plates in the present volume cover changes in the external configuration of the face and body (semeiology) as well as pathological changes in structures beneath the skin. It is plain that this phase of the history of pathology is largely the history of its delineation by skilled artists. The author, a Frankfurt professor and prosecutor in the Senckenburg Pathological Institute, has therefore followed the ground-plan of Choulant's famous "History of Anatomical Illustration" (1852). If his adherence to the Choulant tradition seems a bit too formal at whiles, it is to be remembered that his model is one of the greater classics of medicine, a work of infallible accuracy, representing a lifetime of patient research. His book begins with a sketch of the history of pathological illustration, including the technical processes of reproduction. This is followed by a brief bibliography of source-books, after which the author launches bravely into a complete reasoned bibliography of books containing pathological pictures, arranged in five chronological periods. There follow valuable and accurate indices of authors, artists, publishers and books (under authors' names), a subject-index of the diseases and parts of the body illustrated in the different atlases and an index of the forty-four plates, twenty-eight of which are handsomely colored.

The prehistory of the subject comprises accidental figuration of pathological formations on antique vases, stelae, papyri, frescoes, old MSS., primitive pottery, ex voto tablets and the like. Between this phase and the period of conscious or intentional illustration of pathology come the chance figurations on fugitive sheets, in non-medical books, oil paintings, sculpture of the post-antique period and so on. Examples of the early phases, as presented in the plates, are a votive tablet from Athens representing varicose veins, a bit of Huaco sculpture showing facial paralysis, terra-cotta figurations of the facies of disease from Asia Minor, Albert Durer's colored print of syphilis, Ghirlandajo's rhinophyma and a painting of Simon Vouët's, showing suppurative osteomyelitis. The first period of illustration with didactic intention begins with the start made in first-class anatomical illustration by Leonardo da Vinci and Vesalius and goes down to the time of the great surgeon-anatomists of the 18th century (1517-1733). It is the period of wood- and copper-plate engraving and etching, illustrated in the volume by cuts from Bonetus (1686), Valentini (1715) and Heister (1715). The second period, from Cheselden to Soemmering (1733-92), is the period of the surgeon anatomists who produced great atlases in copper and steel-engraving. The third period, from Sandifort to Cruveilhier (1793-1829), marks the rapid victory of colored lithography over colored copper-plates, splendidly exemplified in the pathological reports of Richard Bright (1827-31). The fourth period (1830-60) finds its high spots in the atlases of Cruveilhier (1829-42), Carswell (1838), Lebert (pathological histology, 1845), Danielssen and Boeck on leprosy (1848), Auvert (1851), in the work of the dermatologists and in Virchow's *Archiv* (1847-1925). The fifth period runs from 1860 to the recent developments of chromolithography, photography and the low-priced hand-atlases. The colored plates illustrating these periods are of superlative excellence, particularly those from Cruveilhier, Lebert, Auvert and the dermatological atlases of Alibert (1817-28), Bateman (1830) and Rayer (1839). One misses, it is true, the Venus of Willendorf, the earliest known bit of prehistoric sculpture (showing the endocrine phase of obesity), the achondroplasic dwarf figurines of Egypt, collected by Charcot, the pathological plates of Richard Bright (1827), Corrigan's superb engraving of aortic insufficiency (1832), the facies of Addison's disease (1855) and the wonderful iconography of nervous diseases made under the inspiration and guidance of Charcot. The *Nouvelle Iconographie de la Salpétrière* is, in fact, treated with scant courtesy. Our author does not seem to realize that it consists of twenty-eight stout volumes (1888-1918) containing the most valuable illustrations of the pathology and semeiology of nervous diseases in existence. These pictures show not only the facies and habitus in typical cases, but, in accordance with Charcot's teaching, carefully selected atypical or incipient cases, so that a person with a tendency to acromegaly or exophthalmic goiter might be recognized (say) in a street-car. The excellent *Revue photographique des hôpitaux de Paris* (1869-72) is also omitted. These, however, are slips which it will be easy to correct in a subsequent edition. The book is obviously a *vade mecum* for all medical librarians and will find its way into the collections of professional pathologists who care for their subject. The format is, if anything, too massive and sumptuous. A later edition in smaller size, and with a more definite choice of pictures, would be a valuable acquisition for the active practitioner and surgeon.

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NOTES

THE State Board of Fisheries and Game of Connecticut has just issued "A report of investigations concerning shad in the rivers of Connecticut," by P. N. Mitchell and staff (1925, 63 pages, illustrated) which contains detailed analytical data such as is necessary for intelligent conservation of a given species of fish. Embryology, food, growth, enemies and para-

sites of the shad are discussed, as also the environment. A considerable amount of new information is here contained, and we may mention particularly the contribution to the fascinating science (or art) of reading age and life history from the structure of fish scales, by N. Borodin. It seems that for almost every species of fish this presents a separate problem. In the shad scale, so-called "annuli" are difficult to find, but distinct transverse grooves, running across the annuli, two for each year, are readily made out. Dr. Borodin's results are corroborated in a study of otoliths by R. L. Barney.—J. T. NICHOLS.

A MONOGRAPH, "The Termites of Kartabo, Bartica District, British Guiana" has been lately issued by the department of tropical research of the New York Zoological Society. Dr. Alfred E. Emerson, associate professor of zoology at the University of Pittsburgh and for several years associated with the University Zoological Station at Kartabo, British Guiana, is the author. Seventy-eight species, fifty-one of them discovered by Dr. Emerson, are classified in the volume.—LORENZ G. WALTERS.

IN 1902 the Coast and Geodetic Survey published "Principal Facts of the Earth's Magnetism," by L. A. Bauer, then inspector of magnetic work. This covered the early history of the development of knowledge in regard to the earth's magnetism and gave an appraisal of the knowledge of the subject at the time the publication was issued. A new publication "The Earth's Magnetism," by D. L. Hazard, assistant chief of the division of terrestrial magnetism and seismology, U. S. Coast and Geodetic Survey, replaces the earlier one and it covers not only the early history, but also that of the important period since 1902, during which so much advancement has been made in our knowledge of the subject. It is a fact that this period of intensive world-wide study has made very great progress. At the same time it must be recognized that the final solution of the problems is still very far in the future. The outstanding feature of the first quarter of the twentieth century was the extension by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington of magnetic surveys of all parts of the earth not covered by national governments, and to the high seas. Also the precise work done by many governments, especially that of the United States through the Coast and Geodetic Survey. It appears that in every branch of scientific investigation which must be expected to continue for a long period, appraisal from time to time of the progress that has been made is almost as essential as the actual carrying on of the work.—R. L. FARIS.

SPECIAL ARTICLES

X-RAY DIFFRACTION PATTERNS FROM PLANT MATERIALS

DURING the past three or four years the writer has been making many X-ray diffraction patterns of the materials of plants which are normally thought of as solid substances, such as starch grains, cell-walls, both lignified and non-lignified, and those of hemicelluloses. These materials are very probably built up by additions of layer upon layer at the interface between the substance and the living protoplasm, and for that reason they would be expected to have a certain regularity in their structure. The fact that diffraction patterns are obtained from them is evidence that there is undoubtedly a degree of regularity in the structure, which could only be surmised heretofore. Diffraction lines have been obtained from many plant materials, among which are bast fibers of ramie and hemp; hairs of cotton; tracheids of spruce; starch grains of potato, corn, wheat, cassava and arrow-root; and the sclerenchyma cells from the seeds of *Phytelephas* and of another palm, *Erythea*.

The method used was that devised by Hull[1] for obtaining diffraction lines from powdered crystal materials. It was modified somewhat in order to be more usable with fibers and cells of other kinds. The principles involved include not only those pertaining to the powder method, but on account of the modifications also those which apply to large single crystals.[2]

Although the work is by no means completed, there are several points of a general nature which stand out from the mass of details as items of interest in the study of protoplasmic activities.

In the table only a few of the diffraction lines obtained are given, and they include only the wider interplanar spacings for a few representative substances. More complete studies are given elsewhere,[3] or will appear in the literature at an early date. Since the earlier publications on starch,[3] refinement in the apparatus and a better technique have resulted in the resolution of several lines and in their more accurate measurement. The figures in the table, therefore, will not check exactly with those in the paper to which reference was made. A revision of the earlier work is, of course, necessary, but so far

[1] Hull, A. W., *Phys. Review*, X, 661–696, 1917; and XVII, 571, 1921.

[2] Bragg and Bragg, "X-Rays and Crystal Structure," London, 1924.

[3] Sponsler, O. L., *Amer. Jour. Bot.*, IX, 471, 1922, and *Jour. Gen. Physiol.*, V, 757–776, 1923.