origin of the solar system, the interiors of the earth and other planets, the nature of comets, and the tektites (a queer type of meteorite).

A quantity of observational data are presented in tabular form and interpreted in terms of various theories of origin. Lyttleton states the case well for his theory whereby the sun collected material for comets and planets by gravitational accretion as it moved through clouds of interstellar dust. Each of the essays is a coherent summary of data and ideas bearing on one unsolved problem—a "case-history" illustration of the scientific method.

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Interesting Molecule

Treatise on Collagen. Vol. 1, Chemistry of Collagen. G. N. RAMACHANDRAN, Ed. (xiv + 556 pp., illus. $22.50). Vols. 2 and 3, Biology of Collagen, Parts A and B. BERNARD S. GOULD, Ed. (vol. 2, xviii + 434 pp., illus. $17.50; vol. 3, xvi + 488 pp., illus. $18.50). Academic Press, New York, 1967–68.

In this *Treatise on Collagen* the editors have put together a comprehensive summary of the chemistry, structure, synthesis, metabolism, and biology of collagen. The chemistry is covered in one volume edited by Ramachandran, and the less readily delimited field of the biology of collagen is covered in the two volumes edited by Gould. The volumes are well produced and not unduly ponderous, and the electron micrographs are satisfactorily reproduced. The contributors to the treatise have done significant work in the field, and the result is an up-to-date review of most of the research (but not clinical) topics directly pertinent to collagen. As a compilation of results, references, and opinions, the treatise should be indispensable to any collagen worker and a most valuable source for students.

The adequacy of a treatise intended to be comprehensive must be measured by the scope of the review articles and the criticism their authors bring to bear on the findings in the literature. Ramachandran and Gould's selection of authors can hardly be criticized. The lengths of the chapters differ considerably; O'Dell covers the "Immunology of collagen and related materials" adequately in 10 pages; Glimcher and Krane describe the "Organization and structure of bone, and the mechanism of calcification" in 170 pages, a length that could well have justified a separate publication. Some of the authors betray a distressingly parochial view of the literature, and among these some recite their work and opinions in ways that are already familiar to workers in the field. The combination of such articles can confuse the student, but the intrusion of personal prejudice is probably inevitable when the authors are outstanding and opinionated workers in the field, and the value of the compilation of data this treatise contains outweighs this criticism.

It is to be regretted that the editors did not take a firmer hand to eliminate the considerable overlap in discussion in many of the articles, particularly those on the chemistry of collagen, and also that they did not do more to encourage a uniformity of vocabulary. The cost of books is too high to permit the repeated description of the triple-helix structure of collagen, and Ramachandran himself is culpable in that he includes in his chapter "Structure of collagen on the molecular level" previews of much of the later contents of that same volume. With regard to nomenclature, in three succeeding chapters the macromolecules from which collagen fibrils are built are referred to as "tropocollagen" by Alan Hodge, "soluble collagen" by Karl Piez, and "collagen molecules" by Peter von Hippel. Although there are arguments for and against each of these terms, the editors could have done service to the collagen field and avoided confusing newcomers to it had they insisted upon a common usage.

It is difficult to delimit the studies pertinent to the "biology of collagen," but it is to be regretted that a chapter on osteolathyrism was not included. Much of the present outstanding work on inter- and intramolecular cross-linking derives from studies on lathyritic animals, and the subject has progressed so rapidly that a revision of the chapter written by Tanzer in 1965 for the *International Review of Connective Tissue Research* would have been valuable.

The vigor of the present research on collagen is apparent from the fact that more than half the references cited in many chapters have been published since 1960, and the breadth of the studies described in this treatise belies Jim Watson's premature dismissal of collagen as an "uninteresting molecule." It is clear from these studies that collagen is a representative of long-lived biological macromolecules that in the extracellular milieu are extensively modified and manipulated by homeostatic mechanisms, the investigation of which has only just begun.

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Books Received

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Animal Mechanics. R. McNeill Alexander. University of Washington Press, Seattle, 1969. xiv + 348 pp., illus. $9.50. Biology Series.

Annual Review of Entomology. Vol. 14. Ray F. Smith and Thomas E. Miller, Eds. Annual Reviews, Palo Alto, Calif., 1969. x + 480 pp., illus. $8.50.

Approaches to a Philosophical Biology. Marjorie Grene. Basic Books, New York, 1969. x + 302 pp. $6.95.

Aspects of Form. A Symposium on Form in Nature and Art. Lancelot Law Whyte, Ed. Elsevier, New York, 1968. xxii + 254 pp. illus. $8.50. Reprint, with a new preface, of the 1951 edition.

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