perhaps inevitable in a volume of this sort that much good work will be omitted and that some work of inferior quality, or of less general interest, will be included. As with most Raven publications the printing is excellent; however, the price the reader has to pay for this is considerable.

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Isotopic Variations in Space

CNO Isotopes in Astrophysics. Proceedings of a meeting, Grenoble, Aug. 1976. JEAN AUDOUZE, Ed. Reidel, Boston, 1977. xiv, 198 pp., illus. $22. Astrophysics and Space Science Library, vol. 67.

Carbon, nitrogen, and oxygen are essential products of the generation of nuclear energy in stars. Primeval nucleosynthesis formed helium and hydrogen. During stellar evolution, carbon and heavier elements form. Thus, a universe of stars beginning with hydrogen, deuterium, and helium could, by orderly processes now understood, produce all the elements and isotopes with which we are familiar. In the carbon-nitrogen-oxygen group are contained the elements essential for life; ^{13}C, ^{15}N, and ^{14}N are ash from the carbon cycle, ^{12}C is ash from helium burning. Instabilities somehow move synthesized nuclei to the surface of stars and eventually into interstellar space.

The present volume consists of 21 papers discussing work on these processes carried out with the use of a variety of astrophysical techniques. Anomalous carbon isotope ratios have long been recognized in stars; molecules containing rare CNOS isotopes provide radio astronomers with details of isotopic composition in space. The book discusses the surprising finding of an apparently high concentration of deuterated compounds in space and whether chemical fractionation alone explains the isotope variations detected. Anomalies in meteorites, the solar wind, and the lunar surface all give rise to puzzling questions.

The book gives rich detail on elemental and isotopic variations in red giants. Abundance variations are found within a single globular cluster even though such old stars were formed with the same initial composition. The increased carbon content of their atmospheres suggests both unexpected helium burning and instabilities that transfer material from stellar cores to surfaces. A quantitative exploration of reaction rates in the energy-producing cycles is given by G. R. Caughlan, who has recomputed the equilibria in slow and fast CNO cycles as laboratory cross sections have been improved.

The large number of interstellar molecular species with isotopic variants also provide a set of new problems. Astrophysicists are now faced with understanding the complicated low-temperature, low-density chemistry of free radicals and carbon compounds. Some reactions possibly occur on small solids. This subject is particularly well explored in introductory and résumé papers.

Changes of composition inside stars are ultimately reflected in the global composition and spectrum of a galaxy; the secular increases in carbon and, especially, nitrogen are reviewed by the editor, with collaborators, and by B. M. Tinsley. The $^{12}C/^{13}C$ ratio in the earth is not typical of the stars or of interstellar clouds. The N/O ratio at the center of galaxies differs from that at the edges. We see in our neighborhood, and in other galaxies, the result of nuclear furnaces slowly accumulating synthesized nuclei over eons and recycling them to the interstellar medium, from which new stars are born.

The book is an excellent introduction to the subject. It can be recommended to physicists and astrophysicists and to those interested in free radicals and low-temperature chemistry.

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Foraging in Primates

Primate Ecology. Studies of Feeding and Ranging Behaviour in Lemurs, Monkeys and Apes. T. H. CLUTTON-BROCK, Ed. Academic Press, New York, 1977. xxii, 632 pp., illus. $41.

Primates, with the exception of a number of specialized, insectivorous prosimians, mostly small and nocturnal, are primarily vegetarian. Vegetarian primates are far from uniform in their eating habits, however. Some, such as the colobines, are primarily leaf-eaters, and others are primarily fruit-eaters. Among primates, geladas are the only true grazers: more than 90 percent of their diet is grass. One primate species, *Lemur mongoz*, feeds mostly on flowers and nectar. Another, *Galago elegantulus*, specializes in plant gums. Many basically vegetarian primates eat considerable amounts of animal material, including various invertebrates and small vertebrates. Even the fruits that they eat often contain insect larvae. Baboons may be the only nonhuman primates that prey on mammals of their own size range. From this animal food, primates obtain their essential vitamin B_{12}.

Systematic studies of primate feeding ecology began to proliferate about ten years ago. This volume is the first book devoted to the topic. Its 20 contributors present basic data on feeding behavior, diet, ranging patterns, and related aspects of primate ecology. Detailed treatment is given to 17 primate species, including various prosimians, monkeys, and apes. Two final chapters survey variations within and between species, including correlations between several components of primate life histories. Three appendixes provide useful information on research methods.

The material in the volume is largely descriptive, often quantitative. Most of the authors used point samples, which provide estimates of the time spent on each food but not of the amounts eaten. The few hypotheses that are tested are primarily of the no-pattern type. Several of the authors suggest relations of primate foraging to behavior and social organization. Surprisingly, they are almost uniformly silent about the possibility that primate populations are food-limited (although there is evidence that several are), and they scarcely mention recent ecological research on optimal foraging. Clearly primate field research has been largely independent of related developments in other areas of ecology.

This well-written volume, along with results of the recent Cambridge symposium on primate feeding behavior, the proceedings of which are to be published by Academic Press, provide us with a new perspective on primate foraging. The next step will be to relate foraging patterns in primates to other aspects of their ecology and behavior by testing hypotheses about differential habitat utilization, competition, optimal diet and foraging strategies, social and spatial relations, demographic parameters, and other components of primate life histories.

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