The Prehistoric Culture of Ecuador

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The prosaic title, **Early Formative Period of Coastal Ecuador: The Valdivia and Machalilla Phases** (Smithsonian Institution, Washington, D.C., 1965. 452 pp., $6.75), correctly describes the principal subject matter of this publication, but fails to give even a hint of the startling hypothesis that is its main contribution. In essence, the authors, Betty J. Meggers, Clifford Evans, and Emilio Estrada, suggest that the earliest, or Valdivia, phase of prehistoric Ecuadorian culture received a strong cultural impetus from the opposite side of the Pacific Ocean. At minimum, they claim that ceramic art was introduced to the coast of Ecuador by a canoe load of Middle Jomon Period people who arrived by accidental voyage from Kyushu, Japan, some 5000 years ago. It seems certain that the daring nature of this hypothesis will generate considerable discussion and controversy. This stimulating aspect of the report is, perhaps, the reason it was chosen to inaugurate the new series, *Smithsonian Contributions to Anthropology*.

The late Ecuadorian archeologist, Emilio Estrada, originally proposed the possible correlation between Valdivia and Jomon pottery and was responsible for several of the excavations on which this report is based. Although Estrada did not live to participate in the writing of this monograph, Meggers and Evans have included his name on the roster of authors as "a position fully earned." The entire publication is a tribute to this dynamic man.

The monograph is a model of fine organization and contains excellent line drawings and halftone illustrations. Only an unessential frontispiece fails to match this quality standard. In a field where theoretical approaches differ widely, the authors have carefully included in their introduction a discussion of their theoretical approach to analysis, classification, and interpretation. Here the emphasis on ceramics anticipates the fact that the report is based almost exclusively on this limited aspect of culture. This dependence on pottery is understandable, because there was an abundance of potsherds at the sites excavated and because ceramic materials customarily show greater change during smaller increments of time than do other artifacts.

The results of field work and analysis bring to light two different phases of Early Formative culture which once existed along the southern shores of coastal Ecuador. The earliest of these, the Valdivia Phase, is of particular interest because it appears to have produced the oldest pottery known in the New World. This fishing and food-gathering culture had small villages located around the edges of shallow bays that have long since dried up and become great salt pans. No direct evidence of houses was encountered. The authors reason that, because most trash deposits are on sloping ground, the houses were also built there, probably on piles to maintain level floors. However, one might suggest with equal validity that the structures were placed on the tops of the low knolls and the trash dumped down the surrounding slopes. No evidence of fire pits was found, but occasional lenses of charcoal and numerous fire-cracked stones are interpreted as residue from hearths. Because quantities of fire-cracked stones are characteristic of Valdivia sites, one might suggest that pit-oven cooking was employed along with surface cooking in pottery vessels. Similar dual cooking techniques were employed by several ceramic-using prehistoric cultures in the southwestern United States and northern Mexico. The few burials encountered were in graves excavated through trash to sterile soil.

The tools of the Valdivia Phase were rather crude with the exception of those that pertain to the sea (net sinkers and small, circular, shell fishhooks, for example), and the stone saws and reamers used in the manufacture of the latter. One would expect to find the simple ungrooved axes that were uncovered in this early phase but not the well developed, polished T-shaped axe. T-shaped axes are common in much later cultural horizons in western South America, but are rare or absent in Early Formative cultures of Peru that are only slightly later in time than the Valdivia Phase sites in Ecuador.

The most dynamic aspect of this culture was its ceramics and figurines. These latter first appear in the earliest levels of the phase and consist of stylized scratched designs on stone. However, soon after the beginning of the phase, they were reproduced in clay and the freedom allowed by this medium is apparent. Pottery, produced in considerable quantity, was decorated by innumerable techniques of clay manipulation, though red paint was also employed on some vessels. At the outset, corrugated vessels occur, and such decorative techniques as shell stamping, finger grooving, combing, and incising were employed. The introduction of further techniques continue through time until the Valdivia culture disappears as a distinctive entity.

During the latter half of the Valdivia culture's life-span, or about 4000 years ago, another Early Formative culture, the Machalilla Phase, appears along the southern coast of Ecuador. Although apparently living in separate communities, both cultures seem to have maintained amicable relations because a certain amount of Valdivia pottery is found in Machalilla sites and Machalilla pottery in Valdivia village remains. This culture was also based on a fishing economy with a simple tool inventory generally similar to that of the Valdivia Phase, although the similarly shaped shell fishhooks are larger. Although the figurines are few and crude, Machalilla pottery is of a finer quality than that of Valdivia in that it has thinner walls and a higher tensile strength. Some decorative techniques are new; others are of a type shared by both Phases. The Machalilla Phase did not endure as long as that of Valdivia. Various of its ceramic traits are shared by other cultures in western South America and Mesoamerica, but the differences in radiocarbon dates rule out any of these locations as sources for the origin of the Machalilla Phase. The final disappear-

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ance of the Machalilla Phase as a cultural entity was due to the arrival of various influences bearing the stamp of Mesoamerican cultural origin.

The knottiest problem presented by this report is the question of the origin of the ceramics of the Valdivia Phase, which, on the basis of *prima facie* evidence of radiocarbon dates, is the earliest known pottery in the New World. If one were to extract all ceramic items from the Valdivia Phase, there would be little question that the remaining cultural inventory was essentially similar to other simple preceramic fishing cultures of western South America. However, pottery is present, and it exhibits sufficient sophistication to rule out any suggestion of local invention. Furthermore, despite the author's final hypothesis that Middle Jomon people of Japan introduced pottery making to a nonceramic Ecuadorian Indian fishing culture not one fragment of evidence in any of the Valdivia Phase sites excavated indicates that pottery was superimposed on an underlying nonceramic culture. In other words, all known Valdivia sites indicate that their founding societies brought with them not only a knowledge of fishing, but the art of pottery making as well.

On the basis of the factual evidence noted above, the first logical step in searching for origins is to compare the material with other pottery-making, fishing cultures along the Pacific coast of America. This has been done, even though the sites selected for comparison appear to be more recent. However, the notorious lack of success is less a reflection of the lack of adequate comparisons than of the pitifully few shell mound sites that have been excavated. Even when the authors compare the ceramic techniques and traditions of nonseafaring New World cultures, there is a seeming lack of complexes comparable to that displayed for the earliest levels of the Valdivia Phase, although individual traits may be found widely scattered in time and space.

The apparent lack of existing evidence of the American origin of Valdivia pottery would seem to suggest the same conclusion that the authors arrived at with regard to their unsuccessful search for the origin of the Machalilla Phase culture. In this latter case the lack of success brought forth the stated hope that further work in prehistoric coastal fishing cultures from Mexico to Central America might bring to light the needed evidence. However, given the apparent lack of comparable Valdivia Phase ceramic complexes in other known prehistoric cultures of the New World, plus a seeming willingness in this case to overlook the abysmal lack of knowledge of prehistoric fishing cultures on the Pacific coasts from Mexico to Ecuador, a search for Valdivia Phase pottery origins has been carried to areas beyond the New World. This bold approach by the authors has resulted in a surprising degree of seeming success. The success is limited, however, largely to what appears to be quite valid parallels in decorative techniques, motifs, and rim and base forms of pottery belonging to the fishing and hunting culture of the Middle Jomon Period of Kyushu, Japan. To add further significance to these parallels, the range of radiocarbon dates for the Valdivia Phase is well within the range of those dating the Middle Jomon Period of Japan. Furthermore, if a boatload of Jomon fishermen did, in fact, accidentally land among the folk of an Ecuadorian village where ceramics were unknown, it is well within the realm of expectation that the Ecuadorians may have readily accepted a completely new and obviously utilitarian trait like pottery. However, because the evidence suggests that their traditional tools and equipment had proven their worth from long years of use, it is less likely that new ideas pertaining to these items would be as readily accepted.

The validity of the comparisons found in Middle Jomon and early Valdivia Phase ceramics seem acceptable to me. Moreover, the record of long-range accidental voyages in the Pacific leads me to accept as potentially possible the successful completion of an accidental voyage from Japan to the coast of Ecuador by Middle Jomon fishermen. However, these acceptances lend little credence to the hypothesis when viewed in the light of our knowledge, and especially of our lacunae of knowledge, of the Early Formative cultures of Mesoamerica and South America. Even with the little knowledge at our disposal, one must ask why, if the art of pottery manufacture was introduced to the New World by the Jomon people landing in the region of Valdivia, did not the bulk of the ceramic complex of traits move north and south to appear in the earliest known pottery horizons of Peru and coastal Colombia? This obviously did not happen, for, as the authors point out, the ceramics of the earliest Formative cultures of Peru to the south and Colombia and Panama to the north are characterized by simple forms and are dominantly undecorated. This is precisely what one might expect if the art of pottery were independently invented in the New World, for there would be a period of simple, experimental beginnings. However, one might also reason that perhaps pottery was invented in these areas as a result of stimulus diffusion—that is, the knowledge that it was being made at Valdivia!

One could continue defending this hypothesis or tearing down its defenses to little avail. Conservative archeologists are sure to regard the hypothesis as extreme and unwarranted. Some of us who are interested in the cultural potentials of accidental, or purposeful, seafaring voyagers in the Pacific may regret a little the single-hypothesis explanation employed in this report. Many will think that more archeological knowledge, certainly in the region of Central America, is the more logical first approach than reaching across the Pacific for a hypothetical explanation. However, there is little doubt that the authors will succeed in their stated fundamental desire to stimulate field work in Colombia and Ecuador. To this I add my hope that it will also lead to more thorough distributional studies and to attempts to clarify the nature and potential results of random tranoceanic contacts by peoples with different cultural traditions.

Mathematics

This textbook, **The Circular Functions** (Prentice-Hall, Englewood Cliffs, N.J., 1966. 188 pp., $5.95), by Clayton W. Dodge, was written primarily as an introduction to trigonometry and related topics for students preparing to study the calculus and for teachers of such students. It appears to have sufficient material for a college course of two semester hours but is probably more appropriate for an advanced secondary-school course.

The volume treats aspects of elementary analytic geometry, including lines, circles, and arc length; circular functions, including their graphs, basic identities, and conditional equations; trigonometry, including the right triangle, and the laws of sines and cosines; and complex numbers. Unique features are chapters on harmonic motion and the history of trigonometry