

all scholars under suitable conditions to sixteen years of age, this association is of opinion that the provisions of the Bill as introduced require considerable amendment, especially in the direction of fixing more definitely the age of fourteen as the normal age for leaving the day school and in the incidence of compulsion upon employers to afford facilities for the attendance of young people at continuation schools by the reasonable limitation of their hours of labour."

At the close of the business of the meeting the president presented, on behalf of the association, a handsome silver rose bowl and four candlesticks to Dr. R. S. Clay, principal of the Northern Polytechnic Institute, Holloway, "in recognition of his valuable services as honorary secretary from 1907 to 1911."

The master of Caius presided at a dinner on Thursday night at Caius College, and the president of Queen's College received the members on Friday night.

RALPH S. HYAMS.

THE OPENING OF THE NEW BUILDINGS OF THE ROYAL COLLEGE OF SCIENCE FOR IRELAND.

THE scientific work of the Department of Agriculture and Technical Instruction for Ireland received welcome recognition through the opening of the new buildings of the Royal College of Science for Ireland by the King, accompanied by the Queen, as the first act of the royal visit to Dublin on Saturday last, July 8. The ceremony was under the control of the Commissioners of the Board of Public Works, and a picturesque temporary hall had been constructed in the Great Quadrangle, through the open side of which the front of the new college was visible. The vice-president of the Department of Agriculture and Technical Instruction (the Rt. Hon. T. W. Russell, P.C.), the higher officials of the Department, and the professors of the college, had the honour of being presented to their Majesties. The King was pleased to announce that he had conferred a knighthood on Prof. W. Noel Hartley, F.R.S., dean of faculty of the college, whose absence through temporary illness was greatly regretted. The architects, Sir Aston Webb, R.A., and Mr. T. Manley Deane, and the builder, Mr. W. H. McLaughlin, were presented to his Majesty, who knighted Mr. Deane upon the spot. A pleasing feature was the introduction to their Majesties of a deputation of the foremen engaged upon the works.

The Minister in Attendance (the Rt. Hon. Augustine Birrell, P.C.) then asked the King to open the college, and their Majesties, conducted by the officers of the Board of Works, visited the building. Though the ceremony had little of an academic character, the large number of visitors honoured with an invitation must have realised the place taken by science in the educational system now being built up in Ireland, and the honour conferred on Prof. Hartley will be warmly appreciated. When the classes begin work in October in the handsome building now provided, it is hoped that a scheme of correlation may be introduced by which the Irish universities will take advantage of the courses of instruction in applied science in the college. It is important to remember that the maintenance of such courses, from the days of the Science and Art Department onward, has been recognised as a part of the system of public education, and that the new building of the Royal College of Science for Ireland represents visibly the stimulus given to scientific observation and research by Sir Horace Plunkett and his colleagues when they reorganised the agricultural and technical instruction of the country.

THE EUGENICS EDUCATION SOCIETY.

THE annual report of the Eugenics Education Society shows how much progress has been made by the society during the three years of its existence. Besides quick growth of the parent stem, branches have spread from Liverpool to New Zealand; indeed, in New Zealand eugenic ideas seem to be making their way into legislation.

The main feature of the report, however, is the address of the new president, Major Leonard Darwin. Major Darwin emphasises the view that the study of heredity and

its application to sociology is the main function of eugenics. He says:—

"Although the science of heredity is now young, yet certain not hitherto widely recognised conclusions can already be preached with absolute confidence:

"(1) That men are very differently endowed by nature in inherent mental and bodily qualities. . . .

"(2) That in normal conditions, although [individual] children differ widely from their parents, yet each generation closely resembles its predecessors in average inherent qualities; a truth which applies to every nation, and every separable section of a nation.

"(3) That it follows from these premises that, if one nation is more highly endowed than another in inherent qualities, that superiority will remain with it generation after generation in the absence of disturbing causes. . . .

"(4) That if the least naturally gifted sections of a nation are reproducing their kind more rapidly than are those more highly endowed in mental and physical qualities, then the higher are being swamped by the lower, and the nation is decadent. . . .

"(5) Lastly, that whilst every effort to improve the environment of the nation should be made, modern science indicates that the beneficial results on the race of possible changes in external conditions are, in nearly all cases, likely to be far less than was formerly believed to be the case, the advantages being, moreover, probably dependent on the maintenance of the reforms in question; whereas no assignable limit can be placed to the amount of the improvement in the condition of the nation which might in time result from reforms affecting its inherent qualities, the results thus attainable being also of a vastly more permanent character."

In the necessary application of these principles in practice, Major Darwin places in the forefront the need of legislative power to segregate the feeble-minded. He says:—"Here the difficulties encountered ought not to be great, since public opinion is already largely on our side." Doubtless, instructed public opinion is almost or quite unanimous. But, unfortunately, instructed public opinion has little voting power in present political conditions, and the long delay in carrying out the recommendation of the Royal Commission on Mental Defect is impressing on us the unwelcome fact that the Government and Legislature will take no action, even in a case which is urgent and patent to every thinking man, unless there are votes behind it. All the more need exists, therefore, for the efforts of such associations as the Eugenics Education Society to awake the nation to the evils of further inaction.

On the other side, Major Darwin rightly points out that much might be done by the adjustment of taxation to give really effective economic relief to households consisting of large families of sound stock. He also revives the suggestion that the Government as an employer should pay salaries to include an allowance for every living child. As Government employees are usually picked men, this proposal has definite eugenic value.

Major Darwin concludes with a striking passage on the moral question. He says:—

"With regard to the moral aspects of eugenics, what is it which has hitherto been the chief aim of the moral teacher? Has it not been to enforce the necessity of self-sacrifice for the sake of our fellow creatures? The eugenic reformer now demands an enlargement of this code in the light of facts unknown to our ancestors, and pleads for the self-sacrifice of this generation for the sake of the moral and physical welfare of the countless millions of the unborn of the future. May not this be the greatest moral question of all?"

W. C. D. W.

PERUVIAN ANTHROPOLOGY.

UP to the present, the dearth of knowledge regarding the people of Peru has been due to the almost complete lack of anthropological examination of the living subject and to the nature of the material available, consisting largely of skulls accidentally or artificially deformed, normal specimens from this region being rare in our existing collections. We knew in a general way that Peru, shortly before the conquest, was peopled by at least three

or four Indian races: the Aymara and Quichua in the central and southern highlands; the Huancas in the north; the Yungas or Chinchas along the coast, besides several still unclassified tribes in the north-eastern and northern territories. From recent accessions of material collected by the American museum, we are now able to differentiate the Aymara, representing a dolichocephalic type, from the middle coast people, who are brachycephalic. Further information has now been collected by Dr. Ales Hrdlicka, curator of physical anthropology in the United States National Museum, who has recently made a hasty tour through the coastal region and a more careful examination of two important sites, Pachacamac and Chan-chan or Gran Chimú. The results of his investigations are published in vol. lvi., No. 16, of the Smithsonian Miscellaneous Collections.

It now appears to be certain that the whole, or the greater part, of the Peruvian coast was originally peopled by a race of a single type, brachycephalic Indians of moderate stature. The remains of the earliest people are found in the huacas and some cemeteries associated with pottery of simple but interesting forms. Metal is scarce, and when found is gold. These people were followed by others of the same fundamental type, but of different habits, as is shown by the fact that their skulls have been subjected to occipital flattening and fronto-occipital deformations. In their graves are found copper and brass, with a little gold and some simple pottery. Upon this brachycephalic people a dolichocephalic race, probably from the north, intruded, and were the makers of the more highly ornamented pottery, some specimens of which are illustrated in this memoir.

The material collected by Dr. Hrdlicka contributes some other interesting facts. No case of rachitis was observed, and in only one vertebra was there indications of tuberculosis; but the evidence is not quite conclusive, and the age of the grave is uncertain. The specimens indicating syphilis were recent. Fractures were rare, the setting defective, and there were no indications of surgical skill. The evidence for trephining is confined to a single case. Finally, it is clear that the ordinary collections of Peruvian pottery possess no scientific value, as it is usually a heterogeneous mixture of specimens of different races and epochs. The work of exploration must begin *de novo*, and the new race of archaeologists must adapt those methods of scientific excavation of which the work of Dr. Arthur Evans in Crete and Prof. Flinders Petrie in Egypt are such excellent examples.

AÉRONAUTIC INVESTIGATIONS.¹

THE Advisory Committee for Aeronautics was appointed in April, 1909. The first report of the committee was prepared in April, 1910, and presented to Parliament in July of that year. At the date of the preparation of that report no very large amount of experimental work had been completed: the first year's work was necessarily largely devoted to an examination of the ground to be covered, with a view to the determination of the questions upon which experimental information was most urgently required, and to the design and construction of the necessary apparatus.

The aim of the present report is to give a general account of the work of the committee during the year 1910-11. The technical papers giving the detailed results of the various investigations which have been carried out by the experimental department, with other reports and memoranda of general interest which have been laid before the committee, are no longer included with this report, but will be collected together in a volume to be issued separately. This will be referred to as the Technical Report of the Committee for the year 1910-11.

During the past year the committee has had under consideration a large number of questions which have arisen in connection with the constructional work in progress at Farnborough and at Barrow. At the National Physical Laboratory, also, a considerable proportion of the experimental work has been directed towards the solution of

specific problems of airship design and the determination of the necessary experimental data. In addition, research of a somewhat more general character has been carried out, and some results of fundamental importance with reference to the future work to be undertaken have been arrived at.

Equipment for Experimental Work.—The principal apparatus which has been installed at the National Physical Laboratory for the purpose of the researches in aeronautics now in progress was described in the report of the committee for 1909-10. The most interesting and novel addition to the equipment during the past year is a circular rotating water channel, to be used for determining the forces acting on plates and small models in a circular stream of water. It is hoped that, with the aid of this, certain data of fundamental importance in connection with the motion of an airship may be determined, and, in general, that the forces acting on aircraft when executing turning movements in the air may be investigated. In addition, a special water tank has been provided for the study, by visual and photographic methods, of the eddying motion in the rear of plane and curved surfaces, balloon bodies, &c.

Air and Water Channels.—The laboratory has now at its disposal for resistance experiments two air channels—the larger air channel of 4 foot square section, specially constructed for the aeronautical work, and the circular channel of 2 foot diameter, previously employed by Dr. Stanton in his researches on the resistance of models in a current of air—and a water channel which continues to be of much value for obtaining results from which the corresponding data for air can be immediately deduced.

With these various means a large amount of experimental work has been carried out throughout the year. This work has included the determination of the resistance of a number of airship bodies of different forms, and the measurement for these forms of the "lift" and "drift" at various angles to the wind; the investigation of the relative stability of different airship models, and of the stabilising action of fins of different area and in different positions; the determination of the efficiency of various types of rudders and lifting surfaces, plane and curved; the air resistance of wires, stationary and vibrating, of stays and ropes, of model gondolas, model radiators, &c.; the investigation of the forces due to the wind acting on models of dirigible sheds of different forms; and of the forces acting under various conditions on a model of a girder of the type employed in the new Paulhan aeroplane.

Resistance and Directional Stability of Airship Models.—Perhaps the most interesting investigation among those enumerated above is that on airship models. The investigation has comprised a large series of observations on models of different forms, carried out at intervals throughout the year. The work has been directed to the determination of the head resistance for motion parallel to the axis, the "lift" and "drift" for motion oblique to the axis, the magnitude of the moment tending to increase the obliquity—called hereafter the negative righting moment—when the ship is at different angles to the relative wind, and the amount of fin area necessary to give a positive, in place of a negative, righting moment.

The work has been carried out in cooperation with the superintendent of the Army Aircraft Factory, who provided the models for the tests, the head and tail curves for which were systematically varied according to a plan devised by him. The object of the tests for head resistance was to determine the amount of change in resistance due to specific alterations of the curvature in head or tail, and ultimately to determine the forms of minimum resistance for a given gross lifting power and for a given net lift. The experiments led to the adoption of certain curves for head and tail, with a ratio of total length to maximum diameter of about 6:1.

The experiments on models inclined to the current determined the amount of dynamic lift obtainable owing to the inclination of the airship to the horizontal, as distinct from that directly due to the elevating planes, and at the same time the increase in head resistance owing to the obliquity.

The complete investigation of the conditions affecting the stability of path of an airship will no doubt take a

¹ From the Report of the Advisory Committee for Aeronautics for the Year 1910-11. [Cd. 5706.] (London: Wyman and Sons, Ltd., 1911.) Price 1s. 6d.