really resist the action of gasolene would be of the highest benefit.

A difficulty lies in the fact that the tanks are large (say 20 to 100 gallon capacity). The structural problems would be serious. The tanks now used are large and of metal. Vibration causes much difficulty and leakage.

(*e*) Metal coating. The protecting of the metal parts of an airplane, especially the fittings and cables, is a serious problem. A material is desired that would really prevent dangerous corrosion. Nickel-plating over copper is very good, but will not suffice. Rust strikes through very rapidly. Baked enamel is the best coating. It is impossible to apply in many cases.

(*f*) Sound. The question of eliminating the noises involved in the operation of aircraft is one of importance. The peculiar note of the propeller of a Zeppelin can be heard for several miles, and is usually the first warning of its approach at night.

3. *Miscellaneous.*—(*a*) Physiological. Study the physiological and psychological effects of low-density air at high altitudes on the performance of pilots.

(*b*) Transparent wing covering for airplanes. A wing covering which would answer the following general requirements would be of great value to military aviation :—

Weight not more than 5 oz. per square yard.

It should present reasonably great resistance to flame.

It should be reasonably proof against action of salt water, moist air, extreme dryness, and quick temperature changes.

It should not stretch in any direction. Its ability to retain its original form as placed on the airplane is very important.

It should have tensile strength of at least 75 lb. per inch width in any direction.

Its tendency to tear and split because of tack holes through it, or because of bullet holes, should be as small as possible.

(*c*) Development of light alloys for airplane construction. Pure aluminium or aluminium alloys. It is believed that a great deal can be done in this direction. So far no alloy has been developed, except possibly in Germany, which can compare with average Alaskan spruce in its "specific tenacity."

(*d*) The structure of gusts. It is believed that this is of sufficient importance to aviation to warrant considerable expense in its study.

Painstaking investigation of the character of eddy formations caused when wind strikes trees, hollows, cliffs, etc., and the character of disturbances created by canyons, swamps, deserts, etc., would be of great value to aviators.

This can be done not only by smoke and toy balloon work in the vicinity of obstructions such as the above, but also by photographic work in wind channels.

A set of simple rules laying down just what the aviator may expect on one side or another of canyons, cities, trees, lakes, and swamps would be very helpful in aviation.

(*e*) Radio-apparatus for aircraft. The subject of radio-intercommunication between aircraft in flight, and between aircraft and the earth, requires for its solution the highest possible efficiency and trustworthiness combined with minimum weight.

A present tendency is to separate entirely the power plant from the main engine of an aircraft. The generator body in this case has a stream-line figure, and a separate small air-screw is provided. Among other methods the oscillion is being tried as the actual source of continuous electromagnetic waves.

(*f*) Bullet-proof gasolene tanks. Development of a material with which to line or construct tanks to contain the gasolene in an airplane in which a bullet hole will quickly close, entirely or at least partly. This would enable many a flyer to get back to his own lines after having been fired upon.

(*g*) Development of a fabric as good as, or better than, Irish linen for the covering of airplanes. There has not been manufactured in the United States a fabric suitable for use in covering airplanes.

The fabric should answer all requirements laid down under *transparent wing covering*, and be, in addition, such as to shrink the proper amount without harm when cellulose solution is applied.

It is possible that long-fibre cotton might be developed that would answer the purpose.

We must become independent in all lines affecting our military aviation. To-day we depend entirely upon Ireland and England for our linen, and the supply is becoming very low in the United States.

(*h*) Aviator's clothing. Much has still to be done in devising non-inflammable and protective clothing for aviators. This question is intimately connected with personal armour and safety in case of fall.

(*i*) Ground-speed indicator. An instrument which would measure the actual speed of an aircraft over the ground would be useful in the operation of military machines.

4. *Physics of the Air.*—A number of physical properties of air, important in the problems of aviation, were also discussed.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

BIRMINGHAM.—Miss Helen Caddick has presented to the University a valuable collection of examples of the art of primitive peoples. The collection, which has been made by Miss Caddick in numerous travels, includes specimens from Central Africa, Tonga and Fiji Islands, New Zealand, and Peru. It is hoped that the gift may form the nucleus of an ethnological museum for the University.

LONDON.—At a meeting of the Senate held on January 24, the Vice-Chancellor (Sir Alfred Pearce Gould) being in the chair, Mr. J. J. Guest, of Trinity College, Cambridge, was appointed as from February 12 next to the University readership in graphics and structural engineering tenable at University College, in succession to Dr. W. H. Eccles, reader in graphics, who has been appointed professor of applied physics and electrical engineering at Finsbury Technical College.

The following doctorates have been conferred by the Senate :—*In Chemistry* : Mr. Guy Barr, an external student, for a thesis entitled "Researches in Relation to the Tensile Strength of Fabric, and the Effects of Experimental Variations on the Result of Tensile Tests," and other papers. *In Botany* : Mr. R. C. McLean, an external student, for a thesis entitled "Studies in the Ecology of Tropical Rain Forests," and other papers.

OXFORD.—On January 30 the preamble of the Statute creating the status of "advanced student" and prescribing the conditions on which advanced students may obtain certain degrees came before Congregation. An able speech in favour of the Statute was delivered by the Rev. E. M. Walker (Queen's), who was supported by Prof. Perkin, Waynflete professor of chemistry, and as to the principle of the Statute by Mr. S. Ball (St. John's), Dr. Macan, Master of University College, and Dr. F. C. Schiller (Corpus). The last three speakers argued in favour of the degree of doctor of philosophy being offered under the Statute, instead of that of D.Sc. or D.Litt. as was at present contemplated. Notice was given of an amendment to be proposed in this sense. The only

speaker in opposition was Prof. J. E. Holland (All Souls), who thought that council should have proceeded by resolution rather than by Statute. On a division the preamble was carried by 69 to 7.

THE KING has consented to open the School of Oriental Studies, London Institution, on Friday morning, February 23.

DR. C. E. MOSS, Botany School, Cambridge, has been appointed professor of botany in the South African School of Mines and Technology, Johannesburg.

AT the request of Mr. Fisher, Prof. Gilbert Murray, professor of Greek, Oxford University, is undertaking temporary work at the Board of Education, taking the place of Mr. H. F. Heath, C.B., now Secretary of the Department of Scientific and Industrial Research. Mr. Heath was head of the Universities Branch of the Board, and also Director of Special Inquiries and Reports.

ONE of the sections of the report to the Prime Minister of the Speaker's conference on electoral reform, which was issued on Tuesday, deals with university representation. The following recommendations are made:—(*a*) The Universities of Oxford and Cambridge shall continue to return two members each; the electorate shall be widened, and, in order to secure a proper representation of minorities, each voter shall be allowed to vote for one candidate only. (*b*) The Universities of Durham, Manchester, Birmingham, Liverpool, Leeds, Sheffield, Bristol, and the University of Wales shall receive representation; these universities shall be grouped with the University of London so as to form a single constituency returning three members elected on the system of a single transferable vote. (*c*) The combined Universities of Edinburgh and St. Andrews and of Glasgow and Aberdeen shall also be grouped so as to form a single constituency returning three members under the system of a single transferable vote. (*d*) As regards all universities, the obtaining of a degree shall be the basis for electoral qualification.

THE following resolutions were passed at the annual meeting of the Association of Science Teachers, held at the University of London on January 6:—(1) That the science teaching in the schools should aim at developing in the pupils (*a*) the power to observe accurately, to reason logically from observed facts, to frame hypotheses and to test these hypotheses by means of their own experiments; (*b*) a spirit of interest and inquiry with regard to the world around them and the universe at large, an interest in the growth of knowledge in the past, and an appreciation of some of the wider problems with which science deals at present and which influence modern thought and modern activities. (2) That in order to accomplish the first of these aims a thorough course of experimental work in the laboratory is absolutely necessary, that such a course should be continuous, or nearly so, from the ages of twelve to sixteen, and that in this course the pupils should, so far as possible, be encouraged to attack problems for themselves. (3) That as such a course by itself would necessarily cover a very narrow field, the work should be supplemented by teaching or by activities on the part of the pupils themselves, designed to bring them into contact with the wider issues indicated in (1. *b*). (4) That if science is to play its due part in the curriculum as indicated in the foregoing resolutions lessons encouraging the children to observe the phenomena of Nature should be given from the earliest ages, while between the ages of twelve and sixteen not less than an average of one-seventh of the teaching hours of the school should be given to science.

SOCIETIES AND ACADEMIES.

LONDON.

Geological Society, January 10.—Dr. A. Harker, president, in the chair.—H. A. **Baker**: The Palæozoic platform beneath the London Basin and adjoining areas, and the disposition of the Mesozoic strata upon it. With an appendix by Dr. A. M. Davies. The author carries on the work of tracing the contours of the Palæozoic platform of S.E. England. By comparing these with the contours of the base of the Gault, the probable boundaries of the areas of the platform that were only submerged finally under the Gault sea are determined. The effects of post-Cretaceous tilting and warping are analysed. The successive Mesozoic overlaps on the platform, their probable areas, and the tectonics of the platform are discussed. Evidence is given for a second Charnian axis, proceeding southeastwards through Norfolk and Suffolk, east of Kent, to the North of France.—Dr. C. **Lapworth**: Balston Expedition to Peru: report on graptolites collected by Capt. J. A. Douglas, R.E. The graptolites were collected from the rocks of the Inambari district. The specimens are recorded as all occurring in the same locality, but it is not known whether they were obtained from a single zone. The lithology of the containing rocks and the mode of preservation of the graptolites are similar to those obtaining in the richest of graptolite-bearing strata of Britain, Europe, and North America. Taken as a whole, this graptolite fauna may best be compared with that of the Upper Arenig formation of Britain and its North American equivalents. The assemblage of graptolites discovered in Bolivia a few years ago by Dr. J. W. Evans corresponds closely with this Peruvian fauna, and was probably derived from the southward continuation of the same Andean graptolite-band. The Douglas collection of Peruvian graptolites greatly strengthens the inference that in Arenig-Llandeilo times there was open-sea communication admitting of the circulation of sea-currents along some as yet undetermined line or lines, connecting these widely separated regions, which must have extended across the equator and apparently throughout a length nearly equal to that of half the circumference of the globe.

Linnean Society, January 18.—Sir David Prain, president, in the chair.—Prof. F. O. **Bower**: The morphology of the sorus of ferns. The isolated sporangium (monangial sorus of Prantl) is frequent among primitive Filicales. The distal or marginal position of the sorus is prevalent in primitive types. The transition from a marginal to a superficial position has frequently occurred. Interpolation of sporangia has led to increased complexity of the sorus. In simple, gradate, and mixed sori thus constituted the receptacle varies: it is not a stable entity, but a result of elaboration of the vein-ending on which the sporangia are seated. Superficial extension of sori occurs. Duplication of sori also occurs. Fusion of sori occurs progressively in various phyla. The fusion-sorus may disintegrate, but not necessarily along the original lines of fusion. The identity of the sorus may be lost by acrostichoid development, which has occurred along numerous lines of phyletic advance. The more complex sori of ferns, as they are now seen, are referable along such lines of comparison to marginal or distal monangial sori. Such a position of isolated or few sporangia is found to prevail in plants of the Lower Devonian period. The marginal placentation of seed-plants is probably more than a mere analogy.

Aristotelian Society, January 22.—Dr. H. Wildon Carr, president, in the chair.—C. E. M. **Joad**: Monism in the light of recent developments in philosophy. A monistic theory confuses two distinct propositions. A