

internal energy, especially that associated with the longer-period motions, will be in part energy of currents arising from temperature differences, and therefore supplied by the solar heat and not by the energy of the earth's rotation. The contribution from the shallower parts of the ocean may have more chance of falling under the latter head. In any case, the whole question can be discussed only when more is known as to the distribution of the oceanic currents. At present the only motion known at a considerable distance from land is the residual drift, and this only in a few places, chiefly where it exceeds one knot. But as this does not change with the tide, its energy is of thermal origin.

It is more difficult to agree with Mr. Jeffreys's contention that viscous action in a solid earth cannot be an appreciable cause of the slowing of its rotation. By using a special law of viscosity quoted by him (M.N. Roy. Astron. Soc., vol. lxxvii., p. 449) as suggested amongst other possibilities by Sir J. Larmor as a reasonable alternative to the Maxwell-Darwin law used by him previously (M.N. Roy. Astron. Soc., vol. lxxv., p. 648), he himself has considerably modified his previous views. But a wide field of choice is open, of which this is one example. Thus the law might be that the ratio of the stress to strain is $n + f(d/dt)$, where f is any function. In order to give the required values of the earth's retardation and of the Eulerian nutation, the function f is defined for only two values of the argument, and so is to a great extent arbitrary. Evidently suitable forms may be chosen in very many different ways, so as, in addition, to allow for the properties of earthquake waves.

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Stereo-Radioscopes.

WE have read with interest in the Notes columns of NATURE of October 18 a description of what is called a stereo-radioscope, said to be invented by one Major Lièvre. What interests us so much is the fact that Sir J. Mackenzie-Davidson invented the same thing no fewer than twelve years ago. The instrument was made by our firm and put on the market for several years. As the two sources of rays have to be about 6 cm. apart, the only practical method was found to be to build a special X-ray tube with two anti-cathodes in the same bulb.

The apparatus was exactly the thing described in your paragraph. A motor drove an interrupter having two contact blades opposite each other, exciting the two sides of the tube alternately and driving a stroboscopic shutter synchronously with the interrupter.

The great objection to the instrument is that the operator must look into the view-box in front of the shutter, thus fixing his position with regard to the large and heavy instrument. Either this latter or the patient must be adjusted to obtain the proper view.

The difficulty of this is obvious, and results in an expensive and cumbersome apparatus.

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An Optical Phenomenon.

CAPT. C. J. P. CAVE's letter in NATURE of October 18 reminds me of a similar effect experienced when travelling in a *coupe* compartment at the rear of a train some years ago. From a window at the back of the *coupe* one could watch the ever-disappearing landscape as the train travelled along. The impression created was that every object seen appeared to be

rushing away from the train. But a stranger sensation occurred when turning my eyes from the window to objects in the *coupe*, for, during a space of a few seconds, they appeared to be moving rapidly in a contrary direction.

C. CARUS-WILSON.

October 19.

THE effect described by Capt. Cave in NATURE of October 18 can be observed after walking rapidly along the top of a wall and keeping the eyes fixed on the road. On stopping, still looking at the road, part of the field of view seems to be slipping away backwards.

H. M. ATKINSON.

45 Denman Drive, N.W., October 19.

INFANT AND CHILD MORTALITY.

POLITICAL economists are generally agreed that, if a country is to be prosperous and to maintain its place among the nations, its population must substantially and progressively increase. Two cardinal factors are essential to ensure a satisfactory increase of population: (1) a birth-rate maintained at a proper level, and (2) a death-rate not excessive. A falling birth-rate and an excessive mortality are both national calamities; indeed, it may be questioned if France would be quite in her present position had her birth-rate equalled that of Germany. In France the birth-rate, already abnormally low, fell from 23.5 per 1000 in 1887 to 19.0 in 1914, while for Germany for the same years the figures were respectively 36.9 and 28.3, with the result that during this period the population of France only increased from about 38 $\frac{1}{4}$ millions to 40 millions, whereas that of Germany increased from 49 millions to 65 millions.

We are in a similar parlous state as regards our birth-rate, for this has been steadily declining from 36.3 in 1876 to 23.0 or thereabouts in 1916 per 1000 of population. The effect of this has been that our increase of population for 1914 was less by nearly half a million than it would have been had the birth-rate obtaining in 1876 been maintained. Fortunately, our mortality-rate is one of the lowest in the world, and this, together with a considerable saving of infant and child lives, has enabled us to show a substantial increase of population. We are, nevertheless, still faced with a low and apparently falling birth-rate (for the County of London the birth-rate was 21.5 for 1916, against 22.5 for 1915), and we must, moreover, take into account the serious losses among the adult male population, the potential and prospective fathers of children, owing to the present war. It does not, therefore, appear that any substantial increase in the birth-rate can at present be anticipated.

We are, then, more than ever dependent upon a diminution of mortality if our increase of population is to be maintained. But with a death-rate among the whole civil population of 14.7 per 1000 (1916), we can scarcely expect any considerable diminution in the general mortality. Is there any section of the community among whom the mortality is excessive and might be reduced? An analysis.

of the mortality statistics brings out some startling facts. Of the total deaths occurring in England and Wales during the four years 1911-14, 28.2 per cent., or *more than one-quarter*, occurred during the first five years after birth; the number of deaths of persons sixty-five to seventy years of age is less than of children one to five years of age, and it is not until the age of seventy years and upwards is reached that the mortality is greater than that of infants up to one year of age. For England and Wales the present infant mortality (*i.e.* deaths of infants up to one year of age) per 1000 births is about 110. This means that of the 800,000 infants born in a year some 100,000 never live to see their first birthday. Further, probably at least as many prospective children die before birth, and half the number between one and five years of age, so that out of 900,000 possible children 250,000 have succumbed by the end of the fifth year. What should we think of 250,000 casualties—all fatal—out of 900,000 in action? And what of the uncounted wounded and disabled?

It may be said that, high as our present infant mortality appears from such figures, it is, at any rate, much less than formerly. Fortunately for the nation, this is quite true; the infant mortality has fallen from 165 in 1899 to 110 at the present time. But, even so, there is still an appalling mortality among infants and young children, and the pity of it is that it is undoubtedly largely preventable. The best proof of this statement is, perhaps, the startling difference in child mortality in different districts. We find, for example, that during the first year of life :

In Burnley	172 die against	67 in Hornsey
In Stoke-on-Trent	161 " "	70 in Ilford
In Wigan	159 " "	78 in Bath

If, instead of taking the death-rate of infants, we take that of children up to five, the result is the same :

In Middlesbrough	251 die against	109 in Bournemouth
In St. Helens	242 " "	110 in Ealing
In Oldham	223 " "	127 in Croydon

But this is not all. So far these towns have been considered as a whole, but the worse have their good and bad parts. Thus, while the general child mortality up to five in Middlesbrough is 251 per 1000 births, for the Canon Ward it is 328, and for the St. Hilda's Ward 369! If we survey the country generally, it will be found that child mortality is greatest in the large industrial towns and mining centres, less in the smaller towns, and least in the rural districts. Poverty is not the dominant factor, for the highest child mortality occurs in areas where, on the whole, wages are good, and Dr. Findlay, in a report to the Medical Research Committee, notes that in times of famine and industrial trouble the infantile death-rate usually falls. He emphasises the importance of environment (housing, etc.) as a factor in causing the present high infantile mortality.

Of the total deaths of children up to five years

of age 12.3 per cent. are due to measles and whooping cough, 19.5 per cent. to bronchitis and pneumonia, 15.8 per cent. to diarrhoeal diseases, and 23.0 per cent. to "congenital debility." It is fairly obvious that diarrhoeal diseases and congenital debility are largely dependent upon the conditions under which the people live, and the same holds good also for the other diseases mentioned. We find, for example, that, as regards measles and whooping cough—two diseases over which we have the least control—6 per 1000 die of these diseases in Harrogate and Weymouth, against 41 in Sheffield and Stalybridge. With facts of this kind before us it is patent that a considerable saving of child-life might, and ought to, be accomplished. Of the factors conducing to child mortality, the principal are ignorance and carelessness, intemperance, disease, and poverty, overcrowding, vitiated atmosphere, impure milk supply, and defective sanitation.

The remedies are, for the most part, obvious; they comprise: (1) A better training for motherhood on the part of girls of all classes; (2) improved care of the prospective mother and the provision of well-trained midwives, health visitors, and maternity and child-welfare centres; (3) the clearing out of slum areas; (4) improved housing of the masses, with a wider distribution of the population and better sanitation; and (5) an equitable solution of the drink problem. A great deal can be done by certain measures of care and supervision alone. Mr. Benjamin Broadbent, when Mayor of Huddersfield in 1905, tried such an experiment, with the result that of 112 babies born in that year, 107 survived the first year, and ninety-seven were surviving in 1915, ten years later, whereas, according to the average rate of mortality, only eighty-four would have been alive in 1915!

It ought to be appreciated by every right-thinking man and woman that the child is a national asset of great price, and that the saving of child-life is a duty, national as well as humanitarian. The problem is a vast and complicated one and worthy of the best efforts of the State, yet how little has hitherto been done to grapple with it on anything like a national scale. Mr. Hayes Fisher has recently promised to introduce, and if possible to pass by Christmas, a Maternity and Infant Welfare Bill to deal with the problem. He indicated, however, that delay might be caused by sources of opposition much the same as have apparently obstructed the formation of a Ministry of Health. Let us see to it that Mr. Hayes Fisher's hands are strengthened by the force of public opinion. The call is urgent, and human lives, so much needed by our country, are at stake.¹

R. T. H.

¹ For data bearing on this subject, see "Report on Maternal Mortality in connection with Child-bearing and its Relation to Infant Mortality"; "Report on Child Mortality at Ages 0-5 in England and Wales" (L.G.B. Reports, Cd. 8085 and 8496); "The Problem of Infant and Child Mortality," by J. Sheldon Withers, Medical Officer of Health for Sidmouth; "The Mortalities of Birth, Infancy, and Childhood," by Drs. Brend, Findlay, and Brownlee (Special Report Series, No. 10, Medical Research Committee).