migratory grasshoppers (locusts), and the importance of this fundamental work to the agriculture of numerous developing countries. In 1956 the Centre published H. B. Johnston's *Annotated Catalogue of African Grasshoppers*, a tremendously valuable compilation of the literature through 1953. Now it has followed with this guide to the identification of the genera, and it is stated that the first of several supplements to the *Catalogue* is in preparation. Thus, during a period of about 10 years, the tools to aid in the identification of African grasshoppers and in locating the literature on each kind have been dramatically improved.

The author of this new book, V. M. Dirsh, chief systematist of the Centre, has produced identification keys to the 472 genera. For each genus, there is a concise modern description and a list of the species considered valid for Africa; for each species, the African countries from which it is recorded are listed. There is a total of 1882 species. As the title implies, the emphasis is on genera—there are no keys to species. However, numerous genera require revision before anyone could offer practical species keys. The illustrations, made by four different artists, are an outstanding feature, representing all but 11 of the genera. Contributing to the clarity of the book is the well-illustrated introductory section on terminology. This book is a landmark in acridology, and its author and sponsoring organization deserve great credit.

Potential American buyers may be startled to learn that the listed price ($37.50) is considerably higher in dollars than in English currency; the equivalent of £10 pounds is $28.

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Low-Temperature Geochemistry

Geochemistry of Sediments: A Brief Survey. Egon T. Degens. Prentice-Hall, Englewood Cliffs, N.J., 1965. x + 342 pp. Illus. $13.25.

Geochemistry of Sediments: A Brief Survey is, according to its author, "an introduction for students of geology into the fundamentals of low-temperature geochemistry. Its principal objective is to demonstrate how geochemical data can supplement geological field work or assist in petrographic and paleontologic research." With these stated purposes Degens has set out to fill a gap in the spectrum of existing geological textbooks. By and large he achieves these purposes very well. The range of content of the book is general, and it is written in such a way that one studying in a relatively unrelated scientific field can read and comprehend it with little difficulty. The topics covered are of basic interest and are not overly specific. This is not to say that the contents are superficial. It is to say that Degens has written successfully for his intended reader.

The systematically organized contents proceed from an introductory chapter to a discussion in chapter 2 of the weathering residues of igneous and metamorphic minerals. Chapter 3 deals with minerals of low temperature and aqueous formation, with sections on silicates, oxides and hydroxides, carbonates, phosphates, sulfides and sulfates, and halides. Chapter 4 relates to mobile phases and contains an adequate discussion of the role of water and a somewhat abbreviated discussion of the role of gases and petroleum. Chapter 5, "Organic chemistry," treats of concepts of biogeochemical studies, classification of organic substances, distribution of carbonate isotopes and organic minerals, and geochemical data and concepts on the origin of organic matter, the latter including primordial "organic" matter, petroleum, and coal. Chapters 6 and 7 consist of a brief coverage of miscellaneous topics and a summary and outlook.

The format of the book is pleasing, the text well written, and the illustrations clear and in sufficient quantity to elucidate the various topics covered. Each chapter is followed by an ample list of selected references that appear to contain reasonably current citations where they are pertinent.

For the nonspecialist who wishes an entree into the field, this book will provide good background. For the researcher who has a somewhat more sophisticated knowledge of the literature and current research in this area, it will be less useful. However, the latter should remember that Degens did not set out to write an advanced treatise, but to introduce the nongeochemist to certain aspects of the field. To this end the book fulfills a need, and *Geochemistry of Sediments* is recommended as an addition to the library of the nonspecialist.

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Paleobiogeography

The Geography of Evolution: Collected Essays. George Gaylord Simpson. Chilton, Philadelphia, 1965. xiv + 249 pp. Illus. $5.50.

It is well known that geography was midwife to evolution, for the facts that led Darwin to reject special creation of species were all geographical: representative species in different areas of a continent; related fossil and surviving species in the same continent; the South American character of Galápagos finches; and the geographical apartness of those islands. Less well known to those who are not specialists in paleontology and biogeography is the astonishingly high degree of precision which these fields of study have now reached, largely owing to George Gaylord Simpson's work. In this admirable collection of essays, Simpson shows how use can be made of actual measurements of taxonomic diversity between continental faunas, time-records of major groups of mammals, measurements of amounts of faunal interchange between continents at different periods, and indexes of faunal resemblance, also at different periods.

An illuminating analysis of possible paths of migration into corridors (which allow balanced faunas to pass in either direction), filter-bridges (which allow filtered and therefore unbalanced portions of faunas to pass), and "sweepstake-routes" by "island hopping" (on the probability of which the odds of passage can be calculated), not only explains the differences between basic continental faunal types, but also makes paleobiogeography an objective science which is no longer a field for speculative subjective preferences. It also enables biology to repay its debt to geography because it provides the best evidence available on the permanence of ocean barriers represented by their impassability. This is in accordance with the

latest evidence from geodesy, gravity anomalies, and seismology, to the effect that the floors of ocean beds have never been terrestrial continents. The old naïve hypotheses of land bridges, made "to order," as easily as "a cook does pancakes" to quote Darwin's unbeatable remark, have been superseded by the now real possibility that continental blocks have shifted over the underlying layers. By means of studies on remanent magnetism in rocks, P. M. S. Blackett has proved that this has occurred with changes in latitude, but there is still no physical evidence that there have been changes in longitude, which would have been involved in the separation of North America from Europe and of South America from Africa. Paleobiogeography states unequivocally that there can be no question of contact between these continents since the Triassic.

Readers of *Tempo and Mode in Evolution, The Meaning of Evolution,* and *The Major Factors of Evolution* will find in this book the same crystal clarity of exposition, in thought-sequence and in language. They will realize that those great books represent a distillation of the quintessence of meticulous research, in the field and in the laboratory. The present book brings the reader a stage closer to the field and the bench and gives a more intimate insight into how the conclusions have been arrived at. Throughout, the indomitable and inimitable buoyancy (may I spell it "boyancy"?) of the author's spirit protrudes and sustains interest and curiosity, and, among the excellent diagrams, those labeled "Whence? When? What?" and "How to make a living in the Eocene (or now)" show that the author has enjoyed writing these essays almost as much as the reader will enjoy reading them.

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Astronomy

The Planet Uranus: A History of Observation, Theory, and Discovery. A. F. O'D. Alexander. Elsevier, New York, 1965. 316 pp. Illus. $12.75.

The Planet Uranus, by A. F. O'D. Alexander, is an excellent, descriptive treatise on the planet and its satellites. Compilation of this volume must have involved a tremendous amount of painstaking research on references from many countries. The book includes considerable obscure material of much value, which otherwise, in time, would probably be lost. In places the reading may become a bit tedious, but the organization of such a mass of significant material would impose a problem. It may surprise many astronomers to learn that so much difficult observational work was bestowed on the planet Uranus in the 19th century.

The aspects of Uranus and its system of satellites was more of a challenge than many investigators could meet. In the first place, Uranus was seen 22 times as a star before its nonstellar nature was recognized: ". . . the most amazing fact is that Lemonnier should have recorded Uranus as stars (in Aries) six times in nine days, four of them on consecutive days, without suspecting that he was confronted by a moving planet, 12 years before Herschel discovered it" (p. 89). It is also surprising that for so long a time Herschel considered his new-found body to be a comet, when the simple pattern of the Earth's parallactic motion indicated a distance far beyond the limit of visibility of any comet.

Uranus itself had many surprises in store. A few decades after its discovery, its orbital motion became intolerable, and this led to the discovery of Neptune, the eighth planet. Its satellites were faint, and astronomers strained to search for them. It had such a high tilt in its axis that its rotation was retrograde. It was unique in color. Its high albedo led to suspicions of self-luminosity. The markings on its disk were hard to see. Its angular size and polar flattening were difficult to measure. Lastly its spectrum contained strange, heavy absorptions.

Those who read the book should certainly read the preface first. The contents are divided into 27 chapters with appropriate titles and subtitles. Fifteen chapters contain a short "running abstract" which is very helpful to the reader. There are two full pages of bibliography and a 16-page well-organized index. The sources of material are well documented. Five pages are used to give the full titles of references cited and their abbreviations as used in the book. Ten beautifully reproduced plates and 20 diagrams are found in the book.

The book is particularly timely because Uranus will be in perihelion in 1966, and the plane of its equator will be edgewise to our view. This will permit astronomers to make the most effective measurements of polar flattening and spectrographic determination of its period of rotation in 84 years, because the other edgewise view will be two astronomical units further away. It is apparent that such measurements with the largest telescopes are urgent. It will also be the best time to watch for spots and belts. Many tables and statistics to aid the observer are given in the last chapter.

The Planet Uranus deserves a place in the personal library of every planetary astronomer (both amateur and professional) and in every observatory and university library.

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Protoanthropological Literature

Readings in Early Anthropology. J. S. Slotkin, Ed. Aldine, Chicago, 1965. xvi + 530 pp. $9.75.

In its compiler's view, this book is "simply a collection of odds and ends . . . . In no sense is it a history of early anthropology. . . . Instead . . . I have merely collected materials in reference to some of my personal interests, with little or no regard to its cultural context. Also, there are serious gaps." Nonetheless, as Sol Tax remarks in his foreword, this collection of readings is "important for historians of anthropology." This is so largely because, in abstracting and annotating the early literature, the late Professor J. S. Slotkin, who compiled this volume for his own understanding, concentrated on the main branches and questions of modern anthropology—namely, linguistics, physical anthropology, archeology, ethnology ("a study of the historical relations between cultures"), ethnography, and social anthropology ("the comparative study of cultures"). In the masterly essay that introduces the compilation and furnishes a general overview, Slotkin uses this framework to review the growth and convergence of anthropological thought and knowledge in Western Europe during the interval between the 12th to the 18th centuries.

Briefly, we have here a collection of excerpts from the early protoanthropological literature, unusual and perhaps unequalled in its range, qual-