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Guitarrero Cave in its Andean Context

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In most respects Guitarrero Cave is an unusual and even unique site. Very few "early man" sites have been excavated in South America and none have yielded a comparable range of data for archaeological study. While this lends an aura of excitement to the account, the task of placing the site in comparative context is, thereby, made somewhat difficult.

For comparative purposes, then, I must lean heavily upon the chipped stone tools, in spite of their basic simplicity. Were it not for the efforts of other archaeologists who have written descriptive accounts of their excavations, even this would be impossible. As it stands, the relationships are seldom conclusive, for the Andean region is extensive and comparisons with collections made more than a few hundred miles away are difficult (cf. Hurt *et al.* 1977, for a well reported site of similar age in Colombia, which did not even contain projectile points). The usefulness of contrast and correlation with material from nearby localities is also limited, chiefly because of a lack of described and illustrated artifact collections from more than a handful of sites.

I initially compared the Guitarrero I stone industry with the Ayacucho complex (central Peru) and the material from the earliest stratum at Laguna de Tagua-Tagua, a kill or butchering site in central Chile (Lynch and Kennedy 1970:1308). The latter site, which has a date of 9430 ± 320 B.C. on carbon flecks, should be closely equivalent in age and yielded very similar flake scrapers (Montané 1968). The Guitarrero I industry shares general characteristics with the Ayacucho complex, insofar as this can be determined from the pre-

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Early Man in the Andes

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liminary reports, but closer comparisons await the publication of typologies and illustrations in either case. All three industries are essentially unifacial in workmanship, although I am increasingly inclined (see Chapter 2) to accept the stemmed projectile point, small biface, and two microblades as integral to Guitarrero Complex I. The publication of numerous microblades and a bifacial projectile point from Stratum IIa of Meadowcroft Shelter (Pennsylvania), all assuredly dating before a rock fall some 12,000 years ago, encourages this interpretation (Adovasio *et al.* 1978:160–165).

Since the writing of my preliminary report, two additional flake industries have been published which may bear important relationships to Guitarrero Complex I. The Amotape assemblage was collected from 10 campsites overlooking the Talara Tar-seeps (Figure 12.1) on the desert coast of northern Peru (Richardson 1978). These are presumably hunting camps or lookouts, rather than long-term occupation sites, so it is not surprising that the Amotape assemblage is simple and undiversified. Richardson has been able to classify the 596 artifacts into three basic categories: denticulates, flakes, and cores. In spite of the relative proximity to Guitarrero Cave (about 600 km) and the early dates on shells from the Amotape collections (9250 ± 115 B.C. and 6175 ± 80 B.C.), there are no specific parallels with the Guitarrero I industry beyond the presence of pointed tools (cf. QP type 22), and various crude scrapers and core tools (cf. QP types 22, 24, 35b, 42, 43, crude percussion core scrapers, and steep scrapers on cobble chunks from Guitarrero I). It may be, as Richardson suggests, that these general similarities indicate independent technological solutions to the problems of working wood and bone, rather than specific cultural affiliations.

Although much further away in distance, level 11 at Los Toldos Cave 3 (Santa Cruz, Argentina) bears a date on charcoal (10,650 ± 600 B.C.) only 40 years removed in time from the earliest determination for Guitarrero Cave (Cardich *et al.* 1973). The lowest industry at Los Toldos totally lacks bifacial workmanship, although, as in Guitarrero I, there is apparently one projectile point (and a fragment of a second?) in the collection. This is a roughly triangular unifacial flake "point," shouldered on one edge, reminiscent of European Mousterian point-scrapers. The rest of the industry, which has been well illustrated, is dominated by large flake tools, usually retouched in a rough manner along only parts of the edges. Illustrated specimens closely resemble examples from types QP 24, 40, 42, 43, 49, and steep scrapers on cobble chunks in Guitarrero Complex I. Cardich's *raederas* (more finely retouched flake-scrapers) are in some cases much like specimens of QP type 24b from Guitarrero I. He also records a few medium- and small-sized flakes, some having

FIGURE 12.1. Peru and portions of adjacent countries, showing localities discussed in Chapter 12. 1. El Inga; 2. Chobshi Cave; 3. Talara Tar-seeps, Amotape complex; 4. Paiján and Huaca Prieta; 5. La Cumbre and Quirihuac Shelter; 6. Casma; 7. Guitarrero Cave; 8. Quishqui Puncu; 9. Chavín de Huántar; 10. Pampa de Lampas; 11. Lauricocha; 12. Kotosh; 13. Pachamachay; 14. Ancón Bay; 15. Chivateros; 16. Chilca; 17. Asia; 18. Tupe; 19. Ayacucho, Pikimachay; 20. Paracas; 21. Quiani.

retouched edges. All in all, the early Los Toldos artifacts seem quite similar to those from Guitarrero I, with the exception of an unusual cube-shaped piece of flint. The similarity may be more a function of the simplicity and small size of the collections than anything else, but it is interesting that both sites are cave shelters evidently inhabited by hunting people, in spite of the paucity of stone projectile points. Cardich (1977:153) reports the recovery of camelid and rodent bones, as well as a few assignable to an extinct horse, probably *Parahipparion*.

The Guitarrero I materials can also be compared, although with less utility, to the El Abra assemblage from the Sabana de Bogotá, Colombia, where cave dwellers hunted white-tailed deer, rabbits, and wild guinea pigs as early as 7000 B.C. (Hurt *et al.* 1977:19). While there are some signs of human occupation as early as 10,450 B.C., the El Abra excavations were excessively complicated by large boulders, intrusive pits, and armadillo burrows. It is only in subunit D1 (about 8000–7000 B.C.) that there was definite evidence of occupation of rockshelters 3 and 4 and sufficiently numerous pieces of worked stone (331) in shelter 2 to allow Hurt to reach conclusions on the composition of the tool kit: "The most numerous types included core and thick flake tools with a single obtuse edge that may have been used as end-scrapers or planes while others with a single or multiple concave cutting edge may have served as spokeshaves. Common also were core and flake tools with an acute-angled cutting edge that may have served as side-scrapers and knives [Hurt *et al.* 1977:20]." Hurt proposes that wood, which would not have been preserved at El Abra, may have been used for projectile points. Photographs confirm that the core and flake tools are indeed quite simple and that they bear few if any specific resemblances to the Guitarrero I specimens.

To smaller and more finely worked scrapers and, especially, the Guitarrero projectile points allow more specific correlations with nearby sites. As nearly all of the points occur in or must be derived from Complexes II and III, the comparisons which follow are, in effect, an attempt to relate the major aspect of the cave's occupation to central Andean regional patterns. From stylistic analysis alone it is apparent that by 7000 or 8000 B.C., the inhabitants of South America were well along in the process of developing locally adapted regional cultures. By this time the abundant and easily hunted Pleistocene "megafauna," which was basic to the initial peopling of the continent, had become extinct and attention must have shifted to less efficiently hunted animals and plant foods (Lynch 1978). The exploitation of these localized resources required what has often been called a "settling in" process—an adaptive specialization or parochialization which is reflected in regionalization of artifact typology, as regards both the functional and stylistic aspects. Projectile point typology should be, then, a rather indirect but still significant indicator of important changes in adaptive patterns such as food procurement.

To the north of Guitarrero Cave, the highland zone of Peru is essentially unknown in preceramic times. This is especially lamentable in that one would first look up the Andean mountain chains, to the presumed zone of origin and population pressure, for cultural affiliations. The nearest site in this direction, for which we have a fully adequate published description of the stone tool typology, is El Inga in the north highlands of Ecuador (Bell 1965). Although the occupations of the two sites overlap in time (El Inga having been used from at least 7000–2000 B.C.) and they are less than 1000 km apart in air miles, the projectile points differ greatly. There are no specific correspondences in types, and only the very generalized small leaf-shaped and lanceolate points are at all alike. The El Inga industry has a strong burin component, largely absent at Guitarrero Cave, and the scrapers are rather different as well. Some of the differences between the Guitarrero and El Inga industries might be attributable to the one being a cave shelter while the other was an occasionally occupied open site, but still the gap is wide enough that, were it not for relative proximity and environmental similarity, connections would not likely be posited.

In 1972 I excavated Chobshi Cave, some 300 km south of El Inga, near Cuenca, Ecuador. Although my privately circulated report has been available for several years, publication of the full analysis has been long delayed (Lynch and Pollock, n.d.). Judging from radiocarbon dates and obsidian hydration measurements, Chobshi Cave was used as a base camp from at least 8060 to 5585 B.C. In other respects, too, such as elevation (2400 m) and animals hunted (mostly deer, followed by rabbit, paca, opossum, porcupine, tinamou, and tapir) the situation at Chobshi is closely analogous to that at Guitarrero Cave.

The preservation of bone in Chobshi Cave, and the recovery of deer cannon-bone and other bone awls, allow the establishment of that general link with Guitarrero and other sites in the Americas. In the stone industry, the most specific correspondences are in the burin making process and several stemmed and barbed or shouldered point types, both being features which link Chobshi Cave to El Inga. Nevertheless, a single rhomboidal point (Chobshi type 33) bears resemblances to the larger of the two specimens of Lampas type 12 from Guitarrero Complex IIb as regards its outline, dimensions, and imperfect workmanship. In form the Chobshi rhomboidal point approaches QP type 1, also found at Guitarrero Cave, but that type is smaller and more finely worked. Chobshi type 34 includes at least three examples which, in the central Andes, would be called Ayampitín points. If these specimens had been found at Guitarrero Cave they might have been allocated to QP types 5 or 6, although in the Callejón de Huaylas such points are usually smaller and better finished. A few other Chobshi types (snub-nosed endscrapers, gravers, nosed scrapers, and edge-ground cobbles) have general parallels in the Guitarrero industry but, overall, Chobshi Cave relates more closely with El Inga to the north or perhaps the Peruvian coast, where stemmed points and burins are also prominent.

Preceramic sites have been investigated all along the Peruvian coast by a number of Peruvian, European, and North American archaeologists. Most of these are relatively recent shell middens or quarry sites of unknown age, where projectile points are rare or non-existent. Other open sites along the coastal strip seem to be temporary camps or gathering stations in the ephemeral *lomas* vegetation, but even at these locations we would expect the nature and purpose of chipped stone industries to be different and projectile points relatively uncommon. Still, among the collections now reported, there are a number of points with good correspondences to the types I have defined for the Callejón de Huaylas. Lanning (1963:Figure 5) illustrates a series from the Ancón Bay area, as few kilometers north of Lima and a little less than 300 kilometers from Guitarrero Cave. His Arenal, Canario, Corbina, and Encanto complexes have never been thoroughly defined or isolated by means of seriation or stratigraphy, but these materials are clearly related to the industries from Pachamachay (Junín) and Lauricocha (Huánuco), as well as Guitarrero. If found in the Callejón some of Lanning's specimens might be assigned to QP types 5 and 6, while the majority would fit with the larger and less finely worked lanceolate, tanged, and lightly shouldered Lampas varieties.

At La Cumbre and Quirihuac, just over 150 km northwest of Guitarrero Cave, Ossa has investigated two Moche Valley sites and thoroughly described their stone tool industries, which are assigned to the 9th millennium B.C. (Ossa and Moseley 1971: Ossa 1973, 1978). Chauchat (1975) and Kornfield (1972) have further elucidated the north coast Paiján complex, to which these sites pertain, while Chauchat has gone on to postulate a connection with Lanning's Luz and Chivateros materials from the central coast. As I have already indicated, I would extend these correlations yet further, to the Ecuadorean highlands. The El Inga and Chobshi stemmed points, although often smaller than the published Paiján and Luz specimens, are quite similar in form (and dissimilar to other Andean types); the El Inga and Chobshi burins resemble those collected by Lanning and Patterson (1967) at the Oquendo quarries. Acknowledging that these differences set the Guitarrero industry strongly apart from the Paiján complex centering on the Peruvian north coast, I now wish to turn to other aspects of the industry collected at the La Cumbre kill site and Quirihuac shelter. These sites are unusual not only for their excellent descriptions, but also, in the coastal context, for their functional nature (hunting and shelter) which should provide a better parallel for the Guitarrero Cave situation.

Nevertheless, as Chauchat (1975:85) has pointed out, the Paiján industry is unusual in that it entirely lacks the endscrapers which are common in central Andean preceramic industries. Perhaps this is understandable, at least in part, when one considers that endscrapers, especially snub-nosed endscrapers, are thought to have been used for cleaning the inside of hides. In the coastal zone, hunting may have been a minor activity, particularly if the preceramic occupants were seasonal or transhumant, and longer term camps, where hides might have been processed, have not yet been found.

Leaving aside the stemmed bifacial points, preforms, and blanks which characterize the Peruvian coast and Ecuadorean highlands, we find that the remainder of the Moche Valley Paiján industry is composed of a "rather irregular lot" of sidescrapers on flakes, retouched flakes, notched tools, denticulates, pebble tools, and an occasional *limace* or slug-shaped scraper (Ossa 1973:107–128). This last type compares directly to QP types 36 and 38 at Guitarrero Cave where "turtle-backed" scrapers are also in the minority. Ossa types the rest of his flake scrapers largely by the shape of the retouched edge and its position on the flake. Correspondence can be found with the following types from Guitarrero Cave: QP 22 (graver–scrapers), QP 24 and 24b (irregular and oval flake scrapers), QP 26 (straight-edged scrapers), QP 29 (snub-edged scrapers), QP 33 (point and notch tools), QP 35 and 35b (roughly domed scrapers on thick flakes), concave edge scrapers, and perhaps the heavy scrapers QP 40 and 42. This is not to say that any of these types are exact equivalents to Ossa's types, but they share enough key attributes that I am inclined to think that the scraper aspect of these industries is related functionally and/or historically. Ossa's (1973:108–109) suggestion that some of the Moche Valley scrapers could have been used to scrape skins makes more sense when one observes that the known or suspected faunal associations are mastodon, giant ground sloth, and capybara—all rather large animals; perhaps the absent snubnosed endscrapers, blade scrapers, and other fine highland types would have little use in this context.

When all is said and done there is simply no question that the Guitarrero industry relates most closely to others from the central Peruvian highlands, particularly those from the Lauricocha and Pachamachay caves. Cardich (1958, 1964) has provided good drawings of a number of the Lauricocha artifacts and, in 1964, I had the opportunity to examine the type collection in the museum of the University of San Marcos in Lima. I can see close correspondences between practically all the illustrated Lauricocha specimens and types I have established for the Callejón de Huaylas. This does not surprise me, as the Lauricocha caves are closer to Laguna Conococha, at the upper end of the Callejón, than the sites around Conococha are to Guitarrero Cave. Also, the Lauricocha caves have been used from the 8th millennium B.C. until after the introduction of pottery. Here, in direct contrast to the coastal industries, endscrapers, and especially snubnosed endscrapers, are very common. At about 4000 m elevation the preparation of hides for garments is surely a factor, but also the game hunted (mostly camelids and deer) contributed to the use of fine scrapers with regular edges. Cardich (1958:Figure 27) illustrates one *cuchillo-raedera* which appears not only to be perfectly at home in my QP type 24b, but also closely equivalent to Ossa's Moche Valley *racloirs*. Other *cuchillo-raederas* and *cuchillos* (flake scrapers or knives) fit nicely in my type QP 22, as well as QP 24b, while the *raspadores* would be classed with my various steep-edged scraper types.

Many of the projectile points from Lauricocha, although not assigned to formal types by Cardich, could serve as type specimens in the Callejón as well. Various Lampas types are there in quantity (including a specimen very close to the Lampas type 8 point from Guitarrero I; cf. Cardich 1964:Fig. 83c), but there are also representatives of QP types 5, 6, and 7 (cf. Cardich 1958: Figures 11c and f, 13a and b; 1964: Figures 64a, 65a, 79c, 82a).

Pachamachay and its chipped stone industry are well known from the pioneering work by Matos Mendieta (1975:48–50, 8 figures) and the later studies by Rick (1978). In addition to the line drawings by Matos and Rick, we have Rick's series of casts of typical specimens. The site is a small cave at 4300 m elevation, lying about half way between the Mantaro River and Lake Junín. As it is only about 100 km southeast of Lauricocha, or a total of a bit more than 250 km from Guitarrero Cave, and was occupied over a nearly equivalent time span, Pachamachay shows expectable similarities. Nevertheless, these are closer than I would expect if Rick turns out to be generally right about the extreme localization of puna hunters and their artifact styles. (Rick, 1978, pp. 168–169, believes that the band is the unit of projectile point style or type production, that point styles served to identify social groups, and that the percentage of point types within a level should represent the relative amount of time specific social groups inhabited the cave.)

Both Rick (1978:170) and I have commented upon the similarities between his type 1A and my Lampas types 1 and 1b (triangular, broad-bladed points with concave to nearly straight bases). Although he found only 5 examples at Pachamachay, Rick is convinced that this type is restricted to the earliest phase at that site, while I found them as early as Guitarrero IIb. Rick's type 2A, lenticular bipoints with small barb-like shoulders, also characterizes Phase 1 at Pachamachay. Although present in the Pampa de Lampas, this type has no exact equivalent at Guitarrero Cave. Note, however, that one of the QP 5 types from Guitarrero IIa has rather similar small projecting shoulders; this specimen was figured as a "shouldered lanceolate point" in my preliminary report (Lynch and Kennedy 1970:Figure 1c). Pachamachay type 2B, restricted to Phase 2 (7000–5000 B.C.), has an exact equivalent in Lampas type 8 from Guitarrero I. Lampas type 7, found in Guitarrero IIb and IIe, appears to be essentially the same as Pachamachay stemmed type 2D, also restricted to Rick's Phase 2.

My QP types 5 and 6, taken together, seem to be the same as Rick's types 3F and 4A, taken together; we have simply made our divisions along different lines, Rick apparently to better advantage, as his 3F is found only in Phase 2 while 4A persists much later. These are the "standard" laurel leaf, willow leaf, or Ayampitín points, as Rick (1978:388) puts it. They occur not only in the central Andes, but also into Bolivia, Argentina, and Chile. Rick's type 4B equals my QP type 7, even to the unusual length of most of the specimens. At Pachamachay type 4B was found nearly exclusively in Phase 3, 5000–3000 B.C., while my single example of QP 7 at Guitarrero comes, unluckily, from mixed Complex IV. I believe that these points are related to the square or straight-based Ayampitín variant type, as defined in Argentina by González (1952:118–119, Plate 13e).

Lampas types 10, 11, and 12 were also found in secure preceramic contexts at Guitarrero Cave (Complex IIa, P, and IIb). It is more difficult to make correlations with these rather crudely worked types, but they seem to be very close to Pachamachay types 4C, 4D, and 4E—although again Rick's subdivisions in typology follow slightly different lines. At Pachamachay all but 4C are predominately late preceramic types, while at Guitarrero Cave the meager indications are that Lampas 10 and 12, at least, are relatively early.

Of all the Guitarrero projectile points with definite preceramic provenience, only Lampas types 16 and 17 (the only possibly a knife and the other unfinished) lack analogues at Pachamachay. While Rick might disagree with some of my comparisons, and I have handled only Rick's excellent casts of the Pachamachay artifacts, I find the correspondences to be amazingly close. I would be satisfied to find these equivalencies in typology and chronology in neighboring valleys, let alone in sites separated by 250 km of rugged Andean terrain. Rick's typology of forms other than projectile points is not as detailed as mine for the Callejón, so I will not trouble the reader with a confusing exercise in comparison. Nevertheless, my impression is that the correspondences are equally close. To my mind, the similarity in chipped stone tools is truly impressive between the Callejón de Huaylas, Lauricocha, and Pachamachay. When comparisons can be made with preceramic artifacts from the Ayacucho Valley, it may be possible to extend the typological connections to that area as well. In the meantime I think it is safe to postulate a Central Andean Preceramic tradition centered on the Peruvian Departments of Ancash, Huánuco, Junín, probably Pasco, and Lima. (In the case of the Department of Lima, I extrapolate not only from Lanning and Patterson's work but also from examination of Engel's extensive collections from the Quebrada de Chilca and elsewhere.)

It is obviously important to relate the findings from any newly excavated site to the general body of knowledge gained from other archaeological excavations. Nevertheless, as I reflect on the work at Guitarrero Cave, it strikes me that my primary responsibility is to explain the site in its own terms, to make sure that those who use my report understand the nature of the data, and, as an anthropologist, to place Guitarrero Cave within the context of Andean cultural patterns.

As analysis progressed, the most nettling of our difficulties was the small size of the data base, because of the scarcity of undisturbed deposits in the cave. At times some of my collaborators have gotten understandably impatient, as have I, with the knowledge that the bulk of our specimens came from unreliable contexts. All Andean caves that I have investigated share this drawback; intensive recent use disturbs the older deposits, unless they are sealed by heavy roof-fall before later occupations. Nevertheless, we all must prefer a small but reliable sample over a larger one where the limits of reliability are poorly known. No amount of statistical manipulation can save poor data. All excavation was done under my direct supervision by skillful and communicative students and professionals. An important result was that I could rate the reliability of the excavation or provenience units for my collaborators working with the samples in their North American laboratories. It would have been better if they could have been at the site themselves to experience the complexities and uncertainties of cave stratigraphy, but as they worked with, and were repeatedly frustrated by, my complicated designations and the qualifications that lay behind them, it was driven home that archaeological data are of uneven quality. It is better to face the unevenness, and work principally with the best data, than to be ignorant of the field problems and deal with "full samples" drawn from idealized stratigraphy. At the same time, I have to admit that our conclusions would bear more weight if they were based on larger samples.

Small samples severely restrict our evaluation of the strictly cultural remains, such as stone artifacts, where frequency of occurrence is often more important than simple presence or absence of a type. Artifact types do not require breeding populations for their survival; unlike living species they can be recreated at will, in imitation of "extinct" models; even without the benefits of cryogenics, a stone artifact may enjoy a second life of use thousands of years after its manufacture. In short the role of *fossile directeur* should not be forced on artifacts, especially when they have been drawn from small samples. It would be particularly foolhardy to use individual specimens as index fossils in the Andes, where experience has taught us that types have long lives and seriation only works on large samples, such as Matos' and Rick's from Pachamachy. Cultural persistence, then, especially in combination with small samples, might be seen mostly as a hazard by an archaeologist concerned primarily with chronology and typology.

I would rather see cultural persistence, in the several new ways in which it is manifested at Guitarrero Cave, as the most important revelation of the studies reported in this volume. Cultural conservation—or the good fit of an environmental adaptation, depending on your point of view—has become increasingly clear in recent Andean studies. In the Guitarrero case it can be demonstrated even through the biological data, not only because preservation was extraordinary but also because sample size is not necessarily as critical in these studies. Single specimens of biological organisms *can* serve as index or guide fossils, in archaeology as in geology, so long as we can be sure of uncontaminated and surely identified provenience.

Although the number of specimens from highly reliable provenience units was limited, Smith has very effectively demonstrated the continuity in Andean dietary patterns in Chapter 5. Hawkes' analysis of the tuber and root material is not yet complete, and the tentative identification of ullucu and oca may not be confirmed, but it is certain that the inhabitants of the Callejón de Huaylas were already relying on tubers and rhizomes some 10,000 years ago, from the beginning of Complex II. Until the relatively late introduction of the foreign crop maize, grass (straw) seems to have been seen as bedding rather than useful for its edible seeds. In my opinion it is not particularly important to know whether the "root crops," or for that matter the tree fruits (pacay and lucuma), were changed morphologically or technically domesticated. The important fact is that the pattern of use and nutritional complex was already in operation. It is interesting too that *Solanum hispidum* (lulo) and *Trichocereus peruvianus* (achuma) have had their part in this complex for so many thousands of years without undergoing local domestication. Perhaps, because of their importance in the modern economy, we have been disproportionately interested in domesticated plants that have undergone obvious morphological change. The single ají pepper (*Capsicum*) from Complex IIa troubles me somewhat, but I see no way in which it could be intrusive, nor even where it might have come from if it did not belong there. (We did not, needless to say, relieve the monotony of our lunches by munching on ají.) At any rate, wild peppers are native to the Amazonic drainage of Peru and Bolivia, and Pickersgill (1969a) believes that an early independent domestication in this area is likely. She also notes that there is archaeological evidence of the use of wild peppers as early as 7000 B.C. in Tamaulipas and the Tehuacán Valley, Mexico (Pickersgill 1969b: 446).

The emphasis on fiber plants can also be interpreted as an Andean orientation. While the preservation of textiles in Complex II is in itself no more than a happy accident of archaeology, Smith's observation (p. 107) that the bulk of fiber plants equaled that of food plants is impressive. If fiber plant remains are exceeded in quantity only at Purrón and Coxcatlón in Mexico, then Guitarrero Cave was either a highly specialized site, which is unlikely at that time depth, or we catch here our first glimpse of the Andean obsession with fibers and textiles. Even more significant is the use of several different plant sources for the fibers. They may all seem functionally equivalent today, but, somehow, I suspect that the users perceived and appreciated some differences, and that these lie behind the change in frequencies through time. Smith's suggestion (p. 95) that *maíz de perdices* might have been used to finish yarn is also intriguing.

The study by Adovasio and Maslowski (Chapter 11) brings to light some possible pan-Andean consistencies as early as the preceramic stage of development. Twining, or finger weaving, seems to me to be basic to the whole concept of loom weaving itself. What little information we have on the rest of the Andean preceramic, shows that twining is the preferred technique for the production of matting and basketry, as far away as Punta Pichalo in Chile and as distant in time as the twined mat wall (esteras) of the new *barriada* squatter settlements or "*callampas*" which spring up overnight around the coastal cities. True, very similar twining was also used on baskets in early Nevada and Oregon, and quite possibly over the entire Americas for all we know, but in the Andean zone twining was long referred over the coiling technique, which virtually replaced twining in the American West. In short, Guitarrero Complex II shows the beginning of the basic techniques which are elaborated in later Andean textiles. The simple Guitarrero linking and looping represents a tradition antecedent to elaborations manifested somewhat later at sites such as

Huaca Prieta, Asia, Paracas, and Quiani (see references in Chapter 11). Adovasio and Maslowski are a bit bothered by the failure of spiral interlinking and simple twining to reappear in the latter part of the Guitarrero preceramic, but I attribute this to nothing more than the small size of our sample. Similarly, the lack of decoration on any of the Complex II and III textiles is hardly surprising, especially as true cloth is not represented.

The introduction of Indian corn in Complex III can be taken as our first preceivable break or modification of the Andean pattern, although even here the similarities drawn by Smith are almost exclusively to montane varieties rather than the archaeologically known coastal types. In my role as archaeological synthesizer, I would like to pull some general inferences out of the remarkably complete description and evaluation of the corn remains that Smith has given us. This should be helpful both to the reader without a botanical education and to those archaeologists with particular interests in the development and spread of corn agriculture.

First, I am a little anxious that casual readers of Smith's report may make too much of the noted resemblances to early corn from Bat Cave, New Mexico, and MacNeish's famous cobs from the Tehaucán Valley of Mexico. Thus, I would stress that Smith compares the Complex III "slim cobs" most closely with Colombian *Pira* and the primitive Peruvian popcorn *Confite Morocho*, which Grobman *et al.* (1961:145–146, 337) believed to have more primitive characteristics than any other living Peruvian race. Grobman considered it likely to trace its existence back to the first Peruvian domesticated corn, and that now appears increasingly likely (Bonavia and Grobman 1978; Grobman, Bonavia, and Kelley 1977). I think it important too that Smith finds one cob to be much like *Confite Chavinense* and that, in general, the Complex III and IV medium and thick cobs look like under-sized precursors of the locally important, modern *Ancashino* race. The ultimate ancestor of the Guitarrero corn may be a Mesoamerican maize of the series leading to *Polomero Toluqueño*, but it also has a long history of development in the Andes. The more variable remains of corn from Complex IV show additional influence from later, more evolved or "tripsacoid," Mesoamerican types, but the resemblances to Colombian *Pollo* and to local Peruvian *Huayleño* and *Confite Puntiagudo* should be noticed as well.

Smith remarks that in a few examples the glumes of the Complex IV medium cobs resemble those on Mesoamerican tripsacoid cobs and that the thicker, more upright glumes may have resulted from an infusion of teosinte germ plasm. The reader should be aware that teosinte is not native to Peru; any genetic contact with teosinte would most likely have taken place in Mexico or Central America, where some corn botanists (e.g., Galinat 1971, 1977) believe corn to have originally evolved directly from teosinte. According to Smith, Galinat relates the majority of Complex IV medium and thick cobs to the modern Peruvian popcorn *Confite Puntiagudo*. Smith's proposal that both *Confite Puntiagudo* and Colombian *Pollo* were derived from some such ancient pre-*Pollo* stock makes good archaeological sense, especially as it would conform to our ideas about an early hearth of agriculture and other Formative traits in the north or north–central Andean zone.

Smith's tentative proposal that the Guitarrero slim cobs, along with the New Mexican Bat Cave slim cobs, may both ultimately have resulted from an early dispersal of Mexican corn is also intriguing if speculative. Most of us will be content to stress the long history of indigenous development of agriculture in South America and follow Galinat's (1978) vision of the "string cob" trait as an adaptation for rapid ear-drying under cool and humid Andean conditions. In the Callejón de Huaylas, especially the lower part around Guitarrero Cave, drying conditions are quite good and the string cob trait would have had little adaptive value. Perhaps for that reason *Confite Morocho,* the "modern" race in which the string cob is most prominent, is not grown in the Callejón. Viewed this way, increased condensation of the medium and thick-cobbed Guitarrero varieties presents little difficulty.

Whatever the adaptive significance and origin of the slim cobs be, it is fairly clear to Smith that the Guitarrero slim cob variety is closely ralated to *Confite Morocho,* and perhaps on its direct line of development. Similarly, Galinat (1978) reports that, "the archaeological evidence from the Ayacucho area of Peru with cobs collected by R. S. MacNeish is that the first corn to reach there (4000 B.C.) was basically similar to the *Pollo*-Nal Tel cobs tracing back to Mexico. They have a thicker, more condensed rachis than the type of *Confite Morocho* that became adapted to the Andes [p.59]." The increased condensation exhibited in the Ayacucho cobs may also be a function of excellent drying conditions there.

As Smith indicates, the apparently certain cultivation of corn by 3000 or 2500 B.C. in Ecuador and its probable occurrence in Chihua levels (4300–2800 B.C.) in the Ayacucho Valley correspond well with the evidence from Guitarrero Cave, where the first cobs appear as early as the fourth or even fifth millennium B.C.

Whatever the beginning date for Complex III, the corn recovered from that stratum must belong with the preceramic materials. Smith has emphasized that, in morphological terms, the 26 Complex III cobs precede the Complex IV cobs. They are generally smaller, of course, but it may be more significant that the cobs from excavation units 35, 36, and 37 of grid square B2 display hints of a morphological progression that corresponds to the internal stratigraphy of Complex III. If the cobs were intrusive from Complex IV, this would be a most improbable outcome. It is also significant that the slim cobs of Complex III show no clear relationships with more modern races of Peruvian corn, as would be expected in the case of modern mixture and intrusion. Similarly, Kautz [pp. 49–51] notes that the pollen evidence from Complex III integrates exceedingly well with the pollen record from Complex II below it. This would be unlikely if there had been substantial mixture and intrusion of plant remains.

In his concluding discussion Smith makes the point that, in the Guitarrero collection as a whole, the degree of variety in cob morphology is low—in contrast to the situation in prehistoric Mesoamerica or modern Ancash. Surely this argues against any significant modern intrusion at the same time as it suggests that we are dealing, in the Andean prehistoric cultural context, with a situation where either the use of corn has just begun or, at least, it has been the focus of less elaboration than in Mesoamerica.

Finally, from the paucity of shanks and husks in the cave deposits, it is apparent that the cobs were broken from the shanks in the field and probably shucked before removal to the cave. This is in sharp contrast to the modern Ancashino practice in which the entire plant (sometimes with bean plants intertwined) is brought back to the homestead for disassembly. After removal of the cobs for drying, the rest of the plant is stored up as fodder for the cattle. Both cattle and fodder storage are European introductions. The two systems of handling corn can be distinguished archaeologically.

For botanical purposes, then, Complex III should be considered as an integral unit and assigned a date somewhere between the end of Complex II and the beginning of the earliest materials in Complex IV. Smith estimates that Complex III corn dates to the last part of the preceramic period, about 4000 to 2000 B.C. On the basis of the textile analysis, as well as the palynological continuity, I would rather connect Complex III with the end of Complex II in the sixth millennium B.C., but there is very little essential difference in our interpretations. Most of the Complex III corn comes from the upper levels, and neither the stratigraphic situation nor the radiocarbon determinations require that the corn date before the period Smith prefers. Nevertheless, Adovasio and Maslowski have also given us good evidence for a break in the textile arts between Complex III and Complex IV tomb furnishings of the first millennium B.C. This includes the change in direction of both spin and twist, the addition of seven knot types to a previous inventory of three, and the sudden appearance of a complex technology associated with loom-woven cloth. They would explain the discontinuity by means of a change of peoples, but I think that is unnecessary. Perhaps it is sufficient to postulate a simple gap in use of the cave, of at least 1000 or 1500 years, during the Initial Ceramic Period and most of the Early Horizon. This compromise solution would leave Complex III floating in chronology at either end, while it satisfies both classes of data. For the sake of the botanical arguments we may assume that Complex III is basically a primary deposit, to which all or most of the corn belongs, but that it is minimally contaminated by a piece of plain weave and a textile fragment built by interconnected looping which pertain to the ceramic-age burials.

The textiles also provide us with a rough measure of contamination or mixture for the secondary Complex IV deposits. The total sample of cordage was of course retained, so the ratio of 5% "preceramic" S spun cord to approximately 73% "ceramic age" Z spun cord gives us a rough index or recipe for two of the three original components. These figures should not be taken literally, though, for the Z spun cordage may contain a few pieces from the third component of Complex IV (post-Columbian contamination, which was slight, judging from the absence of introduced agave). Also, there is no way of extending these proportions to other classes of artifacts. There are, for instance, far more pieces of worked stone than potsherds in Complex IV. Most of the chipped stone is preceramic in style, workmanship, and probably age. As there would be little reason for the later tomb-builders to make fire in Guitarrero Cave, it is likely that most of the charcoal and other living debris is preceramic too, although some part of it may also be modern. Food remains, however, are often found in ceramic-age burials, so there is good reason to associate the Complex IV dietary innovations with the pottery, most of which was made in the Early Intermediate Period.

The new foods of Complex IV include achira, possibly manioc, edible cactus stems, two additional varieties of common beans and one of lima beans, and the new varieties and emphasis on Indian corn. Manioc, seen by Lathrap (1973:97–103) as essential in the Chavin iconography of the neighboring valley, is possibly present in Complex IV. The seeds of pacay fruit now occur in respectable numbers. The small numbers of beans in Complex II (six specimens), Complex II? (eight specimens), and Complex III (six specimens) will bother some historians of agriculture, but, I think, give little concern to archaeologists. The very fact that several new varieties appear in Complex IV tends to reinforce the integrity of the sequence and the Complex II proveniences. Although rodents left very few of the edible seeds for Kaplan to study, some come from absolutely secure contexts, and bean pods occur in great numbers throughout the deposits. To refuse to believe that beans were cultivated in Complex II and III times would be akin to rejecting most of the record of prehistoric maize, on the grounds that only cobs, and seldom kernels are preserved.

The corn cob is a complicated structure and paleobotanists have learned to extract a great deal of information from it. Unfortunately for the prehistorian, the bean pod is much simpler and less of a story can be told about it. Kaplan's analysis (Chapter 7) was also hampered by the lack of prehistoric material for comparison. From the highlands there is only the Ayacucho sample to which he refers, and from the coast only the somewhat later remains from Huaca Prieta, Chilca, and Pichasca. Happily, the relationships to coastal beans, known from more recent and sufficient samples, are clear to Kaplan. The argument for domestication in the Andean zone, independent from those in Mexico, is strengthened by the early beans in Guitarrero II. A strictly local domestication, however, is unlikely in view of Smith's observation that wild beans are not found today in the Cordillera Negra.

One of the most interesting collateral results of Smith's field and laboratory studies is his conclusion that the species composition and basic nature of the local vegetation has not changed since about 5000 B.C. A number of exotic plants and animals have been introduced since the conquest, and overgrazing and wood cutting have placed severe pressures on the native vegetation, but he finds essentially no evidence of climate change, even though the Cordillera Negra vegetation exists in a state of precarious water supply. The critical limitation of the macrobotanical material studied by Smith is that the sample was selected by the prehistoric men and women who carried plants into Guitarrero Cave. Only a small part of the plant community was represented, with perhaps a stress on the stable and common elements that entered into the human subsistence system. New elements, not yet perceived as useful, might have been largely ignored by the Guitarrero Cave occupants. There is nothing wrong with the argument for a stable Postglacial environment, but it depends heavily on the absence of evidence for change.

In theory at least, the study of pollen should give us a less biased picture of the local vegetation. Or perhaps I should say that the biases, such as differential production and dispersal of pollen, are known and allow for control in analysis. But this requires an off-site control, unfortunately unavailable to Kautz, where the pollen rain collects naturally or is subject to known and calculable cultural interference. If archaeologists are to reconstruct prehistoric vegetation and climate in the Callejón de Huaylas, we need a number of additional field studies, palynological as well as botanical. They need to be undertaken before rising pressure on the land totally destroys the natural order.

With Hatoff's cooperation Kautz has done what he could to explicate the accumulation of pollen in the Guitarrero Cave sediments. It is important to realize that this is essentially a local and culturally determined record. Although the presence of pollen in Zone 1 (the culturally sterile sediments underlying Complex I) establishes that there must always have been some natural airborne transport of pollen into the cave, it is likely that in later times the natural pollen rain was masked by pollen incidentally introduced by human and perhaps other occupants. The selection may not have been deliberate and conscious, as in the case of macroscopic plant remains, but we must observe similar caveats. Thus, the increasing grass pollen of Zones 2 and 3 (corresponding to Complex I and II) is seen to represent not a Postglacial thermal maximum but, rather, flowering grasses brought in as bedding, as construed by Smith. The incorporation into the stratigraphic record of superficially similar data from multiple sources is a persistent problem in archaeological interpretation, and it generally gets less serious consideration than it deserves. At Guitarrero Cave the problem of pollen record genesis, which crosses the boundary between natural and cultural phenomena, is analogous to our difficulties with Complex IV in which materials of different age and cultural affiliation are finally deposited together in the same stratum.

Our pollen and sediment sampling procedure at Guitarrero Cave was rather limited, but pollen recovery was fairly good. Kautz uses the pollen and soil chemistry data to good effect in his interpretation of the local cultural record; however, with my encouragement, he has eschewed any ambitious attempt at correlation of global climate changes. In the absence of an opportunity to develop an off-site culture-free vegetation history, and given the general lack of comparable studies in the central Andes, we felt that such an endeavor would be full of pitfalls. Still, some of the pollen incorporated in the Guitarrero deposits was surely blown into the cave in a natural and arbitrary way and thus reflects the vegetation history of the outside environment. In spite of the cautions just expressed, the reader is owed an evaluation of the extent to which the Guitarrero pollen record agrees with other indications of South American vegetation and climate history.

The Colombian and South Chilean pollen and vegetation sequences are fairly well known from a number of open sites yielding long records that are largely free of human interference. This sort of complete and detailed study is only beginning in the central Andes (e.g., the University of Minnesota/Michigan project in Junín), and we should be careful with our long-distance correlations. It comes as no surprise that the two short, incomplete, and culturally altered columns at Guitarrero Cave show imperfect agreement with the records, partially inconsistent in themselves, from the southern and northern Andes. Much evidence now shows that global atmospheric temperatures were higher than at present during a major interval of approximately three thousand years after the Classic Wisconsin glaciation. The peak of this "thermal maximum" may have occurred as early as 6000 B.C. or as late as 3000 B.C., depending on the area and author consulted. Changes in the amount and pattern of Postglacial precipitation show no such consistency, due to the complexity of regional weather patterns. Many more local sequences are needed, especially in the Southern Hemisphere, before climatologists will be able to chart and interpret the pattern of precipitation changes. In the meantime, it is probably safe to say that *effective* precipitation decreased in many areas, due to higher rates of evaporation and transpiration, during the thermal maximum.

Kautz's interpretation of Zone 2 (Complex I) as relatively cool and dry fits well with the latest work in the Colombian Andes, which indicates similarly cool and dry conditions, along with low lake levels, during the El Abra glacial stadial (Pollen Zone Y-II). Most of the Guitarrero Complex I dates fall within van der Hammen's estimate of 10,800 to 9500 years ago for the El Abra stadial (van Geel and van der Hammen 1973). The Complex I average of 10,125 B.P. is squarely in the middle. Mercer (1976) concludes that after 13,000 B.P. glaciers in southernmost South American shrank rapidly, and apparently without interruption, until the start of the first Neoglacial advance about 5500 B.P. On glacial evidence alone, he would start the Hypsithermal Interval as early as 11,000 B.P. On the other hand, he also admits that "an unlikely level of ardity" between 12,000 and 10,000 B.P. might reconcile the glacial record with Heusser's palynological evidence of a return to much colder conditions between 11,000 and 10,000 B.P. (Heusser 1974:310; Mercer 1976:157–160). Such a cold but arid interval between 12,000 and 10,000 B.P.

fits well enough with Kautz's interpretation of Zone 2 (Complex I) as cooler and drier than Guitarrero Zone 1, as does the Cardich *et al.* (1977) model of an interstade at 12,500 B.P. followed by minor glacial advances. The agreement with the Colombian (Fuquene) Zone Y-II, seen as cool and dry between 10,800 and 9500 B.P., would also be good.

Knowledge of the Pleistocene glaciation of north-central Chile, somewhat closer to our Peruvian study area, has increased greatly over the last dozen years, although absolute dates are still unknown for most glacial events. In a recent review Caviedas and Paskoff (1975:166–168) conclude that the major Wisconsin advances were a response more to increases in precipitation than to decreases in temperature, but they also remark that the retreat of ice from the final moraines "was interrupted by a new advance of glaciers heavily loaded with coarse debris ('dark' glaciers and rock glaciers), probably related to a climatic oscillation mainly characterized by a decrease in temperatures [p.168]." Although undated, this cool and possibly dry Late Glacial event may correlate with Kautz's Zone 2 (Complex I). Even more significantly, Lliboutry *et al.* 1977:287) have determined, in their study of glaciation in the Callejón itself, that the glaciers of the Cordillera Blanca are more sensitive to variations in temperature than precipitation.

Within Pollen Zone 3 Kautz tentatively suggests that, if cultural interference with the pollen rain permits any reconstruction of climate at all, there may have been a slight warming and drying trend at Guitarrero Cave in Complex II, broken by a minor moist incident during Complex IId (8800–8200 B.P.). It is possible that this hypothetical wet interval correlates with the end of a readvance marked by moraines 5 and 6 above Huaráz, about 50 km from Guitarrero Cave. Lliboutry *et al.* (1977:288) date these terminal moraines about 7000–5000 B.P., but this is only a rough calculation based on differential uplift along the Cordillera Blanca Fault which cross-cuts the moraines. Far to the north in the Colombian Andes there are palynological indications of increasing warmth and moisture from 9500 to 7500 B.P. in Fuquene Subzone Z-1 (van Geel and van der Hammen 1973:87). However, by 5000–6000 B.C. the Postglacial flora of these intermontane Andean Valleys seems to have been established and, to judge by Smith's recent work, it has remained remarkably stable ever since.

Having reconstructed the preceramic habitat and subsistence resources as well as the data allow, it remains to show how the early Andean people made use of them. To what extent is my model of a transhumant seasonal round borne out by the archaeological and other data? As I mentioned in Chapter 1, I have largely abandoned the notion that the coastal zone itself was regularly utilized by groups based in the Callejón de Huaylas. Other than a single marine shell, we have no direct indication of contact with the Pacific zone. All plants and animals identified in Complexes I through III, with the possible exception of pacay and lúcuma fruits, should have been available in the Callejón and adjacent mountains. Cardich (1976) has most effectively argued for the selfsufficiency of the "high Andean" area in preceramic times. Except in a restricted and local form, he finds transhumance to be of little help in explaining the development of Andean culture. Rick (1978) likewise calculates that small hunting bands could maintain themselves on little more than the vicuña herds, living year round on the *puna*. Moseley (1972:36) finds that the scheduling problems inherent in montane–coastal transhumance would be inimical to the establishment of coastal agriculture. While I think that at times they may be over-reacting, their arguments are well put and I am now content to visualize a seasonal round restricted to a single large and environmentally diverse valley. However, even within the confines of the valley and its differing environments, this seasonal movement is still transhumance—with all its remarkable and inherent advantages as an Andean strategy of life.

I continue to think that transhumance is a reasonable and likely adaptation for mobile hunting and gathering people in montane environments, especially the Andes. Once the zone had been populated and the Late Pleistocene "megafauna" decimated, transhumance allowed efficient utilization of the remaining plant and animal resources, some of which had been previously neglected, by a quickly growing population. The first indication of transhumance in the Callejón de Huaylas dates to 9690 B.C. (11,640 ± 360 B.P.: GX 1893) when PAn 12-58 and presumably other rockshelters at over 4000 elevation were used seasonally by deer and camelid hunters. (At this early date glacial ice would have just freed the zone; sedentary, year-round occupation would have been impossible.) As I have argued for many years, such people also sheltered at lower sites like Guitarrero Cave where they used artifacts of the same types, sometimes even made of stone from the same sources. In the various altitudinally determined environmental zones, different tasks were performed and the functional classes of artifacts occur in different frequencies (Lynch 1971). We must also presume, in the absence of critical information from most sites, that varying plants and animals were utilized where necessary, quite likely on a seasonal basis.

Smith was able to appreciate the resources of the immediate neighborhood of Guitarrero Cave at the end of the rainy season, when they are most evident. A few months later, when most shrubs have shed their leaves and plants are mostly dormant, the attractions are much less apparent (see Figures 1.2, 1.8, 1.12). Not only is the area fairly desolate, in contrast to the still-lush *pampas* and glacial *quebradas* 1000–2000 m above, but there is no need to shelter in a cave. No rain falls in the vicinity of Guitarrero Cave for months on end; night-time temperatures are brisk, but not cold, with frosts unknown below about 3000 m. Once the harvests had been collected, there would have been little reason to remain near Guitarrero Cave. To the contrary, the higher elevation camps become more pleasant to inhabit and more profitable to exploit at the end of the rainy season. A permanent camp at Guitarrero Cave might serve the old, the infirm, and perhaps children too old to carry conveniently, yet too young to travel well, but I see little other purpose. Permanent occupation is also directly contradicted by the archaeological evidence: the debris of 3000 and more years of steady occupation cannot be accommodated in a small dry cave, yet, if it had been cleaned out from time to time, we would have no record of consistent and progressive stratigraphy in *any* part of the deposits.

Put bluntly, although I agree with Smith's proposal that cultivation of the valley floors was primary and began well back in preceramic times, the Callejón de Huaylas offers us no archaeological evidence of permanent settlements on or near the floodplain until the beginning of the Initial Ceramic Period (Lower Formative) about 2000 B.C. In fact it is a little curious that the earliest date on pottery in the Callejón de Huaylas (GX 2198, 4090 ± 120 radiocarbon years: 2140 B.C.) comes from a site located at 4000 m elevation (PAn 12–57). The use of pottery is usually associated with permanent settlements, although in this case I believe we are dealing with a situation where the permanent settlement remains undiscovered and the pottery was carried to a temporary hunting or herding camp. If the first permanent settlements were located directly on the floodplain of the Río Santa, they are going to be hard to find, for the disastrous landslides and floods which recently obliterated Ranrajirca and Yungay are common occurrences archaeologically speaking. A glance at a topographic map shows how the periodic avalanches of mud, ice, and rock have forced the Río Santa westward against the foothills of the Cordillera Negra. In the past 40 years three major *huaicos*, or landslides, have leveled and covered whole villages and towns on the east side of the river. The attractions of farming and living on the alluvium have proven nearly irresistable to this day, but the settlements are sometimes short-lived. Thus, the archaeologically perceived settlement pattern is surely somewhat distorted, with the first Initial Period and Early Horizon ceremonial centers, such as Huaricoto and Toril, located just above the main valley floor. The archaeological evidence is weak and largely negative, but it seems to me that the first year-round, permanent settlements in the Callejón were made by people more exclusively dependent on agriculture than were the preceramic inhabitants of Guitarrero Cave.

It remains to be seen whether transhumance ever became a *general* system in the Andean region. It may well be that it was useful in some subareas but unnecessary, unprofitable, or impossible in others. I would emphasize that where transhumance provided for a more productively intense or efficient exploitation of areal resources (and thus allowed higher overall population), it would be favored as soon as depletion and extinction of game imposed a limit on the growth of human population. To my way of thinking, transhumance is a sort of palliative precursor to intensive sedentary agriculture, which is seen by Cohen (1977) as a more general solution to the prehistoric problem of growing population and shrinking resource base. By the ninth, or at latest, eighth millennium B.C. this problem was becoming critical in several "nuclear" areas that were to become hearths of agricultural development. In the central Andes

I suspect that sedentary agriculture, in turn, put limitations on the feasibility of transhumance by at least the fourth or fifth millennium B.C., although transhumance may have flourished later in other areas peripheral to the centers of agricultural development. Eventually, throughout most of the Andean region, sedentary agriculture became the most productive system, capable of supporting the greatest number of people. It is worth noting, though, that in marginally high and arid zones (for example the Chilean and Argentine Puna de Atacama) *pastoral* transhumance has proved itself the safest and most productive strategy even until modern times.

It is a shame that it is so hard to make osteological distinctions among the camelids, wild and domestic, whose bones are found in Andean sites (see Wing, Chapter 8). Wing has accordingly had to restrict her positive identifications of camelids to the familial level. Still, even if we are unable to shed much light on the problem of animal domestication, a few generalizations are possible on the basis of Wing's identifications, the archaeological data, and my summary review (Chapter 1) of the game resources of the Callejón de Huaylas. Wing's attempt to estimate the relative quantities of meat and plant foods in Andean diet, by measuring the strontium level in bone apatite, is also stimulating. Unfortunately, of the six specimens tested from the Callejón de Huaylas, none, except possibly the deer-bone control from Guitarrero III, has anything approaching adequate provenience or chronological control. Fuchs (1978:10) cautions that the method is beset by theoretical and practical difficulties.

It is clear that the unusually diverse Guitarrero fauna, said to bear a resemblance to the Pikimachay fauna, includes some animals that were either natural cave inhabitants or the unhappy victims of owl predation. Wing's conclusions are based on the relative completeness of skeletons (equitability index), lack of breakage of bones, occasional mummification, and unburned condition of the bones. Although generally convincing, and particularly so in the case of the small perching birds, this explanation may not cover all of the minor rodents. In other cultures and other times than our own, small rodents have commonly been eaten. Hair and even small bones are found in the dried feces left behind by Desert Culture inhabitants of the Great Basin, where small rodents were apparently caught in snares (Aikens 1970). Two larger rodents, guinea pig and viscacha, are favored delicacies in the Andes today. Viscachas were surely eaten by the Guitarrero inhabitants, yet their bones are also equitably distributed according to natural occurrence. Whether or not the smaller rodents were utilized, viscacha and rabbit must nevertheless have been more important due to their larger size.

As Wing notes, the increasing frequency of viscacha relative to rabbit is probably due either to shifts in their natural ranges or changes in hunting strategies. The viscacha has surely never been subject to control or domestication, although that explanation may turn out to be valid for the increasing frequency of camelids over cervids (Wheeler *et al.* 1976). It may also be that the appearance of guinea pigs in Complex IV indicates that they began then to be kept as household scavengers or livestock, as they are in the vicinity today. Their absence in early preceramic times is completely expected, given that their closest wild or feral relatives are found today around the high altitude marshes and lakes. Wing's report of guinea pig from the relatively low and dry Pikimachay site in the Ayacucho Valley is puzzling in environmental terms. If the guinea pig had been domesticated early enough to be present at Pikimachay, one would expect to find it not too much later at valley sites in the northern highlands as well. Wing stresses that camelids increased in frequency later at the valley sites than in the *puna,* presumably when they were brought down as domestic animals, and the same process might be expected of guinea pigs. Other minor components of the Guitarrero fauna, such as the tasty tinamous and pigeons, are also interesting, but it should be borne in mind at all times that deer are dominant. In addition to its role as a game bird, the tinamou occurs repeatedly, to this day, in the Quechua constellations (Gary Urton, personal communication 1978). For the preceramic periods we lack faunal lists from similarly situated sites, but by Complex IV it is significant that the most closely comparable collection comes from the Sajarapatac phase (Middle Formative) at Kotosh (Huánuco), closely equivalent in time as well as environmental setting.

The deer hunted in the vicinity of Guitarrero Cave would have been scarce on the barren slopes of the Cordillera Negra during the dry season, from May through September. If for no other reason, the preceramic inhabitants would have traveled to higher elevations to seek game. Indeed, from sites bordering the Pampa de Lampas and Lake Conococha in the upper southern end of the Callejón, we have recovered abundant remains of camelids and deer, reported here by Wing (sites PAn 12–51, 12–53, 12–57, 12–58). Only the latter two sites, both at about 4000 m elevation, have substantial preceramic occupations, but both yielded good faunal samples from the text excavations. The large camelids are probably guanaco, or a closely related form, if wild, or llama if domesticated. The small camelid is most likely vicuña, which is still occasionally seen in the area, or possibly alpaca if that domesticate had already appeared. White-tailed deer are surely present, while huemal deer, a common inhabitant of the high Andes, and brocket deer may well be represented too, although Wing cannot positively identify the remains. In contrast to the diverse Guitarrero fauna, the degree of variety here is low, as should be expected in specialized sites. Whether used by preceramic hunters or later hunters and pastoralists, these shelters are not likely ever to have been inhabited throughout the year. In recent years such rockshelters have seen only intermittent use by shepherds, travelers, potato harvesters, and refugees from the military draft.

Wing has appropriately compared the fauna from the sites of the Upper Santa to those known from around Lake Junín. However, Rick (1978:127) reports only a 2% frequency for deer at Pachamachay, whereas it rises as high as 25% at PAn 12-58, the site providing our earliest radiocarbon date (11,640 ± 360 years: 9690 B.C.; GX 1893). Furthermore, while the frequency of deer relative to camelids generally drops through time in the Callejón, deer are slightly more common in late than early preceramic levels in Rick's excavations. The Junín situation of specialized vicuña hunters does not seem to apply to the Upper Santa. I feel that there may be better parallels with the Lauricocha sites, only about 170 km away, where Cardich describes a very similar fauna in which deer are somewhat better represented (Cardich 1976 and works cited therein).

Nevertheless, Cardich, like Rick, believes that the Lauricocha people did not find it necessary to migrate on a seasonal basis. In his attempt to demonstrate the sufficiency of this single high Andean zone, Cardich (1976:28–31) has catalogued the major wild plants used as occasional dietary supplements by the local people of the present and recent past. In the best Andean tradition Table 12.1 includes a remarkable number and variety of plants with edible roots and tubers. It is possible that the wild forms of *maca, ullucu,* potatoes, and *mashua* are feral varieties escaped from cultivation. They may equally well be more directly related to the wild ancestors of these Andean cultivars. The starch stored by the plants in their underground parts is an accommodation to the period of stress (lack of both water and heat) which becomes most severe during July and August in the Callejón (Masias 1963). Cardich notes that *nonopucu* can be collected throughout the year, but I should think that the optimal time to harvest most of these wild crops would be at the onset of the dry season, when transhumant peoples would move up from lower and truly arid elevations.

The edible berries (Table 12.2) of the *jalca* or *puna* zone mature during the more temperate rainy season, characteristically before the end of March. Although greatly appreciated, they are a relatively poor source of calories and would not have been a primary resource that determined the timing of the seasonal round. Perhaps it is partly for this reason that they have not played a more important role in Andean diet and culture. Cardich (1976:32) would

TABLE 12.1

Common Name	Family	Genus and species
Altia	Malvaceae	Malvastrum acaule
Anco aytsa	Valerianaceae	Belonanthus angustifolius
Antañahue	Onagraceae	Oenothera multicaulis
Chicarhua	Valerianaceae	Stangea sp.
Hualmish	Compositae	Senecio condimentarius
Maca	Cruciferae	Lepidium meyenii
Nonopucu	Campanulaceae	Wahlenbergia peruviana
Ullucu silvestre	Basellaceae	Ullucus tuberosus
Papas silvestres, papas malezas	Solanaceae	Solanum sec. Tuberarium
Purunmashua	Tropeolaceae	Tropeolum tuberosum

TABLE 12.2

Common name	Family	Genus and species
Jaramullaca	Ericaceae	Vaccinium sp.
Linle-linle	Ericaceae	Gaultheria brachybotrys
Murmunya	Saxifragaceae	Ribes cuneifolium

have me bring transhumant people to the *puna* zone during the wet season. This is a simple misunderstanding. As I have stressed from the beginning, it is during the dry months that "hunters in the Callejón de Huaylas would surely have utilized the green upper reaches . . . which provided seasonal pasture and browse for the Andean camelids and deer hunted in preceramic times [Lynch 1967:780]." They would also go to the high natural pastures at the onset of the dry season to dig their natural or planted tuber and root crops, gladly accepting the colder night temperatures and sunny days in exchange for the chill soaking they would get earlier in the year.

Numerous other wild foods are seasonally available in the complex Andean environment, but studies of their use are few. Weberbauer (1936, 1945) and MacBride (1936) are basic descriptive studies of the botany, and Tosi (1960) has a useful ecological orientation, but the ethnobotanical studies are few and limited in their approaches. Towle (1961) covers the material recovered from coastal archaeology well, but is not particularly useful for most of the rest of Peru. Gade (1975) has contributed an agricultural ethnobotany for the Vilcanota Valley. The most pertinent highland ethnobotany, other than the studies included in this volume, pertains to the area around Tupe (Department of Lima), some 300 miles (500 km) south of our work area (Cerrate and Tovar 1954). Unfortunately, it is not illustrated. The study by Pearsall (1978) shares the same drawback, but as it deals with resources of the Lake Junín area, it is quite to the point. Fernández (n.d.) has provided me with a well illustrated description of the bulbs, rhizomes, and tubers of the Puna de Jujuy, far to the south in the much drier environment of northwestern Argentina. Although this area and its resources are not directly comparable to the central Andes, the purpose of Fernández' study was like my own. He also concludes that in Ayampitín and later preceramic times his Despensas Rockshelter and Inca Cave were occupied by small hunting and gathering groups practicing seasonal transhumance between the highlands and the valley bottoms (Fernández n.d.:137). More recent studies at the Huachichocana Caves of the Quebrada de Purmamarca, as well as Inca Cave and Puente del Diablo (Salta), suggest that the cultivation of corn, beans, peppers, and squash may date well back in the Argentine preceramic stage (Aguerre, Fernández Distel, and Aschero 1975).

Botanical, zoological, ethnographical, and archaeological studies throughout the Andes are necessary for comparative purposes and to set a context in which to understand the results of our investigations at Guitarrero Cave. Some of the new work will have to be at strategic locations within the Callejón de Huaylas itself. In this report I set myself the task of describing and explaining a very important and exciting archaeological site as thoroughly as permitted by limitations of data and resources. I am grateful to my colleagues who have published complete reports of their own excavations, but the Andean world is extensive and varied; as we have seen, correlations with materials from the Pacific coast, or even other sectors of the highlands, are hardly obvious. The analysis of the internal distribution of artifacts, within the complicated and sometimes confused deposits, should have permanent value. There would be little point in belaboring these distributions further, due to the small size of the sample with secure provenience.

In retrospect I think that Guitarrero Cave may be most interesting for its nearly unique record of organic remains. They demonstrate the complexity of the central Andean subsistence system from its earliest recorded moments, allowing us a glimpse of a way of life based primarily on hunting and gathering, while showing at the same time how a nuclear agricultural system evolved in concert with the harvesting of wild plant and animal products. This was the Central Andean Preceramic Tradition, a remarkably successful and persistent adaptation to a bountiful, if sometimes difficult, environment.

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