of the development of modern physics.

Readers of *The Structure of Scientific Revolutions* are familiar with Kuhn's concern with the workings of scientific communities as producers and validators of natural knowledge. As Kuhn's new book offers a historical illustration of those workings, readers will be aware of a continuity of some of his concerns. The introduction and assimilation of a concept such as quantum discontinuity, which calls for the restructuring of traditional theory, hold a natural interest within a theory of scientific change. Readers will not meet "paradigm," "exemplar," "disciplinary matrix," "normal science," "anomalies," "crises," and "scientific revolution," terms familiar from *Structure*. But they will meet other familiar terms that will orient them within the insulated world that Kuhn portrays of scientific specialists working within the circle of their professional concerns. Here black-body physicists address themselves to technical "puzzles," and they do or do not "convert" to discontinuity. They give a "revolutionary reformulation" to Planck's theory not from any wish to overthrow "classical" theories but as a response to Planck's "classical" theory with its unanticipated problems. Early quantum theorists correspond, publish, usually in the leading German physics journal, *Annalen der Physik*, and debate at meetings as they seek agreement on the question of admitting some form of quantum discontinuity. Like *Structure*, *Black-Body Theory* will interest historians, natural, social, and psychological scientists, philosophers, and other students of scientific change.

In closing it should be noted that *Black-Body Theory* is less accessible than *Structure*. It is less accessible, too, than Kuhn's *The Copernican Revolution*, in which he argues that to fully understand the origins of the great intellectual changes associated with the "Copernican Revolution" we must understand the technical problems at issue and the recondite minutiae that occupied Copernicus and other astronomers. In this new book the understanding of the past of physics that Kuhn wishes to impart requires highly technical discussions indeed. Although he gives frequent summaries of the technical discussions and explanations of what he is going to discuss next and why, for full comprehension readers need a good grasp of the classical theories—above all of thermodynamics, kinetic theory, and Maxwell's theory—that converge in Planck's work on black-body radiation. Readers who know enough physics and who want to understand one of the most far-reaching conceptual changes in the history of physics will greatly profit from *Black-Body Theory and the Quantum Discontinuity, 1894-1912*.

RUSSELL MCCORMMACH
Department of the History of Science, Johns Hopkins University, Baltimore, Maryland 21218

Historical Genetics

The Genetics of the Jews. A. E. MOURANT, ADA C. KOPEĆ, and KAZIMIERA DOMANIEWSKA-SOBCZAK. Clarendon (Oxford University Press), New York, 1978. viii, 122 pp. $34.50. Research Monographs on Human Population Biology.

Recent years have seen the discovery of a variety of genetic markers, such as serum and enzyme variants. The gene frequencies of such markers and of blood groups usually differ between human populations and can be utilized to assess the affinities of various populations and racial groups. Mourant and his co-workers have been in the forefront in consolidating the scattered information in this field. Their monumental volume *The Distribution of Human Blood Groups and Other Polymorphisms* (1976) is the key reference in this field. They now address the genetics of Jews.

The Jews of the world have a common religion or at least common cultural traditions and, for some large groups, a common language, namely Yiddish among Ashkenazi Jews and Ladino among Sephardic Jews. Whether the various Jewish populations have common genes has been less clear. Mourant and his coauthors in this book trace the history of various Jewish groups and integrate the historical data with an assessment of gene frequencies for various markers compiled from the world literature.

After a succinct and clear exposition of the genetic polymorphisms referred to in the book, the early history of Jews is described. Chapters are then devoted to various Jewish populations—Samaritans, Oriental Jews, Yemenite Jews, various Jewish groups of Africa, and Karaites, as well as the currently most numerous Ashkenazi and Sephardic Jews, that is, Jews of Central European and Spanish origin.

Each major Jewish community tends to resemble genetically the indigenous population of the region whence it originated. Ashkenazi and Sephardic Jews have many resemblances in different genetic systems and are therefore considered to have a common "Palestinian" origin. Earlier assessments of genetic affinities were largely based on the ABO blood groups and led to the conclusion that Ashkenazi Jews resembled closely the populations of the various European areas where they lived. The analysis by Mourant and his coauthors of the total evidence suggests the genetic distinctiveness of this and other Jewish populations. Generally, however, some similarity between Jewish subcommunities and the people among whom they have lived more recently can be detected. Claims (recently resurrected by Arthur Koestler in his book *The Thirteenth Tribe*) that Ashkenazi Jews are genetically derived entirely from the Khazars (a Turkic tribe that embraced Judaism and lived between the Caspian and the Black seas between the 6th and the 9th centuries) appear highly unlikely on the evidence of genetic markers. It is possible, however, that the Crimean and Lithuanian Karaites (a sect that accepts the Old Testament but rejects later interpretations such as the Talmud) as well as the Krimchaks (Orthodox Jews of the Crimea) may be descendants of the Khazars. In fact, the Nazis spared the Karaites from extermination in the early 1940's because of the already known blood group differences between them and the general Ashkenazi Jewish population. African admixture of the order of 5 to 10 percent in most Jewish groups (including Ashkenazim) has been documented by a higher frequency of the typically African rhesus genotype *cDe*. This African marker was presumably acquired by the Jews through admixture from slaves and concubines during their prolonged sojourn in Egypt.

The analysis of Mourant and his coauthors is wide-ranging. Their assessments do not use the various quantitative methods developed by population geneticists to study intermixture and population affinities, but several of their conclusions have already been independently confirmed, refined, and extended by recent papers dealing with additional Jewish gene frequencies on old and new markers (*1-3*) and using more quantitative admixture (*4*) as well as multivariate methods of analysis (*5*). However, the analysis by Mourant and his coauthors covers many more Jewish populations than the newer work.

Several diseases unique to various Jewish populations are briefly discussed in a separate chapter. The survey of the literature here is somewhat selective and is less complete than that for polymorphisms. Mourant and his coauthors believe

that the relatively high frequency of the recessively inherited sphingolipidoses (Tay-Sachs, Gaucher's, and Niemann-Pick diseases) among Ashkenazi Jews is caused by chance. A rare mutation for each one of these diseases is postulated to have occurred in a reduced Ashkenazi population following persecution and extermination. Whether such chance events or natural selection was at work is being contested hotly in the current literature, with proponents of natural selection asking how chance can explain why three different genes affecting sphingolipid metabolism occur in the Ashkenazi population. Mourant and his coauthors do not enter the argument.

The book is a brilliant and sweeping synthesis of historical and genetic information and can serve as a model for future research of this type on Jewish and other populations. Half of the book is taken up by extensive and detailed tables listing the results of gene frequency studies for many genetic markers in different Jewish populations. These tabulations alone make the book of lasting value.

The book is short and easy to read. It will be of interest to a wide variety of scientists interested in human biology and should attract many others interested in this unique set of populations.

ARNO G. MOTULSKY
Departments of Medicine and *Genetics, Center for Inherited Diseases, University of Washington, Seattle 98195*

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Auditory Systems

The Reptile Ear. Its Structure and Function. ERNEST GLEN WEVER. Princeton University Press, Princeton, N.J., 1978. xii, 1024 pp., illus. $50.

In this work Wever, who is one of the pioneer investigators of electric potentials generated in the ear, presents an extensive study of the structure and function of the reptilian peripheral auditory system. The investigations were carried out over the past 20 years, and much of the material in the book is presented for the first time.

After a description of the methods used and a general description of the anatomy of the reptilian ear, Wever surveys the structure and sensitivity of 250 species. Included among these are representatives of the major living groups of reptiles—lizards, snakes, amphisbaenians, turtles, crocodiles—and the only surviving species of the primitive rhynchocephalians, *Sphenodon*. The structure of each ear is described and illustrated with drawings based upon dissection and reconstruction of serial histological sections. Wever compares the structure with the cochlear electric potentials recorded on the round window of each species and speculates about the possible correlation of the morphology with the cochlear potential. The fact that the same techniques were used for all the ears permits easy comparison of a large number of different reptiles. Comparing the anatomy of these ears illustrates well the extensive experimentation that occurred among reptiles in the evolution of the ear. There are, however, limitations to these techniques. For example, the structure of the tectorial membrane and its fine connections to the cilia of the receptor cells are important considerations in Wever's interpretations. Because of the differential shrinkage of the auditory tissue and the overlying extracellular tectorial substance that is inherent in all histological procedures, it is difficult to convincingly demonstrate the relation of the tectorial membrane with the cilia in vivo. This same technical limitation is the crux of the current controversy about the relation of the tectorial membrane to the inner hair cells in the mammalian organ of Corti. Another limitation is the assumption that thresholds and frequency range of hearing can be precisely determined from sensitivity curves derived from cochlear potentials. These potentials are complex and not completely understood. Wever himself, in a section devoted to "some open horizons," points out the necessity of supplementing the sensitivity curve determined by the cochlear potentials methods with those obtained by recording neural responses and behavioral audiograms.

This book will be appreciated by biologists who are interested in the comparative structure and function of the ears of the different groups of reptiles as an aid to determining the taxonomic and phylogenetic relations between those subgroups of reptiles about which controversy still exists. It should also be of value to otolaryngologists, audiologists, and auditory scientists. As Wever readably demonstrates, the evolution of the reptilian ear has supplied us with many variations on the basic vertebrate ear which should stimulate our thoughts and be useful as experimental models for investigating the basic peripheral mechanisms of hearing.

MICHAEL J. MULROY
Department of Anatomy, University of Massachusetts Medical School, Worcester 01605

Social Behavior

Social Play in Primates. Proceedings of a symposium, University Park, Pa., 1977. EUCLID O. SMITH, Ed. Academic Press, New York, 1978. xii, 324 pp., illus. $18.

Play has remained one of the most enigmatic categories in animal behavior and development. Despite a plethora of studies and more than two dozen major reviews of the subject, there is no consensus concerning the definitions and functions of play. As Bateson (1955) indicated in his insightful essay on the role of metacommunication in play, the major problem resides in the simple question, how do we know when play is play? This perceptual problem for observers can also exist for the participants in play: if two monkeys are play-fighting, how do they discern the thin line between play and aggression when the behavioral acts can look so much alike?

Social Play in Primates, a compilation of papers from a symposium of the Animal Behavior Society, deals with such questions and attempts to elucidate the structural characteristics and functions of play in primates. The book consists of several theoretical papers, which provide overviews of the history and progress of research in this area, and a number of data-oriented papers. It is an important addition to the libraries of those interested in play and development, but in general it fails to have significance for a wider audience.

The most interesting and valuable chapters are the theoretical ones, which offer extensive literature reviews and reveal the state of the art. The editor, Euclid Smith, opens with an excellent history of the study of play. Frank Poirier, who has been an important reviewer of play studies, and his colleagues have written a good paper on the variables that affect the manifestation of play, such as age, sex, and environmental context. Poirier *et al.* also attempt to show that play has benefits for both the individual and the group, a point vehemently contested by Donald Symons in another