ticity of the strophanthinised heart; and Prof. P. T. Herring on the effect of thyroidectomy on the adrenin-content of the suprarenals.

In Section K a lecture is to be given by W. Lawrence Balls on cotton, and the following papers will be read:—Prof. F. O. Bower on the evolution of some ferns, in particular the Dipterids and the allies of the common bracken; Dr. D. H. Scott on the fossil plants of the genus Heterangium; Dr. Marie C. Stopes on the fossils of the Aptian (Greensand) period, including some of the oldest flowering plants of this country showing internal structure; Prof. Osborn on the morphology of *Selaginella uliginosa*, and his wife on some Australian fossils belonging to the genus Zygopteris; Dr. Ellis on fossil bacteria and fossil fungi; Dr. Sarah M. Baker on a new hypothesis regarding the ascent of sap in plants; Dr. Marion Delf on the effect of temperature on the permeability of protoplasm to water; Miss Prankerd on Statoliths; Prof. W. B. Bottomley on the formation of auximones from nitrogenous organic substances; Prof. Julius MacLeod on the expression by measurements of specific characters with special reference to the mosses; Dr. J. C. Willis on the evolution of the flora of Ceylon.

In Section L the following discussions may be expected:—On methods and content of history as a subject of school study; on military training in schools; on education of women in relation to their careers; on education and industry.

In Section M papers will be read by Prof. J. Hendrick on composition and uses of seaweed; by Prof. W. Somerville on accumulation of fertility in grass land; by D. Macpherson on types of hill grazings, their economic value and importance; and discussions will take place on probable effects of the war on the future of British agriculture, and the economics of milk production.

THE STUDY OF HEREDITY.

THE popularity of problems of genetics as subjects for research and discussion is well illustrated by the May number of the *American Naturalist* (vol. xlix., No. 581), every paper in which bears on one or other of such problems. Of especial interest is Prof. Jacques Loeb's article on the nature of the conditions which determine or prevent the entrance of the spermatozoon into the egg. It is well-known that in normal fertilisation, the entrance of the spermatozoon is followed by the formation of a membrane around the egg, so that the entrance of other spermatozoa is prevented. But, as Prof. Loeb has already recorded in his work on "Artificial Parthenogenesis and Fertilisation," sea-urchin eggs the development of which has been started by treatment with hypertonic sea-water can be afterwards fertilised, a spermatozoon being capable of entering a blastomere—at least up to the stage of the eighth cleavage—and inducing "a distinct and clear membrane formation" around it. This shows that the entrance of a male cell is not necessarily prevented by "the changes underlying development." But eggs by treatment with butyric acid can be induced to form a membrane. If this membrane remain unbroken subsequent fertilisation becomes impossible, though parthenogenetic segmentation may begin; if, however, the membrane be ruptured by shaking, a spermatozoon can enter and the egg undergoes normal development. Hence it may be inferred that the physical condition of the surface of the egg—howsoever modified—is the immediate determinant of the admission or exclusion of a spermatozoon. This view is supported by Loeb's experiments in cross-fertilisation, which show that the sea-urchin (Strongylocentrotus) egg admits the sperm of an echinoderm of another class only in a hyper-alkaline solution. On the other hand, eggs cannot be fertilised by sperms of their own species in sea-water containing an excess of neutral chlorides. From all these facts Loeb is inclined to draw the conclusion that the tension of the surface of the egg may explain the engulfment or exclusion of the spermatozoon. But it is obvious that in the case of normal fertilisation this surface-condition is "induced from within the egg by changes caused by the entrance of the spermatozoon"—a deduction made by biologists long before the study of "experimental embryology" had become fashionable.

In the same number of the *American Naturalist* Dr. Raymond Pearl continues his studies in heredity with reference to questions of practical breeding with a paper on Mendelian inheritance of fecundity in the domestic fowl." Large egg-yield, especially during the winter months, is shown by experiment to depend upon the presence of two Mendelian factors in the germ-cells, so linked with sex-determining characters that the female is heterozygous. Thus is confirmed the belief of some poultry-fanciers that the father is of greater importance than the mother for the establishment of a "good laying strain." In the *Biological Bulletin* (vol. xxviii., No. 3) Dr. M. R. Curtis describes a Rhode Island red hen with the terminal part of her oviduct aborted. Consequently the eggs—which were produced in the normal way—passed out into the body cavity and their food materials were absorbed by the bird's tissues without disturbance of the metabolism.

A recent number of our British *Journal of Genetics* (vol. iv., No. 4) contains a noteworthy paper, by Dr. H. Drinkwater, on the inheritance of brachydactyly in human families. The observations on this condition made by Dr. W. C. Farabee in North America, and by Dr. Drinkwater in this country are summarised in Mr. Bateson's book, "Mendel's Principles of Heredity," and brachydactyly has become a classical example of a simple Mendelian dominant-character. Dr. Drinkwater now describes a second family in England, and proves it to be a branch of the American stock studied by Dr. Farabee. The most important feature of the present study is found in the very beautiful series of radiographs of the brachydactylous hands and feet. The second phalanx is not really absent, but remains in a rudimentary condition, and becomes usually united to the base of the terminal phalanx.

Colour phenomena in animal and plant inheritance naturally continue to attract the attention of experimenters. A short paper on the "English" rabbit, by Prof. W. E. Castle and P. B. Hadley (Proc. Nat. Acad. Sci., vol. i.) is worthy of note. The "standard" coat in these rabbits is white with black muzzle, ears, and spots on back and flanks. Breeding experiments have shown that this "standard" coloration is really a mark of hybridity, for when mated together such rabbits yield a progeny half of which are either without the back and flank black markings or with these greatly exaggerated. The present paper describes how a "standard English" buck was mated with "Belgian hare" does, and how one of his dark-coated sons from this cross was afterwards mated to the same does; the result was that this latter begot distinctly darker offspring than his father, the "modal grades" being respectively 2·0 and 3·25. "Yet the father," write the authors, "contained only a single dose (one gamete) of English pattern, and the son derived his English pattern exclusively from this same source. Hence the English unit-character had changed quantitatively in transmission from father to son. This seems to us conclusive evidence against the idea of unit-character constancy or gametic purity."

Dr. L. J. Cole's paper on the inheritance of colour in pigeons (Rhode Island Agric. Exp. Station, Bulletin 158) was summarised in NATURE last year (vol. xciv.,

p. 213). The same subject has now been further investigated by Mr. D. Lloyd-Jones (*Journ. Experimental Zoology*, vol. xviii., No. 3) in a microscopical and chemical study of the feather-pigments. Red colour is due to red-brown pigment-granules which are present in the intermediate cells of the epidermis as well as in special pigment-cells. This pigment, if very finely divided, produces yellow. Black pigment under various conditions produces black, dun, blue, or silver.

Pigeons serve also as the subject of an inquiry into "Sex Ratios" by Drs. L. J. Cole and W. F. Kirkpatrick (Rhode Island Agric. Exp. Station, Bulletin 162). The normal ratio calculated from a large number of broods is 105 males to 100 females, and the death-rate is especially high for the first three days after hatching and at the age of about a fortnight. It is well known that the pigeon's normal brood consists of two eggs. In the recorded cases there were 284 bisexual broods to 302 unisexual; of the latter 149 consisted of two males and 153 of two females—a result indicating almost perfect equality. The death-rate of males and females in the bisexual broods is essentially equal. "A comparison of the numbers of each sex hatched from first and from second eggs respectively shows no tendency for the former to produce exclusively males and the latter females, but more males than females are hatched from both." The authors conclude that "sex in pigeons is determined according to the laws of chance"—in Mendelian terminology the individuals of one sex are heterozygous, and those of the other homozygous as regards the sex-determining factors. G. H. C.

BIOMETRICS AND MAN.

IN part iv. of vol. x. of *Biometrika*, Mr. H. Waite publishes an interesting study, based on two thousand complete sets of finger-prints of adult males, part of a series in the biometric laboratory, University College, London. It appears that the various types of finger-print are not scattered at random over the fingers; certain types are more or less peculiar to certain fingers, and the appearance of one type is associated with that of another. In this respect certain fingers are more closely related to each other than to any third finger, and the distribution of this relationship is in general similar to that of the correlations of the bones of the same fingers. In the same number, Dr. Alice Lee discusses the influence of segregation on tuberculosis, a question to which much attention has been devoted of recent years. No method of measuring the extent of segregation is, however, found satisfactory, and the various methods used, for example, by Dr. Newsholme, lead, when examined by more stringent methods, to contradictory and inconclusive results. Whether there is any really substantial relation between the prevalence of phthisis and institutional segregation may remain an open question, but Dr. Lee is of opinion that no such relation has been demonstrated. Miss Elderton and Prof. Pearson similarly fail to find any evidence that isolation reduces the attack-rate from diphtheria; no appreciable influence on the attack-rate is found in certain data placed at their disposal by the medical officer of health for Coventry, though the death-rate may be lowered.

In the same journal Prof. Pearson, in collaboration with Miss Elderton, contributes an important memoir on further evidence of natural selection in man. The variate-difference correlation method is applied to the death-rates for males and for females in England and Wales from 1850 to 1908. The correlation between death-rates for successive years of life, over a long series of years, is high and positive. But the correlation of first differences is negative, and this negative correlation increases in intensity as higher and higher differences are taken, until fairly steady values are reached for the sixth differences, ranging round −0·7. Thus for males the correlation of sixth differences in the first and second years of life is −0·688, in the fourth and fifth years of life −0·695. For females the corresponding figures are −0·719 and −0·736. The correlations in each case are taken between death-rates of those born in the same year. At an interval of two years the partial correlations are negative but much lower; at three and four years' interval the signs are irregular and the results inconclusive. To assert the existence of selection and measure its intensity, the authors remind their readers, must be distinguished from advocacy of a high infantile mortality as a factor of racial efficiency.

We can only briefly direct attention to two articles by Mr. R. A. Fisher on the frequency distribution of the correlation coefficient in samples from an indefinitely large population, and on the distribution of standard derivations of small samples.

REPORTS ON MINING INDUSTRIES.

TWO reports issued by the Canadian Department of Mines ("Peat, Lignite, and Coal," by B. F. Haanel; "Report on the Non-Metallic Minerals Used in the Canadian Manufacturing Industries," by Howells Frechette; Ottawa, 1914) are further examples of the sedulous care with which the Canadian Government is endeavouring to foster the industry of mining in the Dominion. The report upon peat, lignite, and coal deals exclusively with the application of these fuels to the generation of power-gas and to the recovery of by-products, the latter being chiefly ammoniacal salts. An elaborate study has been made of the various methods of dealing with peat in Europe, although, for some reason not easy to understand, Russian practice appears not to have been included, in spite of the fact that conditions in Russia resemble more closely those in Canada than do any of the other countries investigated. The first part of the report is taken up with a discussion of the various methods of producing peat fuel; it is interesting to note that the author has devoted a good deal of attention to the well-known Ekenberg process of wet carbonisation, and that his conclusions are decidedly unfavourable to the process. He points out that the most recent report on the subject by Lassen shows "that in continuous operation on a large scale, a moisture content below 70 per cent. in the pressed cake cannot be counted on," and dismisses the subject with the following statement:—

"Although large funds have been placed at the disposal of various investigators in order to enable them to demonstrate the economic value of the process, and although a private company has conducted elaborate experiments on a large scale, involving the expenditure of a large amount of money, not one ton of peat fuel has been manufactured on a commercial scale by means of this process."

The author's opinion of the Brune and Horst process for pressing out the water is equally unfavourable, nor is he greatly impressed by the possibilities of any of the methods of artificial drying, and sums up in favour of air-dried peat. He shows that under normal Canadian conditions peat can be utilised to advantage for the production of gas provided that it contains not more than 40 per cent. of moisture and that it can be obtained at a cost not exceeding 1.50 dollars (6*s.* 3*d.*) per ton of peat containing 30 per cent. of moisture. He holds