enough to isolate and observe the effects from the field. However, lake level changes significantly on the Great Lakes over five- to 10-year periods, providing an outdoor laboratory model of the slower and noisier ocean process. Hands summarizes his extensive experience with beach profile changes on Lake Michigan during times of changing lake level. He found that longshore bars moved shoreward as lake level rose (1969–1976) and that shore erosion lags the change in lake level by two to three years. Erosion in response to a rise in lake level depends on the selection of the seaward limit of sediment motion, which Hands relates to a wave height having an expected recurrence interval of five years. Hands concludes that confirmation of this approach for ocean shores is lacking, and is not likely, because of the difficulty of measuring small, slow changes.

Among possible solutions to beach erosion, the one most favored by regulatory agencies with coastal responsibilities is nourishment of the beach by sand from outside sources. Dean reviews the subject, stressing that the effectiveness of nourishment depends to a large extent on the longshore length of the beach being nourished. Where this length must be small, terminal groins or a groin field are needed. Terminal groins are more likely to be effective at sites where the breaking wave crests parallel the shoreline.

Since this is called a handbook, one looks for tables of useful data. They are to be found primarily in the chapter by Dolan *et al.*, which tabulates rates of shore erosion along U.S. coasts by state for major water bodies and by landform for geographic regions. The accompanying text states that erosion now is occurring along 79 percent of the Atlantic coast, 63 percent of the Gulf coast, and 30 percent of the Pacific coast including Alaska (these percentages are not derivable from the tables). The tables suggest that about 69 percent of the weighted Gulf coast erosion is in Louisiana, associated with subsidence and erosion of the Mississippi Delta. The statistics given for Alaska in the tables represent only a small part of the total Alaskan coast, so presumably the low frequency of Pacific coast erosion is not overweighted by the very long Alaskan shore.

Useful data on worldwide cliff erosion are found in the tables in a chapter by Sunamura. The subject of cliff erosion and platform development was of interest in the early days of this field, but it no longer attracts much attention among American workers. Sunamura's chapter is a good general starting point for a renewed look at this subject. In the following chapter Kuhn and Shepard provide a qualitative supplement for the cliffs of San Diego County.

Granted the strengths of the chapters described above, the book remains a collection of papers rather than a cohesive treatise. The cross references between chapters are few and unspecific. Symbols describing shore profiles and sea level rise change from chapter to chapter and even within the same chapter. Terminology in the book is often imprecise. The term "littoral drift" is used to describe both the sand-transporting process (longshore transport) and the sand itself, occasionally with both meanings in the same paragraph. The term "morphodynamics" is undefined. Nongeologists will be surprised to learn, if they figure it out at all, that a "regressive" shoreline is not eroding but accreting. "Regression," "transgression," "morphodynamics," and "longshore transport" are not included in the brief index.

Edge waves receive attention, though detection of their presence requires a detailed field study and some faith. On the other hand, solitons developed from the decomposition of shoaling waves are easily seen and are shown (but not identified) in at least five photographs in the book. These more substantial phenomena fail to arouse curiosity, but the will-o'-the-wisp edge waves continue to fascinate.

This book is well suited for use as a supplemental reference in courses on coastal processes, marine geology, and coastal engineering. It will fill a gap in the libraries of most coastal specialists with geologic or engineering interests and stand as a good summary of present activity in the field. The price will inhibit wider use.

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Anatomy and Behavior

Adaptations for Foraging in Nonhuman Primates. Contributions to an Organismal Biology of Prosimians, Monkeys, and Apes. PETER S. RODMAN and JOHN G. H. CANT, Eds. Columbia University Press, New York, 1984. x, 351 pp., illus. $35; paper, $18.50. Based on a symposium, 1980.

The 13 papers in this book illustrate a number of approaches to answering questions concerning how anatomy and behavior related to it affect foraging strategies.

Two of the contributions deal with morphological features involved in processing food. Kay addresses the question of which features might be used to infer the foraging behavior of extinct primates. He presents evidence that 60 percent of the diet of most primates is made up of either insects, fruit, or leaves. As many as 90 percent of the species have diets consisting mainly of fruit and leaves or fruit and insects. None feed exclusively on leaves and insects. Because of the difficulty of catching a large number of insects and of digesting leaf material, highly insectivorous primates are usually small and highly folivorous ones are large. Kay has found that there is a significant correlation between the shearing crest morphology of molar teeth and dietary propensities. Insect and leaf eaters have similar molar morphology, but this morphology differs from that of primates that feed mainly on fruit. Since primates with leaf and insect diets can be distinguished by body size, the type of diet of fossil primates can be determined. Kay also explains how such features as enamel thickness, incisor wear, and incisor structure can be used to infer aspects of the diet.

Milton presents evidence that certain features of gut morphology, food passage rates, and body size may play an important role in determining the types of foods a given primate species finds most suitable. Smaller species tend to pass food through their guts more rapidly than larger species, and modifications of proportions of the gut tract allow plant feeders (especially those that eat mainly leaves) to have slower food passage rates.

Both these papers illustrate that morphological features related to feeding are quite conservative and place constraints on the diet of a species. Waser, who has compared the foraging and ranging behavior of two closely related primates (*Cercocebus albigena* and *C. galeritus*) living in radically different habitats, reports that these species have adopted different patterns of ranging and of intergroup and intragroup dispersal to obtain diets that are extremely similar in composition (proportions of different types of foods) and in short-term diversity (number and proportions of different foods eaten per month).

In his contribution Post, drawing examples from his study of yellow baboons in Kenya, stresses that the foraging decisions a baboon troop makes at one point in time (for example, upon leaving its sleeping groves) will affect and constrain

subsequent foraging decisions. Thus it is not the quality or abundance of any given food item in the baboons' range per se that "determines its inclusion in the diet but it is the animals' decisions themselves that 'determine' encounter probabilities with various food items" (p. 296). It is especially difficult to predict the optimal foraging strategies for species, like baboons, living in large ranges with unpredictable and widely scattered resources. Under these conditions, each decision involves a certain degree of risk and uncertainty and certain trade-offs.

There are three papers dealing with locomotor aspects of feeding. Grand describes how four primate genera (macaques, gibbons, howler monkeys, and spider monkeys) might move on the same hypothetical supports. He warns that in comparisons such as these the species should not be too closely related because their body structures may be "so similar that no significant contrast may be evident" and that "if the animals are too different the comparison may be gratuitous or absurd" (p. 56). Yet Grand's own choice of species and his nonquantitative approach lead to results that are impossible to evaluate.

Grand's warning could also be leveled at the paper by Temerin *et al.* These authors compare orangutans and macaques and conclude that differences in the foraging and feeding behavior of these species are due mainly to differences in body size. Furthermore, they claim that, given the body size of each, behavioral differences are predictable. Yet many species of the same size have quite different feeding and foraging behavior and other species with different body sizes have convergent feeding patterns. Macaques and orangs differ greatly in many aspects of morphology, physiology, and behavior, and the conclusions of this chapter are highly questionable.

It is focused, quantitative field studies of closely related species that have led to a better understanding of relationships between morphology and behavior. Crompton's chapter comparing the foraging behavior, habitat structure, and locomotion of two species of *Galago* is an excellent example. Crompton describes how feeding behaviors of *G. senegalensis* and *G. crassicaudatus* converge in seasons of abundance but diverge in seasons of scarcity. During the latter periods, the smaller species (*G. senegalensis*) feeds mainly on insects caught on or near the ground whereas the larger species eats mainly gums high in the trees. Crompton illustrates the relationship between body size, diet, energetics, support use, and locomotion in these two species and gives us an understanding of how these aspects are integrated into a total adaptive package.

Using a similar approach, Garber illustrates how the small Panamanian tamarin monkey (*Saguinus oedipus*) uses particular locomotor and postural behavior, and related morphological adaptations, in obtaining specific food types. Tamarins, like most primates, use their grasping hands and feet to grip thin, terminal branches while moving quickly to search for insects or hanging under branches to feed on fruits. A third important component of the diet, gums, is obtained by clinging to large trunks. Tamarins have evolved claw-like nails in order to exploit this resource. Before Garber's quantitative study, these primates were characterized as squirrel-like. The claws were assumed to be a primitive adaptation and to function as a locomotor adaptation for running up and down large tree trunks. However, most tamarins move mainly on thin supports (as do other primates) and use their claws almost exclusively while clinging to feed on gums. Thus the claws can be seen as a special, derived trait in these small primates, and the total adaptive pattern of the tamarins can be better understood.

Approximately half the papers in this book are of top quality and exemplify some of the best theoretical and methodological approaches to the study of foraging and feeding behavior. The other half leave much to be desired. Moreover, the editors do not provide an overview of the book or of the subject generally. Their introductory chapter presents a historical view of the field of primatology that emphasizes the contributions of one "school" (derived from the University of California at Berkeley) and does not put the subject into perspective. Nor do the editors define foraging and feeding, and no attempt is made to discuss the differences in adaptation and behavior related to these two distinct phenomena. In the final chapter, Cant and Temerin attempt to summarize many of the ideas presented in the book. However, rather than developing themes that emerge from the papers, they conclude with a list of everything that came to mind that could possibly be related to primate foraging (and feeding). The usefulness of the book lies in the opportunity it provides to contrast good and not so good approaches to its subject.

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