cal facility to follow the detail of Cohen's specialist treatment. Despite his extensive use of appendices one has to search hard to find the not always quite explicit discussions of what the mathematics is actually addressed to. Since procedures are not in any case presented in all the step-by-step detail necessary for the relatively innumerate majority to apply them to data of their own, the influence of the book would surely be greater if Cohen had presented his models and their evaluation in a more intuitively comprehensible fashion and left almost all the quantitative treatment for appendices. At the very least a glossary of the terms and symbols used should have been provided, especially as their definitions are not always apparent in the text.

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A Coastal Tour

Our Changing Coastlines. FRANCIS P. SHEPARD and HAROLD R. WANLESS. McGraw-Hill, New York, 1971. x, 580 pp., illus. $39.50.

Interest in coastlines is at an all-time high, and awareness of the importance of the coastal zone in the overall environment is definitely on the increase. Significant legislation has been introduced in Congress for the management of the coastal zone, and many states have adopted their own plans for the development of this important piece of real estate. The coastline, a significant part of the coastal zone, has received considerable detailed attention in the U.S. Army Corps of Engineers' recently released *National Shoreline Study*. The Corps's study provides a complement to Shepard and Wanless's *Our Changing Coastlines*.

Shepard and Wanless have attempted a comprehensive survey, suitable for the general reader, of the shoreline of the United States, including Alaska and Hawaii, and have documented coastal changes that have occurred during historical times. Information on the shoreline is coordinated so that some general conclusions may be reached about both the natural fate of the coast and its potential use.

As might be expected by students of coastal geomorphology, the authors have followed Shepard's classification according to which shorelines are regarded as either primary or secondary. Primary shorelines are margins of the land that have scarcely been affected by marine processes; they are essentially in the same condition they were in when the sea came to rest against them. Secondary shorelines are those that have been modified by the action of waves and currents. This classification is based on an interpretation of the dominant process by which the coast has been shaped. Primary coasts include drowned river valleys, coastal areas dominated by glacial erosion and deposition, coasts formed by river deposition such as deltas, volcanic coasts, fault coasts, and drowned karst topography. Secondary coasts include coasts straightened by erosion, coastlines of marine deposition such as barrier islands, and coasts built up by animals and plants (coral reefs, mangrove swamps, and so on).

The authors describe the coast of the United States starting in New England and proceeding clockwise to Washington, Alaska, and finally Hawaii. The division into chapters is based on morphology—for example, "Glaciated coasts: New England and Long Island" and "Deltaic coasts: Louisiana." The discussion is primarily geographic. A great many illustrations, among them pairs showing sections of coast before and after such events as storms and earthslides, give graphic evidence of changes that have occurred; the book is profusely illustrated with vertical aerial photographs, charts, and oblique photographs. The style is informal; anecdotes and miscellaneous items of interest are scattered through the text. These serve to dramatize coastal events or to bring the human factor into coastal studies.

Because it has been impossible for Shepard and Wanless to visit every segment of the coast, they have based some tentative conclusions on aerial photographs and literature. This has resulted in some errors concerning particular sections. The authors readily admit such errors are possible. Each reader will undoubtedly find that his particular segment of the coast is not treated as fully as he would like. Completeness, of course, is impossible in a study of 84,000 miles of coastline in a single volume. The serious student of coastal geomorphology will wish that more geology were included and that literature citations were more numerous. The random, friendly style of writing may bother those who are used to reading of coastlines from more conventional texts; to others it will be refreshing.

The price may keep a great many people who should have the book from buying it. The book will certainly make it to most libraries and to the shelves of those specializing in coastal processes and coastal geomorphology. Because of the beauty of production, it may find its way to the gift tables of bookstores. In one sense the book is a bargain; it presents more than 2000 miles of coastline for each dollar invested.

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Research on the Maya

Monographs and Papers in Maya Archaeology. WILLIAM R. BULLARD, JR., Ed. Peabody Museum of Archaeology and Ethnology, Cambridge, Mass., 1970. x, 502 pp., illus. $13.50. Papers of the Peabody Museum, vol. 61.

Archeologists trace the evolution of cultural systems by analysis of stratified deposits. The volume under review can be viewed as a stratigraphic record of changes in research objectives and associated methods in Maya archeology over three generations. These changes reflect the increasing scope of fieldwork in the Maya area, as well as the correlated shifts in its theoretical and methodological underpinnings. It is impossible to summarize adequately the descriptive richness of this volume spanning over 30 years of survey and excavation by some of the most noted Maya archeologists. Yet one perceives differing ways of collecting, analyzing, and presenting data in the four parts devoted to major archeological programs.

The report of H. E. D. Pollock on a 1936 survey of the Chenes region of Yucatan represents the initial stages of systematic archeological research in a poorly known area. Pollock wishes to determine whether the region contains a distinctive cultural tradition. Is there such a thing as Chenes culture? If so, what is its chronological placement? Its geographical distribution? Its cultural affiliations? Since architectural styles are often used as diagnostic markers in defining regional cultural traditions, Pollock systematically describes attributes of Chenes style architecture from a large number of sites. Yet he reaches no definite conclusions

concerning the cultural distinctiveness of the region. While this may be due in part to the lack of corroborating data in other artifact categories, the problem may also lie in the nature of the defined units of study. What does the distribution of architectural and ceramic styles or types represent in terms of social and economic unit boundaries?

The article by Robert Wauchope on Protohistoric pottery from the Guatemalan highlands contains some sobering evidence concerning this question. In describing pottery collections from a limited time span, Wauchope also examines how his ceramic types correlate with known Protohistoric and early historic political, economic, and linguistic boundaries. Although Wauchope finds a tendency for localized popularity of certain types, and especially certain shape and decorative attributes which cut across types, the broad distribution of types does not appear to correlate significantly with those boundaries. This casts doubt on the meaningfulness of stylistically defined cultural boundaries, especially within ecologically and culturally homogeneous regions.

Despite the problems in using typologies based on stylistic attributes, such systems are still popular. Certainly for tracing broadly defined "influences" over large regions, for tracing origins of cultural groupings, and for chronological placement taxonomic schemes are most useful. Articles by Gordon R. Willey and Jeremy A. Sabloff on Seibal ceramics and William R. Bullard on excavations at the Postclassic site of Topoxte effectively use the taxonomic type-variety system for those purposes. Descriptions are formal and detailed, with cross-cutting attributes listed for each type. Types are fully described, diagnostic attributes stressed, intra- and intersite contexts discussed. Illustrations are profuse and well executed.

In spite of the thoroughness of the analyses and descriptions, however, one still feels a slight unease. The type-variety system is geared to solve only a limited range of problems of culture history. Explanations of variability within and between complexes tend to rely inordinately on temporal placement, to the exclusion of other possible hypotheses. Outside influences are noted, but the specific nature of those influences in terms of significant sociopolitical or economic changes often is not fully explored. Bullard, for example, notes the distinctiveness of the pottery assemblage from Topoxte in comparison with nearby Postclassic sites and explains this distinctiveness as being due to the later chronological placement of Topoxte. Alternative hypotheses are not explicitly formulated and tested. We should keep in mind that the Seibal reports in particular are preliminary reports concentrating on the chronological placement and cultural affiliations of the Seibal materials, however. It is to be hoped that the final reports will examine other aspects of the data, allowing for a more complete description of the structure of ancient Seibal.

As archeologists increasingly use the variability in their data to test hypotheses about ancient cultural systems, explicit statements of research designs which take into account sampling problems become more common. A paper by Gair Tourtellot on survey and excavations in the periphery of Seibal is representative of the genre. The results of the survey provide added data to our small but rapidly expanding body of knowledge on the evolution of Maya communities.

Finally one should note a final section of shorter essays. All are of high quality, especially that by Tatiana Proskouriakoff, who uses sculptural and legendary material to shed new light on the nature of that shadowy group known as the Itza. Works of this sort go far toward dispelling the idea that the demands of anthropological and historical perspectives in archeology are irreconcilable.

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Physics

Lectures on Elementary Particles and Quantum Field Theory. 1970 Brandeis University Summer Institute in Theoretical Physics. STANLEY DESER, MARC GRISARU, and HUGH PENDLETON, Eds. M.I.T. Press, Cambridge, Mass., 1971. Vol. 1, x, 592 pp., illus. Cloth, $17.50; paper, $7.95. Vol. 2, viii, 502 pp., illus. Cloth, $17.50; paper, $6.95.

The two volumes under review are the latest additions to the Brandeis Summer School Lecture Series which for over ten years has served the theoretical physics community well. At this school leading theoreticians either review successful theories that have achieved some measure of acceptance or summarize speculative developments that are currently being researched.

By the summer of 1970, the subject of current algebra seemed exhausted, and Weinberg provides a timely summary. A synthesis is especially useful here, for development had proceeded in three directions which did not always seem related: (i) current algebra is a property of *weak and electromagnetic* currents; (ii) current algebra reflects a symmetry (chirality) of the *strong* interactions; (iii) current algebra provides low energy theorems for the scattering matrix. Much of Weinberg's research in this area concerned itself with connecting these three approaches. His lectures therefore give the subject a logical coherence that it did not possess historically.

One of the strengths of current algebra is its apparent model independence; many different dynamical schemes seem to lead to the same algebraic structure. Thus one can hope to obtain results without making detailed dynamical assumptions. It has become clear recently, however, that in many theories where conventional current algebra appears to hold, the solutions to that theory do not respect the current algebraic constraints. The causes of this "anomalous" behavior are the notorious divergences of relativistic quantum field theory: a model that appears to satisfy current algebra is undefined, and the process of defining it—the renormalization procedure—spoils the current algebra. These anomalies are not new; first Schwinger and then Johnson and Low called attention to them. But it was Adler, among others, who demonstrated that they have important experimental consequences and are not mathematical curiosities. In his lectures Adler summarizes the extensive investigations which showed that those results of current algebra which are unrelated to the symmetry are not maintained in perturbative solutions to model field theories. On the other hand, the current algebraic theorems reflecting the symmetry seem to be preserved, with one important exception, which has to do with the electromagnetic decay of the neutral pion (and other pseudoscalar mesons). For some time it had been thought that this process cannot occur if chiral invariance is approximately true. However, it *does* occur in the perturbative solutions to the σ model—the paradigm of chirally invariant the-