logic (R. E. Butts, L. Laudan) through physics (L. P. Williams, M. Hesse), geology (D. B. Kitts), biology (G. Buchdahl, D. L. Hull, F. B. Churchill), and physiology (J. Schiller), to sociology (V. L. Hilts) and economics (H. S. Gordon).

Much excitement in the history and philosophy of science has been generated recently by attempts to provide a unified theory of scientific change. This collection of essays bears on this interest because of its attempt to utilize historical case studies to support philosophical points and because the 19th century was the period when scientific methods were applied to the biological and human sciences. Specifically, by demonstrating the complexity of 19th-century methodologies, these essays clearly expose the difficulty, not to say danger, of moving from individual historical examples to generalized theories of scientific change. The detailed studies show the many variables —philosophical, social, psychological, empirical, experimental—which introduce and support putative scientific theories. For example, Gerd Buchdahl's study of Matthias Schleiden's inductive method grounds it in philosophical maxims derived from Schleiden's post-Kantian education. Historians have not always been so appreciative of the fertility of post-Kantian philosophy for experimental biology. Frederick B. Churchill contrasts the experimental embryology of L. M. Chabry and W. Roux in the light of different French and German traditions (in teratology and mechanistic physiology respectively). Again, Victor L. Hilts argues that Francis Galton advanced to the notion of statistical correlation because of his interest in men who were different from, and not representative of, the average, whereas Adolphe Quetelet, lacking this interest, did not. Schleiden, Roux, and Galton are all characteristically seen as protagonists of scientific method, but whether there are unified grounds for this remains to be seen. The whole issue is implicitly raised in H. Scott Gordon's review of Alfred Marshall's foundation of scientific method in economics through concentration on the mechanics of the market rather than on the historical process of the development of wealth. Twentieth-century economists work within concrete frameworks, but whether their methods are scientific in the sense in which the physical sciences are is problematical.

It appears to me that the immediate achievement of these essays is historical. Only secondarily will the implications for an understanding of scientific method become clear. The editors have refrained from drawing out the implications because they "were convinced that the present understanding of the question is such that any attempt to single out a central theme was unlikely to be fruitful" (p. ix). The complexity of the historical variables discussed supports their view, but the relevance of the studies in the book to current interest in scientific change needs to be emphasized. The studies achieve important historical insights because they concentrate on the reasons for the application of particular methods. Thus Mary Hesse's interest in analogical argument helps clarify the historical development of Maxwell's electromagnetic theory. Again, Joseph Schiller, in discussing Claude Bernard's experimental method, sets up a framework for asking useful questions about the physiological contributions of earlier workers such as Bichat and Magendie.

The strength of the majority of the essays lies in their detailed historical discussion of methodologies that are of general philosophical concern. Points of weakness appear where the historical treatment is insufficient. Thus Robert E. Butts's study of Whewell's logic of induction does not sufficiently consider that Whewell's natural philosophy changed in structure over time and that it exemplified early Victorian metaphysics. What Whewell's view of induction means for 19th-century scientific methodology will become clearer when his metaphysics (for instance, the theological understanding of causal relations) has been identified. David Hull's study of Darwin and 19th-century philosophies of science is perhaps the widest-ranging of the essays, but it does not do justice to the metaphysics of Herschel, Whewell, and Mill. Hull is too willing to see issues as polarized rather than complex; he ignores a long historical tradition (going back through Newton) when he remarks, "The facility with which Herschel, Whewell and Mill could demand the exact verification of scientific hypotheses and the exclusion of occult qualities from science on the one hand while on the other asserting God's direct intervention in natural phenomena is nothing less than schizophrenic" (p. 122).

Fortunately, the philosophically informed willingness to study historical detail is predominant. As a result, we have a useful contribution toward solving the problem, clearly presented by J. T. Merz at the beginning of the present century, of explaining why the application of methods, claimed to be "scientific," suggested the ideal of the unification of diverse physical, biological, and human disciplines during the 19th century. And the existence and nature of this unity must be shown if there is to be a single version of the process of scientific change.

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Old World Prehistory

South Asian Archaeology. Papers from a conference, Cambridge, England, July 1971. NORMAN HAMMOND, Ed. Noyes, Park Ridge, N.J., 1973. xii, 308 pp., illus. $20.

The papers in this volume are introduced by an essay listing nine major problem foci for archeology in southern Asia (F. R. Allchin). These problem foci are essentially historical in nature, relating either to the description of major epochs or to their "origins." This restatement of problems shows both how little the perception of archeological research objectives has changed in this area over the past 25 years and how a few directions of change are now beginning to appear. The papers that follow in many instances reflect some of these new directions, but in a very limited way.

In the realm of the natural sciences Goudie's report on the geology, geomorphology, and prehistory of the Gujerat plain suggests the gains to be made by developing integrated studies of the environmental and ecological conditions surrounding cultural developments in the subcontinent. A surface survey for Afghan Seistan (K. Fischer) underlines the importance of an understanding of the ecological forces at work in this part of the world.

One of the greatest needs in archeology in this area has been the systematic study of settlement organization through extensive horizontal excavation. This has been attempted for the Paleolithic at the site of Chirki on the Pravara River, a tributary of the Godavari (G. K. Corvinus), and for the major Bronze Age Harappan city of Kalibangan (B. K. Thapar). The effort for the Paleolithic promises to break that

subject out of its typological straitjacket and revitalize it. Chirki, although a limited site, already has demonstrated the contemporaneity of side-flake tools, core tools (picks and handaxes), and pebble tools (choppers and the like). Kalibangan, on the other hand, has gone a long way toward elucidating the organization of a Harappan settlement, filling in data missing from or incomplete at older excavated sites. Especially interesting is the division of the site into a town area and a citadel area divided into two parts. Equally important is the documentation of an earlier "pre-Harappan" level including the remains of a ploughed field. The latter documents for the first time the use of the plough in Bronze Age agriculture in the area. L. S. Leshnik in a paper that combines archeological questions with ethnographic answers picks up the subject of Harappan agricultural practice and presents a stimulating discussion of possibilities. Two other papers also deal with technological questions: M. Piperno discusses methods of microdrilling as revealed by wear patterns on flint drill bits from Bronze Age Shahr-i Sokhta in Iranian Seistan, and J. Stargardt includes the results of thermometric testing of Kedah Red Wares in her review of Indian influence in Malaysia in the 13th century A.D.

Other papers deal with the results of distributional studies of a more traditional type and cover such diverse topics as Upper Paleolithic blade cultures in western India (B. Allchin), comparisons of ceramics in the Quetta area based on surface surveys (J. F. Enault and J. F. Jarrige), shared design elements in the painted pottery of Iranian Seistan and Turkmenia in the third millennium (R. Biscione), and possible typological and cultural links between the late second millennium "Gandhara Complex" of burials and northern Iran and Europe (G. Stacul). An especially ambitious paper by I. C. Glover deals with the relative distribution of Hoabinhian and Flake Tool traditions throughout Southeast Asia. Other typological and stylistic analyses deal with problems having a strong chronological aspect: Kushan coinage (D. W. MacDowall), Late Kushan–Early Gupta sculpture (J. C. Harle), Chinese trade wares (9 through 11th centuries A.D.) at Persian Gulf Siraf (D. Whitehouse), and Bengal temple terra-cotta of the 16th through 19th centuries (D. McCutchion).

Fundamental as a background to all of the papers dealing with Bronze Age problems is the systematic review by G. F. Dales of the absolute chronology of the Indus and adjacent areas based on radiocarbon dating. With current correction factors proposed by MASCA (the University of Pennsylvania Museum Applied Science Center for Archaeology) calculated from samples of known age, the radiocarbon chronology now appears much closer to the relative chronology based on the comparative typology of Indus materials and Mesopotamian sequences and historical dating. Dales and others struggle with the problem of terminology in the Indus area emerging as the result of increasing evidence for levels of occupation which underlie the "mature" Harappan but show a wide diversity of content. Neither "pre-Harappan" nor "early Harappan" satisfies the experts. One suggestion is to call all of these assemblages simply "Early Indus Cultures." The argument over terminology itself pinpoints one of the research frontiers of the immediate future in the Indus area. The 21 papers in this small volume indicate many others and illustrate the continuing vitality of South Asian field research as a whole.

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The Ovary

Comparative Morphology of the Mammalian Ovary. HARLAND W. MOSSMAN and KENNETH L. DUKE. University of Wisconsin Press, Madison, 1973. xxviii, 462 pp., illus. $25.

Books summarizing a life's work generally have a heightened interest and value, and this monograph is no exception; the senior author's distinguished contribution to knowledge of ovarian morphology has earned respect over many years. His co-author is a worthy younger colleague, and there is no doubt that the appearance of their joint treatise will be greatly appreciated by reproductive biologists.

The book sets out in detail the histological features of the ovary in an extensive range of mammals, showing precision and accuracy in identification and description. After dealing with gross anatomy, general microscopic structure, and the development of the ovary, the authors pass on to describe and discuss comparative matters, with particular reference to the human ovary, and then point up special problems for research and debate. Many of the data have never previously been published. The treatment throughout is clear, direct, and succinct, and the numerous illustrations are well chosen and most are of excellent quality.

The formal text as thus far considered accounts for only about two-thirds of the book. The balance contains "synoptic tables" in which distinctive features of ovaries in representatives in all mammalian orders are set out and "supplementary notes" which provide additional minutiae of comparative morphology. This material is impressively comprehensive: its main appeal is rather restrictedly for the systematist, but the collation does provide a source of information that otherwise would be difficult to come by. There is also a useful glossary, the usual list of cited literature, and a well-prepared index.

The book is intended to be of use to teachers and researchers in zoology, morphology, embryology, physiology, and endocrinology, and also to medical specialists in obstetrics and gynecology. This goal is very likely to be achieved; equally, the book may well "bore most people who are not of a scientific turn of mind," as the authors remark in the preface, for it is dedicated to the unvarnished fact. Indeed it deserves a warm recommendation to the scientifically minded.

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Prenatal Activity

Behavioral Embryology. GILBERT GOTTLIEB, Ed. Academic Press, New York, 1973. xviii, 370 pp., illus. $22.50. Studies on the Development of Behavior and the Nervous System, vol. 1.

In the introductory chapter of this volume Gilbert Gottlieb, editor of the series, provides an overview of the main problems and issues pertaining to the prenatal development of behavior and the nervous system, traced historically and through a review of the current research. The volume is devoted mainly to the behavioral embryology of the chick, although it includes important contributions, which I will describe later, on other animals.

The keynote is sounded by V. Hamburger in his chapter on embryonic motility, which is followed by chapters