taken. Dr. Jebb next touched upon the uneasiness caused in some quarters by Clause 7 in the revised Directory of the Science and Art Department, issued in 1897, and said a needless fear had arisen lest the clause was designed to forestall the establishment of local authorities by Parliament and to set up voluntary organisations in their place. It was a "temporary and partial expedient." After what the Lord President had said he might say that they had the most explicit and the most completely satisfactory assurances that the Government contemplated following up their creation of a central authority by the creation of local authorities, and that it would be altogether unjustifiable to refuse a welcome to the Board of Education Bill on the ground that its own immediate scope was limited. With regard to the second proposition, Dr. Jebb addressed himself to the desirability of the Consultative Committee of the Board of Education being of a permanent character. They desired that, if not a statutory body, it should, at all events, be a recognised institution, not a merely occasional resource, which might or might not be called into existence by the Minister of the time. In asking for some express recognition of the Universities and the teachers on the Consultative Committee they were merely asking that the Government should not leave to chance a result which would probably occur in any case, and that the committee should always include certain elements which, as would be generally allowed, would be indispensable to its efficiency for the purposes which the Bill contemplated.

Need for a Central Authority.

There existed in England a very large supply of institutions which gave secondary education in some form or other. There were public schools, grammar schools, large and small, of various types, proprietary and private schools, technical colleges and institutes, polytechnics, science and art classes in connection with South Kensington; and at the top of the elementary school system there were the higher grade Board schools, some of which were also schools of science, receiving Government aid; there were also higher grade schools not subject to School Boards, but under voluntary management. These various resources for secondary teaching were controlled by various agencies which had no connection with each other. The central control was divided up between the Charity Commission, the Department of Science and Art, and the Education Department; the Board of Agriculture, too, had certain functions in this respect. The local authorities were no less manifold and disparate. Within the same town or district the local power over secondary education might be shared between a county or borough council, a School Board, various governing bodies, committees under the Science and Art Department, and managers of voluntary schools. The inevitable result was overlapping and waste of power, greater or less in different places, but prevalent in some degree everywhere. Such waste of power meant increased cost to the taxpayer or ratepayer. Economy alone dictated organisation. But organisation was also demanded by regard to the efficiency of our secondary system as a whole, which vitally concerned not only our industrial and commercial interests, but also the general welfare of the nation and the empire.

Organisation of Education Board.

The Board of Education Bill introduced in the House of Lords by the Duke of Devonshire last August was to be again introduced this Session. Its object was to establish a Board of Education for England and Wales, which should take the place of the existing Education Department (including the Department of Science and Art at South Kensington), and should also exercise certain powers now pertaining to the Charity Commission. This Board would have the superintendence of all matters relating to education, both secondary and elementary. It might probably be organised in three departments—one for secondary education proper, one for the more technical branches of science and art teaching and for the control of science and art museums, and a third for elementary education. The object was to establish a single strong central authority which could survey the whole field. At the same time, nothing was more remote from the intention of the Bill than to impose a rigid or bureaucratic system of secondary education on the country. There was no idea of a cast-iron uniformity. The local authorities, which in due course would be created, would have free discretion to deal in their own way with the varying needs and circumstances of their respective localities. The central authority would merely exercise a general supervision, affording guidance and assistance as they might be needed. The Duke of Devonshire indicated, in his speech at Birmingham on January 23, what the first task of the new central authority would be. He said that the literary side of education should not be unduly neglected in comparison with the scientific and the technical. It would be a guarantee for the maintenance of the distinctly liberal studies and of that liberal spirit in education generally which was the very breath of life to secondary schools. Already a very large number of schools, of various sizes and types, had had experience of examination by the Universities, and had been thoroughly satisfied with it. About one hundred secondary schools were represented in the Cambridge local examinations, and about the same or a slightly larger number were examined by the Oxford and Cambridge Joint Board. The cost was very moderate, making the aid of the Universities available for many schools of which the resources were comparatively limited. He could not, of course, speak with any authority as to the manner in which the Government might be disposed to regard the suggestion made in this resolution; but it appeared reasonable to hope and believe that the assistance of the Universities in work for which they had already proved their competence, and which had been done to the satisfaction of the schools, would be accepted by the Education Board of the future. Such assistance would so far diminish the number of new inspectors that would have to be appointed. In conclusion, he would only say that the Board of Education Bill appeared to him, on the whole, to receive a cordial welcome from all who were interested in the welfare of secondary education in this country. The Government had shown itself fully alive to the importance of the question. It had chosen the method of procedure which was recommended by practical considerations, and which was most likely to conduce to effective legislation on sound lines and without unavoidable delay. Dr. Jebb concluded by moving the resolutions *en bloc*, and after short addresses by the Master of Trinity, Mr. Swallow, and Mr. Bryce, M.P., the resolutions were put to the meeting and carried.

EXPERIMENTAL CONTRIBUTIONS TO THE THEORY OF HEREDITY.[1]

IN this, the first part of a paper on reversion, the two following questions are dealt with, viz.: (1) Is there invariably evidence of reversion? (2) May reversion, when it does occur, result in the complete, or all but complete restoration of either comparatively recent or of comparatively remote ancestors? The first question is answered in the negative, but to the second an affirmative answer is given. In support of the view that reversion does not invariably occur, it is pointed out (1) that clear evidence of reversion is rare in the pure-bred offspring of highly prepotent animals, such as Galloway, Aberdeen, Angus, and Shorthorn cattle. And (2) that there is sometimes no evidence of reversion in cross-bred animals. While it is deemed unnecessary to submit evidence of the fact, long recognised by breeders, that the offspring of highly prepotent animals are, as a rule, the image of their parents, it is thought desirable to submit evidence in support of the contention that in cross-bred animals indications of reversion may be wholly wanting. The following experiments bear on this point: (*a*) When a prepotent Galloway bull (which is black and hornless) is crossed with a Highland heifer, the result may be an animal which experts are unable to distinguish from a pure-bred Galloway—there may be neither a trace of the long-horned Highland parent, nor yet any indication of reversion. (*b*) A peculiarly marked skewbald (bay and white) Iceland pony mare, when mated with a whole-coloured bay Shetland pony, produced a foal which in colour, form, and gait is almost identical with the skewbald dam—on no single point does it suggest the bay Shetland sire. (*c*) A nearly black Shetland mare, when mated with a bay Welsh pony, produced a bay foal which in its make, colour, &c., is the image of the sire. (*d*) A pure white fantail pigeon, crossed with a blue pouter hen, yielded a nearly white bird having the form and habits of a pouter, but no suggestion of *Columba livia*, the supposed ancestor of the numerous varieties of pigeons. (*e*) A white Shorthorn crossed with Aberdeen, Angus, or Galloway cattle results in "blue-greys," which,

[1] By Prof. J. C. Ewart, F.R.S. (Communicated to the Royal Society of Edinburgh, December 5, 1898.)

though more or less intermediate in their characters, rarely afford any evidence of reversion. It thus appears that, notwithstanding the "swamping effects of intercrossing," the offspring of quite distinct varieties sometimes afford no evidence of reversion, and, further, that Galton's law of heredity (which teaches that the intermediate and remote ancestors together contribute one-half of the total heritage of the average offspring) does not appear to hold in the case of highly prepotent animals. In dealing with the second question, experiments are first described in support of the view that there may be complete, or all but complete, reversion to comparatively recent ancestors. (*a*) A blue and white fantail (a cross between a white fantail and a dark blue cross-bred fantail), when mated with a blue fantail, invariably produces pure white fantails, identical, as far as external characters go, with their grandsire. (*b*) A smooth-coated white rabbit (a cross between an Angora and a smooth-coated white buck), mated with a smooth-coated and almost white doe (the granddaughter of a Himalaya rabbit), produced a litter of three, one of which is the image of the mother, one is an Angora like the grandmother, while the third is a Himalaya (with the characteristic black ears and muzzle and dark grey feet and tail) like the great grandmother.

The following experiment supports the view that there may be reversion to intermediate ancestors:—A Dalmatian dog crossed with a well-bred sable collie produced three pups, which closely resemble young pointers—these pups, with their white ground colour and four or five yellowish-brown patches, in all probability reproduce fairly accurately the intermediate ancestors of the Dalmatian sire. This experiment also suggests that if prepotent ancestors occur along the route which any given variety has travelled, reversion may be at any point abruptly arrested. The remaining experiments detailed afford evidence of more or less complete reversion to comparatively remote ancestors: (*a*) An Indian game Dorking cock, crossed with a dark bantam hen, produced, amongst other birds, a cockerel almost identical with a jungle fowl. It not only resembles *Gallus bankiva* in form and colour, but also in being extremely shy and (unlike the Dorking-like members of the same brood) in its habit of flying away for a considerable distance when suddenly disturbed. (*b*) The zebra-horse hybrids hitherto bred are in their markings very unlike their zebra parent. When the sire or dam is a Burchell zebra, the hybrids in the arrangement of their stripes are not unlike the Somali zebra (*Equus grevyi*), which is, in all probability, in its decoration, the most primitive of all the living zebras. The zebra ♂-horse ♀ hybrids (*Zebrules*), bred by the author at Penycuik, and the horse ♂-zebra ♀ hybrids (*Zebrinnies*), bred at Theobald's Park, Herts, by Lady Meux, differ from the Burchell zebra parents, and agree with the Somali zebra in having (1) rounded instead of pointed arches on the forehead; (2) more than twelve cervical stripes; (3) numerous stripes across the loins and croup—instead of five or six broad oblique stripes—and (4) in having the mane extending some distance beyond the withers.

In one of the Penycuik hybrids there are two sets of stripes over the hind quarters. In this hybrid the more pronounced stripes seem to have been inherited through the zebra parent, while the less distinct, which run in a different direction, have in all probability been inherited through the horse parent. This view is supported by the markings usually found in zebra-ass hybrids, in which the dorsal and shoulder stripes and the bars across the legs are, without doubt, inherited from or through the donkey parent, while the majority of the other markings are probably transmitted by the zebra. (*c*) Mules and hinnies are often more richly striped than their parents; *e.g.* a hinny recently obtained at Penycuik by crossing a light grey she-ass with a bay Welsh pony has, in addition to dorsal and shoulder stripes, distinct bars across the legs—there are no leg bars in either of the parents. Moreover, this hinny is of a yellowish brown colour, and in many ways seems more primitive than either of its parents. (*d*) The nearest approach to complete reversion has hitherto been obtained by crossing pigeons. Darwin, by crossing a barb-fantail with a barb-spot, produced a bird "which was hardly distinguishable from the wild Shetland species." [1]

Referring to this experiment, Weismann says that Darwin devoted his attention to the coloration of the species, and failed to state whether there was complete reversion, *i.e.* a complete agreement in form as well as in colour of the barb-fantail-spot with the wild rock pigeon. By way of settling whether in the case of pigeons complete, or all but complete reversion occurs, the author first crossed an "owl" with an "archangel" pigeon, and then mated the cross-bred bird with a pure white fantail. The owl-archangel cross had neither the frill, short beak, or short round head of the owl, nor yet the crest or bronzed black colour of the archangel. The owl-archangel-fantail cross is almost identical in colour, size, and form with the Indian wild rock pigeon. The only essential difference is in the tail, for though there are twelve feathers (in the fantail parent there are thirty), the tail is slightly arched; this is the only suggestion of the white fantail sire.

The author believes that the experiments recorded afford substantial support to the reversion hypothesis.

[1] "Animals and Plants," vol. i. p. 210.

MASSIVE LAVA FLOWS ON THE SIERRA NEVADA.

AN account of "Some Lava Flows of the Western Slope of the Sierra Nevada, California," is given by Mr. F. Leslie Ransome, in *Bulletin* No. 89 of the United States Geological Survey, 1898. The area is described as having been worn down to a rough peneplain during the interval between the close of the Jura-trias and the beginning of the Miocene period. The rocks upon which this somewhat uneven peneplain has been carved are those of the so-called "Bed-rock series" of the Gold Belt, and are of Jura-trias and earlier age. They consist on the lower slopes (or foothill region) of clay-slates, schists, limestones, quartzites and various igneous rocks; and on the higher slopes mainly of gneissic and granitic rocks.

Volcanic eruptions began during the Miocene period, and, accompanied by elevation and tilting of the peneplain, lasted to the end of the Pliocene. The first eruptions were rhyolitic, followed by the laying down of a great cloak of andesitic breccias and tuffs. The deposition of auriferous gravels both preceded and accompanied the piling up of volcanic materials. Thus the earlier accumulation of andesitic breccias and tuffs was interrupted by at least one period of considerable erosion during which a large stream, the predecessor of the present Stanislaus river, cut through the volcanic cover into the Bed-rock series along the greater part of its course. During subsequent eruptions massive flows of lava extended over limited areas, displacing the stream before mentioned, and following generally the course of the Stanislaus river, while andesitic breccias and tuffs were spread for hundreds of square miles over the western slope of the Sierra. Other more restricted flows of lava followed, and the volcanic period was brought to an end by fresh andesitic eruptions, as shown by breccias which rest on the massive flows of lava. To these lavas the author applies the name of *Latite*, derived from the Italian province of Latium, where there occur in abundance rocks closely related to those he describes. Mineralogically the Sierra Nevada latites are nearly allied to ordinary andesites, but chemically they stand between the andesites and trachytes. They correspond to the plutonic monzonites of Brögger, and represent the effusive forms of the magma. The author would use the term latite in a broad sense, and to include such varieties as toscanite, vulsinite, and ciminite, which have been described by Washington in his studies in the Italian volcanic regions.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—At the 196th meeting of the Junior Scientific Club, on February 3, Mr. F. N. A. Fleischmann exhibited a heart-shaped twin of calcite, and Mr. H. B. Hartley gave an exhibit of Japanese sword blades, explaining at the same time the mode of manufacture that has been used since the fourteenth century in Japan. Mr. M. Burr read a paper on "grasshoppers."—The officers for this term are—President, Mr. F. Soddy (Merton); Chemical Secretary, Mr. H. B. Hartley (Balliol); Biological Secretary, Mr. A. G. Gibson (Ch. Ch.); Treasurer, Mr. W. E. Blackall (Non-Collegiate); Editor, Mr. H. E. Stapleton (St. John's); Committee, Mr. F. N. A. Fleischmann (Magdalen), Mr. E. Gurney (New College), and Hon. F. R. Henley (Balliol). At the next meeting of the Club (Wednesday, February 15), Prof. Odling, F.R.S., will read a paper on "Chemical