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.