of the petals. The results are complicated, and not readily summarised, but they confirm a generalisation already established by work in hybridisation among both plants and animals; that "views on the presence and action of factors obtained by an investigation of one single crossing are liable to modification when one of the forms investigated is crossed with a third form. Hence it is necessary to cross the same form with more than one partner in order to arrive, step by step, at the truth."

MATHEMATICS AND PHYSICS AT THE BRITISH ASSOCIATION.

THE first of the two organised discussions arranged for this section was on "Gravitation." The discussion followed immediately after Prof. Whitehead's presidential address, and it happened that the arrangement was appropriate, for the president's exposition of the logical texture of geometry had carried us far from the ordinary conceptions of space, and paved the way for the revolutionary ideas associated with the space-time world of Einstein and Minkowski. Mr. E. Cunningham, who opened the discussion, and Prof. A. S. Eddington, who followed, dealt with Einstein's recent work, which brings gravitation within the scope of the principle of relativity. If an observer is in a closed lift, it is well understood that an acceleration of the lift upwards is exactly equivalent to an increase of the force of gravity, so far as mechanical phenomena inside the lift are concerned. There would, however, be minute differences in the optical phenomena according to the ordinary theory; relatively to the accelerated lift the path of a ray of light would seem to be curved, whereas for the stationary lift it would be straight if the increased gravitational field makes no difference. Accordingly, the first suggestion towards a relativity theory which shall include gravitation is that the path of a ray of light must be bent by the gravitational field, just as it is apparently bent by an acceleration of the framework of reference. The curvature to be expected is extremely small—amounting to a change of direction of 1·7″ in the case of a star seen close to the sun's limb—and it has not been possible to prove or disprove the hypothesis directly. Meanwhile the theory has been elaborated and generalised by Einstein, who has at length been able to throw the laws of motion, of electrodynamics, and of gravitation into a form which makes the sequence of phenomena entirely independent of any particular framework of reference. The result has been to yield a very striking confirmation of the theory, for it is found to predict a motion of the perihelion of Mercury amounting to 43″ per century—just the amount of the hitherto unexplained discordance. The new theory removes what is probably the most celebrated of the few cases of failure of gravitational astronomy. The discussion afterwards turned to the experimental side. Dr. P. E. Shaw gave an account of his experiments which appear to indicate a change in the constant of gravitation with temperature, and Prof. R. A. Sampson urged that astronomical evidence is not capable of denying this possibility. Dr. W. G. Duffield read a report of the Committee on the Determination of Gravity at Sea, considering especially the difficulties attending the use of the aneroid method, and the possibility of improvements in future attempts.

A paper by Sir Ernest Rutherford on the "X-Ray Spectra of the Elements" was of special interest. He referred particularly to the researches of Siegbahn and Friman, who have extended the work of Moseley to the elements of high atomic weight from gold to uranium by examining the L spectra. It appears that there are ninety-two elements up to uranium. By finding the atomic number of lead it has now been possible to assign the whole series of radio-active products to their places in the scheme. Sir E. Rutherford further described the work done in America with the Coolidge tube, which provides a steady high voltage. It is found that the maximum frequency of the rays which can be obtained follows closely the quantum relation $Ve=h\nu$, the accuracy between 20,000 and 100,000 volts being one per cent. To excite the characteristic radiation of a substance a rather higher voltage is needed than that given by the quantum relation, as though it were necessary to expend some energy in disturbing an oscillator.

Prof. H. H. Turner read a paper on the "Measurement of Time," dealing with daylight saving and justifying the innovation from a scientific point of view. The paper elicited an interesting speech from Prof. J. Perry, who admitted that he had formerly rather thoughtlessly opposed the scheme, and urged the warning against being led by authority in science. Other members, however, professed themselves still unconverted.

Prof. T. H. Havelock gave a review of recent work on the "Propagation of a Signal in a Dispersive Medium." He described the approximate methods of calculation which have been used, showing the relation between the recent methods of contour integration and the older work of Hamilton and Kelvin. The precise nature of the "forerunner," or minute disturbance which travels through the medium in advance of the main signal, is a matter of special difficulty, and an exact solution for any particular cases that may prove tractable would be a great help towards progress.

The absence of several speakers who had been expected to take part rather detracted from a discussion on "Osmotic Pressure," opened by Prof. A. W. Porter. There were many other interesting papers, most of which we must pass unnoticed for want of space, but special mention may be made of Prof. J. C. McLennan's paper on "Ionisation Potential," continuing and extending the results communicated last year; also of Sir F. W. Dyson's "Mean Parallaxes of Stars of Different Magnitudes," which in the main confirm the well-known formulæ given by Kapteyn in 1901. At a separate meeting of the department of mathematics Prof. G. N. Watson gave a general survey of the recent developments of the theory of asymptotic series.

A new departure, which it is hoped may lead to important results, was the formation of a committee representing Sections A and E to consider the needs of geodetic research. This arose from the presentation of a report by Col. Close, Sir F. W. Dyson, and Col. Hills, prepared at the request of the Organising Committee of Section A. The report brought out clearly the lack of organisation and general neglect of higher geodesy in this country, and there was a unanimous feeling that steps should be taken towards the constitution of some committee or association responsible for stimulating this branch of science.

THE BRITISH ASSOCIATION AT NEWCASTLE.

SECTION D.

ZOOLOGY.

ABSTRACT OF THE OPENING ADDRESS BY PROF. E. W. MACBRIDE, M.A., D.Sc., F.R.S., PRESIDENT OF THE SECTION.

THE decision of the Organising Committee to devote the sittings of the section chiefly to the economic and medical applications of zoology must not divert us from the task of research into fundamental laws. The laws of heredity had been intensively studied for the