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PALEOINDIAN INTERACTION AND MATING NETWORKS: REPLY TO MOORE AND MOSELEY

David G. Anderson and J. Christopher Gillam

How early human populations in North America maintained reproductive viability is a question that has shaped our research for over a decade. The concept of staging areas, mechanisms for band-macroband interaction, and an examination of how interaction networks could have formed and evolved over the course of the Paleoindian era are all solutions that we have presented.

Una de las preguntas que mayores repercusiones ha tenido en investigaciones arqueológicas por más de una década es cómo los primeros grupos de seres humanos en América del Norte mantuvieron su viabilidad reproductiva. Varias de las soluciones que este ensayo sugiere están relacionadas con el concepto de áreas de actividad, los mecanismos de interacción entre pequeños y grandes grupos, y un exámen de cómo las redes de interacción humanas pudieron haberse formado y evolucionado a tráves del curso de la era Paleoindia.

> The need to find and exchange mates in a cultural environment characterized by an extremely low population density is what drives our model, and presumably earlier Paleoindian settlement systems [Anderson and Hanson 1988:271].
>
> While it is sometimes suggested that Paleoindian sociopolitical organization would have been quite simple and uncomplicated, in all probability fairly sophisticated information exchange and mating networks would have had to develop for these populations to remain reproductively viable... [and] probably greatly shaped the nature and extent of Paleoindian settlement systems in the region [Anderson 1990:181].
>
> I believe that loosely scheduled meetings between differing groups were essential to the long term survival of human populations in the East. Demographic pressure, specifically the need to find a mate of a suitable age, sex, and kinship distance, would have been a particularly compelling force prompting intergroup interaction. Quite simply, in small, band level groups, the likelihood that suitable mates would have been available for everyone is statistically remote. Mechanisms facilitating the at-least occasional meeting of groups, however, would have helped overcome problems and tensions created by unbalanced sex ratios. As Wobst (1974, 1975, 1976) demonstrated in a computer simulation analysis of these processes, at least occasional interaction between ca. 175 to 475 people—what he called a minimum equilibrium network—would have been necessary if Paleoindian populations were to maintain their existence over time. Interaction networks thus had to have appeared very early in the East, and the way these networks formed and operated likely shaped the colonization process itself as well as the subsequent development of subregional cultural traditions [Anderson 1995:11].

How the colonization of the New World may have proceeded has attracted widespread attention in recent years, particularly with increasing acceptance of a pre-Clovis human presence, prior to ca. 11,500 rcbp/13,500 cal. B.P. (Bonnichsen and Turnmire 1999; Dillehay 2000; Fiedel 2000). Moore and Moseley's simulation analyses demonstrating how rapidly small human groups can go extinct have important implications in interpret-

David G. Anderson ■ Southeast Archeological Center, National Park Service, 2035 East Paul Dirac Drive, Box 7, Tallahassee, FL 32310, David_Anderson@nps.gov, jmuse@sc.tds.net

J. Christopher Gillam ■ Savannah River Archaeological Research Program, South Carolina Institute of Archaeology and Anthropology, College of Liberal Arts, University of South Carolina, 1321 Pendleton Street, Columbia, SC 29208-0071, gillamc@gwm.sc.edu

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ing the Paleoindian archaeological record. The fact that isolated band-sized groups of 25 people could go extinct within a comparatively short time (average = 292.2 years; $n = 11$ runs) highlights the critical importance that must be accorded the study of the formation and maintenance of Paleoindian interaction networks. It may also help explain why pre-Clovis archaeological remains are so uncommon in the New World—small numbers of people may have been present much earlier than traditionally thought, but prior to much before ca. 13,500 cal. B.P. most or all probably died out, representing "failed" migrations, and hence leaving the spotty, varied, and somewhat ambiguous archaeological record that characterizes the pre-Clovis era.

The fact that small groups could have been reproductively (if precariously) viable for generations, even in isolation, however, also means they likely would have had sufficient time, and gone to great lengths, to develop sophisticated mechanisms to promote and maintain interaction with other groups. That they apparently failed to do this successfully prior to ca. 13,500 cal. B.P.—given the lack of evidence for a continuous or extensive archaeological record before this—suggests that initial colonizing groups may have been few and far between, in time, numbers, and space.

We have been exploring Paleoindian and Early Archaic population density, interaction, mating network formation and maintenance, mobility strategies, and settlement systems for some 15 years now, in a number of widely circulated papers (e.g., Anderson 1990, 1991, 1995, 1996; Anderson and Faught 1998, 2000; Anderson and Hanson 1988; Gillam 1996, 1999). None of this work is acknowledged in Moore and Moseley's commentary; examining it (see sample quotes above) clearly refutes their claim that our ideas on possible Paleoindian movement patterns (i.e., leap-frogging) or group interaction and mating network maintenance are "at least nonspecific and at worst terribly naive concerning the social structure of foraging bands and the marriage systems maintained by such societies."

Furthermore, as we explicitly stated, our demographic arguments were for heuristic purposes, to show that the New World could have been filled up fairly quickly in any of a number of scenarios (Anderson and Gillam 2000:54–46, 66). The fact that we ran dozens of analyses, varying founding population size (25, 50, 175), group size (25, 50), population doubling rates (100, 134, 268 years), group size when fissioning occurred (50, 100), and group range (25, 50, 100, 200, 400 km), coupled with the fact that the reproductive viability of small groups has been discussed at length in several previous papers, makes it difficult for Moore and Moseley to claim that we "presume that 25 people constitute an isolated, self-perpetuating breeding population" (p. 526, this issue). We thus do not think we are "hoaxing ourselves about the peopling of the New World," nor believe our work deserves to be characterized in such a fashion.

What we have been trying to do is to develop and test models to explain patterning observed in the North American Paleoindian archaeological record, using demographic and ethnographic information to inform our efforts wherever possible. There is a long tradition of such activity in Paleoindian studies, dating back to Martin's (1973; Mosimann and Martin 1975) wave-advance model of Paleoindian colonization, or Morse's (1977) Dalton settlement model, which hypothesized late Paleoindian groups positioned on the landscape in such a way as to facilitate interaction (see also Beaton 1991; Dincauze 1993; MacDonald 1997, 1998; Meltzer 1989, 2001; Steele et al. 1998; Surovell 2000). Much of our own work has been directed to documenting and then explaining the pronounced patterning observed in the Clovis and immediate post-Clovis archaeological record across the continent—a highly uneven occurrence of sites and artifacts, with distinct concentrations and voids—that indicates populations were widely scattered, present in moderate numbers in some areas and all but absent in others (e.g., Anderson 1990; Anderson and Faught 1998, 2000). We are thus well aware of the problems facing groups moving long distances (i.e., leap-frogging). As we said in our paper: "Leap-frogging groups becoming widely separated from one another would also likely be more vulnerable to disease, accident, or other calamity, resulting in failed migrations, and hence leaving behind the sparse assemblages, widely scattered in time and space, that are seen in the pre-Clovis archaeological record" (Anderson and Gillam 2000:66).

How did individuals in Paleoindian and Early Archaic groups find mates, particularly when these populations are assumed to have been highly mobile, widely scattered, and low in numbers? Two solutions have been offered: (1) the "band-macroband" model, based on the Early Archaic archaeological record of the South Atlantic Slope (Anderson and Hanson 1988); and (2) the "staging area" model, based on the occurrence of Paleoindian sites and artifacts

across eastern North America (Anderson 1990:185–196). How interaction/mating networks changed over the Paleoindian era has also been examined at length (Anderson 1995) (Table 1).

In the "band-macroband" model, Early Archaic settlement was considered to be strongly shaped by environmental structure, specifically seasonal and geographic variation in food and other resources; biological interaction, manifest in mating network structure and regulation; information exchange, notably for mating network maintenance, for social interaction, and for subsistence resource regulation; and demographic structure, evidenced in population size and spacing (Anderson and Hanson 1988). Two levels of settlement organization were proposed, corresponding to local band-level and regional macroband-level social systems, together with mechanisms for regular interaction ("aggregation events") between segments. Regional social entities or macrobands were assumed to consist of 500 to 1,500 people, corresponding to Wobst's (1974) minimum equilibrium mating networks. While aspects of the model have been challenged, such as whether group ranges were along or across drainages, or centered on lithic source areas (Daniel 1998, 2001), the need for mechanisms to facilitate mate and information exchange remains unquestioned.

The "staging area" model argued that Paleoindian colonizing populations settled into resource-rich areas fairly quickly and used them as bases from which to familiarize themselves with local resources, as well as to explore and settle the surrounding region (Anderson 1990:185–196). While some people may have chosen to stay in the staging areas, over time others could have left for new areas, repeating the process. People in the radiating groups would have had the option of returning to the staging area, in the event of disaster, or to find suitable mates. That is, groups exploring or colonizing beyond the staging areas would have had the knowledge that there were places on the landscape where they would have a high probability of finding other people. The concept of staging areas thus offers a solution to the question of how groups could maintain reproductive viability given extensive long-distance movement.

While finding mates was an important mechanism driving intergroup interaction, as populations grew and the landscape filled over the course of the Paleoindian era, effectively dispersing people over the landscape became important as well, to avoid redundant land use. Thus, the interaction networks that evolved during the Paleoindian era not only brought people together, but also, over time, had the increasingly important role of keeping them apart. The fact that Paleoindian sites are often located in dramatic or readily identifiable areas on the landscape, and the evidence that people sometimes traveled great distances to visit these settings, suggests appreciable effort went into the development of mechanisms to facilitate interaction. The distribution of lithic raw materials indicates people moved great distances in late Pleistocene North America, probably to facilitate interaction as much as anything (e.g., Meltzer 1989; Tankersley 1991).

While demonstrating conditions under which small groups could go extinct is a useful contribution, several aspects of Moore and Moseley's commentary appear in need of further thought. What does the mating behavior/reproductive viability of condors and panthers (scavengers or predators that typically operate alone or in small numbers) have to do with that of human groups (social primates) who, as we have shown, can develop elaborate cultural mechanisms to facilitate interaction and mating opportunities? Why is incest (i.e., who are acceptable marriage partners, and who are not) so broadly defined in their simulation? Incest prohibitions may reflect cultural ideals, but the reality could have been very different. More importantly, cultural definitions about what constitutes incest vary widely (Murdock 1949:284–288). Two provisions in their simulation—that mates cannot be drawn from one's parents' siblings or first cousins—are flatly contradicted by ethnographic evidence (Murdock 1949:284–287, 304–313); cross-cousin marriage, for example, occurs widely (e.g., Lowie 1947:26–32; Murdock 1949:172–174, 286–287, 304–313). That mates must be similar in age (which they suggest drives the formation of interaction networks, but which they do not include in their simulation) is also unsupported (Murdock 1949:301). Finally, while ethnographic analogy can be useful, we must also recognize that "there are no ethnographic analogues to help us understand how preagricultural human populations colonized continental land masses the magnitude of North and South America, which were themselves characterized by climates and ecosystems lacking modern analogues" (Anderson 1996:29). We need more simulation studies, however, not fewer, and only wish the authors had been more aware of the work that has been conducted on Paleoindian interaction, by ourselves and others. We do not know how

Table 1. Changes Over Time in Paleoindian Interaction Behavior in Eastern North America
(modified from Anderson 1995:8–9, courtesy University of Tennessee Press).

Subperiod/Diagnostics	Mobility/Organizational Strategies	Interaction Strategies	Purpose of Interaction Behavior
Early Paleoindian (Pre-Clovis Occupations) *>11,500 rcbp* *> ca. 13,450 cal. B.P.*	Initially: Continuous movement, exploring/free wandering "Failed migrations"	Extreme mobility, driven by group survival/mating requirements Fortuitous meetings between groups?	Group survival Provide opportunity for mate and information exchange
Diagnostics unknown. Early Triangular? Microblades? Miller Lanceolate? Blade technology?	Use of any available stone, regardless of quality Later: Extended settlement in resource-rich areas?	Loosely scheduled meetings between bands	Toolkit replenishment largely irrelevant to interaction strategies
Middle Paleoindian (Clovis Occupations) *ca. 11,500–10,800 rcbp* *ca. 13,450–12,900 cal. B.P.*	High technology forager adaptation develops Early: Settlement within staging areas. (Very large habitual-use areas)	Loosely scheduled meetings between bands in staging areas (probably between no more than two band-sized groups)	Group survival Provide opportunity for mate and information exchange
Clovis points (typically large, parallel-sided lanceolates) Fluted and non-fluted variants Blade technology	Group ranges centered about major physiographic features, resource-rich areas, and stone quarries Exploitation of high quality stone sources predominant in tool manufacture	Meetings held at known quarries or other prominent features Ceremonial caching behavior? Food resource availability may not greatly constrain interaction (due to the low numbers of people involved)	Provide safe haven for groups radiating out from staging areas and simultaneously facilitate mating network operation Toolkit replenishment closely tied to interaction strategies
Clovis-contemporaries	Later: Distinctive subregional traditions begin to emerge		Avoidance of redundant land-use within the larger region
Early Late Paleoindian (Subregional Cultural Traditions) *ca. 10,800–10,500 rcbp* *ca. 12,900–12,650 cal. B.P.*	Recognizable subregional cultural traditions (Geographically extensive mobility along and across drainages within vaguely defined territories)	Beginnings of macroband interaction networks characterized by the regularly scheduled meetings between two or more bands Interaction between subregional culture areas greatest in intervening areas; interaction within subregional culture areas greatest at centers	Ensure the operation of predictable/reliable mating and information networks Facilitate group relocation into different regions during periods of major resource stress Avoidance of redundant land-use within macroband and band ranges
South: weakly fluted points; unfluted broad blade forms	Group ranges centered about major physiographic features,		

Table 1. Continued.

Subperiod/Diagnostics	Mobility/Organizational Strategies	Interaction Strategies	Purpose of Interaction Behavior
(e.g., Cumberland, Quad, Simpson, Suwannee) North: fluted points with deeply indented bases (e.g., Vail, Debert variants)	resource-rich areas, and stone quarries Continued use of high-quality stone sources in tool manufacture	Meetings continue to be held at known quarries or other prominent features Meetings tied to seasons and areas of food resource super-abundance (capable of supporting multi-band population aggregates)	Toolkit replenishment closely tied to interaction strategies
Later Late Paleoindian (Subregional Cultural Traditions) *ca. 10,500-10,000 rcbp* *ca. 12,650–11,550 cal. B.P.* South (early): Dalton and related forms South (late): Early Side Notched types (e.g., Taylor, Bolen, Big Sandy) North (early): fluted points with deeply indented bases North (late): Dalton points, weakly fluted points, unfluted lanceolates Early Side Notched types	Adoption of more-or-less fixed territories (annual ranges decrease over time) Increasing social/biological isolation of local populations Use of locally available or lower quality stone in tool manufacture predominant Territorial ranges/central areas for local populations become well defined	Macroband interaction networks present over the region, with regularly-scheduled meetings between constituent bands (up to several bands may meet at a time) Collective ceremonial behavior (cemeteries, ceremonial biface exchange evident in central Mississippi Valley) Interaction increasingly uncommon between groups in differing subregional culture areas Larger meetings tied to seasons and areas of food resource super-abundance (capable of supporting multi-band population aggregates) Smaller meetings (between two bands) in a variety of settings.	Ensure the operation of predictable/reliable mating and information networks Avoidance of redundant land-use within macroband and band ranges Facilitate possible multi-band-level solidarity/group identity? Toolkit replenishment no longer closely linked to interaction strategies Facilitate physical separation of groups to avoid redundant land use

the New World was colonized, but by working together we should come to a better understanding of the process.

References Cited

Anderson, D. G.
1990 The Paleoindian Colonization of Eastern North America: A View from the Southeastern United States. In *Early Paleoindian Economies of Eastern North America*, edited by K. B. Tankersley and B. L. Isaac, pp. 163–216. Research in Economic Anthropology, Supplement 5. JAI Press, Greenwich, Connecticut.
1991 Examining Prehistoric Settlement Distribution in Eastern North America. *Archaeology of Eastern North America* 19:1–22.
1995 Paleoindian Interaction Networks in the Eastern Woodlands. In *Native American Interaction: Multiscalar Analyses and Interpretations in the Eastern Woodlands,* edited by M. S. Nassaney and K. E. Sassaman, pp. 1–26. University of Tennessee Press, Knoxville.
1996 Models of Paleoindian and Early Archaic Settlement in the Southeastern United States. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 29–57. University of Alabama Press, Tuscaloosa.

Anderson, D. G., and M. K. Faught
1998 The Distribution of Fluted Paleoindian Projectile Points: Update 1998. *Archaeology of Eastern North America* 26:163–187.
2000 Paleoindian Artefact Distributions: Evidence and Implications. *Antiquity* 74:507–513.

Anderson, D. G., and J. C. Gillam
2000 Paleoindian Colonization of the Americas: Implications from an Examination of Physiography, Demography, and Artifact Distribution. *American Antiquity* 65:43–66.

Anderson, D. G., and G. T. Hanson
1988 Early Archaic Settlement in the Southeastern United States: A Case Study from the Savannah River Valley. *American Antiquity* 53:262–286.

Beaton, J. M.
1991 Colonizing Continents: Some Problems from Australia and the Americas. In *The First Americans: Search and Research,* edited by T. D. Dillehay and D. J. Meltzer, pp. 209–230. CRC Press, Boca Raton, Florida.

Bonnichsen, R., and K. L. Turnmire
1999 An Introduction to the Peopling of the Americas. In *Ice Age Peoples of North America Environments, Origins, and Adaptations of the First Americans*, edited by R. Bonnichsen and K. L. Turnmire, pp. 1–26. Center for the Study of the First Americans and Oregon State University Press, Corvallis, Oregon.

Daniel, I. R.
1998 *Hardaway Revisited: Early Archaic Settlement in the Southeast.* University of Alabama Press, Tuscaloosa.
2001 Stone Raw Material Availability and Early Archaic Settlement in the Southeastern United States. *American Antiquity* 66:237–265.

Dillehay, T.
2000 *The Settlement of the Americas: A New Prehistory.* Basic Books, New York.

Dincauze, D. F.
1993 Pioneering in the Pleistocene Large Paleoindian Sites in the Northwest. In *Archaeology of Eastern North America Papers in Honor of Stephen Williams,* edited by J. B. Stoltman, pp. 43–60. Mississippi Department of Archives and History, Archaeological Report No. 25, Jackson.

Fiedel, S.
2000 The Peopling of the New World: Present Evidence, New Theories, and Future Directions. *Journal of Archaeological Research* 8:39–103.

Gillam, J. C.
1996 A View of Paleoindian Settlement from Crowley's Ridge. *Plains Anthropologist* 157:273–286.
1999 Paleoindian Settlement in Northeastern Arkansas. In *Papers in Honor of Dan and Phyllis Morse*, edited by R. C. Mainfort Jr. and M. D. Jeter, pp. 99–118. University of Arkansas Press, Fayetteville.

Lowie, R. H.
1947 *Primitive Society.* Liveright Publishing Corporation, New York.

MacDonald, D. H.
1997 Hunter-Gatherer Mating Distance and Early Paleoindian Social Mobility. *Current Research in the Pleistocene* 14:119–121.
1998 Subsistence, Sex, and Cultural Transmission in Folsom Culture. *Journal of Anthropological Archaeology* 17:217–239.

Martin, P. S.
1973 The Discovery of America. *Science* 179:969–974.

Meltzer, D. J.
1989 Was Stone Exchanged Among Eastern North American Paleoindians? In *Eastern Paleoindian Lithic Resource Use,* edited by C. J. Ellis and J. C. Lothrop, pp. 11–39. Westview Press, Boulder, Colorado.
2001 What Do You Do When No One's Been There Before: Thoughts on the Exploration and Colonization of New Lands. Paper submitted for the edited proceedings of the Paul L. and Phyllis Wattis Foundation Endowment Symposium, The First Americans: The Pleistocene Colonization of the New World. California Academy of Sciences, San Francisco, California, in Press.

Morse, D. F.
1977 Dalton Settlement Systems: Reply to Schiffer (2). *Plains Anthropologist* 22:149–158.

Mosimann, J. E., and P. S. Martin
1975 Simulating Overkill by Paleoindians. *American Scientist* 63:305–313.

Murdock, G. P.
1949 *Social Structure.* The Macmillan Company, New York.

Steele, J., J. Adams, and T. Sluckin
1998 Modeling Paleoindian Dispersals. *World Archaeology* 30:286–305.

Surovell, T. A.
2000 Early Paleoindian Women, Children, Mobility, and Fertility. *American Antiquity* 65:493–508.

Tankersley, K. B.
1991 A Geoarchaeological Investigation of Distribution and Exchange in the Raw Material Economies of Clovis Groups in Eastern North America. In *Raw Material Economies among Prehistoric Hunter-Gatherers*, edited by A. Montet-White and S. Holen, pp. 285–303. University of Kansas, Publications in Anthropology 19. Lawrence.

Wobst, M.
1974 Boundary Conditions for Paleolithic Social Systems: A Simulation Approach. *American Antiquity* 39:147–178.
1975 The Demography of Finite Populations and the Origins of the Incest Taboo. *Memoirs of the Society for American Archaeology* 30:75–81.
1976 Locational Relationships in Paleolithic Society. *Journal of Human Evolution* 5:49–58.

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