somewhat uncomfortable. Responses as indicants of discrimination are indeed important in Eleanor Gibson's thinking, and even though it is the stimulus that is learned, we (the scientists, that is) must learn about the learning by paying close attention to the nature of the discriminative response used by the experimental subject.

Why this difference, James Gibson emphasizing direct cognition, and Eleanor Gibson emphasizing discriminative perception? Certainly it is in line with their backgrounds, one having come from a partly introspectionist training at Princeton, the other from a stimulus-response tradition at Yale. But more than that, it reflects the inherent limitations the student of development must accept in studying perception in either animals or children, particularly preverbal children. It is essentially impossible to find out how a child or an animal knows the world; but it is quite easy (relatively speaking) to find out whether an organism can discriminate aspects of the world, and the discrimination learning procedures are the ones to use. With adults, capable of accepting complex instructions and of giving verifiable complex responses, we can learn much more about the nature of knowing, about perception as cognition.

So Eleanor Gibson is emphasizing a point of view entirely appropriate to her subject matter, but one that is perhaps still methodologically limited. Nevertheless, her thinking about the nature of perceptual development has gone far beyond any such limitations, and we are indebted to her for an excellent addition to the study of perception and its development.

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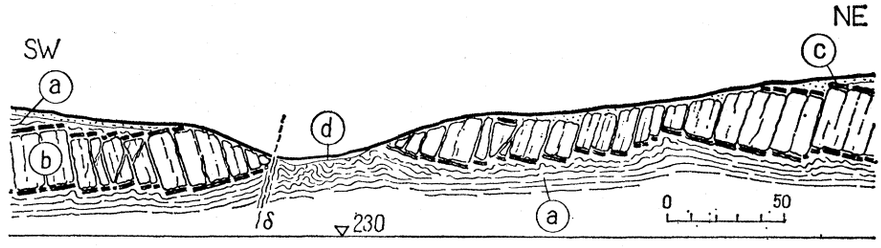
Instabilities

Landslides and Their Control. QUIDO ZÁRUBA and VOJTECH MENCL. Elsevier, New York, and Academia, Prague, 1969. x + 206 pp., illus. $14.50.

This book is organized about a fourfold geological classification of landslides, to wit: superficial slides; slides in weak rocks; slides in solid rocks; and other types. Superficial slides include creep of debris, sheet slides, earth flows, and debris flows. Slides in weak rocks are divided into those on cylindrical shear surfaces, those on ancient slide surfaces, and those caused by bulging or squeezing of soft layers. Solid rock slides are those controlled by geological structure, slides associated with the long-term deformation of mountain slopes, and rock falls. Under the fourth category are solifluction phenomena, quick clay slides, and subaqueous slides. One of the most interesting chapters gives geological examples of every type, including many totally new to this reviewer.



Squeezing out of marly shales on the valley bottom of the Lucina River near Ostrava, Czechoslovakia. *a*, marly shales (Lower Cretaceous); *b*, teschenite; *c*, contact metamorphosed slates; *d*, disturbed shale beds in the valley bottom. [From *Landslides and Their Control*]

Since slides are geomorphic features, terms expressing the stage and degree of development are useful. Thus the authors refer to *active*, *dormant*, and *fossil* slides. Dormant slides are those for which the basic causes persist, so that there is a possibility of renewed movement. Fossil slides, in contrast, cannot revive under present climatic conditions. The degrees of development of landslides are defined as *initial*, *advanced*, or *exhausted*, according to the relative degree of cracking and of emptying of the head area. In the initial stages, the factor of safety can be estimated from the degree of development. Slides may be active, fossil, or dormant in any of the three degrees of development.

The type of slides in weak rocks caused by bulging or squeezing up of soft layers is illustrated by fig. 5-36, reproduced here, which shows a slide associated with a "valley anticline"—an anticline caused by upward bulging of shale accompanying unloading by erosion. This process is accompanied by a tension cracking in the more rigid strata in the valley sides. A very similar occurrence in Dallas, Texas, accompanied the collapse of an excavation several years ago.

The authors do not pretend to present a highly technical work with the latest refinements in analysis and corrective measures, but they are careful to give extensive references on these subjects and to provide a review of the basic phenomena which will be helpful to those who have not closely followed these areas. Almost no attention has been paid in landslide literature to the measurement of stresses accompanying landsliding. The authors give examples of their own stress measurements in slides using rock-mechanics methods; they point out that these methods are well suited in view of the small deformation moduli and therefore relatively large displacements that accompany the release of strain when stress measurements are carried out in clays and weak rocks. The book also reviews various methods of stabilizing slides, giving examples from practice. These methods include excavation, drainage, plantings of vegetation, construction of retaining walls and similar structures, the use of rock bolts, stabilization of slopes by piles and hardening of soils by grouting and electrical techniques, and finally the rupture of the slip surface by blasting.

In summary, the book is a complete study of the enormously interesting subject of landslides, including not only those slides produced in the natural terrain and considered as geologic phenomena but those produced by man and his activities as well. It is very well written from both the geological and the engineering point of view and is thorough in both fields to a degree seldom achieved in a single work.

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Troposphere and Stratosphere

Climate of the Free Atmosphere. D. F. REX, Ed. Elsevier, New York, 1969. x + 450 pp., illus. $52.50. World Survey of Climatology, vol. 4.

In the 15-volume series *World Survey of Climatology*, 3 volumes are devoted to "general climatology," 11 to regional climatologies, and 1 to the climate of the "free atmosphere."

The editor of the present volume has

chosen to restrict his domain to the lowest 50 kilometers of the air above the atmospheric boundary layer, thus limiting it to the troposphere and stratosphere. This constraint is breached only in the article by N. Sissenwine ("Standard and supplemental atmospheres"), wherein standard atmosphere properties are presented in tabular and graphical form up to 700 kilometers. Although these data are available in greater detail elsewhere, it is convenient to have them in the present volume. The comparison between the 1961 COSPAR International Reference Atmosphere (CIRA) and the 1962 COESA Standard Atmosphere, an extension of the ICAO Standard Atmosphere, is of particular interest.

The remainder of the volume is indeed restricted to the lowest 50 kilometers of the free atmosphere. H. L. Crutcher presents data on the variability in time and space of the vertical profiles of temperature and humidity up to the tropopause, as well as maps and meridional-vertical cross sections illustrating geographical distributions of average temperature and dew point. E. Reiter discusses, at some length and with pedagogical precision, the dynamics and structure of large-scale wind systems, with particular emphasis on jet streams, as well as some properties of smaller-scale circulations, including hurricanes.

Two chapters are devoted to clouds. "Major cloud systems" by J. H. Conover, W. S. Lanterman, and V. J. Schaefer is largely descriptive, with the emphasis primarily on models of cloud systems. On the other hand, "Global distribution of cloudiness and radiation as measured from weather satellites" by J. S. Winston presents a wealth of new, but time-limited, data on global distributions of cloudiness, albedo, and outgoing long-wave radiation based on satellite measurements.

The structure and circulation of the atmosphere above the tropopause, and especially the contributions of the Meteorological Rocket Network, are reviewed by W. L. Webb. The final chapter, by H. V. Dütsch, presents a survey of the horizontal and vertical distributions of ozone as deduced both from ground observations with the Dobson spectrophotometer and from a limited number of balloon soundings, and discusses the interaction between ozone and stratospheric motions.

On the whole, the book fulfills the promise of the title of the series. It is indeed an up-to-date "survey," rather than a comprehensive atlas, of climatology of the free atmosphere. Copious references are provided, however.

Although the level of difficulty varies from that of a dynamic meteorology textbook (as in Reiter's chapter) to that of a good *Scientific American* article (as in Conover, Lanterman, and Schaefer's), the writing is uniformly lucid and readable. Nevertheless, the book is not an introductory text. It would be a useful addition to a technical library. The climatological facts presented are enriched with physical and dynamical explanations, and variability is emphasized as much as average conditions.

The omission (except for ozone) of any information on atmospheric aerosols and air chemistry, including radioactive trace gases, and the absence of any results on circulation, mixing, and stratospheric-tropospheric exchange as deduced from the study of radioactive debris from nuclear weapons tests, is unfortunate, but does not diminish the value of the material presented.

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Bacterial Genetics Updated

The Genetics of Bacteria and Their Viruses. Studies in Basic Genetics and Molecular Biology. WILLIAM HAYES. Second edition. Wiley, New York, 1968. xvi + 928 pp. + plates. $13.75.

The first edition of this book, which appeared in 1964, effectively summarized a new field that had reached an impressive degree of maturity. Acceptance was enthusiastic: the exposition was detailed, authoritative, and critical, and it included extensive consideration of the relation of the subject to classical genetics and to molecular genetics. The present edition has expanded and updated the material in those areas that have undergone a major advance: the genetic code, the regulation of gene expression, the provirus state, the mode of replication of single-stranded viruses, the behavior of bacterial plasmids, the mechanism of recombination, the repair of radiation damage, and the conformation of protein and RNA molecules. The text is increased by 140 pages, as very little of the first edition has been eliminated.

The author has maintained his original high standards in the added portions, but it seems a pity that he did not edit the old material more ruthlessly: in teaching, at least, when extensive new material is added it seems essential to condense some of the old. In particular, the treatment of biochemical topics, which was rather superficial in the first edition, has now become quite obsolete. For example, the discussion of selected amino acid pathways, which has hardly been changed, retains both a dubious arginine cycle and an equally suspect tryptophan cycle in *Neurospora* and leaves aromatic biosynthesis at the stage before the discovery of chorismic acid. And the fairly extensive chapter on protein synthesis, though somewhat updated, lacks mention of 5*S* RNA or of chain extension factors or initiation factors. Since protein synthesis and metabolic pathways, despite their intimate historic link with bacterial genetics, are now the warp and woof of much of contemporary biochemistry, it might have been better to refer the reader to textbooks in that subject, and to summarize here only those points essential for understanding bacterial genetics.

But the biochemistry is a minor part of the book. In the major sections I would question only the logic of the presentation. Thus two chapters on mutation in bacteria are not closely linked either to the chapters on gene exchange or to that on molecular aspects of mutation; fine structure genetics is curiously separated into a chapter on theory followed by one on practice; the chapters on transformation, transduction, and conjugation come at the very end; and fine-structure genetics and complementation, which rest heavily on the latter operations, come much earlier, even before DNA. Teachers who prefer a more historical approach, which would move from the cellular and the descriptive to the molecular and the mechanistic, will therefore have to jump about quite a bit. However, the material is all there, up to mid-1967, in a well-digested form. Hayes's book thus remains the best available monograph on bacterial genetics, and an excellent source on bacteriophage genetics.

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