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Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as American industries, Arctic expedition, inventions, and scientific notes with corresponding page numbers.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

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Detailed table of contents for the supplement, categorized by I. ENGINEERING AND MECHANICS, II. TECHNOLOGY, III. CHEMISTRY AND METALLURGY, IV. ELECTRICITY, LIGHT, HEAT, ETC., V. MEDICINE AND HYGIENE, VI. ARCHAEOLOGY, VII. MISCELLANEOUS.

OVER-DENSITY OF POPULATION IN CITIES.

The great and growing question as to the dangers, 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.

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.

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.

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 circumstances of any particular community must always exercise a considerable influence on the death rate. It is scarcely necessary 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."

Without pretending to state the cause, we may call attention, in connection with this subject, to the following fact: From the figures lately published by the German Imperial 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 introduced in the Parliament of New South Wales. It provides for the establishment of a patent office, the appointment of a "Patents Officer," and the issuing of patents for inventions, and the publication of the patent specifications.

vides for the establishment of a patent office, the appointment of a "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.

SUN SPOTS AND COMMERCIAL CRISES.

To the numerous explanations that have hitherto been given by various writers on commercial topics, to account for 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 long 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 recent 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 yet 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 thorough inquiry. Deferring, however, for the present, any minute inquiry, I permit myself to assume that there were, about the years 1742 and 1752, fluctuations of trade 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 series 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 commercial 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 that 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 has 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 inference. Professor Jevons confesses that as yet his own inquiries 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 fluctuations of European commerce, although the decennial fluctuations 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 most largely with those parts of the world, and which give long credits to their customers, which suffer most from these crises. Professor Jevons sees nothing in his theory inconsistent with the fact that crises and panics arise from other than meteorological causes; but when such do happen, they