as other countries have established the organisation required if they wish to adhere, there seems to be a good prospect of a much more efficient control of the dissemination of the fungus diseases to distant countries than has ever been thought possible in the past."

The memoir contains an appendix giving a brief history of the spread of most of the important cryptogamic diseases of cultivated plants, the extension of which has attracted notice during the past seventy years.

PARIS ACADEMY OF SCIENCES.

BONAPARTE FUND.

THE committee has considered twenty applications for grants from the Bonaparte Fund. It is considered desirable to reserve the greater part of the annual income until after the conclusion of the war and to defer grants for the purchase of apparatus. The grants recommended and approved by the Academy are :—

(1) 2000 francs to Edmond Bordage, for the publication of his histological researches on the metamorphoses of insects.

(2) 2000 francs to E. Chauvenet, for the continuation of his researches on zirconium.

(3) 2000 francs to Gustave Dollfus, for the continuation of his studies on the Paris basin.

(4) 2000 francs to Henri Froidevaux, for the production of a catalogue of the periodicals, more than eight hundred in number, in the library of the Société de Géographie.

(5) 2000 francs to Emile Gadeceau, for his studies on the submerged forests of Belle-Ile-en-Mer.

(6) 2000 francs to F. Gagnepain, for assistance in the publication of an etymological dictionary of botanical genera, with illustrations.

(7) 2000 francs to L. Joubin, for pursuing at Messina the researches he has undertaken on the deep-sea Cephalopods.

(8) 2000 francs to W. Kilian, for the pursuit of his studies and his publications on the fossil fauna and the stratigraphy of the south-east of France.

Including the balance from 1916 (55,000 francs), the amount in hand is 105,000 francs, and the balance carried forward, after paying the above-named grants, is 89,000 francs.

THE AMERICAN PHILOSOPHICAL SOCIETY.

THE American Philosophical Society held a very successful meeting in Philadelphia on April 12–14. The address of welcome was delivered by the president, Dr. W. W. Keen, who, with Vice Presidents W. B. Scott and G. E. Hale, and with Dr. A. A. Michelson, presided. More than forty papers were presented. The national crisis also received some attention, Dr. M. T. Bogert, of Columbia University, outlining the work chemists may do to aid the National Research Council in the solution of certain war problems. Suitable badges to identify "members of the industrial army" so that they may not be called slackers was urged. Attention was directed to England's mistake in permitting general enlistment for "the front" when in many cases men with special ability could have been of much more value using their brains in the laboratory. A well-trained industrial army is just as important as the army of fighters.

A brief outline of the effect of different lighting conditions on the eye and the factors which cause the eye to lose in efficiency and to experience discomfort was given by Dr. C. E. Ferree, of Bryn Mawr College. More than forty different lighting conditions have been investigated, and many experiments conducted pertaining to the hygienic use of the eye. The loss of efficiency sustained by the eye in an unfavourable lighting situation seems to be muscular, not retinal. The retina has been found to lose little, if any, more in functional activity under one than under another of the lighting systems employed. The observation of motion pictures for two or more hours causes the eye to lose heavily in efficiency. The loss decreases rather regularly with increase of distance from the projection screen. It seems little, if any, greater, however, than the loss caused by an equal period of steady reading under much of the artificial lighting in actual use. In all the lighting situations tested a close correlation was found to obtain between the loss in power to sustain clear seeing and the tendency to produce ocular discomfort.

A spectroscopic method of deriving the absolute magnitudes of stars, and a new formula connecting parallax and proper motion for studying the relationship between the motion of stars and their true or absolute magnitudes, were described by Dr. W. S. Adams, of Mount Wilson Observatory. About one thousand stars have been used in the investigation, and the results establish almost certainly a definite increase in velocity with decrease in brightness.

The skeleton of a gigantic extinct bird found last summer in the Bighorn basin of Wyoming by an expedition from the American Museum of Natural History was described by Dr. W. D. Matthew, one of the curators. It is of the Lower Eocene age, a contemporary of the little four-toed horse, the fossil remains of which are found in the same region. The bird was about as large as the extinct moas of New Zealand, much bulkier than any living bird, although not so tall as an ostrich. It stood nearly 7 ft. high. The head was enormous, 18 in. long with huge compressed beak like the extinct Phororhachos of Patagonia, but unlike any living bird. The neck, too, was very massive and rather short, and it was quite unable to fly, the wings being about as large as in the cassowary. Although it resembled the modern ostrich group in some ways, it was not related to them, and only remotely related to any other known birds, the nearest perhaps being the seriema of South America. A few fragments of this gigantic bird were found by the late Prof. Cope more than forty years ago, and named Diatryma, but it remained practically unknown until the discovery of this nearly complete skeleton. A description of this specimen by W. D. Matthew and Walter Granger, with photographs and a reconstruction, will appear in the Bulletin of the American Museum.

In a paper by E. S. Botch, of Philadelphia, the present status of our knowledge about early man in America was summed up as follows. Man lived during at least a part of the Pleistocene period for tens of thousands of years south of the Glacial moraines. He probably went through an Eolithic period, and certainly through a Chelleen period in some places, and therefore was truly a Palæolithic man. He may have shown rudimentary fine art. Palæolithic American man was the ancestor of the Neolithic historic Indian, and although less advanced in culture, much like his descendant in anthropological characteristics. Whether he was an autochthon in America or whether he came from some other place, and, if so, when, we do not as yet know positively, although his affiliations seem to be to the west. And it is to four men above all others that we owe our knowledge: Abbott, the discoverer of Palæolithic implements and horizons; Volk, the corroborator; Lund, the first finder of probably Palæolithic bones; and Winchell, the investigator of patination.

A valuable paper describing the factors influencing the sex ratio in poultry was read by Dr. Raymond Pearl, of the Maine Agricultural Station. In the present war conditions any information which would make it possible for the poultryman or farmer to produce a larger number of pullets to lay eggs, with out producing so many cockerels to eat up costly food, would be of very great value. This study, which is based on eight years' experiments and more than 22,000 individuals, demonstrates, first, that the determination of sex in poultry is primarily a matter of a definite, hereditary mechanism, just as it is in insects and other forms which have been studied. At the same time, it is demonstrated, however, that in certain physiological circumstances the operation of this mechanism may be modified in such a way as to lead to the production of more females in proportion to the number of males. The chief factor in bringing about the modification in the direction of a larger production of females is the fecundity of laying ability of the hens used as breeders. The larger the number of eggs which a hen lays before being put into the breeding pen, the larger will be the proportion of females and the smaller the proportion of males produced by her eggs. Some years ago it was shown by the speaker that the ability to lay eggs (fecundity) in poultry is a matter of definite Mendelian inheritance. As a result of this knowledge, it is possible to breed strains of hens in which productivity is a definitely fixed characteristic. The present results, taken in connection with the earlier ones, show that when the poultryman breeds along the right lines for increased egg production, he will at the same time be producing a strain in which profit-making pullets preponderate in place of the less profitable cockerels.

The session on Saturday afternoon (April 14) was set apart for a special symposium on aeronautics, the speakers including Dr. A. G. Webster, of Clark University, a member of the Naval Advisory Board, and Dr. W. F. Durand, chairman of the National Advisory Committee for Aeronautics.

On Friday evening (April 13) a reception was held in the hall of the Historical Society of Pennsylvania, when Prof. G. E. Hale, director of the Solar Observatory at Mount Wilson, California, gave a most interesting address on "The Work of the Mount Wilson Observatory."

A very pleasant feature of the Saturday afternoon session was the presentation of a portrait of Dr. J. Minis Hays, dean of the Wistar Association, by Joseph G. Rosengarten, LL.D., on behalf of the association. on the centennial anniversary of its organisation, and in the twenty-first year of Dr. Hays's secretaryship of the American Philosophical Society.

ARTHUR W. GOODSPEED.

EXPERIMENTAL WORK IN AERONAUTICS.[1]

THE report to Parliament of the Advisory Committee for Aeronautics for 1916–17 has just been issued, and is a further vindication of the foresight shown when this committee was inaugurated in 1909 under the presidency of Lord Rayleigh. Since that time funds have been continuously placed at the disposal of the Royal Society for the development of the experimental investigations at the National Physical Laboratory, the aeronautical work of which in all its branches is controlled by the Advisory Committee for Aeronautics.

Although less directly responsible to the Advisory Committee than the National Physical Laboratory, the Royal Aircraft Factory carries on its experimental work in close co-operation, as does also the Meteorological Office in its aeronautical work. Other institutions and private bodies find the Advisory Committee for Aeronautics a suitable body to receive and review their communications.

In normal times approved reports and papers are collected annually into a technical report issued for sale, but for obvious reasons publication has not taken place since the opening of hostilities. The volume of material collected is now very large, and special arrangements have been made to render it available to British designers, to whom it is of incalculable value. As the brief report now issued appears to have been framed to give as much information as is permissible and is of very general interest, it is reproduced below almost in full.

The experimental investigations carried out under the control of the Advisory Committee for Aeronautics into the many problems affecting the development of aircraft have been continued and extended during the past year.

Owing to the growth of the work of the committee in certain directions, sub-committees have been formed to advise in regard to special matters. An Internal-Combustion Engine Sub-Committee has been appointed under the chairmanship of Dr. Dugald Clerk, while Mr. H. Fowler is chairman of a Light Alloys Sub-Committee. Other sub-committees have been constituted from time to time to investigate particular problems.

Many changes and developments in the design and construction of aircraft have taken place as the result of the continued and varied experience gained from their use in warfare under modern conditions. An increasing number of special problems is thus constantly presented for investigation, and these have very closely occupied throughout the year the attention of the staffs engaged in experimental work, both at the National Physical Laboratory and at the Royal Aircraft Factory. In addition to aerodynamical research, much attention has been given to questions relating to engines, materials of construction, strength of construction and design, instruments and accessories, as well as to methods of attack from aircraft, and other matters.

Equipment for Experimental Work at the National Physical Laboratory.—Reference was made in the report for last year to the additional equipment provided for experimental work. The wind channels now available comprise two 7-ft. channels, two 4-ft., and one 3-ft. The new 7-ft. channel was completed and brought into use early in the year 1916–17. No important departure has been made in its design from that of the earlier 7-ft. channel, but some minor modifications have been introduced which experience had indicated as tending to greater convenience in working. An air-speed of 85 ft. per second can be reached in this channel with an expenditure of 160 h.p. It is doubtful whether further increase in size of channel or in speed of air-current would advance existing knowledge to an extent sufficient to outweigh the greatly increased cost and other disadvantages involved. If it should prove necessary, for certain purposes, to conduct experiments on a larger scale and at higher speeds, it would appear, therefore, to be necessary to employ a method in which the model is moved through the air. As is well known, this procedure presents various difficulties, and the securing of even moderately accurate data in this manner is, at the best, extremely laborious. Probably the least troublesome way of applying this method is by installing measuring apparatus on the aeroplane itself, and it seems probable that only in this way can an

[1] Report of the Advisory Committee for Aeronautics for the Year 1916–17. (Cd. 8629.) (London: H.M. Stationery Office.) Price 1*d*. net.