period of about six weeks. The method should be readily adaptable to experiments requiring that multiple micro quantities of blood be obtained within a short period of time.

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Sperm Survival in Rodents?

IN SCIENCE, 117, 159 (1953), there is a report by Florence L. Evans of "Unusual Reproductive Phenomena in Rodents." In this report Dr. Evans cites three authentic cases in which a female rat or mouse dropped a 2nd litter 25–28 days after the first (no mating having occurred in this interval). She suggests that these phenomena involve "delayed implantation of the blastocyst stage," superfetation, or both. Another explanation much simpler than those suggested by Dr. Evans would be to suppose that sperms survived from matings toward the end of the initial pregnancy, and that these sperms were able to fertilize ova which were matured at parturition. It is fairly common to observe rodents in heat at this time. Sperm survival in rodents has also been observed in the vaginal plug for prolonged periods of time.

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Book Reviews

The Human Senses. Frank A. Geldard. New York: Wiley; London: Chapman & Hall, 1953. 365 pp. Illus. $5.00.

This timely monograph presents a comprehensive description of all human sensations, resting upon a review of 330 papers, with more than a hundred well-chosen illustrations. The contributions of anatomy, physiology, and psychology are skillfully integrated to give a text which is remarkably clear and forceful, written in a distinguished scientific style. The author is fully at home in all three fields and indicates relationships which are brought together in no other single source. The careful descriptions combine the most accurate experimental studies with examples taken from everyday human experience, so that the discussion often becomes an intimate account of the reader's own sensory life, answering many questions never before resolved.

Much of the author's own research has been concerned with the physiology and psychology of vision. His discussions of visual phenomena (4 chs.) are particularly clear, reaching their highest level in an excellent chapter on color vision and color blindness. Only on the anatomical side does the text seem to be somewhat inadequate, resting its argument on older histological descriptions of retinal structure which are surely too simple to explain such phenomena as those of color contrast and spatial interaction. Hartline's recent important work on spatial inhibitions in the eye of *Limulus* (*Symposia on Quantitative Biology,* 17, 125, [1952]) is barely mentioned, and the descriptions of recently discovered collateral connections between visual units in this material were apparently not available in time to influence the text.

The treatment of the phenomena of hearing is lucid (3 chs.), ending in a good review and critique of auditory theories. It is concluded that the original form of the Helmholtz theory is no longer tenable. "A kind of resonance occurs. The relative amplitudes of vibration of different parts of the basilar membrane . . . change in a regular manner as stimulus frequency is changed . . . but a large portion of the membrane is in operation for all frequencies. The membrane . . . is not a series of stretched transverse fibers. . . . [It] is not even under tension."

Three chapters are devoted to the various cutaneous sensibilities. The chapter on pressure and pain, including vibratory sensibility, contains important but little-known material including the author's own studies. The history of the "protopathic-epicritic" theory of Head and Rivers is reviewed, with the author joining the numerous group of students in this field who discount or reject it. The chapter on temperature sensitivity is largely written in terms of the older literature of experimental psychology. New interpretations in this field have become necessary as the result of the very recent physiological work of Zotterman and his colleagues (*Ann. Rev. Physiol.,* 15, 357, [1953]), who have succeeded in recording the nerve impulse discharges along single warm and cold fibers in the tongue of cat and dog.

The treatment of kinesthetic sensibility is rather brief, considering its importance in physiology. The emphasis is properly made that "muscle sense" is largely a matter of joint sensibility, a view which has recently been again confirmed by Mountcastle and his associates (*A.R.N.M.D.,* 30, 339, [1952]). Our newer knowledge of the role of the "small-nerve" efferent fibers in controlling the nervous discharges from muscle proprioceptors has not been covered (Kuffler *et al.,* *A.R.N.M.D.,* 30, 24, [1952]).

In sensory physiology the terms "lumen" and "decibel" are well understood. Less well known is the more recently introduced "dol" scale of pain intensity. Scarcely known at all are the "olfactie" scale for smell and the "gust" scale for taste, resting upon psy-

chological rather than physical determinations. Excellent discussions of these various units are given.

The book transcends the chapters in textbooks of physiology which describe sensory phenomena. It is at once more authoritative than they and more cautious. It avoids the dogmatisms so prevalent in the texts, warning against the uncritical tendency to accept early hypotheses and tentative theories as established facts. It repeatedly indicates the direction which research should follow to achieve fuller truth. Even the most serious passages may include a flash of wit or some apt allusion to human experience which helps carry the reader through to the end of the argument.

This volume is probably too serious and too scientific a study to attract the general public, although it could be read with profit by any educated layman. It should be read by every graduate student in the biological and medical fields. Teachers in physiology and psychology will discover here a mine of information from which to draw material for lectures. Research workers will find in it a stimulus to further theory and experimentation.

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Starch: Its Sources, Production and Uses. Charles Andrew Brautlecht. New York: Reinhold, 1953. 408 pp. Illus. $10.00.

Numerous inaccuracies detract seriously from what otherwise might have been a very useful book on the starch industry. Twelve inaccuracies were counted on the first three pages of Chapter I and eight were counted on the first page of Chapter II. Three examples of errors are: on page one "Monosaccharides are simple sugars with six carbon atoms . . .," is an inaccurate definition as are the definitions of di- and trisaccharides; on page 189 it is stated that "16 to 20 per cent" sulfurous acid is used in corn steeping; on page 207 the figure identified as "Waxy maize factory" is a portion of the sorghum mill at Corpus Christi. Chapter XXI by O. A. Moe contains inaccuracies in structural formulas either from omission of hydrogen atoms or from a stereo-arrangement of carbon atoms. The nomenclature is not that commonly employed today. On page 358, the list of important polysaccharides includes mannans and glucomannans of doubtful importance and omits many generally considered important. The structural formula for guar was not properly accredited to the first publisher of structural data.

The portion of the book dealing with the potato starch industry, a total of 163 pages, is very well written and valuable. Here one will find extensive information on the history and development of the potato starch industry, the agricultural production of potatoes, their grading, handling, composition, and analysis. An excellent and authoritative chapter deals with the manufacture of potato starch. Two of the chapters deal with the sweet potato industry. In the reviewer's opinion this section on the potato industry is valuable and is recommended to those persons interested in this area.

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Psychiatric Dictionary. With encyclopedic treatment of modern terms. 2nd ed. Leland E. Hinsie and Jacob Shatzky. New York: Oxford Univ. Press, 1953. 781 pp. $15.00.

Psychiatry, perhaps more than any other medical specialty, has developed a highly complicated technical language of its own. New words are constantly added, definitions are vague and at times strictly personal, and a term may be used with different meaning at different times, thus compounding the confusion. An accurate, authoritative, up-to-date psychiatric dictionary is a great need. The first edition of this dictionary came close to filling this need. Unfortunately, the second edition, if such it can be called, falls far short of such attainment.

Actually, this new edition is a reprint of the first edition as Part I, with a supplement of new words as Part II. In this arrangement lies the work's fatal weakness. From the standpoint of convenience alone, the format is poor. The supplement is approximately half the size of Part I. In effect, this means that one must consult two dictionaries on each word being searched. Economically, many purchasers would have saved money by simply purchasing the supplement separately, since there is no revision of Part I.

These discrepancies, however, are of minor importance compared with the basic fault arising from this method of revision. The primary part of the dictionary is reprinted exactly as in the first edition (1940). This means that many of the changes of the past 13 years have not been incorporated in this "new" edition. Ordinary dictionaries remain relatively static; this cannot be so of a dictionary which covers the lexicon of a science changing as rapidly as psychiatry. The 13-year period overlooked by the authors included a three-year period of partial military mobilization as well as a world war, the latter event being renowned for, among other things, the manner in which it altered psychiatric concepts. Of even more significance, from a lexicographer's point of view, there has been a sweeping revision of the official nomenclature of psychiatric disorders, a revision which has the official support of the American Psychiatric Association, and which has become the psychiatric nomenclature of the American Medical Association's Standard Nomenclature. This item, of no mean significance, has been completely overlooked by the authors.

These oversights seriously impair the usefulness of the dictionary, rendering it not only incomplete, but actually inaccurate. When one seeks a definition of "combat exhaustion," "combat fatigue," or similar terms, one finds them listed in Part II without definition, and with a simple referral to the term "shell-shock" in Part I. In Part I there is given an explana-