ment of a personal philosophy that it represents, it will appeal to the specialist in astrophysics as well. Amply sprinkled throughout the book are skeleton diagrams of nuclear transformation chains and photographs of spectacular stars, stellar regions, and galaxies, all of which contribute to the reader's understanding and enjoyment. The author's insistence on laboratory measurements as a foundation for nuclear astrophysics and his obvious delight in the interpretation of astronomical observations are apparent throughout. It is easy to see why he has, for over a decade, been a leader in the field.

One particular passage in the book deserves to be ranged alongside that classic quotation from John Donne that sets the theme for Hemingway's *For Whom the Bell Tolls*. After carefully tracing the sequences of nuclear transformations and element synthesis that occur in stars as they evolve from the hydrogen-burning main-sequence and red-giant stages through helium-burning stages and beyond, Fowler concludes: " . . . all the elements heavier than helium, and perhaps the helium too, have been synthesized in stars . . . your bodies consist for the most part of these heavier elements. Thus . . . you and your neighbor and I, each one of us and all of us, are truly and literally a little bit of stardust." Statements such as this convey to the layman how it is that men can dedicate their lives to research in astrophysics.

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## Growth Symposium

**Major Problems in Developmental Biology**. The 25th symposium of the Society for Developmental Biology, Haverford, Pa., June 1966. MICHAEL LOCKE, Ed. Academic Press, New York, 1967. 420 pp., illus. $16.

This volume, the latest of the "Growth Symposia," marks the silver jubilee of this splendid series. It provides an occasion for a backward look, and in the opening paper Jane Oppenheimer recounts the origins and something of the achievements of the symposia, putting them into a background of contemporary discoveries. It provides an occasion, too, for a wider span of topics than has recently been usual. A substantial sample of those major problems of animal development which seem due soon for solution come up for discussion under various guises.

Preeminent among these is the determination of tissue types. Molecular genetics has blown the fog away from this towering problem and suddenly it seems to be approachable. The developmental biologist, since he is in no danger of distracting the biochemist from the search for gene repressors (given a stimulating discussion here by Koshland and Kirtley), can with a clear conscience continue his harping on some of the complexities of the business. Of these the involvement of cell heredity, or at least cell population heredity, is one of the most interesting. It has seldom been more beautifully displayed than in the work of Hadorn, which he discusses here, on the prolonged replication in culture of the state of determination in *Drosophila* imaginal disks. Cell heredity is of course part of the cancer problem too. Malignant transformation has attractions as at least an analogue of differentiation, and vice versa, and it is interesting that more than a tenth of the book is concerned with the cancer cell, in papers by Ebert and Kaighn and by Rubin. It is refreshing to have Rubin's uninhibited airing of the idea that the cell surface may be an organ of heredity.

Twenty-five years ago the inside of a cell was such a mystery that the only approachable problems of determination seemed to be those concerned with the signals between embryonic cells that switched determination on. Whether these are really a softer option seems doubtful now. We are faced with problems whose outlines we cannot even make out when we read of the laying down of the intricate patterns of differentiation described here by Ursprung and by Waddington; or, in Jacobson's article, of the onset of the polarities of embryonic rudiments, a problem which the modern highly refined analysis of retinal development revives from earlier days.

The Growth Symposia have always put botanical and zoological contributions side by side, and in this volume there is a most lucid account by Lang of the (to a zoologist) usually impossibly confusing subject of plant hormones. But one has the impression that the two cultures are still apart, even though they share, with stimulating variations, the problems of determination. Perhaps it is because they have less in common when it comes to morphogenetic mechanisms. Morphogenetic cell death, here discussed by Saunders and Fallon, and especially morphogenetic cell movement, given a masterly review by Trinkaus, are predominantly animal mechanisms. Indeed, the pride of the animal kingdom, the ordered complexity of its nervous systems, depends largely on the extreme subtlety of the behavior of moving axon tips during development. There is no more striking example of this than the regeneration of the anamniote optic nerve that Jacobson describes. But though animals by their exploitation of cell movement may have gained a nervous system, the vegetable world has not had to pay the corresponding penalty of cancer.

One cannot leave this volume without recording the great debt of gratitude that the community of developmental biologists owes to those who have organized the Growth Symposia; for a quarter of a century they have spent much imagination and skill in our service.

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## Sulfur Chemistry

**The Chemistry of Organic Sulfur Compounds**. Vol. 2. NORMAN KHARASCH and CAL Y. MEYERS, Eds. Pergamon, New York, 1966. 473 pp., illus. $21.

The second volume of this work consists of 15 chapters, most of which seem to have been written shortly after publication of the first volume in 1961. To bridge this time gap, some of the authors contribute short addenda to the appendix, and the editors themselves list in the appendix reviews of organic sulfur chemistry and provide a collection of brief summaries of selected primary publications from the period 1961–1965. Regrettably the material of the appendix (30 pages) is not indexed.

The most comprehensive and generally useful discussions are those on Polyfluoroalkyl Derivatives (R. E. Banks and R. N. Haszeldine), The Chemistry of the 1,2-Dithiole Ring (N. Lozac'h and J. Vialle), Mechanisms of Raney Nickel Desulfurization (W. A. Bonner and R. A. Grimm), Oxidation of Disulfides, with Special Reference to Cystine (W. E. Savige and J. A. Maclaren),