

the other hand, from those benevolent institutions from which no interest is expected. An experiment can never be in itself a source of money profit. Benefit may be regarded as certain; but while at times it may be immediate, it is often remote, and not unfrequently the benefit is derived in practice without crediting, or even tracing, the source from which the benefit has sprung."

Among other matters in the report from which this extract has been taken, is a description of educational agricultural experiments intended to be performed by schoolmasters in country districts. The suggestion that a scheme of simple experiments should be framed, such as teachers might suitably carry out for illustration, was made at a meeting of the Institute of Agricultural Education for the North-Eastern Counties of Scotland, consisting exclusively of certificated teachers of agriculture. Mr. T. Jamieson, Mr. W. A. Simpson, and Mr. Gavin Grieg, have now drawn up a scheme on the lines proposed. To show the effects of partial manuring, they suggest a series of tests, such as those shown from A to F, inclusive, in Fig 1. A will thus exhibit the effect of nitrogen alone; B, of potassium alone; C, of phosphorus; D, of nitrogen and phosphorus; E, of phosphorus and potassium; and F, of potassium and nitrogen. The series of experiments indicated by 1 to 6 in the figure have been designed to show the effect of complete manuring. No.

employed. The experiments from Nos. 1 to 6, inclusive, will thus afford comparison with the farm trials to be performed by farmers in different parts of Scotland. The scheme will therefore not only prove of great educational advantage, but will lead to results of scientific value.

THE INFLUENZA EPIDEMIC IN GERMANY  
IN 1889-90.

THE patient compilation of countless facts, and their elaborate arrangement, is a task in the performance of which the Germans are *facile princeps*. If any fresh instance were required, we need only refer the reader to the official report, which has just been issued, of the history of the influenza epidemic which spread through Germany in the years 1889-90. This document covers upwards of two hundred pages of the large quarto volume containing the "Arbeiten aus dem Kaiserlichen Gesundheitsamte," and has been drawn up by Dr. Paul L. Friedrich, Königlicher Sächsische Assistenzarzt I. Klasse, Kommandirt zum Kaiserlichen Gesundheitsamte.

No pains have been spared to secure, as far as possible, trustworthy official data from all parts of the country concerning the various factors intimately connected with the epidemic. The

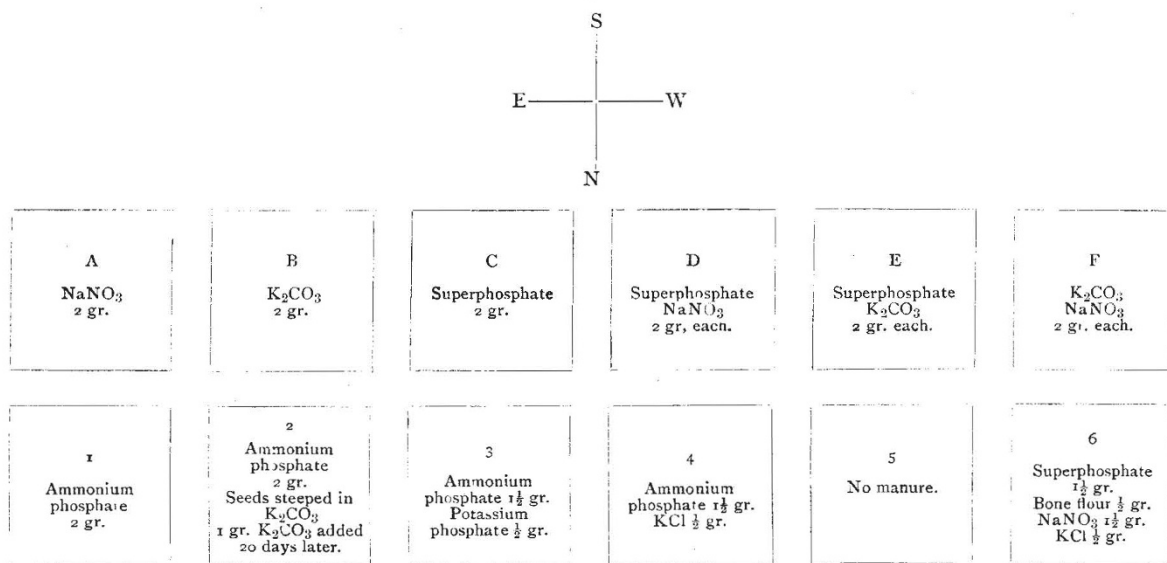
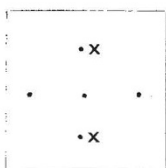


FIG. 1.

5, having no manure, will afford a comparison with the others. No. 6 will show the effect of complete manuring, as given in the usual manure mixtures. No. 1 to 4, inclusive, will show the effect of new forms of phosphate proposed for manure. For the steeping of the seeds in No. 2, a solution containing about one or two per cent. of potassium carbonate should be made, and the seeds allowed to lie in it for about twelve hours. The committee have prepared full directions as to the manner in which the experiments should be carried out. Twelve flower-pots are required, or wooden boxes, 9 x 9 x 12 inches deep. The soil with which these are to be filled should be dug out from a cavity 6 x 3 x 1 foot deep, and intimately mixed. It is suggested that five seeds be inserted in each pot or box, thus:—



Fifty days after sowing, the two plants marked x have to be taken up and sent to Mr. Jamieson, at the Research Station, Peterculter, Aberdeen, together with a 1 lb. sample of the soil

first forty pages of the report contain elaborate details and statistics as to the dates when influenza first made its appearance, and the period during which it remained, in the various provinces and cities of the empire. From the information collected it appears that Berlin and Charlottenburg were the first districts in which it declared itself. Statistics have also been gathered together of the varying intensity of the scourge in different parts of the country, and an endeavour has been made to ascertain the influence, if any, of different occupations on the path pursued by the epidemic. So many conflicting reports were received as to the effect exercised by the kind of employment on the susceptibility of the individual to influenza, that it was impossible to arrive at any definite conclusion. In some districts the evidence went to show that a remarkable immunity to the disease was exhibited by people engaged in *out-door* occupations, whilst from other parts the statistics collected pointed equally strongly to the freedom from attacks exhibited by workpeople employed *within doors*. In some glass works, however, careful observations showed that the employes who succumbed first to influenza were those who were farthest removed from the furnaces, and that those whose work was to remove the glass from the latter, and who were therefore working in a very heated atmosphere, enjoyed a remarkable immunity. Dr. Heiszler, who is responsible for these observations, ascribes the undoubted freedom from influenza experienced by these workpeople, to the air in the immediate

vicinity of these furnaces being relatively sterile, the microbes being doubtless unable to exist at such a high temperature. Influenza appears to have but little regard for either sex or age, for it attacked indiscriminately men, women, and children between the ages of fifteen and sixty. Its taste was proved to be equally catholic as regards climate and situation, neither meteorological nor geographical conditions appearing to exercise any sort of control on its genesis and distribution.

The effect of the scourge on the death rate from other diseases has also been carefully investigated, and, as far as the statistics go, it would appear to have materially increased the deaths ascribed to pulmonary consumption.

Innumerable tables are appended to the report, but, perhaps from a popular point of view, the following statement, compiled from official data, showing the time occupied by the epidemic in travelling from east to west, is of most general interest.

Influenza was present as an epidemic in June 1889 in Turkestan, it only reached East Russia (Wjatka) after a lapse of four months, in the middle of October. On October 28 it appeared in West Siberia, and after an interval of three months, travelling eastwards, it reached Japan in January 1890, and Hong Kong in February. On its westward course it moved more rapidly, for it appeared in epidemic form at the commencement of November 1889 in Moscow, and about a fortnight later in St. Petersburg. The capitals of Sweden, Denmark, Germany, Austria, France, and England were all attacked towards the end of November and beginning of December, whilst in Budapest, Brussels, and Madrid it appeared in the middle of December. In New York it was first heard of on December 19, whilst by the end of the month Milan, Rome, Naples, Constantinople, numerous districts in the United States, Canada, and Morocco were all in the hands of the scourge. The commencement and middle of January found it in Turin, Algiers, and Egypt, and by the end of the month it had made its appearance in Central America and in South Africa; owing to the small amount of communication existing between Europe and East Africa, it did not appear in these parts until the end of March. At the end of February it arrived in Bombay. Thus whilst in the absence of definite channels of communication it only made slow progress, requiring upwards of four months to emerge from the heart of Turkestan to European Russia, on once reaching Moscow and St. Petersburg it spread with lightning rapidity over western and southern Europe, crossing the oceans to all parts of the world.

The report manipulates in a masterly manner an immense mass of facts; but valuable as the statistics here collected must be for purposes of reference from an historical point of view, the conclusions indicate only too plainly how far we yet are from an accurate knowledge of the factors which control the genesis and distribution of this terrible disease, convenient hypotheses being continually upset by the conflicting evidence collected as to its course and conduct.

SCIENTIFIC SERIALS.

*Bulletin of the New York Mathematical Society*, vol. iii. No. 6. (New York: Macmillan, March, 1894). — Prof. Markness (pp. 135-141) gives a careful and appreciative abstract of the Cours d'Analyse de l'École Polytechnique, by Camille Jordan, a work commended by Prof. Klein in "The Evanston Colloquium," and which, in its second edition, is "entièrement refondue." Three interesting, though short, notes on Permutations (pp. 142-148) are furnished by Prof. F. Morley. They are headed a pleier for the chess-board in teaching determinants, a special rule of signs, and the enumeration of positions. There are numerous references to the authorities on the subject. Notes and new publications are full as usual.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 18. — "An Estimate of the Degree of Legitimate Natality, as shown in the Table of Natality compiled by the Author from Observations made at Budapest." By Joseph Korösi, Member of the Hungarian Academy of Sciences, Director of Municipal Statistics.

The author has tabulated the age of the 71,800 married couples given in the Census of 1891, conforming to the single year-combinations. The virtual number of these combinations—

as 45 productive years of the male have to be combined with each of the 40 productive years of the female—is about 2000. Knowing thus the number of all age-combinations, he observed for four years (two before and two after the Census) the 46,931 births amongst couples of those ages. By dividing the figures obtained by four, he got the yearly probability of birth for each age-combination.

As the legitimate natality is to be regarded as a resultant between two distinct forces, the instinct of nature which urges towards multiplication and the forethought which causes moral restraint, it was also desirable to get an insight into the march of the physiological fertility alone.

Two degrees of fertility for each age were therefore obtained. The difference between the degree of physiological and that of the actual fertility shows, a few cases of procreative exhaustion being excepted, the influence of the moral factor. In the somewhat advanced ages this moral restraint exercises an influence exceeding all expectation. With the mothers of 30 to 35 it reduces the fertility to 78 per cent. (instead of 100 per cent.), with those of 43 to 2 per cent., i.e. 98/100 of the physiological faculty is suppressed. With men the influence is also very great, though weaker than with women.

Out of a large number of data here follow some figures to characterise the results:

The fertility is	For the mother.		For the father.	
	Actual per cent.	Physiological per cent.	Actual per cent.	Physiological per cent.
at 25 to 29 years	29.2	30.9	35.8	28.0 (?)
" 30 " 34 "	20.6	32.9	27.1	27.0
" 40 " 44 "	5.9	20.4	13.8	21.1

"Results derived from the Natality Table of Korösi by employing the Method of Contours or Isogens." By Francis Galton, F.R.S.

There are three variables in the statistics of natality. The age of the father is one, that of the mother is another, and the percental offspring of parents of those ages is the third. These three variables may be co-ordinated in the same way as that which is daily followed at meteorological offices in dealing with (1) the longitudes of the various stations; (2) their latitudes; and (3) the barometric height at each. After these data have been entered on a chart in their proper places, contours, known by the name of isobars, are drawn to show the lines of equal barometric pressure. In natality tables, the ages of the father and the mother take the place of the longitudes and latitudes in weather charts, and lines of similar birth rates, or as I would call them, "isogens," take the place of isobars. A chart constructed on this principle is shown in Fig. 1. The broken line A B corresponds to the instances in which both parents are of the same age. The chart is practically limited to marriages in which the wife is less than five years older, and less than seven years younger, than her husband.

Father's age.

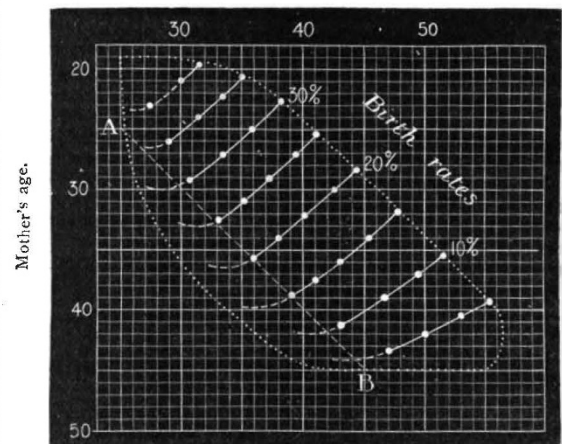


Fig. 1.

It will be noticed that the isogens run in nearly straight, diagonal, and equidistant lines across the greater part of