

Introduction

I was first attracted to the lines while on a pleasure trip in August 1977 with my colleague R. T. Zuidema of the University of Illinois. We had just concluded our second of a planned series of Earthwatch expeditions to Cuzco, where we had been mapping the system of radial lines (*ceques*) which the Inka employed to organize their highland capital. We thought it a good idea to experience our annual descent to the coast by driving the Andes in a rented car. Nazca seemed an attractive place to visit for all the usual reasons. Flying over the figures and examining Maria Reiche's maps and photographs, we were struck by her references to a multitude of lines that appeared connected to star-like or spoke-like patterns. We saw large numbers of lines, some narrow, others very wide, often a dozen or more converging upon particular places. Using a magnifying glass, we were able to trace lines on the photographs that connected one point to another on the pampa.

Formally and structurally, if simplistically, these linear features conjured up a vivid reminder of the general description of the *ceque* system of Cuzco which we had been tracing over the landscape. Zuidema's studies had revealed that a radial element lay at the heart of the design and layout of Cuzco. The Spanish chroniclers tell us that 41 *ceques*, literally visual straight lines, emanated from the Coricancha (Temple of the Sun) and passed outward over the horizon. These *ceques* were delineated by 328 *huacas* or sacred places distributed throughout the landscape. The rather complex plan of the *ceque* system served to define the hierarchical organization of Cuzco. It was based upon kinship and social status, as well as religious and economic principles and Inka concepts of space and time, for the *ceque* system also was a calendar used to tally the days of the civic, agricultural, and religious cycles. At the same time, it served as a device to incorporate an orientation calendar that utilized

important points in the natural and man-made environment.

The linear hierarchical nature of the *ceque* system also appears in the design of the *quipu*, or knotted string scheme, used by Andean people to keep records. In a general way, one can liken the *ceques* to the primary cords of the *quipu*, and the *huacas* to the knots thereupon. Indeed, we are told by one chronicler that the plan of the *ceque* system of Cuzco was recorded on a *quipu*.

The expression of hierarchical organization through a radial plan serves as one of the defining parameters of Andean mental systems. Radiality may be as much an element of Andean insistence as the tactile form of writing or the style of monumental architecture they developed. The appearance of radial networks on the floor of the Nazca desert offered us a clue to a possible way of understanding the lines that employed a pan-Andean concept.

As the fieldwork in Cuzco proceeded, the idea of making a structural comparison between Cuzco and Nazca remained an ever-present possibility. Finally, in 1981, on an Earthwatch-funded trip to Nazca with Tom Zuidema and Gary Urton, we began to become familiar with the ecology and the surface of the pampa, as well as with the sort of data it harbored that might be related to an exploration of the structural similarity between *ceque* lines and Nazca lines.

Meanwhile, in the spring of 1980, Gary Urton, with whom I had already shared a common interest in problems of Andean astronomy and calendar, began joint research with me on a project that consisted of collecting and examining all extant maps and photographs, as well as a large body of literature about the pampa. These efforts resulted in the generation of a number of testable hypotheses relating to the orientation of the lines. Urton and I cast these into the form of research proposals which were jointly funded by the National Geographic Society, the Wenner Gren Foundation, and Earthwatch. Thus, we were

able to carry out more detailed studies on the pampa during the period 1981–1984. During a significant portion of this three-year interval (1982, Sept–Dec), Urton resided in the Nazca area and on the south coast in general. Urton and I did joint fieldwork on the pampa in January 1982 as well as in the summer of 1984. In addition, I spent January 1983 working on the pampa, having received support during that period from the OSCO Fund.

Reading and reviewing the body of literature on Nazca, I was surprised to learn that only a handful of investigators had ever ventured out onto the desolate surface of the pampa to look at the lines close-up. Had we become so conditioned to viewing them from the air, the way they were “discovered” by the outsiders who first flew over the pampa in the 1920s? Had the myth that they were meant to be seen from above become established dogma? I also found that the many explanations offered for the existence of the lines actually can be reduced to relatively few basic categories. Believing that any serious investigation ought to take advantage of the work that has preceded it, I offer in Chapter I of the present text a critical review of the Nazca literature. In it, I attempt to classify both the types of figures one finds on the pampa and the hypotheses that various investigators have proposed to account for them. To my knowledge, such a thorough review had not been attempted previously and I believe the present one has served the useful function of separating out what can and cannot be taken seriously about the lines.

Straight line features dominate the pampa. The so-called animal figures, though a curiosity, are highly localized and almost incidental in terms of the work effort involved in production. Our study was directed mainly to the mapping and detailed description of the linear features that cut across the 200 square kilometers of pampa surface. Concentrating on the radial aspects of these Nazca geoglyphs, we proceed to a physical description of the radial line centers and member lines. In Chapter II, I present and analyze all the relevant data that we collected over several

seasons of fieldwork on the pampa. Distinct from all other studies, our program incorporated a thorough examination of the lines from the ground, while aerial photography played an auxiliary role. The data include locations, dimensions and directions of the several hundred features we were able to trace out on the ground as well as the more prominent lines visible on aerial photographs which could not be detected at ground level. My goal in Chapter II is to recount the progress of these studies and to utilize the data we collected to test the several hypotheses that had been sorted out in Chapter I. I conclude that there are patterns suggestive of concepts of order present in the construction of the lines.

Making no pretenses about having discovered the secret of the pampa, nor any claims about having decoded the lines, I attempt to relate the perceived concepts or patterns to the various hypotheses. What was the motive? I argue that there is a multitude of answers to myriad questions that can be asked about the several kinds of activity that took place on the pampa more than a thousand years ago. Phrasing the most interesting and important questions has been my principal goal. It now seems clear that this activity was related to a concern about the flow of water and possibly also about the flow of time in the Nazca environment. Also, there is little doubt that the lines were intended to be walked upon.

The study of the archaeological remains on the surface of the pampa is vital to an understanding of why the Nazca lines were constructed. To add to the list of surprises encountered in reviewing the past studies, we discovered that no one had ever undertaken a thorough examination of the surface upon which the geoglyphs resided. Chapter III is a condensation of parts of the dissertation of Persis Clarkson (University of Calgary) on the surface archaeology of the pampa. Working with us on the project since 1981, she was quick to emphasize the importance of obtaining a sound chronological record of the artifacts that remain on the pampa surface. Accordingly, she has logged more time on the

Nazca desert than anyone else connected with our project.

One of the most significant conclusions of her ceramic study is that the biomorphic figures and the straight lines may represent unrelated activities attributable to cultures of different periods living about the pampa. This result agrees with that part of my own study of the superposition of lines and figures, based upon an examination of aerial photographs and reported in Chapter II.

Gary Urton is an Andean anthropologist who had undertaken ethnographic studies on the cosmologies of contemporary people residing in the mountain villages in the vicinity of Cuzco. Having linked both ancient and modern Andean concepts of cosmic order to the way in which people comprehend and interact with the ecological parameters of the immediate environment in which they live, he believed that a significant part of our inquiry about the Nazca lines ought to include the study of land and water utilization in the fragile coastal desert environment of the Nazca drainage basin. Though there was little documentation to be found in Nazca, his detective work in the archival sources in Lima turned up a number of post-Conquest written documents that told of how the land and water were treated in the vicinity of the pampa shortly after European contact. As he began to perceive that the information in these documents bore a potentially significant relationship to the activity on the pampa, he developed Chapter IV of the present text. Here, Urton explains how these documents suggest that a scheme of social organization, not unlike that which prevailed in Cuzco, existed in the region around the pampa. This scheme is shown to be consistent with the need for people to travel across the zone in which the lines exist, and Urton argues that such travel may have been related to the construction and use of the lines. He attempts to relate the Nazca line phenomenon to his other contemporary ethnological studies in the community of Pacariqtambo, also near Cuzco. His discussion of the ritual sweeping or cleansing of long, thin strips of the plaza at Pacariqtambo prior to

important festivals provides us with a reasonable hypothesis for the maintenance of the Nazca lines. Each strip was assigned to specific kin groups that farm the land around the village. Urton's essay serves as an excellent example of how ethnographic analogy can be used to help us understand past events.

Pure luck added another archaeological dimension to our Nazca studies, which ultimately resulted in Chapter V. Shortly after we began our surface study of the pampa, we learned that archaeologist Helaine Silverman of the University of Texas had begun a program of excavation on the large ceremonial center of Cahuachi, located on the south bank of the Nazca River fronting one of the heaviest concentrations of line centers. What better way to learn whether a connection might have existed between Cahuachi and the Nazca lines than to ask her to address that very question in the context of her research program? Fortunately for us, not only did she express a willingness to do so, she also became absorbed with some of the ideas on ethnographic analogy discussed by Urton. Utilizing archaeological and ethnographic data, Silverman argues that Cahuachi was, at a late stage of its occupation, a pilgrimage center and that its plaza may have experienced ritual cleaning, not unlike the plaza at Pacariqtambo and perhaps the Nazca lines.

Chapter VI, on the astronomy of the Nazca lines, is somewhat specialized, but very important in certain segments of our research program for it is related to one of the most well-known hypotheses that has traditionally been invoked to explain them. Recognizing the pitfalls that lie in the dependence upon one person's interpretation of a large mass of data, I asked British astronomer Clive Ruggles (who had worked with us during our 1984 Earthwatch field season) to perform an independent analysis upon the alignment data we had collected since 1981. His access to and facility with the superior computing facilities at the University of Leicester offered us the opportunity to push the statistical approach to the limit. My second reason for asking Ruggles to write this chapter was that I wanted to see how

a researcher of British Megalithic astronomy would approach the problem of the Nazca lines. Both the lines and the British Megalithic structures have been interpreted as astronomical artifacts, and for both, indigenous written evidence that directly alludes to their function simply does not exist. While Ruggles's study of the astronomical orientation of the Nazca lines offers some parallels to mine in Chapter II, some significant differences are apparent. Therefore, Chapter VI should be of special concern to the reader who is interested in archaeoastronomy in general.

Finally, our project could not have been completed at a sufficient level of detail without the assistance of the invited team of investigators from the University of Minnesota Remote Sensing Laboratory, who were joint recipients of our 1984 Earthwatch grant. Bill Johnson, Doug Meisner, and Gerry Johnson provided us with the most complete collection of low-altitude photographs now available for documentary research that covers the entire pampa between the Nazca and Ingenio Rivers. While we will never be able to preserve *in situ* the delicate features of the pampa that have

fallen victim to natural and man-made forces as well as to the ravages of tourism, a complete set of high quality photographs such as those used in the present study is the next best fallback position. While Mayanists have the photographic essays of Maudslay and Maler to reveal a more pristine state of the Maya inscriptions, no thorough pictorial record of the markings on the pampa has existed up to the present. To make the reader more familiar with the pampa, I thought it necessary to make available in an appendix at least the mosaic photo which this team has pieced together from 213 separate pictures obtained from low-altitude overflights. Beginning with a photograph of the pampa taken from the space shuttle, their brief, descriptive Chapter VII, which discusses how their own survey photos were obtained, outlines the contribution that aerial photography can make to archaeological studies. In this context, it is worth remembering that Paul Kosok's (1965) magnificent photographic study of the ecology of coastal Peru first brought the lines to the attention of the world and provided the initial impetus for their serious study.