FIRST REPORT OF A NEWLY DISCOVERED PALEOINDIAN QUARRY SITE ON THE ISTHMUS OF PANAMA

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An archaeological survey on the Azuero Peninsula in Panama has recently discovered a Paleoindian quarry/workshop at the base of a quartz outcrop. The Nieto site contains seldom-seen preforms and flake blanks that provide new information on early-stage reduction strategies used by Clovis-like point makers in the Neotropics. Finished tools recovered at the site include gravers, side scrapers, and large scraper planes. The production of flake blanks followed a core reduction and rejuvenation strategy already observed at other Paleoindian sites in Costa Rica and Florida. Although the quartz outcrop is located only a few kilometers away from better-quality sources of jasper and chert, Paleoindians appear to have preferred this translucent stone for their weaponry. This new information, when combined with late-stage production strategies previously recorded from other Panamanian sites, brings us closer to tracing a complete manufacturing trajectory for Clovis-like points on the Isthmus. It is hoped that data from the Nieto quarry/workshop will eventually help archaeologists determine if the presence of the fluting technique in Central and South America is attributable to a migration of Clovis-related people or a technological diffusion among pre-established southerly populations.

Investigaciones arqueológicas llevadas a cabo recientemente en la Península Azuero, Panamá, ha dado como resultado el descubrimiento de una cantera/taller perteneciente al Horizonte Paleoindio, localizada en la base de un afloramiento de cuarzo. Sitio Nieto contiene preformas poco comunes, y lascas nodulares que proporcionan nuevos datos en relación a las estrategias tempranas de reducción empleadas en el Neotrópico. Entre las herramientas recuperadas en el sitio se incluyen picos, raspadores laterales, y grandes raspadores planos. Las lascas obtenidas como resultado del proceso de reducción de talla y estrategias de rejuvenecimiento son similares a las observadas previamente en otros sitios paleoindios de Costa Rica y Florida. Existen algunos afloramientos de jaspes y pedernal próximos a la cantera/taller de cuarzo de Sitio Nieto, por lo que pensamos que los pobladores paleoindios parecen haber tenido una clara preferencia por el cuarzo con el objeto de elaborar su utillaje de piedra. Los nuevos datos obtenidos sobre técnicas de manufactura tempranas conectan con las estrategias tardías registradas en otros sitios de Panamá, gracias a lo cual hemos podido realizar un trazado aproximado de la trayectoria de producción de las puntas Clovis en el Itsmo. Esperamos que los datos de la cantera/taller de Sitio Nieto tarde o temprano ayuden a los arqueólogos a determinar si la presencia de la técnica de acanalado paleoindia, en América Central y América del Sur, es atribuible a una migración de poblaciones Clovis, o bien si está relacionada con una difusión tecnológica entre poblaciones pre-establecidas del sur.

Mounting evidence has challenged the "Clovis First" model of the peopling of the Americas to the point where it may no longer be tenable. In North America, excavations at the Meadowcroft (Adovasio et al. 1978, 1999; Goldberg 1999), Cactus Hill (Johnson 1998; McAvoy and McAvoy 1997), Topper (Goodyear 1999, 2000), Schaefer, and Hebior (Overstreet and Stafford 1997; Overstreet et al. 1995) sites have provided evidence of human occupations possibly antedating Clovis. Similar claims have also been made for South American sites such as Monte Verde (Dillehay 1989, 1997; Meltzer et al. 1997), Taimataima (Ochsenius and Gruhn 1979), Tibitó (Correal 1981, 1986), Pubenza (Correal 1993), El Abra 2 (Correal and van der Hammen 1977; Hurt et al. 1977), and Lapa Vermelha (Laming-Empéraire et al. 1975; Prous 1986), to name a few. Although the existence of pre-Clovis groups is now more widely accepted, interpretation of the data from many of these early occupations has not been unanimous and debates persist (Dillehay et al. 1999; Fiedel 1999; Lynch 2001).

Over the years, the feasibility of a passage

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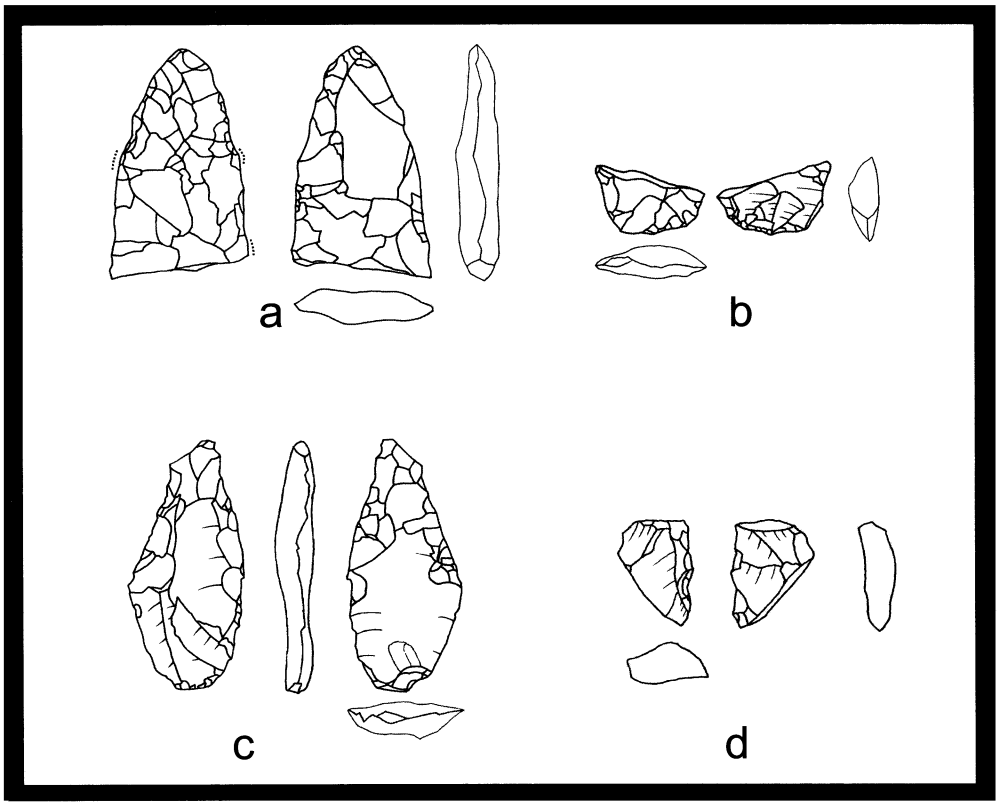

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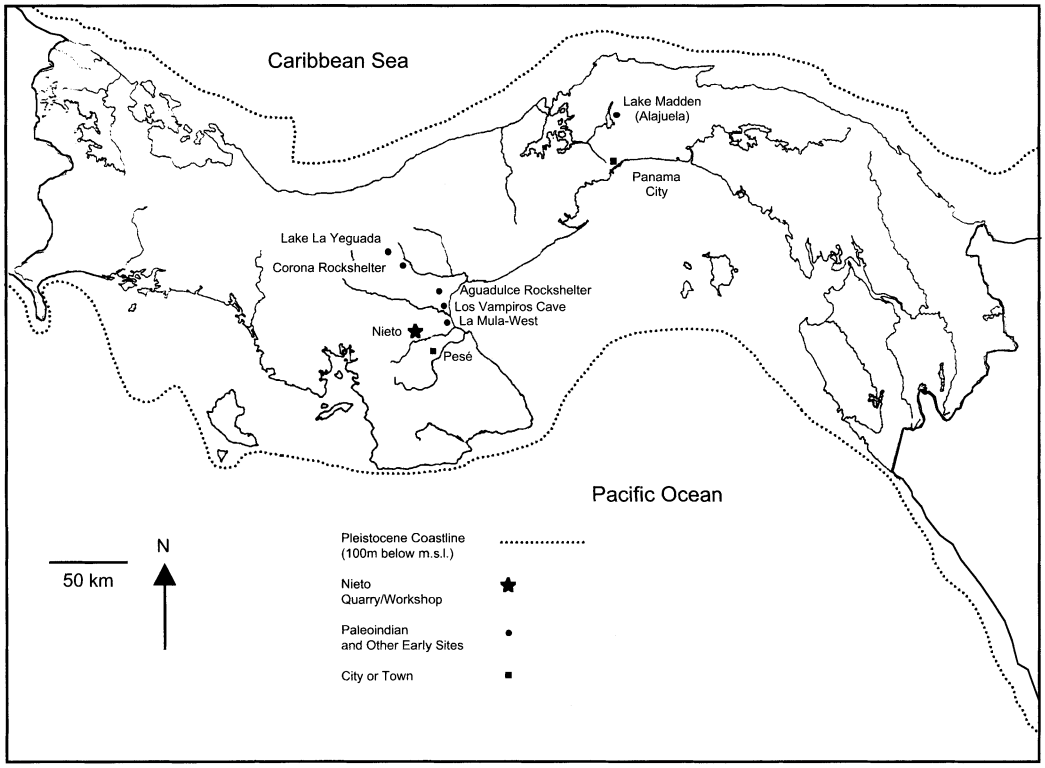

Figure 1. Map of Panama showing locations of Nieto quarry/workshop and other early sites.

between the North American ice sheets and even the existence of such a corridor have been questioned. This challenge has given rise to alternative entryways and migration routes to account for sub-Laurentidian populations (Anderson and Gillam 2000; Fladmark 1979, 1983; Mandryk 2001). For example, to explain the presence of pre-Clovis sites in South America in the absence of similar occupations further north, a popular scenario proposes a late Pleistocene coastal migration along the Pacific seaboard that brought people to South America while bypassing the interior regions (Carvalho Gonçalves et al. 2003; Dixon 1999; Gruhn 1988, 1994).

Another topic of contention has focused on the origin and dispersion of the fluting technique in South America (Ardila 1991; Ardila and Politis 1989; Bell 1965; Bird 1938; Gnecco 1994; Mayer-Oakes 1986a; Jackson 1995; Jaimes 1999). Attempts to explain this phenomenon have centered around three hypotheses. The first suggests that the fluting technique was carried south by migrating humans who were bioculturally related to North American Clovis groups (Lynch 1983; Morrow and Morrow 1999; Ranere and Cooke 1991; Snarskis 1979). The second argues that this manufacturing trait was diffused and adopted south by pre-established populations who came into contact with expanding Clovis bands (Bryan 1973, 1983). Lastly, Mayer-Oakes (1986b) proposed that fluting was independently invented in South America and may or may not have diffused north.

One strategy that can help untangle these ideas is to carry out technological comparisons between fluted point assemblages from North, Central, and South America. The degree of affinity between northern and southern fluted point industries would help archaeologists determine if Clovis groups encountered and influenced, replaced or were assimilated, or simply lived alongside pre-established groups possibly related to Monte Verdeans. Coupled with a solid chronological framework, technological differences and similarities would allow us to distinguish between a migration or a passing of ideas through pre-Clovis populations.

To help shed light on this problem, an ongoing survey has attempted to locate additional Paleoin-

Figure 2. Quartz outcrop and north side of the Nieto quarry/workshop.

dian occupations in Panama (Pearson 1999, 2000; Pearson and Cooke 2002). This area was chosen because of its key geographic location and its role as a narrow land bridge that has concentrated human movements between the continents. Regardless of the route(s) taken by early migrants during the colonization process, the Isthmus of Panama would have been an unavoidable stopping place while moving to or from South America. This report presents preliminary data from a newly discovered Paleoindian quarry/workshop site on the Pacific side of Panama.

The Nieto Paleoindian Quarry and Workshop

Site Location and Description

The Nieto site (124 m a.s.l.) is located on the Azuero Peninsula approximately 10 km northwest of the town of Pesé (Figure 1). The quarry consists of an exposed vein of gray-white, translucent cryptocrystalline quartz that juts from the summit of a small hill (Figure 2). This outcrop forms a pillar-like wall (1 m by 10 m) that is flanked on both sides by steep colluvial slopes containing a large amount of cultural and natural lithic debris (Figure 3). Test excavations were carried out on the northern section of the quarry where a Clovis-like projectile point preform was discovered on the surface (Figure 4a).

Although the majority of artifacts found at Nieto consist of unidirectional and multi-directional blocky cores, core fragments, flakes, and shatter, some broken tool preforms, flake blanks, and finished implements were also encountered. With the exception of a few bladelets and small blade cores, none of the recovered material could be ascribed to possible later preceramic or ceramic cultures. Bifacial reduction of cryptocrystalline stone has not been observed in Panamanian lithic assemblage post-dating 7000 ^{14}C yr B.P. (Ranere and Cooke 1995, 1996, 2002). This peculiarity of the Isthmian archaeological record has, in fact, helped researchers identify early sites by the simple presence of bifacial thinning flakes of fine-grained lithic material.

Deposits and Stratigraphy

Lithic artifacts were discovered lying above and within colluvial deposits around the outcrop. Flakes and other manufacturing detritus were strewn on the surface of the north-facing slope, which dropped at an angle of approximately 40 degrees. Although the rise is vegetated with trees and shrubs (*Curatella americana*), evidence of ongoing erosion and denudation due to heavy rain is visible today. The thickness of the deposits varied from a few centimeters closest to the exposed vein to more than 40 cm at the base of the hill. Sediments were homogeneous, and did not show any evidence of weathering horizons.

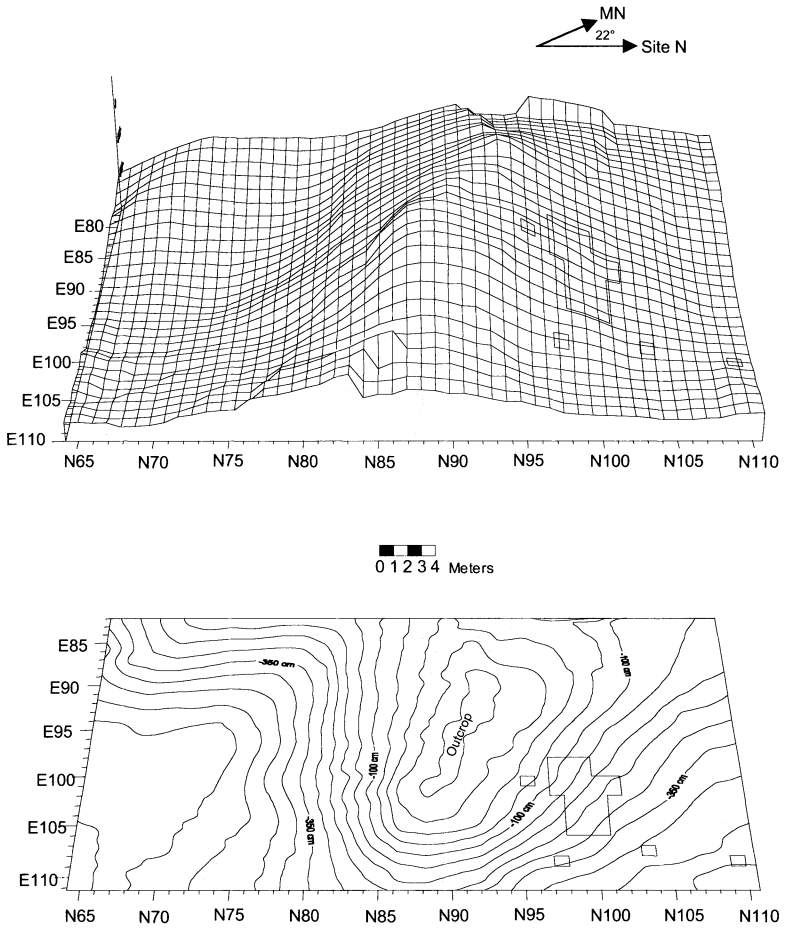

Figure 3. Nieto site map with location of main excavation block and test pits.

Lithic Assemblage

The first diagnostic artifacts discovered at the quarry were bifacial thinning flakes and a Clovis-like point preform fragment that alerted us to a possible late Pleistocene exploitation of the outcrop. Thus far, cores, large flake blanks, bifacial preforms, various scraping and graving tools, and over 50 bifacial thinning flakes have been discovered at Nieto (Figure 4). Technological analysis of the material is still ongoing, and only preliminary data (Table 1) and descriptions are presented below.

The point preform (Figure 4a) has a sinuous edge due to uncorrected deep concavities left by the initial lateral thinning removals. This preform is different both stylistically and technologically from stemmed fishtail and Archaic projectile points found on the Isthmus. It was manufactured from a large flake, which was progressively reduced on both sides, giving it a distinctive bi-convex cross-section. Initial thinning and shaping has completely removed all traces of the original flake blank's surface. Significantly, several isolated and ground platform lobes are still visible on the blade's edge. On one side, the distal end of what could be a flute or large end-thinning scar is visible just above the break (Figure 5). Although the edge of the fracture is square and was not the result of a "*languette*" scar (Roche and Tixier 1982)—which could be mistaken for a flute—the distinction between intentional removals, secondary fractures, and exfoliated breaks has been made difficult due to the unpredictability of this raw material. Nevertheless, fluting of early stage preforms would not be out of

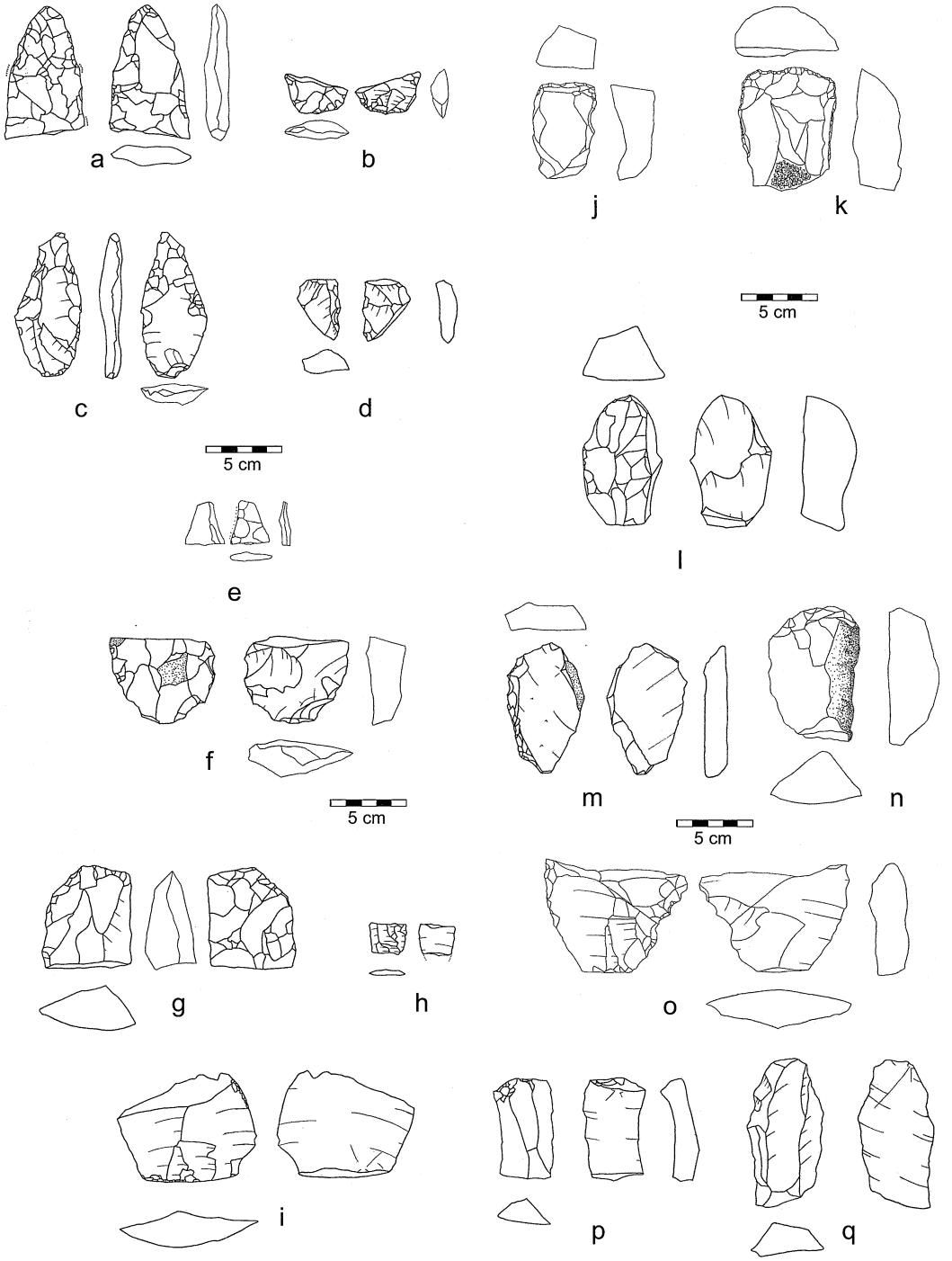

Figure 4. Lithic artifacts from Nieto quarry/workshop: (a–g) bifacial preforms; (h) channel flake fragment; (i) possible large flake blank; (j–n) snubbed-nosed scrapers and large scraper planes; (o) large retouched flake; (p–q) blade-like flakes; (r–u) graving tools; (v–w) spokeshaves; (x–y) core bottom rejuvenation segments.

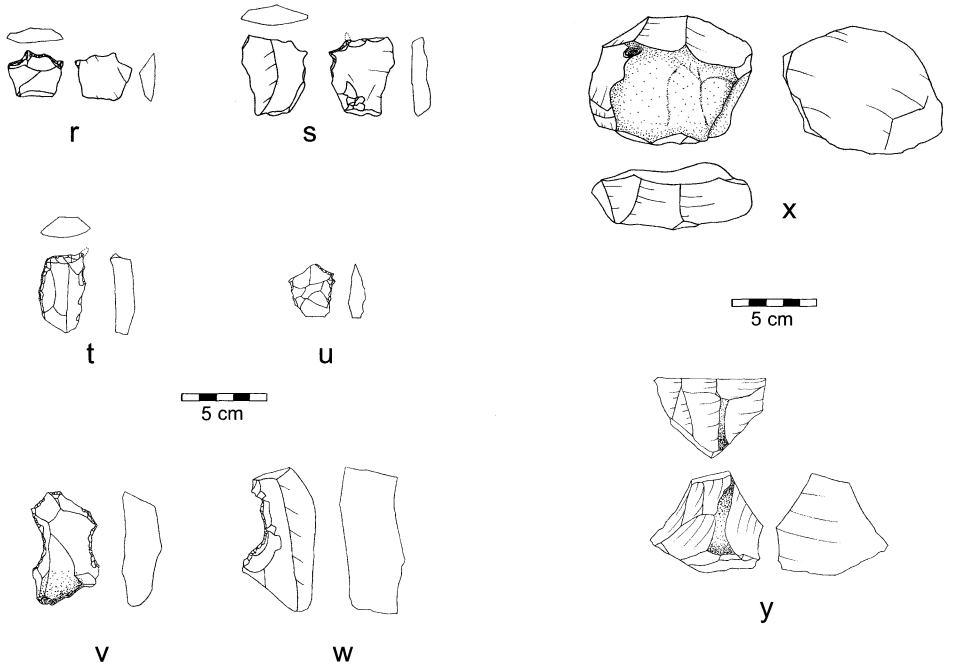

Figure 4. (continued)

Table 1. Metric Information for Lithic Artifacts Illustrated in Figure 4.

Artifact	Length (mm)	Width (mm)	Thickness (mm)
(a) Point Preform	87.86	50.50	17.20
(b) Point Base	28.40	37.90	11.75
(c) Biface (Preform?)	92.65	42.27	14.63
(d) Biface Fragment	39.45	29.02	11.40
(e) Biface Fragment	27.95	25.95	5.72
(f) Biface Preform	55.90	66.95	21.95
(g) Biface Preform	63.55	58.30	29.20
(h) Channel Flake	20.16	23.77	4.24
(i) Large Flake (Blank)	68.21	90.65	23.06
(j) Keeled End Scraper	63.40	40.20	25.35
(k) Scraper Plane	83.20	61.10	28.42
(l) Keeled End Scraper	86.74	51.55	34.16
(m) Side Scraper	84.30	48.64	15.10
(n) Scraper Plane	89.45	60.00	32.95
(o) Large Retouched Flake	71.77	70.00	26.80
(p) Blade-like Flake	64.70	37.60	17.20
(q) Blade-like Flake	95.55	48.30	20.50
(r) Graver	26.60	31.55	8.90
(s) Graver	46.50	37.25	10.20
(t) Graver	47.00	25.35	11.55
(u) Graver	31.21	26.35	9.52
(v) Spokeshave	66.10	38.30	21.00
(w) Spokeshave	86.10	41.55	37.95
(x) Core Base Segment	100.60	75.91	38.82
(y) Core Base Segment	49.16	30.04	19.15

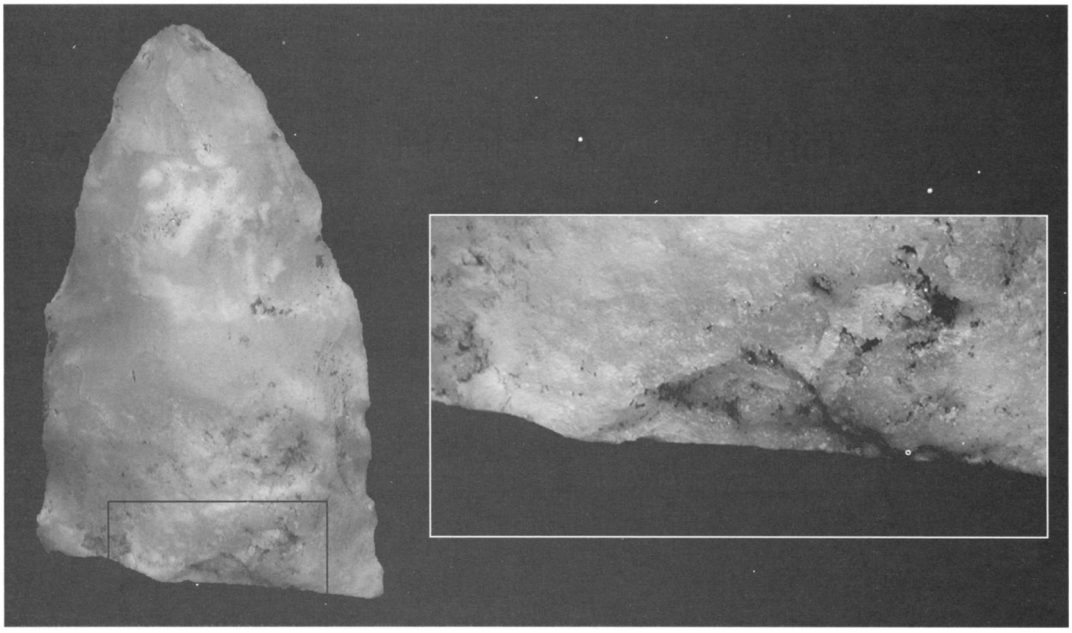

Figure 5. Clovis-like point preform from Nieto showing distal end of possible flute scar.

place here since it has already been observed at other lower Central American sites such as La Mula-West in Panama (Ranere 2000; Ranere and Cooke 1995, 1996) and Guardiria in Costa Rica (Pearson 1998, 2004; Snarskis 1979).

The Nieto preform could be described as a stage 4 biface following Callahan (1979), or more precisely a stage 4.1 according to Morrow's (1996) reduction scheme. Overshooting thinning flakes, commonly encountered in other Clovis-related workshops (Pearson 2002), have not yet been discovered among the manufacturing debris at Nieto. A possible explanation for this could be the low quality of the lithic raw material that caused many thinning flakes to terminate prematurely or break. The flaking pattern indicates that flintknappers attempted to drive long flakes past the preform's midline but were rarely successful. Although the crystalline qualities of the lithic raw material at Nieto are aesthetically pleasing to the eye, its structure makes it highly unpredictable and an inferior stone for flintknapping purposes. Many of the shatter pieces and discarded tool preforms display breaks along linear impurities and larger quartz inclusions. Most intriguing is that the area around Nieto contains many sources of high-quality cherts and jaspers where bifacial material is absent. It appears that the beauty of translucent crystals over less-attractive stones may have overridden more practical factors in the decision-making process leading to the manufacture of *some* points. Similar observations were made at the La Mula-West workshop, where Paleoindians manufactured many Clovis-like points from brittle, translucent agate cobbles (Ranere 2000) found among better-quality cryptocrystalline jaspers. This pattern goes against popular notions of a focused exploitation of high-quality stones by North American Clovis groups (Goodyear 1979) and may be indicative of ideological aspects of Paleoindian life.

The base of a second unfinished projectile point was discovered less than a meter from the preform (Figure 4b). This unground segment displays several longitudinal thinning scars or possible guiding flakes, and a slight nipple indicating that it was possibly being prepared for fluting. Evidence for the manufacture of a third point was provided by the discovery of a differently colored broken channel flake (Figure 2h). The fragment is straight (i.e., no curvature), parallel-sided, has a slight bi-convex cross-section, and broke just below its platform or nipple (Figure 6). Its dorsal surface is charac-

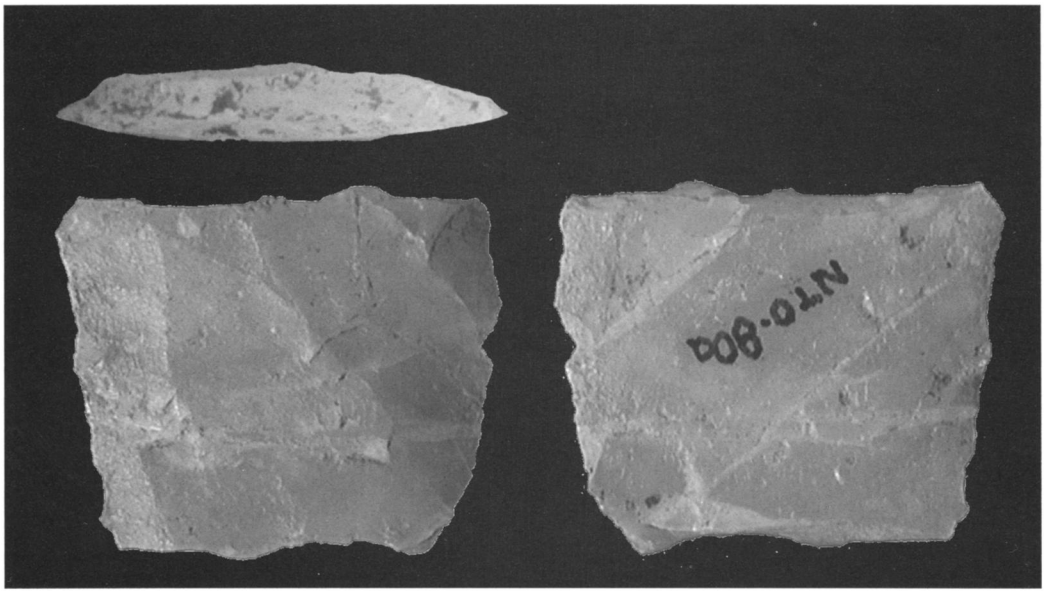

Figure 6. Collapsed proximal fragment of channel flake.

terized by a series of small, unidirectional scars suggesting that it was removed following several basal thinning attempts and/or some of the removals may have served as guiding channels. Especially interesting was a tool with a broken, bifacially worked distal end made on a blue-green chert flake (Figure 4c). No debitage of this material was found at the site and it may have been left behind after retooling (cf., Gramly 1980).

Also found among the debris were early stage preforms and large flake blanks used for the production of bifacial tools or projectile points (Figure 4f, g, i). Finished tools included gravers, keeled (snubbed-nosed) end scrapers, side scrapers, and scraper planes (Figure 2j–n, r–u). Several large blade-like flakes (Figure 2p, q) and ridge spalls were also recovered. These elongated pieces do not display small, prepared platforms or pronounced curvature characteristic of many Clovis blades (Collins 1999). Other important finds consisted of large flake cores and platform rejuvenation segments (Figure 2x, y) displaying identical reduction steps as those from the Guardiria Paleoindian quarry/workshop in Costa Rica (Pearson 1998, 2004), and the Fossil Hole quarry site in Florida (Hemmings 1999). Large scraper planes were fashioned on blade-like flakes and sometimes shaped by a trihedral flaking technique. Great efforts were made to flatten the ventral surfaces of these large scraping tools. Irregularities, such as the bulb of force, and excessive curvature were corrected by striking the blank's edges "head on" to detach large flakes that would terminate in hinge or step fractures. This tactic ensured that the retouch itself did not plunge or compound the initial problem and is comparable to core platform rejuvenation removals. Significantly, this same manufacturing technique was also observed on the planes from Guardiria and lakes La Yeguada and Alajuela (Pearson 1998, 2002).

Overall, the Nieto assemblage mirrors many of the artifact styles, manufacturing techniques, and even lithic raw materials choices observed at other Paleoindian sites. Most importantly, it links with the late-stage rejects and broken preforms discovered at La Mula-West to trace a more complete manufacturing trajectory for fluted lanceolate points in Panama.

Discussion

Several avenues of research, such as detailed technological analyses and comparisons of lithic assemblages, can offer significant clues to the origins of the fluting technique in South America. However, similarities and differences between North and South American Paleoindian lithic tools are mean-

ingless without factoring in contextual data. That is to say, without a clear picture of the culture-adaptive milieu, resemblance among artifacts will not necessarily support a migration scenario nor will discrepancies imply a diffusion of ideas. Lithic assemblages must be compared in relation to the economic systems and environments in which they were used. Moreover, analyses must examine entire tool kits and not concentrate solely on projectile points. Other clues, such as those related to group ideologies, although difficult to interpret, would also be useful, since these abstract elements are less likely to have been borrowed (Storck 1991). Even then, analytical results might still be subjective and open to numerous personal interpretations. For example, when trying to understand the cause(s) for the similarities and differences between a North American Clovis point and a South American fishtail projectile point, how can archaeologists distinguish between factors such as: (1) changing adaptive strategies, when groups face new environmental selective pressures; (2) cultural distortion and selective borrowing, when an idea is passed from one group to another; or (3) simple stochastic and historical events that may have affected styles, when groups become isolated and the flow of information is cut off (O'Brien and Lyman 2000)?

When faced with questions of biocultural affinity, there is no escaping the fact that although humans can modify and borrow technologies, they cannot change their genes. Consequently, the most robust analyses and perhaps the final arbiter of the debates may come from future ancient DNA tests. But until more late Pleistocene skeletons are discovered, archaeologists must rely on variables such as tool form and manufacturing techniques to make sense of the variability. Unfortunately, the majority of Paleoindian sites discovered so far in Central America contain finished points or preforms in late stages of production (Garcia-Barcena 1979; Gruhn and Bryan 1977; Santamaria 1981; Snarskis 1979). In most cases, early stage reduction strategies are obscured if not completely invisible when analyzing finished or resharpened tools. The key difference, and thus the importance, of the Nieto site resides in the fact that the first half of the manufacturing techniques, including raw material extraction, are represented here. Coupled with data from other Panamanian sites (Bird and Cooke 1978; Pearson 2000, 2002; Ranere 2000; Ranere and Cooke 1991, 2001), this latest information brings us closer to tracing a complete *chaîne opératoire* for Clovis-like points on the Isthmus.

Conclusion

Current knowledge on how the first human inhabitants of North and South America related to each other not only has been impeded by geographic distance but also by an information void. To this day, the Paleoindian archaeological records of North and South America remain isolated from each other. Ongoing archaeological research on the Azuero Peninsula in Panama represents an effort to close this gap. One of the principal objectives of the Isthmian survey is to find clues that will help us understand the origins of the fluting technique in South America.

The newly discovered Nieto quarry/workshop provides new information on early stage reduction strategies used by Clovis-like point makers. Preliminary results indicate that the lanceolate fluted points at Nieto were made on large flake blanks. Secondary retouch was invasive and did not leave pseudo flutes on the recovered bifaces. Preforms appear to have been fluted in the early stages of production by isolating and striking a basal nipple. Large Clovis-like macroblades and blade cores were not observed at Nieto. Finally, large flake cores, top and bottom platform rejuvenation segments, and keeled end scrapers, similar to those found at the Guardiria site in Costa Rica and Fossil Hole in Florida, attest to a Paleoindian cultural homogeneity across lower Central America and perhaps around the Gulf of Mexico (Faught and Dunbar 1997; Pearson and Bostrom 1998). Ongoing fieldwork in Central America and additional pan-continental comparative analyses among Paleoindian lithic assemblages should help us determine if southern fluted point makers were distant cousins of Clovis groups or contemporary neighbors who imitated their technology.

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