people and their ideas. It is, like its author, unique and should be read by all: poets and politicians to find out what ecology is about, tyro ecologists to grasp the fundamentals, and practicing ecologists to be reminded of the people and the ideas that have gone before.

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A Mesoamerican Capital

Monte Albán. Settlement Patterns at the Ancient Zapotec Capital. RICHARD E. BLANTON with contributions by William O. Autry, Jr., Stephen A. Kowalewski, Carl Kuttruff, Elsa Redwood, and Charles Spencer. Academic Press, New York, 1978. xxvi, 454 pp., illus. + loose map. $24.50. Studies in Archeology.

Over the past 20 years a prime activity of specialists in Mesoamerican archeology has been settlement pattern analysis of major Mesoamerican centers. These have included such Lowland Maya sites as Dzibilchaltun, Tulúm, Tancah, Mayapán, Tikal, Copán, Coba, Altar de Sacrificios, Quirigua, Becán, and Seibal; the Highland Maya site of Kaminaljuyú; and the Central Mexican sites of Xochicalco, Teotihuacán, Cholula, and Tula. The present study deals with the great Zapotec site of Monte Albán in Oaxaca, which was the center of a large state from 600 B.C. to A.D. 900.

In *Monte Albán: Settlement Patterns at the Ancient Zapotec Capital*, Richard Blanton presents a detailed reconstruction of the origin, growth, and ultimate decay of this major pre-Columbian urban center. Owing to its "unique" location atop a steep-sided mountain some 400 meters above the valley floor, to the paucity of evidence indicating extensive craft specialization, and to the presumed lack of prime arable land in the immediate vicinity of the site, Monte Albán is viewed by Blanton as a disembedded capital, founded as a locus of regional decision-making by a confederacy of autonomous societies residing in the Valley of Oaxaca, in response to some external threat, ostensibly from populations in surrounding valleys. Monte Albán, then, is situated in a neutral place, the population resident at the site being supported by taxation from league members. It gradually grows in size, reaching a demographic and areal peak by Period IIIb times. Internally the site is divided into 15 barrios. Fourteen of these contain small civic–ceremonial–high-status-residential complexes. The structures surrounding the main plaza, on the other hand, house the principal ruler of Monte Albán and his dependents. Iconographic themes at the site, especially during later periods, are primarily militaristic in nature, implying continued competitive pressures from outside the Valley of Oaxaca. Teotihuacán, itself the political seat of an expansionist empire, is considered the most likely source of these pressures. With the collapse of Teotihuacán around A.D. 750, the disembedded administrative function of Monte Albán no longer has political value, and as a direct result Monte Albán is largely abandoned.

Major problems occur throughout Blanton's reconstruction. First, it is by no means clear how small polities neighboring the Valley of Oaxaca could exert sufficient muscle to effect the level of nucleation manifest at Monte Albán during the early history of the city. Likewise, how is the more local threat replaced by the more distant one from Teotihuacán? Blanton's thesis requires perfect timing indeed. Moreover, it seems extremely unlikely that Teotihuacán ever had the manpower to engage in long-term wars of conquest. Whatever control Teotihuacán exercised beyond the Basin of Mexico was almost certainly economic, not political. Finally, one might raise the question how, if the center was founded by a group of autonomous polities, roughly comparable in size and power, one of them evolved into the dominant polity, as is suggested by the presence of a central palace many times larger than any other residence on the site.

By far the most serious problem is Blanton's use of the concept of "disembedded capital." The utility of the concept hinges on two factors that Blanton sees as differentiating Monte Albán from Teotihuacán: namely the limited amount of first-class agricultural land in the immediate vicinity of the site and the relatively small amount of craft specialization found within it. Regarding the first, Monte Albán is situated at the convergence of the valley's three major arms, and Kirkby's study of present land use indicates that this area today is a major source of agricultural production. If this is the case today, why cannot it be assumed that ample prime cultivable land existed in the vicinity in the past? The specific hilltop location of Monte Albán, as Blanton suggests, can be attributed to a competitive political atmosphere. Its general location, however, strongly implies that subsistence requirements were a major consideration in its positioning. Therefore one need not argue that Monte Albán "was a special-function community, located in such a way as to avoid 'distortion' of the region's existing central place hierarchy" (pp. 105–106).

In our opinion a better argument would be that a polity controlling the nearby alluvial plain, because of a demographic advantage, was successful in competition with lesser polities in the valley and unified the valley politically and economically.

Of greater concern is the apparent difference in the level of craft specialty activities. By Blanton's own admission roughly 10 to 13 percent of the total population of the Period IIIb to IV community was involved in craft activity. This contrasts with the 25 to 35 percent figure suggested by Millon and associates for Middle Horizon Teotihuacán. At first glance this difference appears significant; in reality it is not, at least as far as regional consumption needs are concerned. At Teotihuacán, roughly four-fifths of all craft activity was devoted to obsidian working. Recent studies indicate that obsidian working is a high-output craft but that domestic consumption levels were extremely low—somewhere in the vicinity of 20 tools per nuclear family per year. What this means is that the vast majority of all obsidian tools produced at Teotihuacán were channeled into the international market, as other items doubtless also were. When the number of specialists involved in foreign production is subtracted from Millon's figures, the level of craft specialization at Teotihuacán is remarkably close to the figures suggested for Monte Albán. The major difference, in consequence, is that Teotihuacán was the center of a vast commercial market, a role made possible by the localized nature of the obsidian source deposits. Monte Albán was not, in contrast, because the Valley of Oaxaca contained few if any resources whose natural distribution was so sharply circumscribed.

On close inspection, therefore, the disembedded-capital concept has limited utility. Both Monte Albán and Teotihuacán were located near large areas of prime cultivable land, implying that a large proportion of the inhabitants of both communities were resident farmers, and the two centers displayed similar levels of craft specialty production to meet local needs. The key differences that Blanton offers as significant turn out to be inconsequential in the final analysis. Indeed, the sequences of growth and decay are very comparable, suggesting that similar processes were operative in affecting developments at the two centers.

The remainder of the book, in fact the majority of it, consists of ten appendices. Appendices 1, 3, 4, and 5 are computer printouts of artifact tallies. Although Blanton must be commended for publishing all his data, the information tabulated in these sections is regrettably not readily usable. Funds would have been better spent in distributing copies of the original master tape than in publishing the data in tabulated form. The descriptions of ceramic types (appendix 6) are also very difficult to digest, unless one has a copy of *La Cerámica de Monte Albán* handy. No illustrations of vessel forms accompany the text, another important drawback. Appendix 7 comprises a set of 1:2000 grid maps on Monte Albán. The drawings unfortunately are quite amateurish and add no new information, save for terrace numbers. Appendix 8 (figurine and urn fragments), appendix 9 (terrace 1227 excavations), and appendix 10 (structure summary) do provide useful, in some cases provocative, data on a variety of subjects, however.

What then is the value of Blanton's study? Although we think his theoretical position is untenable, his period-by-period descriptive accounts of the history of the city are of considerable value. Blanton is at his best in describing the Period III city. The descriptions of the main plaza and the various site divisions are a masterly piece of archeological reporting.

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Earth Processes

Island Arcs, Deep Sea Trenches and Back-Arc Basins. Papers from a symposium, Harriman, N.Y., March 1976. MANIK TALWANI and WALTER G. PITMAN III, Eds. American Geophysical Union, Washington, D.C., 1977. x, 470 pp., illus. $16.50. Maurice Ewing Series 1.

Because ocean floor is created much faster than any areal increase due to global expansion—if such expansion occurs—the earth's surface area must decrease elsewhere at a similar rate. At the present time the decrease takes place mainly by subduction of old ocean floor at active continental margins and island arcs. The idealized subduction zone has a trench some kilometers deep at the surface and a seismically active zone dipping at 45° under the continental margin or island arc, with andesitic volcanoes some 100 kilometers from the trench. Active arcs commonly have actively spreading small ocean basins—"back-arc basins"—behind them.

This symposium volume, the first of a planned biennial series to honor the late Maurice Ewing, discusses a much greater range of island arcs, active continental margins, trenches, and back-arc basins than is suggested by the idealized model. As a result it will probably sweep away some pre- and misconceptions, but it will not replace them by an overall synthesis; exploration, discovery, and speculation are the keynotes of the book.

Multichannel reflection seismology is a relatively new powerful technique. Several detailed surveys reported in the book show its capabilities, providing what are essentially cross-sections through the upper few kilometers of submarine rock. However, the interpretation of the profiles is still controversial. For example, are the sediments in the deformed wedge landward of a trench scraped-up ocean-floor material, or are they deformed lower-trench-slope sediments? An understanding of their nature may help with understanding why the Mesozoic continental margin of California has accreted sediment whereas that of southern Peru has not.

Even today, volcanicity is unevenly distributed along actively subducting margins. Far fewer active volcanoes lie in the 3000-kilometer subduction zone from the Marianas Trench to the Bonin Trench than in the zone to the north. The South American margin even has stretches where there are no Quaternary volcanoes at all alternating with stretches with active volcanoes. Volcanicity along the subducting Aleutian arc is absent where the slip vector is at an angle of less than 35° with the trend of the arc. Several papers speculate that factors such as stress, subduction-zone dip, thickness of sediment being subducted, water content, and thickness of the asthenosphere play some role in causing these variations. If volcanoes need not accompany subduction for long periods, then the geologist's task of recognizing and interpreting ancient subduction zones is even more perplexing than it already appears.

The simple subduction model suggests that as the lithosphere bends into the mantle the upper part will stretch and the lower part will shorten, like an elastic plate. Exactly the opposite stress orientations have been found in parts of the sinking Pacific and Nazca plates, perhaps reflecting an elastic "unbending" after an initial plastic deformation.

The later Cenozoic ridge-trench collision off California produced the notorious San Andreas Fault system. One possible indication of what happens next, geologically speaking, is suggested by the older ridge-trench collision in the Aleutian Islands: renewed subduction some 15 million years in the future.

How back-arc basins form is not yet known. Wherever direct drilling evidence exists all such basins have formed by the migration of a subduction zone oceanward from a preexisting continent or island arc. Indirect evidence, such as magnetic anomalies and heat flow, shows that most of the remaining basins have a similar origin. The great exception is the eastern Aleutian basin, striped with anomalies believed to be of M1 to M13 age and interpreted as trapped oceanic crust—but it would be reassuring to have drill cores to prove it.

The great strides made in geology in the last two decades are apparent if one recollects the widely acclaimed "Crust of the Earth" symposium held to celebrate the 200th anniversary of Columbia University. The recent revolution owes much to the work of Maurice Ewing and his collaborators at the Lamont-Doherty Geological Observatory of Columbia University. This volume is a fitting memorial to Ewing and an excellent beginning to the planned symposium series.

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