief which nature and existing industrial conditions demand for them. (Pages 25-26.)

Report of Chief of Massachusetts District Police. 1895.

While great reforms have been made in legislation in the last few years in the interest of women employed as operatives and in similar ways, there are special reasons why incessant vigilance must be exercised to secure for them adequate protection from injustice, and the best attainable sanitary conditions. If any considerable number of men so employed suffer from preventable evils, arising from conditions adverse to their welfare in any respect, they have the means of immediate and sure correction. They may alter, amend, or make laws to remove their grievances and better their condition as workmen. It is not claimed that the Commonwealth is indifferent to the welfare of women employees, — the legislation in protection of their rights as workwomen shows the contrary; but because they cannot by direct and personal effort shape the laws intended to protect wage-earners, it is incumbent upon us to secure the best possible conditions of employment for them. (Pages 75-76.)

Report of the United States Industrial Commission. Vol. VII. 1900.

We may find that it is desirable in time to do by law what a few persons are doing voluntarily. It is in that way that the original ten-hour law was tried tentatively in England; a few manufacturers tested the matter in their own factories and found that their people could do as much in ten hours as they theretofore had been doing in twelve and thirteen; that made the law seem reasonable. (Page 64.)

Report of the Wisconsin Bureau of Labor and Industrial Statistics. 1907-1908. Part III. Industrial Hygiene and the Police Power. Being a Reprint of a Paper on the Legitimate Exercise of the Police Power for the Protection of Health. By HENRY BAIRD FAVILL, M.D.

Voluntary effort inadequate. It is not likely that mere voluntary and even co-operative regulation is the best solution. Rules applied to an industrial establishment, which are not purely related to the immediate product of industry are difficult of enforcement and liable to controversy. There is no prospect of such general development of intelligence and co-operative spirit amongst employers as will ensure sufficient uniformity of process. There is no way to ensure the acceptance on the part of laborers of conditions which may be to them distasteful, except through authority backed up by universal custom. There is no reasonable doubt that it is in the interest of employers, not only from an economic standpoint, but in respect to the practicability of instituting reform, that these measures be mandatory and the expression of a very radical state policy. (Page 488.)

Bulletin of the United States Bureau of Labor. No. 80. January, 1909. Woman and Child Wage-earners in Great Britain. VICTOR S. CLARK, Ph.D.

Even where hours of work are shorter than those permitted by law the factory acts applying to them still serve a purpose. The poor economy of excessive factory hours is now understood; but it is a truth that has to be learned anew by so many employers, and there are so many particular and temporary exceptions to its

general application that abuses, though infrequent, can be checked only by statute. Laundries have recently been made subject to factory regulation. Evidence showed that prior to this women were obliged to work in them beyond normal hours, and occasionally even to the limit of physical endurance. And while legislation is not the sole cause for the shorter working-day of women and children, and might not have secured this end without other assisting influences, it has been a potent cause, and without this legal intervention conditions in some industries might not have improved materially during the past century. (Page 53.)

Discussions in Economics and Statistics. Vol. II. FRANCIS A. WALKER, Ph.D., LL.D. *The Eight-hour Law Agitation.* New York, Holt, 1899.

And, in the first place, let it be said that there is no fatal objection to the intervention of the state in the contract for labor. The traditional position of the economists in antagonism to such legislation upon principle, is one which ought never to have been taken, and which cannot be maintained. The factory acts of England, which have become a model to the world, are in themselves a monument of prudent, far-seeing, truly wise statesmanship, which employs the powers of the State to defend its citizenship against deep and irreparable injuries, and truly helps the people to help themselves. . . .

. . . That objective was based on the theory that whatever interferes in any way with the freedom of contract and of action must, in the end and in the long run, injure the working classes. . . .

If one course gives a man a legal right to do anything, but results in his being so helpless, and brings him into such miserable straits that he can, in fact, do but one thing, and that thing which is most distressing; while another course, although it may keep a man somewhat within bounds, actually conducts him to a position where he has a real choice among many and good things, which course affords the larger liberty?

. . . Theoretically, he will not work in any mill where he is not well treated, where the sanitary arrangements are not at least tolerable, where machinery is not fenced to prevent death and mutilation, and where the hours of labor are not kept within the

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limits of health and strength. Certainly, he will not do this if he be really free. Practically, however, in the absence of factory legislation, the operative will have no choice but to work as long as the great wheel turns, be that ten hours, as so generally now, or twelve or fourteen, or sixteen, as in the days before the factory laws; he will see his companions bruised and mangled by unguarded machinery; he will all the time breathe air deeply laden with poisonous particles or deadly gases. (Pages 380-382.)

IV. ECONOMIC ASPECT OF REGULATION

A. *General Benefit to Commercial Prosperity*

The experience of those manufacturing countries which have longest had legal regulation of working hours for women shows that commercial prosperity is not hampered by such regulation. The increased efficiency of the workers due to shorter working hours, together with the general improvement of industrial communities in physique and morals, react so favorably upon output that commercial prosperity is heightened rather than impaired by legal limitation of hours.

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British Sessional Papers. Vol. XXVI. 1847-1848. Reports of Inspectors of Factories for the Half-year ending 30th April, 1848.

Many occupiers of factories, who were originally adverse to legislative interference, have, again and again, stated to me that they had seen reason to alter their opinions; that the restriction of the labor of young persons and women has had a very beneficial influence upon the factory population, and the vast increase in the number and extent of cotton mills, which has taken place since 1834, — is a convincing proof that it could not have had any injurious effects upon trade. (Page 4.)