chapter on instruction in the science will probably possess the greatest interest; it certainly deserves to be most carefully studied, as it is replete with stimulating suggestions. Most welcome will also be the abundant literary references, constituting the first bibliography of pharmacognosy.

Pharmacozoology is very briefly dealt with, and stands in sharp contrast with the rest of the work. Considering the success that has attended the development in recent years of organotherapy, it is difficult to understand why such widely used parts of animals as the thyroid gland, suprarenal capsule, &c., and such products of animals as pepsin, pancreatin, wool fat, &c., have been excluded from the animal drugs enumerated by the author.

All the parts of the handbook that have appeared are most profusely illustrated, and Prof. Tschirch must be congratulated on the excellence of his work.

HENRY G. GREENISH.

## SCIENCE IN THE TEXTILE INDUSTRIES.

*The Structure of the Wool Fibre and its Relation to the Use of Wool for Technical Purposes.* By Dr. F. H. Bowman. Pp. xx+475; with many coloured and other illustrations. (London: Macmillan and Co., Ltd., 1908.) Price 8*s.* 6*d.* net.

THIS is a companion volume to the one on "The Structure of the Cotton Fibre," which was reviewed in these columns in July, 1908, and is to be followed by a third volume dealing with the silk fibre. The subject-matter is treated in a very thorough manner, commencing with a description of the structure of the skin and the genesis of the hair or wool fibre which clearly indicates the mode of its subsequent development. The physical structure of the fibre determines its behaviour during the various mechanical processes of spinning and weaving; and this important point is well brought out in the valuable and interesting portion of the book devoted to it.

Thirty-two distinct varieties of sheep are described, of which four are inhabitants of Europe, fifteen of Asia, eleven of Africa, and two of America; but there appear to be at least thirty-one subvarieties of the common sheep (*Ovis aries*), some of which differ to a greater extent than certain sheep which are regarded as distinct varieties. It is considered probable that all varieties were originally derived from two—the long- and the short-tailed sheep—both of which in the wild state grow an outer covering of hair and a softer, finer inner covering of wool, the latter increasing and the former being gradually eliminated by domestication.

The domestic sheep was first produced in Asia, and spread thence to Europe with advancing civilisation, its introduction into Greece being probably enshrined in the legend of the golden fleece.

The scientific breeding of sheep was first systematically carried out in England, but is now practised in all the important sheep-rearing countries. In this connection it is interesting to note the effect of the frozen-meat trade on the production of wool. Before the introduction of cold-storage transit, the carcase of the sheep at the Antipodes was of much less value than it is to-day. Sheep farmers therefore confined their attention to breeding for wool, but now have to pay more regard to the production of good mutton, the fleece being relatively less important.

In dealing with the question of sheep-dips, which are necessary on account of the parasites which infect all animals with a hairy or woolly covering, the author very properly condemns all compositions containing tar, or lime and sulphur, and advocates arsenical dips. The important question of the preparation of wool for the market receives, as it deserves, full attention, and the recommendations of the Wool Trade Committee of the Bradford Chamber of Commerce are given in full. Briefly, the trouble is caused by the presence of vegetable matter in wool, which may arise from want of care in packing or lack of cleanliness in the shearing house. The importance of this matter arises from the fact that the vegetable matter may accompany wool fibre throughout the whole of the manufacturing operations, and, on account of its very differing dyeing properties, may greatly detract from the appearance of the finished material even when present in very small amount.

The investigation of the mechanical structure of the wool fibre is traced back by the author to 1664, in which year a Dr. Hook read a paper before the Royal Society on the structure of various hairs, but, of course, the power of his microscope was very limited. About 1690 Leeuwenhoek published several illustrations of the microscopical structure of wool, and in 1742 H. Baker also read a paper on the subject before the Royal Society; but a Mr. Youatt, in 1835, using a compound microscope with a magnification of 300 diameters, claimed to have been the first to discover the true nature of the surface of the wool fibre.

The author of the present volume was, however, the first to make a systematic and comparative study of the microscopic structure of wools of various origin and at various stages of growth, and his illustrations, which are reproduced in the book, have for many years been considered as standards, and have been reproduced in most text-books dealing with wool manufacture or dyeing.

The description of the chemical nature and properties of wool is not so exhaustive or quite as satisfactory as that portion of the book dealing with the mechanical structure, but the chapter on the strength and testing of worsted yarns is excellent, and emphasises the importance of spinners and manufacturers making full use of such scientific aids as are now available.

The chapter on the theory of dyeing and colour is the least satisfactory in the book, and the excellent coloured diagrams represent the only feature which warrants inclusion.

The book is one of considerable importance, and will doubtless take the position of a standard work in the libraries of all connected with the textile industries.

WALTER M. GARDNER.