stems from Münsterberg stands out in many of the distinguished Harvard graduates who were his students (including Yerkes, Dunlap, Calkins, Holt, R. Elliot, and F. Allport). Following their teacher's preferred terminology they more often called themselves "objectivists" than "behaviorists."

Although Münsterberg's name was erased from the American consciousness after his fall from grace, Hale has shown that his impact on early-20th-century psychology was a large one.

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Wundt and After

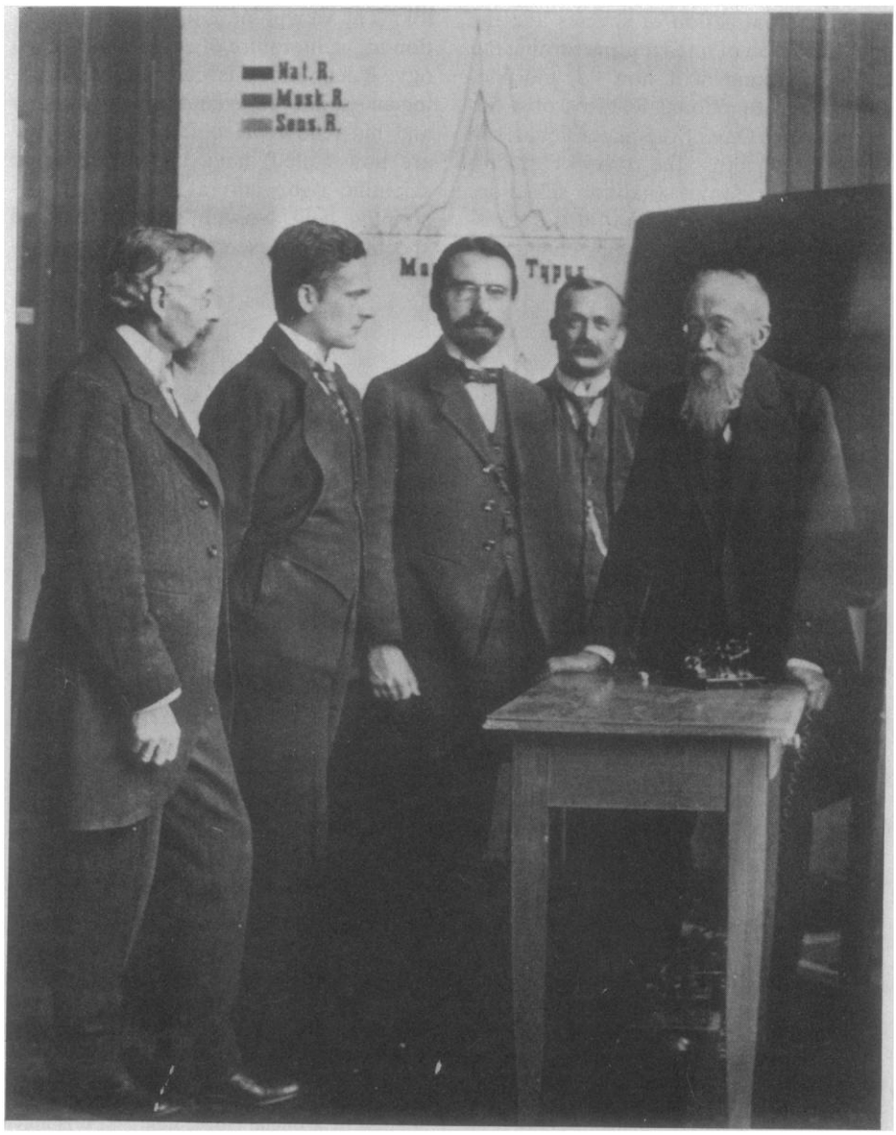
The First Century of Experimental Psychology. ELIOT HEARST, Ed. Erlbaum, Hillsdale, N.J., 1979 (distributor, Halstead [Wiley], New York). xxvi, 694 pp., illus. $19.95.

Experimental psychology began gradually; it did not come about all at once. But there is one event at which experimental psychologists like to set $t = 0$. That was the establishment by Wundt of a physiological psychology laboratory at the University of Leipzig in 1879. Psychological sorts of research had been done before then, of course, but Wundt's lab was different. It was the first to be *called* a psychology laboratory, and it was the first such to have official recognition in the form of university funding. What could be more appropriate for the young science than for a centennial history book to appear in 1979? And what could be better than to have it sponsored by the Psychonomic Society (a group of 2000 active experimentalists) that would be celebrating its own 20th birthday in 1979.

Seizing the opportunity, editor Hearst recruited a group of people who, like himself, are eminent in their research areas to write the chapters—for instance, Gottlieb on comparative psychology and ethology, Jenkins on animal learning, Cofer on human learning, Brown on motivation, and Posner and one of his students (Shulman) on cognition. To give breadth to the enterprise, some of the less experimentally oriented areas were included. There are Cairns and Ornstein on developmental psychology, Steiner on experimental social psychology, and the Mahers on psychopathology. Then, to glue the thing together there are a prolog by Hearst, an epilog by Estes, and a provocative chapter by Littman with a sociology of science point of view that describes the intellectual climate that made Wundt's lab possible. The writers of the content-oriented chapters were thus free to begin their respective narratives 50 years ago, or with Wundt, or with Descartes, or wherever their roots happened to be.

The venture was a resounding success, though not everything fell into place as expected. For example, it will be difficult for most readers to see any continuity of effort or concept in experimental psychology over the last 100 years. Nor will most readers see much relation among the different areas; psychology as a whole will tend to look rather disorganized (which it is). The purpose of the book was to take stock of a century's work, to see if there has been a century's worth of progress, and to have a celebration in any case. It was not intended as a textbook. However, I suspect that the book will be widely read by graduate students preparing for their qualifying exams. You may be sure that my graduate students will do so.

Some contributors had easier assignments than others. For example, emotion is a conceptually tricky area, but it is relatively delimited, with not too many data to worry about. Mandler took advantage of this situation and wrote a valuable essay on the conceptual basis of emotion. By contrast, physiological psychology spreads all over the landscape, and in trying to cover it Thompson and Robinson make it look like it spreads all over the landscape; they cite approximately 310 different names. On the other hand, Hochberg's responsibility was perception and sensation, which is also a



"Wilhelm Wundt, at eighty years of age (1912), with his reaction-time equipment. In the picture are (left to right) Ottmar Dittrich, Friedrich Sander, Wilhelm Wirth, Herr Hartmann (a research technician), and Wundt." [Photograph supplied for *The First Century of Experimental Psychology* by Wolfram Meischner, Karl-Marx University, Leipzig]

vast area full of ancient problems. But by being selective he was able to provide an elegant analysis of the empiricistic doctrine, which has dominated the discipline all through its history.

The success of the book can be attributed to several factors, including careful planning, diligent editing (I saw no errors), the action of some hidden force that induced all of the contributors to minimize their own contributions, the use of a whole army of sympathetic reviewers, and the inclusion of 84 portraits of historically important persons.

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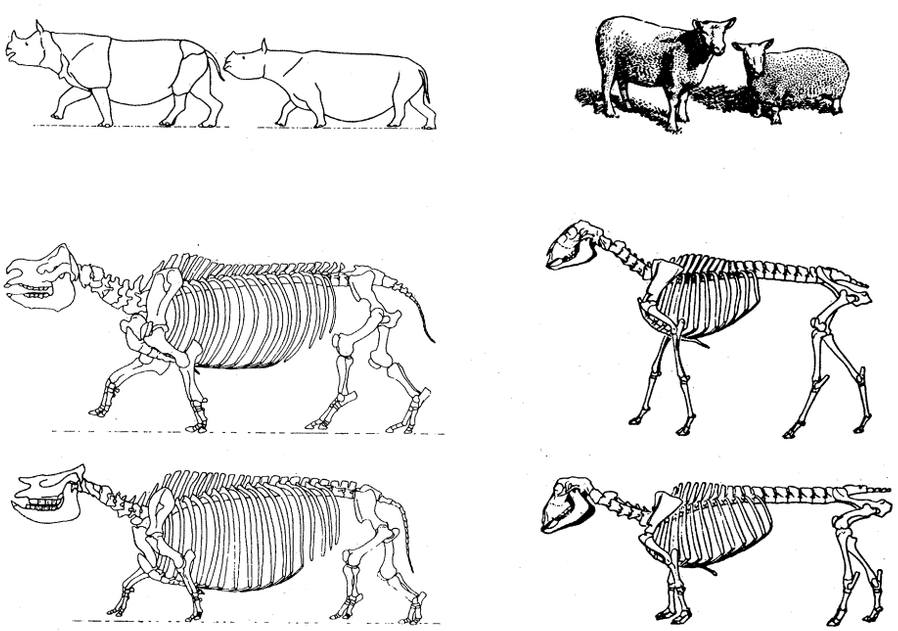
Evolution: The Paleobiological View

Macroevolution. Pattern and Process. STEVEN M. STANLEY. Freeman, San Francisco, 1979. xii, 332 pp., illus. $20.

Macroevolution is concerned with the origin and extinction of species and the diversification of lineages, or, turning the problem around, with how key morphological and functional features of a lineage evolve. One of the major debates in biology concerns the role of microevolutionary forces (natural selection, genetic drift and mutation) at the transspecific level: Are the major changes in the history of life attributable to speciation or to the gradual transformation of lineages within established species by microevolutionary forces? Stanley's exploration of this problem from a paleontological viewpoint is a welcome addition to the literature of evolutionary biology. Paleontology is currently undergoing an exciting rejuvenation, and Stanley and his fellow paleobiologists (as they are now called) have introduced some scientific rigor into a traditionally descriptive field. Now, in place of inspired speculation, we see attempts to test hypotheses derived from theoretical population ecology against the extensive fossil record. Although this volume is in large part an amalgamation of the author's previous publications, his ideas deserve the wider readership they will now receive. He documents and discusses a wide range of interesting topics, and biologists unfamiliar with the recent progress in paleobiology will find this a useful reference. (More than half of the 400 reference citations are to works published since 1969.) Because much of the discussion is controversial the book should also be considered for use in advanced classes and seminars on evolution.



Effects of achondroplasia. (Left) The living Indian rhino, *Rhinoceros unicorni*, and the Late Miocene achondroplastic dwarf rhino, *Teleoceras fossiger*. (Right) Normal domestic sheep and member of the achondroplastic Ancon strain. Among the phenomena "strongly suggestive of rapid evolutionary transition is the origin by single mutations in domestic animals of certain distinctive morphologic features . . . that closely resemble traits of species that appear suddenly in the fossil record as the earliest members of discrete higher taxa. . . . At least twice during the last 200 years, achondroplastic sheep have arisen by single mutations under domestic conditions, and dwarf populations have been maintained by artificial inbreeding. . . . It is much easier to imagine that *Teleoceras* evolved by the rapid fixation of achondroplasia in a small, inbreeding population than by the dwarfing of an entire species." [From *Macroevolution*; drawings at left by Gregory S. Paul, at right from H. Grüneberg, *The Pathology of Development* (Wiley, 1963)]

Stanley's contributions to biology include the development of techniques for the estimation of rates of evolution in the fossil record at the level of the species. This volume contains the results of his analyses, a wealth of well-illustrated data on rates of speciation, extinction, and the diversification of higher taxonomic categories. He discerns a *scala naturae* in the average duration of species in different groups: mammals, ammonites, and trilobites, 1 to 2 million years; echinoderms, 5 million years; marine mollusks, 10 to 15 million years; and planktonic forams, 25 million years. In marked contrast to the relative longevity of species is the speed with which adaptive radiations occur; the diversification of the angiosperms (Darwin's "abominable mystery") in 10 million years, 20 orders of mammals in 12 million years, and 20 families of ammonites in 8 million years. This inconsistency has created a major problem for evolutionary biologists. Darwin and most subsequent authors including G. G. Simpson have held that most evolutionary transitions occur within established lineages by phyletic gradualism guided by natural selection. But fossil species remain unchanged throughout most of their history and the record fails to contain a single example of a significant transition. Similarly, it is difficult to account for the greatly accelerated pace of evolution during periods of adaptive radiation. An alternative model of evolution, that of punctuated equilibria, introduced by Niles Eldredge and Stephen Jay Gould in the early 1970's, more fully accounts for these same observations. According to this major conceptual breakthrough, rapid evolution is typically associated with speciation events that occur cryptically in small isolated populations, often at the edge of a species's geographic range. (This model does not require macromutations of the type that characterized earlier punctuational schemes.) It satisfac-