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## OVER-DENBITY OF POPULATION IN CITIES.

The great and growing question as to the dingers, both to life and health, that result from an overcrowding of the population in large cities, has lately received a new treatment at the hands of the learned Dr. Parr, by the labors of whom the subject has been reduced to a science of almost mathematical exactness. In a paper entitled "Density or Proximity of Population, its Advantages and Disadvantages," recently presented to the Congress at Cheltenham, England, by this excellent authority, the statistics shown are somewhat start ling, and put forth in such a way as to prove exceedingly interesting and instructive. Dr. Parr's principle is this
"Observe the effects of the population-density; as a rule,
the greater this density the shorter the duration of life; and the greater this density the shorter the duration of life; and
this life-duration is seen to follow a ratio appreciable by sim ple arithmetic."
That man by his very nature is gregarious in his habits, and that, following the dictates of his nature, it is his wont to congregate in dense communities, is a fact so well known, and one that has been so often commented upon, as to appear trite in its repetition. We cannot, perhaps, expect to accomplish much in the way of changing his habits in this respect by moral suasion, the best we can do being to exhibit the results that modern science has arrived at in its investigations of the subject of overcrowding, not so much to the sufferers themselves from this state of things, as to the authorities whom they have elected to look after their welfare. The gist of the matter is given by Dr. Parr in the following words: "The nearer people live to each other the shorter their lives are, ${ }^{v}$ and the relations of this proximity to the duration of life are ascertained to be as follows:

In round numbers, where we stand on an average 400 feet off from each other, we live on an average 50 years; where we are 300 feet off, we live 40 years; where we come within 60 feet of each other, we live but 30 years; and where we are but 20 feet off, we live but 25 years. It does not seem likely that by extending our interspace beyond the 400 feet we could prolong the average of life beyond 50 years;
but it is very clear that if we contract the interspace beyond the limit of 20 feet we must rapidly reduce the mean of 25 years to 20 , to 15 , to 10 , and before long, so to speak, to nothing. That is to say, there is a certain population-density with which, in the ordinary circumstances attending such a condition, human life could not be sustained at all; and from this melancholy zero there rises a scale of progression, obey-
ing, of course, a recondite, but intelligible mathematical law, whereby we may measure off in a moment, according to the number of lives per acre, the number of years of life." Again, from Dr. Parr's actual figures we learn that "during the decennial period from 1861 to 1870 inclusive, the deathrate of certain of the most favorably situated districts of England, taken at per 1,000 of the population, proved to be 17 per annum, 16, and even so low as 15 ; whereas in certain other places it stood at 31, 33, and even 39 per 1,000 per annum. He then tells us that in those cases where 16 died in 1,000, each individual had to himself, on an average, 4 acreswhere 15 died, each had 3 acres: whereas where 31 dicd, each had only one tenth part of an acre on an average; and where 39 died, each had only one one-hundredth part of an acre. The writer then goes on to show that, as regards the intermediate cases, the regularity of the rule is sufficiently pre cise." It further appears that the densest and most unwhole some of the districts in England is Liverpool, where a square
mile holds no less than 63,823 human beings-an average of about one hundredth of an acre to each, or equivalent to a space of 12 by 12 feet. Thus it may be readily seen that if the men, women, and children of the lower order were to be placed on a surface of level country, each person being 12 feet from the next, and if the dirt, destitution, intemperance, and disease, coupled, of course, with the toil of this class, were conditions present in full force, 39 out of 1,000 , or say 1 out of 25 , must die annually. In other words, the average duration of human life must be as low as 25 years.
Such are some of the more important of the interesting facts given us by Dr. Parr in his valuable paper. The Architect, to which we are indebted for an abstract of these conclusions, remarks very truly that "no doubt the local circumstance of any particular community must always exercisc a consid erable influence on the death rate. It is scarcely neces
sary to say that it is not so much the crowd that kills, as it is the conditions under which the crowd accumulates; the conditions of soil and climate, of the contamination of air and water, of the disposal of refuse, of food supply, of the consumption of strong drinks, and of social character and habits in various ways, whether in labor or in idleness.' While there is no doubt that such conditions as these exer cise a large influence on mortality in large cities, there is also no doubt that the death rates in such communities are pretty certain indices of the perfection or imperfection of municipal arrangements in regard to sanitary matters.
Without pretending to state the cause, we may call atten tion, in connection with this subject, to the following fact From the figures lately published by the German Imperia Statistic Office, giving the mortality per 1,000 inhabitants in the chief cities of the world, we learn that the death rate in
the city of New York is about one third greater than that of London, and a fraction greater than that of Liverpool, which, as Dr. Parr has shown, is the most unfavorable district in England.

## PATENTS IN NEW SOUTH WALES

A bill to amend the laws relating to patents has been in troduced in the Parliament of New South Wales. It pro
vides for the establishment of a patent offler, the appoint ment of $\dot{x}$ " Patents Officer," and the issuing of patents for inventions, and the publication of the patent specifications Any person may obtain a patent for his invention, giving him an exclusive property therein, provided the invention has not been in public use in New South Wales for more than one year, or has not been patented in any other country more than one year. But if any one in New South Wales shall have begun to manufacture an article before the patent is granted, such person may continue to manufacture and sell such article notwithstanding the patent. The life of a patent is to be five, ten, or fifteen years, at the option of the patentee, the respective fees being $\$ 25, \$ 50$, and $\$ 75$. The Government retains the privilege of using any patented in vention on paying to the patentee such sum as the Patents Officer may decide to be a reasonable compensation therefor. Patents are assignable, wholly or in part, the assignment to be registered in the Patent Office. In case of infringements, the Supreme Court adjudges damages and costs.

## SUN SPOTS AND COMMERCIAL CRISES.

To the numerous explanations that have hitherto been given by various writers on commercial topics, to accoun or the present depressed state of trade, there has recently been added another-this time from the pen of Prof. W. Stanley Jevons, who, in a late number of Nature, treats the matter at some length from a scientific standpoint.
The fact has iong attracted attention that commercial crises, like the one through which we are passing, are marked by a certain periodicity in their. occurrence, and they have been associated, not unreasonably, to a certain extent with a deficiency of crops, and such deficiencies again have in re cent years been supposed to be in some way connected with the "sun spot period."
Professor Jevons, in his present paper, endeavors to establish a direct relation between the latter periods and times of trade depression; and, although his studies have not as ye allowed him to fix the exact nature of the connection, the data that he furnishes exhibit at least some curious coincidences. After some preliminary accounts of what has been done in this field of research, both by himself and others, in former years, Professor Jevons says: " It is impossible in this place to state properly the facts which I possess; I can only briefly mention what I hope to establish by future more horough inquiry. . . . Deferring, however, for the present, any minuter inquiry, I permit myself to assume that there were, about the years 1742 and 1752, fluctuations of rade which connect the undoubted decennial series of 1711 , 1721, and 1732 with that commencing again in the most unquestionable manner in 1763. Thus the whole series of decennial crises may be stated as follows: 1701 (?), 1711, 1721, 1731-32, 1742 (?), 1752 (?), 1763, 1772-3, 1783, 1793, 1804-5 (?), 1815, 1825, 1836-9 (1837 in the United States), 1847, 1857 1866, 1878. A serics of this sort is not, like a chain, as weak as its weakest part; on the contrary, the strong parts add strength to the weak parts. In spite, therefore, of the doubtful existence of some of the crises, as marked in the list, I can entertain no doubt whatever that the principal commer cial crises do fall into a series having an average period of about 10.446 years. Moreover, the almost perfect coincidence of this period with Mr. J. A. Broun's estimate of the sun spot period- 10.45 years-is by itself strong evidence hat the phenomena are casually connected."
Hyde, Clarke, Wilson, and Danson all argued, 30 or 40 years ago, that commercial fluctuations must be governed by physical causes; but the difficulty that bas beset the theory is that hitherto no one has been able to detect a clear periodic variation in the price of corn. Sir William Herschel endeavored to do this at the beginning of the present century in his inquiry as to the economic effects of the sun spots: but his facts are too meager to justify any certain in ference. Professor Jevons confesses that as yet his own in quiries have been equally without result on this point. " The fact is," he says, "I believe that cereal crops, as grown and gathered in Europe, depend for their success upon very complicated conditions, so that the solar influence is disguised. But it does not follow that other crops in other latitudes may not manifest the decennial period. Dr. Schuster has already pointed out in Nature a coincidence between good vintages and minima of sun spots, which can hardly be due to accident. "Now, if we may assume Dr. Hunter's famine theory to be true, there is little difficulty in explaining the remarkable series of periodic crises which I have pointed out." The author goes on to show that the trade of Western Europe has always been strongly affected by communication with the Indies, several crises being distinctly traceable to this cause; thus the crisis of 1878 is clearly connected with the recent famines in India and China, and these famines are confidently attributed to solar influence. He states, then, that it is his present belief that to trade with India, China, and other parts of the tropical and semi-tropical regions, must be attributed the principal fuctuations of European commerce, although the decennial fuctuations ought not to be wholly laid to the account of Indian trade; it being quite possible that tropical Africa, America, the West Indies, and even the Levant are affected by the same meteorological influences which occasion the famines in India. Thus it is the nations which trade mos largely with those parts of the world, and which give lung credits to their customers, which suffer most from these crises. Professor Jevons sees nething in his theory incon sistent with the fact that crises and panics arise from other than meteorological causes; but when such do happen, they

