

births to Nature, is biologically absurd. The rapid cumulative increase following on any practical application of this idea would within measurable time make civilisation impossible in this or any other planet.

In fact, this idea is no more a fundamental part of human thought than is the doctrine of *laissez faire* in economics, which has been its contemporary, alike in dominance and in decay. Sociology and history show that man has scarcely ever acted on this idea; at nearly all stages of his development he has, directly or indirectly, limited the number of his descendants. Vital statistics show that the European races, after a phase of headlong increase, are returning to restriction. The revolutionary fall of fertility among these races within the past fifty years, while it has some mysterious features, is due in the main to practices as deliberate as infanticide. The questions now facing us are how far the fall will go; whether it will bring about a stationary white population after or long before the white man's world is full; how the varying incidence of restriction among different social classes or creeds will affect the stock; how far the unequal adoption of birth control by different races will leave one race at the mercy of another's growing numbers, or drive it to armaments and perpetual aggression in self-defence.

To answer these questions is beyond my scope. The purpose of my paper is rather to give reasons for suspending judgment until we know more. The authority of economic science cannot be invoked for the intensification of these practices as a measure for to-day. Increased birth control is not required by anything in the condition of Europe before the War, and is irrelevant to our present troubles. But behind these troubles the problem of numbers waits—the last inexorable riddle for mankind. To multiply the people and not increase the joy is the most dismal end that can be set for human striving. If we desire another end than that, we should not burk discussion of the means. However the matter be judged, there is full time for inquiry, before fecundity destroys us, but inquiry and frank discussion there must be.

Two inquiries in particular it seems well to suggest at once. The first is an investigation into the potential agricultural resources of the world. There has been more than one elaborate examination of coal supplies; we have estimates of the total stock of coal down to various depths in Britain and Germany, in America,

China, and elsewhere; we can form some impression of how long at given rates of consumption each of those stocks will last; we know that "exhaustion" is not an issue for this generation or many generations to come. There has been no corresponding study of agricultural resources; there is not material even for a guess at what proportion of the vast regions—in Canada, Siberia, South America, Africa, Australia—now used for no productive purpose, could be made productive; and what proportion of all the "productive" but ill-cultivated land could with varying degrees of trouble be fitted for corn and pasture. Without some estimate on such points, discussion of the problem of world population is mere groping in the dark. The inquiry itself is one that by an adequate combination of experts in geographic and economic science—not by a commission gathering opinions or an office gathering statistical returns—it should not be difficult to make.

The second is an investigation into the physical, psychological, and social effects of that restriction of fertility which has now become a leading feature of the problem. This also is a matter neither for one person—for its scope covers several sciences—nor for a commission; facts rather than opinions or prejudices are required.

If the question be asked, not what inquiries should be made but what action should now be taken, it is difficult to go beyond the trite generalities of reconstruction, of peace and trade abroad, of efficiency and education at home. The more completely we can restore the economic system under which our people grew, the sooner shall we absorb them again in productive labour. Unless we can make the world again a vast co-operative commonwealth of trade, we shall not find it spacious enough or rich enough to demand from Great Britain the special services by which alone it can sustain our teeming population. Even if the world becomes again large enough to hold us, we shall not keep our place in it with the ease of Victorian days; we dare no longer allow, on either side of the wage bargain, methods which waste machinery or brains or labour. Finally, if there be any question of numbers, if there be any risk that our people may grow too many, the last folly that we can afford is to lower their quality and go back in measures of health or education. Recoil from standards once reached is the gesture of a community touched by decay.

### Obituary.

MR. FREDERICK CHAMBERS.

THE death is announced of Mr. Frederick Chambers, late Meteorological Reporter for Western India, at the age of seventy-seven years. Mr. Chambers was the younger brother of Charles Chambers, who went out from Kew Observatory in 1864 to take charge of the Colaba Observatory, Bombay. Frederick went out as assistant to his brother. In 1873 his paper, "The Diurnal Variation of the Wind and Barometric Pressure at Bombay," was published in the Phil. Trans. of the Royal Society, and another paper, "Mathematical Expression of Observations of Complex Periodical Phenomena; Planetary Influence on the

Earth's Magnetism," written in collaboration with his brother, appeared in the Phil. Trans. in 1875. About this time Mr. Chambers was appointed Meteorological Reporter for Western India. A quotation from the first annual report which he printed is not without interest. It is explained that meteorological instruments had been sent out from England in 1852, "the duty of making the observations at those places being imposed on the senior medical officers"; the comment is made, "We would hope that from the zeal and energy of medical officers in charge of European hospitals and their love of science, the observations may be made by themselves and their establishments,

without entailing on the public any expense on this account."

The zeal and energy of the medical officers, and their love of science, however, seem not to have been equal to the occasion, for after vainly endeavouring, until the end of 1855, to carry out the orders they had received, without entailing expense on the public, it was arranged, at the direction of the Honourable Board, that two European soldiers should be told off at each station to undertake the duty of making meteorological observations on an allowance of 25 rupees per month for each observatory. The soldiers were sent to the Bombay Observatory early in 1856 for a preparatory course of training, on the successful completion of which they were furnished with certificates of competency to perform the work. Soon after this time the real work of meteorological registration may be said to have commenced, for, so far as the observers are concerned, the work from this time appears to have been carried on generally in a thorough and satisfactory manner. Under Mr. Chambers's administration the instruments were for the first time regularly compared with standards, and trustworthy data, such as made the Climatological Atlas of India possible, were collected.

#### DR. CHRISTIAN HESS.

ONE of the directors of the *Farbenfabriken vorm. Friedr. Bayer und Co.*, in Leverkusen, Dr. Christian Hess, died on July 11 in Bonn, after a serious operation. He was born January 14, 1859, at Eisenach, studied chemistry first at Jena and then in Berlin, where he worked for his doctorate under A. W. v. Hofmann in 1881. After having been assistant chemist to Prof. Wichelhaus at the Institute of Chemical Technology, he went in 1883 to the newly founded weaving, dyeing, and finishing school in Crefeld, where he developed very great activity as a teacher and an expert adviser. At that time he invented his process for removing iron from water. The large number of coal-tar dyestuffs of a new character, which were discovered at that time, brought with them the necessity of using new methods for dyeing. This caused a lot of difficulties in the dyeworks, to meet which the dyemakers engaged colourists of good chemical training, able to introduce the new methods. One of the first of these was Dr. Hess, who was engaged by the *Farbenfabriken* in 1894.

Dr. Hess showed remarkable commercial ability, and after some time the whole of the sale of dyestuffs was entrusted to him; he was nominated a director in 1906. His knowledge of men and things enabled him to render many important and lasting services to the industrial side. His firm, his colleagues, his employees and the great number of men he helped with good advice, with sound reasoning and with hearty encouragement, when in difficulties, will much regret his premature death.

#### PROF. J. VIOLLE.

THE issue of the *Revue scientifique* for September 22 contains a notice of the death of Jules Violle, professor of physics at the *Conservatoire des Arts et Métiers*,

which occurred at Fixin, near Dijon, on September 12. Violle was born in the same district on November 16, 1841. After obtaining his doctorate in 1870, he was in succession professor of physics at Grenoble, at Lyons, and at the *École Normale*. In 1897 he was elected a member of the Paris Academy of Sciences in succession to Fizeau. He was president of the French Physical Society, of the Society of Electricians and of the Committee of Inventions for National Defence. His earliest research was a determination of the mechanical equivalent of heat by means of the Foucault currents in a disc rotating in a magnetic field. His result, about 4 per cent. too high, was published in 1870. His work on the temperature of the sun appeared in 1877, and in 1884 he proposed as a standard of light, that radiated normally by a sq. cm. of molten platinum at its freezing-point. From 1886 to 1905 he published in conjunction with Vautier a number of memoirs on the speed of sound particularly in tubes. His "*Cours de physique*," which began to appear in 1883, was never completed.

WE regret to record the death, on July 26, of Alexander Ellinger, professor of pharmacology in the University of Frankfurt. Before the foundation of the latter university Ellinger held a similar chair at Königsberg. He was best known for his chemical work. Thus he showed that ornithine and lysine are decarboxylated by bacteria to putrescine and cadaverine respectively. He supplied the final touches to the determination of the constitution of tryptophane, and synthesised this amino-acid. Its transformation to kynurenic acid by the animal organism occupied much of his attention, and a few years ago he was able to elucidate the mechanism of this peculiar change, which apparently takes place via the keto-acid corresponding to tryptophane.

THE Brooklyn Museum Quarterly of July includes an obituary notice of Prof. William Henry Goodyear, best known by his work entitled "*The Grammar of the Lotus*," who died in February last aged seventy-seven. The theory developed in this book was conceived during his studies of lotiform decorations in Cypriote art, and included a study of the lotus in the decorations on peat from early Egyptian times. In his work as an architect his discoveries of architectural refinements will prove most important. His published work is extensive and valuable, and is fully recorded in the sketch of his career by Mr. W. S. Conrow.

WE regret to announce the following deaths:

Sir Halliday Croom, emeritus professor of midwifery at the University of Edinburgh and lately president of the Royal College of Surgeons, Edinburgh, on September 27, aged seventy-six.

Dr. P. Friedländer, professor of organic chemistry and of organic-chemical technology at the Darmstadt Technical College, aged sixty-six.

Dr. Herbert McLeod, F.R.S., honorary director of the Royal Society Catalogue of Scientific Papers, on October 1, aged eighty-two.