

text-book from those in common use already. We note the usual unfortunate preference for the equation $y=mx+c$ to represent a straight line, instead of the homogeneous form $lx+my+n=0$. As a natural consequence, we find the equations $y=mx+\sqrt{(a^2m^2+b^2)}$, $y=mx+a/m$, for the tangents to an ellipse and parabola respectively; and we are still left to wonder why no teacher has the courage to write an elementary text-book which uses the tangential equations $a^2l^2+b^2m^2=n^2$, $ln-am^2=0$.

The chief innovation consists in a short chapter (xii., pp. 241-57) on higher plane curves, such as the cissoïd, conchoid, lemniscate, cycloid, and some of the simpler polar curves; but as no Calculus is used, nearly all their more interesting properties have to be omitted, and it seems doubtful if the mere tracing of the curves is of sufficient interest to justify their introduction here. We should have preferred to see this space devoted to an extension of the chapters on solid geometry, which occupy only 30 pages, and are too brief to be of much service to beginners.

T. J. I'A. B.

SCHLICH'S MANUAL OF FORESTRY.

Schlich's Manual of Forestry. Vol. ii.: Silviculture. By Sir Wm. Schlich, K.C.I.E., F.R.S. Fourth edition, revised. Pp. ix+424. (London: Bradbury, Agnew and Co., Ltd., 1910.)

THIS book is a decided advance on the first edition of Schlich's "Silviculture," and a considerable amount of new matter has been added.

Probably the original intention of Schlich's "Manual" was to provide a text-book on the general principles of forestry adapted to the needs of Indian and Colonial forest officers. While this object is still met, the author has evidently made an effort (and we think successfully) to adapt the work better to British needs than was the case in earlier editions.

To accomplish this successfully is not perhaps the easy task many might imagine. It is true the principles of forestry are the same over all, but details in practice must of necessity vary, and climatic differences also tend to modify the relative silvicultural value of various species of trees for any country, or even for districts of a country.

The book is divided into four parts: part i. deals with what the author designates "The Foundations of Silviculture." Here we have a full discussion of such matters as climate, soils, effects of forest vegetation on locality; development of forest trees; character and composition of woods; advantages and disadvantages of mixed woods; and rules for forming pure and mixed woods. The various silvicultural systems are also described in detail.

Part ii. is concerning the "Formation and Regeneration of Woods." Fencing, soil preparation, sowing, planting, and tree nursing management are fully treated. Under this head also the various modern methods of natural regeneration are described.

Part iii. deals with the tending of woods throughout the various stages, from early youth to maturity.

Of part iv. ninety pages are devoted to

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a brief discussion of the silvicultural characters of British forest trees. Under the convenient title of "British Forest Trees" the author includes several recently introduced species, some of which are certainly of doubtful utility for British conditions, as, e.g., American *Black Walnut* and *Black Cherry*. He wisely refrains, however, from definitely recommending such species for general planting.

The book is well illustrated. Although some of the illustrations are necessarily diagrammatic in character, they are none the less valuable to students on that account.

Schlich's "Silviculture" continues to hold its own as one of the chief standard works on the subject, and should be in the hands of all students of forestry.

J. F. A.

GENERAL BIOLOGY.

General Biology: a Book of Outlines and Practical Studies for the General Student. By Prof. James G. Needham. Pp. xiv+542. (Ithaca, N.Y.: The Comstock Publishing Co., 1910.) Price 2 dollars.

WE have long felt that if biology is ever to take the place which it undoubtedly should in our educational system, there will have to be some radical reform in the manner in which it is taught, or perhaps it would be more correct to say in the selection of those portions of the subject which are to be taught. The type-system, excellent as it is in many respects, has had far too much influence on biological curricula, and the over-specialisation in zoology and botany has resulted in a general neglect of those general principles which are the life-blood of both. Fortunately, signs are not wanting of a widespread striving towards a more rational treatment of the subject, and in this respect the Americans appear to be taking the lead. The work before us, modestly described by its author as "A Book of Outlines and Practical Studies for the General Student," strikes us as being delightfully refreshing and original. Its scope is, perhaps, almost too comprehensive. There are only seven chapters, but they are very long ones. In the first, the interdependence of organisms is illustrated by the relations between flowers and insects; galls, and the relation between ants and aphids. The second deals with the simpler organisms, illustrated by typical algæ and protozoa. The third is devoted to organic evolution, with a brief account of the animal and vegetable series and the general principles of the subject. The fourth discusses inheritance; the fifth the life-cycle; the sixth the adjustment of organisms to environment; and the seventh the responsive life of organisms.

A leading feature of the book is a set of practical exercises at the end of each chapter. These are extraordinarily varied and interesting, and well calculated to impart a real vitality to the subject, though perhaps some of them, such as the observations on the internal metamorphosis of insects, are rather too specialised.

The illustrations are excellent and to a large extent novel, and the portraits of Schultze, Pasteur, Von Baer, Iinnæus, Agassiz, Darwin, Leeuwenhoek,