from me), to the sore; and he informs me that by his subsequent observations it seems to be universal at least in America. Asiatic horses not yet having been observed in this respect. I feel sure it is a feature of a horse's life universally.

Many times I have amused myself by telling the owner of a colt, when I had informed myself of its age, that "your colt has a sore on each of its hinder legs."

"When did you see it?" replies the owner.

On my rejoinder that "I have never even seen the colt," he would naturally "say remarks."

The attention of biologists is called to this fact, and *theories* requested—as the writer has none.

L. S. FRIERSON

SCIENTIFIC BOOKS

The Animal Mind. By MARGARET FLOY WASHBURN. New York, The Macmillan Co. 1907. Pp. x + 333.

In this book the author has brought together a wide series of facts which represent the main results achieved in the field of animal behavior during the last few years. It is designed both as a text-book in comparative psychology and as a ready and a convenient reference book. The volume will be of untold value to the general scientific reader, and to the comparative psychologist who has confined himself somewhat narrowly to a particular phase of animal behavior.

The material gathered together in this volume has been arranged in a logical and systematic way. The book affords, consequently, easy orientation into any given phase of the field. The style of presentation is clear and readable. It is the hope of the reviewer that this volume may fall into the hands of the general reader and thereby serve as a counter-irritant to a number of books which deal presumably with the "truth about animals." Certainly any one who has had the benefit of ordinary college training can read the book with profit.

Miss Washburn's opening chapters deal intelligently with the difficulties in the way of observing the reactions of animals; with the methods of observing such reactions; with the methods of interpreting observed facts; and with the evidence for the presence of mind in animals as inferred, on the one hand, from structure and, on the other, from behavior.

In the chapter on the mind of the simplest organisms the author treats first of the structure of the lowest organisms, next of the observed facts about their behavior, and then attempts to construct from these data the kind of mind such organisms must have—if they are conscious. This attempted construction of the mind of lower animals is a somewhat forlorn and hopeless task. The necessity of such a task is felt mainly by those psychologists who think of mind largely in terms of structure.

The chapters dealing with the sensory discriminations in animals are especially well done. Under the heading of Sensory Discrimination: The Chemical Sense, Miss Washburn brings together a vast amount of material taken from the experiments made upon animals ranging from the cœlenterates to the vertebrates. The many research articles dealing with this subject are scattered and inaccessible. The author has done a real service in bringing them together and giving them systematic treatment.

In the chapter on hearing the author, while giving a good résumé of the field, makes the mistake of saying that birds have no cochlea. I quote her in detail as follows (p. 119):

> The cochlea is supposed to be the portion of the human ear upon which the power to distinguish pitch differences rest. *Yet birds have no cochlea* [italics mine], though if we grant that animals which produce sound are those which are able to hear them, some birds at least must be capable of pitch discriminations of wide range and great acuteness. The powers of imitation so often evidenced in bird song are proof that this is the case.

Edinger's statement concerning the cochlea in birds is as follows:

> The cochlea is only slightly developed in fishes, but in birds it reaches a fair development.[1]

Wiedersheim has the following to say concerning the cochlea of birds and reptiles:

[1] "Anatomy of the Central Nervous System, etc.," Hall's English translation, 5th edition, p. 91.

Bei den ersteren wächst die Schnecke immer weiter canal-artig aus (Ductus cochlearis) und erfährt schliesslich bei Crocodiliern und Vögeln eine Krümmung sowie eine schwache Spiraldrehung. Hand in Hand damit geht eine immer schärfere Differenzierung der Lamina (Membrana) basilaris und der Papilla acustica basilaris. Beide strecken sich mehr und mehr in die Länge, und zugleich ist eine Scala tympani und vestibuli schon deutlich angelegt.[2]

It is barely possible that the author had in mind the lack of the arches of Corti in the auditory apparatus of birds. This is admitted by comparative neurologists;[3] but a well-marked basilar membrane is at hand. It will be remembered that one consideration which led Helmholtz to abandon the notion that the arches of Corti alone are responsible for the sensing of the differences in pitch and to assign that function to the fibers of the basilar membrane was due to the fact that birds possess the latter structure but not the former.

The author treats of Spatially determined Reactions and Space Perceptions, in two chapters. She discusses here: reaction to a single localized stimulus; orienting reactions; reaction to a moving stimulus; reaction to a retinal image; reactions adapted to the distance of objects. The various reactions considered in this part of the book should in all probability be treated together, but it is somewhat a stretch of the imagination to deal with them under a title so suggestive of organized mental life. Aside from this point we must comment upon the value of the organization of this complex material. Those of us who have followed in some measure the advances made in the study of the lower organisms know what a tremendous task it must have been to go through this field and to gather up the important facts and then systematically to organize them into a readable whole.

The latter part of the book deals with the modification of conscious processes by individual experience; the memory idea; and some aspects of attention.

The book as a whole is so well done that we venture the opinion that its usefulness will continue for several years to come. Its arrangement is such that the results of later researches as they appear from time to time may be easily incorporated into successive editions.

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[2] "Vergleichende Anatomie der Wirbelthiere," funfte Auflage, p. 324. Cf. also the monumental work of Retzius on the auditory organs of vertebrates.

[3] C. Hasse. See Helmholtz's "Sensations of Tone," p. 146.

A Pocket Handbook of Minerals, designed for use in the field or class-room with little reference to chemical tests. By G. Montague Butler, E.M., Assistant Professor of Geology and Mineralogy, Colorado School of Mines, Golden, Colorado, United States Deputy Mineral Surveyor. 16mo, pp. ix + 298. 89 figures. Morocco, $3 (12/6 net). New York, John Wiley & Sons; London, Chapman & Hall, Limited. 1908.

This book is designed for both field and class work and to fill a space between works "too cumbersome" for the field and works "so condensed as to confuse rather than aid."

Two hundred species are described in terms of those characters which the author considers best help in their determination, and preference is given to the so-called "physical features." Each species is described in the same fixed order and certain chosen characters are brought into especial prominence by the use of heavy-face type so that "a mere glance at a page will often suffice to recall the appearance of a mineral."

In the selection of important characters as indicated by heavy-face type, very great prominence is given to cleavage and very little to blowpipe or acid tests. It is certainly to be questioned whether in the field with average specimens, not usually crystals, even the trained mineralogist can determine more than the existence or non-existence of marked cleavage and in certain instances the approximate cleavage angles. The blowpipe is usually as available as the goniometer or microscope.

Following the descriptions of species, which occupy 270 pages, are some ten pages of miscellaneous tables including lists of commercially