complicate the interpretation of kin-oriented behaviors. One issue discussed in this group report that is now receiving a great deal of attention is kin recognition. Until recently, much of what was known about kin recognition was based on detailed studies of social insects. The group report reviews ideas concerning kin recognition based on the very few studies that existed at the time of the conference. Subsequently numerous experimental studies (conducted both in the laboratory and in the field) have appeared that shed light on some of the matters discussed in this section. For example, the study group suggests that "the absence of innate kin recognition systems on the hard-wired receptor side may be a consequence of one or more factors" (p. 194). Since the conference was held empirical evidence has been gathered that some organisms, such as certain amphibian larvae, mice, ground squirrels, and macaques, display kin recognition abilities that can be interpreted as incorporating an innate receptor.

Some basic conclusions reached by the group on methodology and modeling are especially noteworthy. It is their consensus that "imaginative and plausible sounding theories are not sufficient. Quantitative empirical tests must be carried out to sort out the theorists's lists of possibilities" (p. 175). They express the concern that theorists and empiricists are becoming separate subcultures whose studies are becoming incomprehensible to each other, and they encourage lucid reviews and interpretative syntheses for a remedy to this situation.

Natural Selection and Social Behavior offers a mixed bag of theoretical discussions, reviews, and original research papers that display the state of the art in sociobiology. Unfortunately, many of the pitfalls discussed at the other two conferences are evident in the volume.

Many of the papers do not explicitly define terms and assume that observed behaviors are adaptive. The assumption of adaptation is generally supported by correlation. Experimental analysis is rare. For example, Woolfenden suggests that helpers at the nest are beneficial. In Florida scrub jays a greater percentage of pairs with helpers succeed in fledging one young per season than pairs without helpers. The presence of helpers also "appears to lower the mortality of breeders" (p. 258). As Woolfenden admits, one must account for differences in breeding experience, territory quality, and other factors that may influence fledging success and mortality of breeders. The study by Brown and Brown is more convincing. These authors performed a field experiment, with controls, by selectively removing helpers from groups of gray crowned babblers and found that helpers indeed increase the fitness of the reproductive individuals. Their paper represents an ideal sociobiological study. They explicitly define terms, they know a good deal of the natural history of the species, they marked numerous individuals, and they performed the critical field experiment. Similarly, the paper by Downhower and Brown uses an experimental approach for analyzing reproductive success in sculpins. Howard's study of mating success in bullfrogs is based on many hours of careful observation. The next step in studies like Howard's is to incorporate field experiments to go along with the excellent observational information. Selective removal of some male bullfrogs from his field sites could yield important information on mate choice and reproductive success.

Although correlation does not necessarily mean causation, there are convincing studies based primarily on nonexperimental approaches. Sherman's study of ground squirrels is important because numerous marked animals have been observed for many hours over many years in the field. Although some findings Sherman presents may be interpreted in other ways, the overall assessment is that we probably know more about natural social behavior in Belding's ground squirrels than in most other rodents as a result of his careful observations.

Other noteworthy papers in the book are those on eusociality in insects (West-Eberhard; Noonan; Strassmann) and on the problems of sexuality (Hamilton, Henderson, and Moran; Hartung). There are some useful reviews and theoretical discussions on subjects ranging from parental behavior in frogs (Wells) to evolution of leks (Bradbury), as well as a good review on ecological factors and the role of kin selection in cooperatively breeding birds (Koenig and Pitelka). A good review of the major hypotheses concerning the origin and maintenance of vocal dialects in birds is presented by Payne. He points out some weaknesses in other attempts to differentiate among the hypotheses, but his paper is marred somewhat by the weaknesses of his own arguments when he tries to explain various dialect systems through his favored hypothesis of social adaptation. There is also a section on human sociobiology that is highly speculative and open to debate.

After reading these volumes one gets several distinct impressions about sociobiology: (i) Sociobiologists must define their terms explicitly, especially since there seems to be a coalescing of subdisciplines as far removed from one another as molecular genetics and anthropology. (ii) Theoretical work greatly outweighs empirical information. (iii) There is a great need for experimental studies, especially in the field. (iv) Empiricists and theorists must try to understand one another. (v) Some excellent studies are being conducted.

The volumes stemming from the King's College and Dahlem conferences are important for professionals to read and would be excellent choices for discussion in graduate courses. The volume edited by Alexander and Tinkle contains many useful chapters, but in overall impact it seems less important than the two other volumes.

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Cognitive Aspects of Aging

Aging and Cognitive Processes. Papers from a symposium, Toronto, 1980. F. I. M. CRAIK and SANDRA TREHUB, Eds. Plenum, New York, 1982. xviii, 396 pp., illus. $39.50. Advances in the Study of Communication and Affect, vol. 8.

Although research on how to stay young has always been popular, only lately have we begun to study how we grow old. The recent boom in gerontological research reflects an awareness by granting agencies of the increasing age of our population and the social and health problems this poses. Research into the psychological effects of aging has increased dramatically over the past 15 years, as has the number of books on the topic. The present volume is a report from a conference on the effects that normal and abnormal (dementia) aging have upon cognition and information processing in humans.

As in most books of this type, many chapters are merely recapitulations of their authors' long-published data. In several such chapters, however, (for example, that by Walsh) the summaries of experimental data have been combined with comprehensive reviews of the literature, producing a coherent picture of the current state of the field. This makes these chapters excellent starting places for a reader unfamiliar with the topics they cover.

However, what sets the book apart from similar books is that many of the authors attempt to compare the pattern

of decrement they find in old or demented individuals with that seen in persons with various types of brain disease (such as focal lesions) and cognitive dysfunction (such as alcohol intoxication). This emphasis on relating the psychological performance of the elderly to the state of their brains is evident in the initial chapters, which give brief overviews of the neuroanatomical and neurophysiological changes seen in aging and dementia. These chapters seek to provide a biological context in which cognitive researchers might better interpret their results and frame their experimental questions. Thus, a chapter on electrophysiology describes techniques, such as event-related potentials, that provide converging evidence concerning the information processing changes researchers have documented in the elderly.

One of the more interesting aspects of the book is the inclusion of chapters by two prominent neuropsychologists who approach this field with a very different perspective from that of the other authors. Winocur compares the memory interference problems seen in animals and humans with hippocampal lesions with the memory decrements found in the elderly, especially the institutionalized elderly. Moscovitch examines the pattern of neuroanatomical changes in the aged in light of the behavioral deficits known to follow focal lesions to different brain regions; from this, he predicts the nature of the cognitive deficits that should occur in aging and dementia. Such a search for common patterns in the effects of age and various types of brain dysfunction may prove to be a very useful approach for understanding cognition in the aged. In order for this to occur, however, it will be necessary to go beyond the simplistic reciting of similarities between age changes and neuropsychological deficits that is evident in several chapters (for example, that by Horn).

Just as Winocur and Moscovitch seek to relate decrements seen with age and with brain damage, so Craik and Byrd examine similarities in the patterns of memory encoding shown by elderly persons and by young persons who have diminished attentional resources due to fatigue, intoxication, or divided attention. Such modeling of age deficits in the young appears to be a very powerful technique for teasing out the underlying causes of age changes in cognition.

A number of other chapters focus on possible confounding variables in aging research, such as biological (for example, health) and social (for example, education) differences between young and old subjects, the effects of institutionalization, and the fear of memory loss. A particularly important chapter in this respect is that of Lachman *et al.*, who tested an assumption basic to most cognitive psychology—that results obtained with volunteer subjects are generalizable to the population at large. There has been some concern that research findings in gerontology have been distorted by a systematic bias in subject recruitment, especially among the elderly. The data reported by Lachman *et al.* should help ease this concern.

On the whole, the book is a valuable contribution to the growing literature on the psychology of aging. Besides providing a number of excellent reviews of aging literature and theory, it demonstrates the advantage of viewing age changes in the larger context of other types of cognitive dysfunction.

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Epithelia

The Paracellular Pathway. Papers from a conference. STANLEY E. BRADLEY and ELIZABETH F. PURCELL, Eds. Josiah Macy, Jr. Foundation, New York, 1982 (distributor, Independent Publishers Group, Port Washington, N.Y.). viii, 382 pp., illus. Paper, $15.

When Farquahar and Palade some 20 years ago described the junctional complexes of mammalian epithelia, the idea that epithelial cells were joined by space-occluding tight junctions strongly biased serious consideration of extracellular or paracellular transport. Roughly a decade later, the "classical" finding of Farquahar and Palade had been exhaustively probed, and, in a series of ultrastructural and electrophysiologic studies, the space between cells was "opened." By the time of the symposium of which this book is the proceedings, there remained virtually no controversy that tight junctions are not truly tight. Unfortunately, it appears that something like another decade of research may be required to fully understand the principles of regulation of paracellular flow and how the zonulae occludentes participate in this regulation. Indeed, the theme of this book is a search for some unifying concept that can successfully replace the tight junction concept of 20 years ago.

The book is divided into five sections (general considerations; kidney; liver; gallbladder; and cornea and choroid plexus). Without the discussions that follow each report several important issues would not have been addressed and we would not have the opinions of Boulpaep, Erlij, Forker, Giebisch, Goodenough, Machen, van Os, and Renkin, who made no formal presentations. A 30-page concluding discussion offers a broad perspective of the subject and draws attention to necessary future work. The contributions are generally not simply rehashes of old material, although there are some useful reviews.

There is now a strong dependence between the students of structure and the students of function; this has not always been the case. There is a genuine effort in the papers to correlate morphologic and physiologic data. A central theme of the symposium is the need to understand better the structure of the tight junction. Is it static or fluctuating? How do two cells come together there? Does the junction contain specific permeation sites, or is its permeability due only to discontinuities or assembly errors in the strands of contact between cells? Bullivant presents a cohesive report on the freeze-fracture analysis of junction structures in which he clarifies terminology again (always useful) and points out junctional geometries under consideration. Revel considers junctions between cells in a general way and points out that it may be premature to assign functions to these structures.

A major subject of agreement in the book is that existing nomenclature is far from helpful. It is suggested that the designations "tight" and "leaky" may best be discarded, for the classification of the epithelial world into two camps has not stood up to the last ten years of investigation; Boulpaep and Wright are eloquent on this subject. A real contribution of the volume is that it contains a compendium of nearly all of the varieties of epithelia with respect to tightness. It is clear that there are electrically leaky epithelia with very high resistance to water flow (for example, the thick ascending limb, which is discussed by Andreoli and Hebert) and that there is no obvious association between electrical and hydraulic conductivities. Wright makes a strong plea that a new terminology be established for just this reason, and Boulpaep suggests that on purely electrical grounds one might be better advised to classify epithelia on the basis of the relative conductivities of cellular and paracellular pathways. Though the tight junction is generally regarded as