based upon his own studies of oral cancer in both humans and experimental animals.

The story turns to Tarin's detailed histological and ultrastructural observations of tumorigenesis in the mouse, emphasizing junctional changes. Although not peculiar to carcinogenesis these junctional changes, "collectively and in the sequence described," are regarded as "specially associated with carcinogenesis" and "likely to yield more information relevant to [its] mechanism." This view is supported by observation of wound healing in skin, in which the same sequence of junctional changes is not observed.

Orr's well-known work on separated and recombined epidermis and dermis is represented by a modified reprint of his 1963 paper in National Cancer Institute Monograph No. 10 and additional data by A. T. Spencer. Although still subject to varying interpretation, their experiments support the notion that epidermis is not directly induced to undergo carcinogenesis by methylcholanthrene but rather responds to primary dermal changes. Dawe then details his studies on polyoma-virus-induced tumors in mouse salivary rudiments, which lead him to the conclusion that "the unit responding to polyoma virus . . . is an epithelio-mesenchymal complex" since neither component affected alone yields tumors whereas recombined and infected rudiments do. Tarin and Sturdee then report that pure epidermis transplanted to the eye and peritoneal cavity fails to undergo tumorigenesis, indicating that the role of dermis is not merely to restrain an epidermal tendency toward carcinogenesis.

Mazzucco turns attention to the role of collagen, showing that collagen content of mouse skin falls during early stages of chemically induced carcinogenesis. Strauch, on the other hand, finds increased collagenolytic activity and a general shift of collagen metabolism toward increased degradation. Although these changes are believed to be generally related to the phenomenon of invasiveness, the exact relation is not clear and the phenomena have not yet been made practically useful; that is, it has not been possible to reverse collagenolysis and thus confine a tumor. The book concludes with a chapter by Cowell on control of epithelial invasion by connective tissue during embedding of the mouse ovum in the endometrium. Here decidualized endometrium halts the invasion whereas nondecidualized endometrium undergoes invasion in uncontrolled fashion.

In evaluating the volume one must note that the focus is not "where the action is" in current cancer research. The thesis almost certainly is sound that oncogenesis must somehow be affected by the mechanisms of organogenesis. It remains to be seen, however, whether this concept provides a new look or whether it is only an envelope to be added when initiatory intracellular changes, bet on as primary by most other oncologists, are identified.

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Change with Age

Intellectual Functioning in Adults. Psychological and Biological Influences. Two symposia, San Francisco (1968) and Miami (1970). LISSY F. JARVIK, CARL EISDORFER, and JUNE E. BLUM, Eds. Springer, New York, 1973. xiv, 178 pp., illus. $7.50.

Adulthood and senescence have never received attention from developmental researchers commensurate with the large proportion of the human lifespan they represent. Presumably this is because of the assumption that the first two dozen years of life are where the significant action is; but that assumption is faultily based on some vague conceptions of "maturity." Now there are encouraging signs of a growing recognition that development does not cease with the appearance of axillary hair and that significant changes occur throughout the course of life. More data on adult development, especially late adulthood, are accumulating. The volume under review is very much in the mainstream of this research.

The papers in the first section of the volume are summaries of major longitudinal studies of intelligence (and selected other variables) that have been conducted in the United States over the past several decades. These reports competently spell out the consistent finding that verbal performance stabilizes in adulthood and is maintained (and perhaps increased) over long spans of time; psychomotor performance, on the other hand, declines relentlessly in later life. (Most of the authors make note of one of the irritating but inevitable problems of longitudinal programs—selective dropout. Some subjects become unavailable for later retesting because of refusal to cooperate, inaccessibility, or death. There is evidence that such losses from a study population are greatest among subjects likely to suffer the most decrement with age. The implication of this finding should be clear to the reader: If asked to be a subject in a longitudinal program, don't refuse and don't drop out!)

Part 2 pertains to psychological change as it is related to such somatic variables as blood pressure, heart rate, and cerebral atrophy. Troyer's chapter, which sketches a picture of brain-body interactions in the aged, is perhaps the very best in the book. Also, Wilkie and Eisdorfer are to be commended for cautioning against the common tendency to impute observed performance changes in later life solely to deterioration of the biological system.

The third section contains two papers describing the development of procedures for collecting "life history" data, with the purpose of determining the biological, psychological, and sociological correlates of longevity and successful aging. Finally, there is a commentary by Birren, in which he rightly points out that gerontologists have paid far more attention than have child psychologists to the relation between cognitive functioning and the biological states of the organism. Birren calls for greater consideration of techniques for manipulative intervention to slow or reverse the deleterious features of aging.

The book offers a quick course (there are only 154 pages of text) from which the new student in psychogerontology can gain an adequate perspective on what has taken place in the study of intelligence in adulthood and old age. Most of the papers are clearly and concisely written, and all citations are gathered together in one bibliography, which is thus a good, compact reading list for the student.

On the other hand, the papers reflect the inadequacies of the research conducted within this paradigm. Investigations of psychometric intelligence have typically been devoid of a sound theoretical foundation; nowhere in this book, for example, is there a reference to Cattell's theory of intellectual structure, nor is there any acknowledgment of the qualitative models of intelligence represented by Piaget, Werner, and Bruner. Intelligence tests for adults are merely extrapolations of intelligence tests for children, which are based on school performance. As

Birren asks, should these same criteria be imposed upon adults? These papers reflect also a methodological naiveté that has been pervasive in the field. For example, in one place we are told that Schaie and Strother's study was longitudinal in design (p. 31), and in another it is identified as cross-sectional (p. 61); both observations are partly correct, but the actual design is misunderstood. We also read: "To date, we have no adequate scientific way to determine how much of an impact social change has on the behavior, the health or longevity of successive generations of age cohorts" (p. 144). These examples demonstrate a lack of awareness of highly sophisticated data-gathering plans that indeed have been developed—the time-, cohort-, and age-sequential designs derivable from the "general developmental model."

In sum, the study of adulthood and aging, of which this volume provides a fine sampling, is in a Kuhnian sense caught in a historical cul-de-sac. The investigation of adult intelligence is recapitulating the evolution of the field of child development, in which early work was tied to the ubiquitous traditional intelligence test; only decades later did the orientation begin to shift away from this atheoretical approach. The time is ripe for new conceptualizations of adult cognition—ones that emphasize the competencies and qualities of thought that distinguish adulthood from adolescence.

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