half); the Gay prize to Paul Lemoine, for his geological work in the French colonies.

Physics.—The Hébert prize to M. Hemsalech, for his work on spark spectra; the Hugues prize to Ch. Féry, for his researches in physics, especially those dealing with the laws of radiation and the measurement of high temperatures; the Gaston Planté prize to Paul Janet, for his researches in electricity and magnetism.

Chemistry.—The Jecker prize between M. Darzens (500 francs), M. Fosse (250 francs), and M. Tiffeneau (250 francs), for work in organic chemistry; the Cahours prize (in equal parts) between Louis Hackspill and M. Richard; the Berthelot prize to André Wahl; the Montyon prize (unhealthy trades) to M. Tissot, for his apparatus permitting work in a poisonous atmosphere, an invention of especial importance in mines.

Mineralogy and Geology.—The Delesse prize to Albert Michel-Lévy, for his petrographical and stratigraphical work; the Joseph Labbé prize to René Nicklès, for his geological and practical work in connection with the discovery of the coal basin at Meurthe-et-Moselle; the Fontannes prize to M. Cossmann, for his palæontological studies; the Victor Raulin prize to Emmanuel de Margerie, for the whole of his geological work.

Botany.—The Desmazières prize to Camille Sauvageau, for his recent researches on the brown algæ; the Montagne prize is not awarded, but Jean Beauverie and Antoine Lauby each receive an encouragement of 500 francs; the de Coincy prize to E. Achille Finet, for his publications relating to orchids.

Anatomy and Zoology.—The Grand prize of the physical sciences to M. Anthony, for his memoir on the characters of adaptation to tree life in vertebrates; the Savigny prize to Ferdinand Canu, for his work on the Bryozoa; the Cuvier prize to L. Cuénot, for the whole of his scientific work.

Medicine and Surgery.—Montyon prizes to L. Testut and O. Jacob (2500 francs), for their treatise on topographical anatomy; to Alexandre Besredka (2500 francs), for his work on the mechanism of anaphylaxia; and to E. Cassaet (2500 francs), for his memoir on the diagnosis of posterior pericarditis.

Mentions of 1500 francs are accorded to Pierre Nolf, Emile Feuillé, and E. Sacquépée, and citations to Léopold-Lévi and H. de Rothschild, S. Mercadé, G. Faroy, L. Panisset; the Barbier prize to H. Guilleminot, for his memoir on fluoroscopic radiometry; the Bréant prize is not awarded, but prizes from the foundation funds are given to M. Auclair and Louis Paris (2000 francs), to M. Dopter (2000 francs), and M. Duvoir (1000 francs); the Godard prize to Jean Louis Chirié; the du Baron Larrey prize to H. Coullaud and E. Ginestous, for their work on the physiology and vision of shooting, Maurice Boigey receiving a very honourable mention; the Bellion prize is divided between M. and Mme. Victor Henri, for their studies on the action of ultra-violet light on toxins and micro-organisms, and M. Courmont and M. Nogier for their researches on the sterilisation of water by the ultra-violet rays; the Mège prize is not awarded, but a prize of 300 francs is awarded to P. Nobécourt and Prosper Mercklen; the Chaussier prize to M. Imfert.

Physiology.—The Montyon prize (experimental physiology) divided equally between Dr. Marage and Raoul Combes; the Philipeaux prize between Mme. Z. Gruzewska, for the whole of her work in physiology, and Maurice Piettre, for his researches on bile; the Lallemand prize to Henri Piéron, for his work on the memory, Maurice Brissot receiving a very honourable mention, and J. Lévy-Valensi an honourable mention; the Pourat prize is not awarded.

Statistics.—Montyon prize (1000 francs) to René Risser, and a mention (500 francs) to Charles Heyraud.

History of the Sciences.—The Binoux prize divided between Antonio Favaro and Edmond Bonnet.

General Prizes.—Berthelot medals to MM. Darzens, Tiffeneau, Tissot, André Wahl, Louis Hackspill, Richard; the Gegner prize (increased to 4000 francs) to J. H. Fabre; the Frémont prize to Charles Frémont; the Lannelongue prize between Mme. Cusco and Mme. Rüch; Wilde prizes to M. Stefanik (2000 francs) and A. Trillat (2000 francs); the Lonchampt prize to M. Mazé, for his researches in agricultural chemistry and bacteriology; the Saintour prize to Jules Drach; the Fanny Emden prize is not awarded, but encouragements are attributed to M. Ochorowicz (1000 francs) and M. Boirac (2000 francs); the Pierson-Perrin prize to (the late) Henri Pellat, for the whole of his work; the Petit d'Ormoy prize (mathematics) to Jules Tannery and (natural science) to M. Depéret; the Serres prize to L. Vialleton, for his researches on embryology and comparative anatomy; the Jean Reynaud prize to Emile Picard; the Baron de Joest prize divided between H. Mouton and Charles Tellier; the Leconte prize is held over to this year; the prize founded by Mme. la Marquise de Laplace to Georges Marie Antoine Perrin; the prize founded by Félix Rivot between Georges Perrin, Francois Walckenaer, Henri Terrisse, and Jacques Denis.

The Bonaparte Foundation.

Thirty-four applications for grants from this fund were received, and the eleven mentioned below received favourable consideration:—M. Hartmann (4000 francs), for assistance in his experimental researches on the elasticity of solid bodies; M. Alluaud (3000 francs), for carrying on studies of the Alpine fauna and flora of the tropical mountains Kilimanjaro, Ruwenzori, and Kenia; H. Barbieri (3000 francs), for pursuing his chemical studies on nerve substance; M. André Broca (3000 francs), for constructing an apparatus for the measurement of geodesic angles by the Borda method; M. Krempf (3000 francs), for completing his work on the biology of the coasts of Indo-China; M. Sollaud (3000 francs), for pursuing his researches on the Palemonidæ; M. Topsent (3000 francs), for the zoological study of the fresh water of Saint-Jean-de-Losne (Côte d'Or); MM. Buisson and Fabry (2000 francs), for the purchase of apparatus to enable them to pursue their researches on the distribution of the energy in the solar spectrum; M. Gaubert (2000 francs), to acquire the apparatus necessary to pursue his work on liquid crystals; M. Houard (2000 francs), to permit him to pursue in America his researches on the Zoocecidæ; and M. Moureu (2000 francs), to permit him to pursue his studies on the rare gases and their distribution in nature.

The total grants from the fund amount to 30,000 francs for the year.

FORESTRY EDUCATION AT THE UNIVERSITY OF EDINBURGH.

IN October, 1910, Mr. E. P. Stebbing, who had been appointed university lecturer in forestry the previous May, delivered an inaugural lecture in the University, taking as his subject "Forestry Education: its Importance and Requirements." Extracts from this lecture were printed in NATURE of November 10, 1910 (vol. lxxxv., p. 61). Mr. Stebbing directed attention to the three chief requirements of the department of forestry of the University. These he considered to be: (1) a forest garden; (2) more accommodation for museums and laboratories; (3) an increase in the forestry staff.

The University has been giving undivided attention to these three wants of the department, and the following statement, which has been issued by the University to the Press, places the present position of Edinburgh as a forestry educational centre clearly before the public.

During the past year afforestation questions and forestry education have been receiving considerable attention in this country. In a resolution on the subject, the Development Commissioners decided that their first grants with the object of furthering the progress of afforestation would be made with the object of improving the means of affording sound forestry education in the country.

In Scotland a lecturer in forestry was appointed so long ago as 1888 at Edinburgh University, and an annual course of lectures has been delivered since that date during the winter session.

A few years ago the Edinburgh and East of Scotland Agricultural College inaugurated a short course of evening lectures in simple forestry for working foresters and others. This course has during the past year been extended, and a month's course of simple forestry, forest botany, and forest entomology is now delivered in August at the Agricultural College.

When, a few years ago, it became evident that the question of afforesting a portion of the British Isles had developed into a matter of considerable public importance, Edinburgh again led the way, and instituted a degree of B.Sc. in forestry and appointed lecturers to deliver the special courses which the forestry student is required to take, such as forest botany, forest chemistry, forest engineering, and forest entomology.

The University did not, however, rest content with this. The demands made upon the resources of the department led to the recognition of the fact that provision was required for three additional objects:—

(1) A forest garden, including an area for the experimental formation of woods.

(2) Extensions of the present museum and the provision of laboratories.

(3) Additional lecturers on the University forestry staff.

During the past year undivided attention has been devoted, in collaboration with the Edinburgh and East of Scotland Agricultural College, towards the attainment of these objects.

The Development Commissioners were approached by the University Court and the governors of the Agricultural College, and their applications were received with sympathetic consideration by the Commissioners, and have been accorded generous treatment.

A sum of money has been promised annually for a period of years for the rent and upkeep of a forest garden and area of experimental plantations. This sum has been promised conjointly to the University and College, and the authorities of these two institutions have appointed a joint committee to supervise the management of the area.

The Development Commissioners, recognising the urgent need of additional room for the extension of the forestry department within the University, its museums, and laboratories, have granted the University a sum of 4500*l.* towards the erection of a new forestry building, stipulating that the University should provide a similar sum. The University Court has undertaken to provide this amount, or a larger one should it be required. The Development Commissioners have also made a grant of 2000*l.* towards the equipment of the museums and laboratories, the money to be spent during the next five years. The Commissioners have promised to consider a further provision for this object should such be required at the end of this period. It is expected that the erection of the buildings will be commenced in the coming year.

The instruction in forestry proper for the degree will remain in the University, and with the object of supplementing the staff of the department the Development Commissioners have granted a sum of 2500*l.* (500*l.* a year for five years) as a provision for the salaries of an additional lecturer and for an assistant in the forestry department. One of these gentlemen has been already appointed, and the second will be shortly added to the staff.

The above detailed explanation of the present position of Edinburgh with regard to education in forestry will show that both the University and Agricultural College have gone thoroughly into the matter, and have determined that every effort shall be made to give the best forestry education possible alike to the student wishing to graduate in forestry and to the working forester and woodman who wishes to improve his education by following the simpler forestry courses delivered at the Agricultural College.

TESTS OF PROPELLERS FOR FLYING-MACHINES.

A SERIES of important and valuable experiments are being carried out at Chalais-Meudon by MM. Legrand and Gaudard with the object of testing propellers, while actually in use, on a flying machine, and of studying the action of the air on planes in flight. The machine used is a biplane specially built for the purpose at the laboratory; the propeller in front is run off a 60 horse-power Renault motor; the planes are staggered; and the total weight, including the pilot, is 780 kilograms.

In order to study the action of the air on the propeller and planes of a machine in horizontal flight, the following details must be known:—(1) the thrust of the propeller; (2) the speed of rotation of the propeller-blade or of the motor; (3) the actual speed of the aeroplane as it would be in calm air; and (4) the angle of incidence of the machine. The way employed in these experiments is to take simultaneous and instantaneous readings of all these details by the aid of special apparatus connected electrically, so that the pilot can choose his own moment and take the readings by pressing a button. The method of obtaining the angle of incidence and the speed of the machine is particularly ingenious. It consists of photographing the angle indicator—a pendulum moving in oil—and the manometer recording the pressure of the air-flow. In this way observers are not required, and the factor of personal error is eliminated.

Experiments have already been made with two propellers, A and B, A having a diameter of 2·65 metres and a pitch of 2·10 metres, and B a diameter of 2·85 metres and a pitch of 1·70 metres. The motor gave out 62 horse-power at 1800 revolutions, which was its normal speed, but in the case of A the revolutions in flight went up to 1870, and in B to 1980. It was found that a considerable deformation of both propellers took place during flight by which the pitch was reduced equally on both blades of A by 350 mm., but unequally on B to the extent of 350 mm. on one and 270 mm. on the other, so that when B was used considerable vibrations were observed.

At a speed of 17 metres per second propeller A gave out 168 kilograms thrust when the angle of incidence was 9° 45′, and at a speed of 16 metres, when the angle of incidence was 10° 15′, the thrust was 160 kilograms. B, on the other hand, at a speed of 15 metres, when the angle was 11°, only gave a thrust of 153 kilograms.

In static tests, A gave 225 kilograms and B 245 kilograms. The experimenters, as an outcome of these preliminary tests, state that many of the modern propellers in use have too small a relation between their pitch and diameter to be really efficient.

Lieut. Saunier piloted the machine on its trials, making only short, straight flights when there was practically no wind.

NEW MICROSCOPIC OBJECTIVES AND ACCESSORIES.

WE have received from Messrs. Angus, agents for R. Winkel, of Göttingen, some of his later productions which include special features.

With regard to the objectives, they have been examined and reported on by Mr. E. M. Nelson,[1] whose authority on such matters is second to none, so we may content ourselves by referring to his statements relating to the special colour correction of the achromats which Winkel employs, especially as he introduces a history of the changes made in these corrections which is of great interest.

"Before the introduction of Jena glass, the outstanding secondary spectrum of the old English archromat consisted of claret, or port-red, and apple-green colours. This was always looked for by experts, and its presence was thought to denote perfect correction. About 1870 (or a year or so later) Tolles, in America, altered the correction, and produced some very fine object-glasses with a flaring bright red, or crimson, spectrum. I well remember seeing a *Podura* scale shown with one of these glasses, a very brilliant lens, and a strong diatom resolver; the exclamation marks shone out like rubies, whereas if they had been viewed through an English objective of that date (Lister formula) the exclamation marks would have been seen with a more purple tint, something like an amethyst.

"About 1886, when Jena glass was introduced, an entirely new set of phenomena appeared; pale glasses, and those which gave decidedly bluish tints—which any expert of those days would have unhesitatingly condemned—were found to be not only strong diatom resolvers, but also to give sharp and bright pictures. For a time, experts, until they had learnt the effect of the reduction of the secondary spectrum by these new corrections, were all at sea, and did not know where they were.

"To-day, there is in my cabinet one of these Jena glass semi-apochromats which has such a violent purple secondary spectrum that it can be seen even when a peacock-green glass is used, a more monochromatic fluid

[1] Journ. R. Micr. Soc., 1911, pp. 451–52.