ARQUEOLOGÍA IBEROAMERICANA

NÚMERO 10 • JUNIO 2011 • ISSN 1989-4104

Wari e Inca: el significado de Vilcabamba – ***Lidio M. Valdez,*** **3-5**

El rostro oculto de Espíritu Pampa, Vilcabamba, Cusco
Javier Fonseca Santa Cruz, **5-7**

Lewis Binford and his moral majority – ***Alice Beck Kehoe,*** **8-16**

The introduction of the first farming communities in the western Mediterranean: the Valencian region in Spain as example
Gabriel García Atiénzar & Francisco Javier Jover Maestre, **17-29**

The Moche Botanical Frog – ***Donna McClelland,*** **30-42**

Revista científica trimestral de acceso abierto
http://www.laiesken.net/arqueologia/
Editor/Director: Dr. Pascual Izquierdo-Egea

Correo: http://www.laiesken.net/arqueologia/contacto/. Impresa digitalmente en España.

ARQUEOLOGÍA IBEROAMERICANA

NÚMERO 10 • JUNIO 2011 • ISSN 1989-4104

http://www.laiesken.net/arqueologia/

Revista científica trimestral de acceso abierto distribuida a través de Internet en formato electrónico PDF. *Online open access journal published quarterly in PDF electronic format*. ISSN 1989-4104. Tít. abreviado: *Arqueol. Iberoam. SPARC Europe Seal for Open Access Journals*. Indexada en (*indexed in the*) *Directory of Open Journals* (DOAJ), LATINDEX, e-revistas, DICE, WorldCat, Google Académico (*Google Scholar*), DULCINEA, ISOC-Arqueología y Revistas de Ciencias Sociales y Humanidades del Consejo Superior de Investigaciones Científicas (CSIC). Impresa digitalmente en España. *Printed in Spain.* Fotografía de portada: la estrella AE Aurigae en el centro de la nebulosa de la estrella flameante, a unos 1500 años luz del planeta Tierra (NASA).

© 2011 ARQUEOLOGÍA IBEROAMERICANA 10: 3-7. ISSN 1989–4104. http://www.laiesken.net/arqueologia/.

AVANCES DE INVESTIGACIÓN

WARI E INCA: EL SIGNIFICADO DE VILCABAMBA

Lidio M. Valdez

University of Calgary, Canadá

Fig. 1. Ubicación de Vilcabamba.

ABSTRACT. *Following the unprecedented discovery of an elite Wari burial (circa AD 550-1000) in the tropical region (Vilcabamba) northwest of Cuzco (Peru), this past March the Peruvian Ministry of Culture-Cuzco organized the First Colloquium named* Tras las Huellas de los Wari. *The colloquium was aimed at discussing the archaeological implications of the new findings from Vilcabamba.*

Recientemente un equipo de arqueólogos encabezado por Javier Fonseca Santa Cruz hizo el descubrimiento en Vilcabamba (fig. 1) de un entierro perteneciente a un personaje de alta jerarquía del periodo Wari (*circa* 550-1000 de nuestra era). Wari o Huari es uno de los primeros estados andinos que existió en los Andes centrales mucho tiempo antes que el Estado Inca y que llegó a incorporar gran parte del actual territorio peruano (Menzel 1964; Lumbreras 1980). El hallazgo mencionado es de particular importancia por cuanto, hasta hace poco, no se tenía evidencia alguna que confirmara la existencia de personajes de singular prestigio durante el auge del Estado Wari.

Siguiendo este espectacular descubrimiento, el pasado mes de marzo, el Ministerio de Cultura-Región Cusco, organizó un simposio denominado «Tras las huellas de los Wari», evento al que fueron invitados destacados especialistas en el estudio del Estado Wari. Además de exponer los avances y/o resultados de sus respectivas investigaciones, los participantes tuvieron la oportunidad de reflexionar acerca del significado del descubrimiento hecho en Vilcabamba, de manera particular de la presencia Wari en la región de la Amazonía.

Para muchos, el hallazgo hecho en Vilcabamba es sorprendente (fig. 2), en tanto que siempre se asumió que Wari solo logró controlar la sierra y la costa del Pacífico. Sin embargo, entre 1969 y 1970, Raymond (1992) ya había logrado ubicar las primeras evidencias de ocupación Wari en el valle del río Apurímac. Uno de los sitios Wari identificados por Raymond es Palestina, ubicado en la margen derecha de dicho río, precisamente frente al pequeño río de Anchiway o Anchihuay. El reciente hallazgo en Vilcabamba confirma la inicial identificación hecha por Raymond, quien postuló que la presencia Wari en el valle del río Apurímac fue posiblemente para acceder y explotar recursos como la coca y otros típicos de la región tropical.

Hasta hace poco, Vilcabamba no parecía tener asociación alguna con el Estado Wari. Más bien, todo investigador está familiarizado con la relación de Vilcabamba con los incas. Efectivamente, se conoce que Manco Inca, al constatar que la caída del Estado Inca bajo el control de los conquistadores era inminente, vio por conveniente abandonar Cusco, la ciudad capital, y replegarse hacia Vilcabamba (D'Altroy 2003: 319), lugar este ubicado a

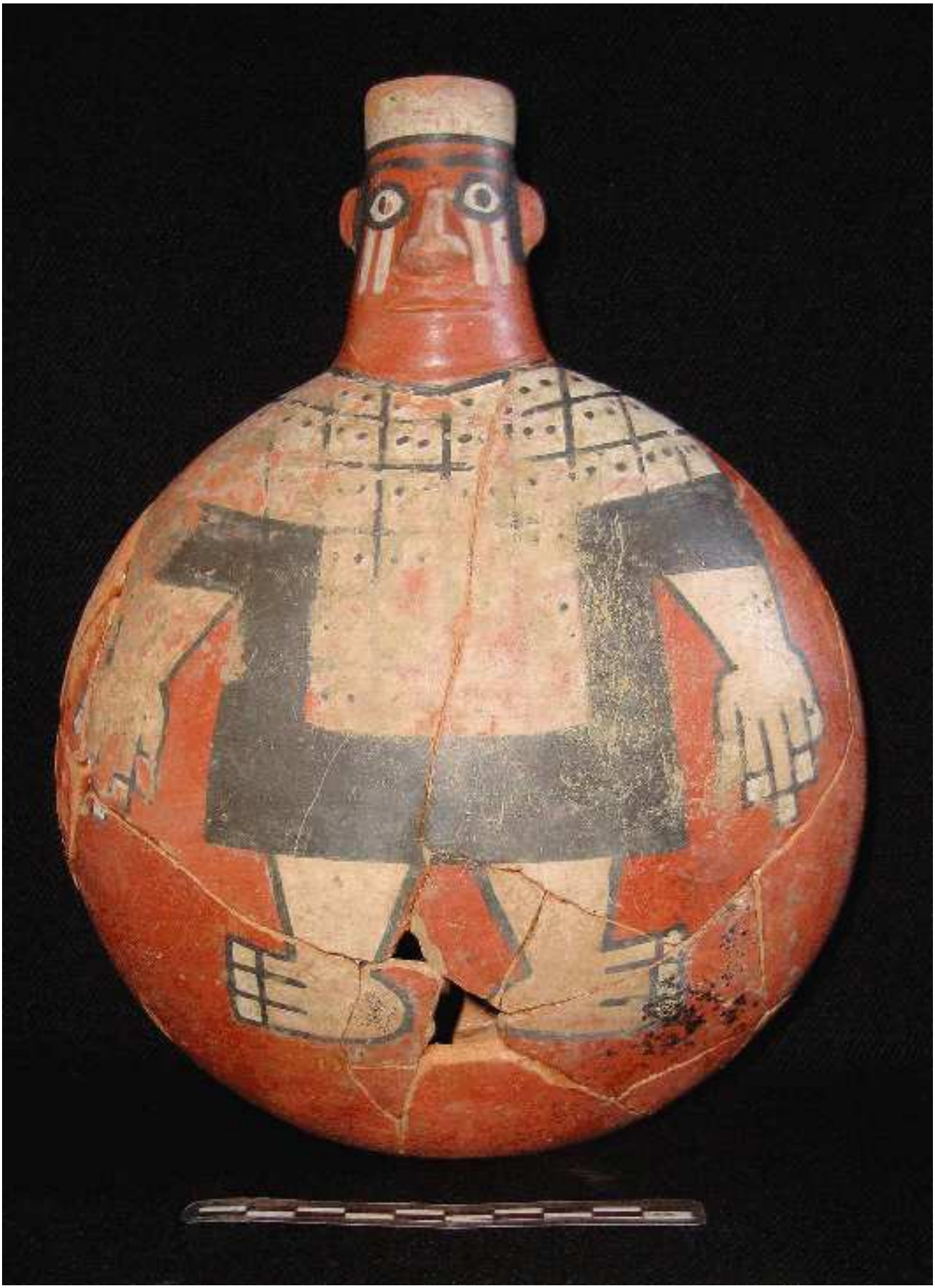

Fig. 2. Cerámica Wari recientemente recuperada de Vilcabamba, Espíritu Pampa (cortesía de Javier Fonseca Santa Cruz).

varios kilómetros al noreste de Cusco. La decisión de Manco Inca por reubicar el poder inca hacia Vilcabamba y, desde allí, ofrecer una heroica resistencia, siempre ha llamado la atención de los especialistas.

Menzel (1977: 54-55) fue una de las primeras en observar muchos paralelos entre los estados Wari e Inca, como es el caso de la religión. Otros investigadores también han notado muchos parecidos entre Wari e Inka. Por ejemplo, el sistema de contabilidad incaico (*kipu*) ya existía durante el tiempo de auge del Estado Wari. Del mismo modo, hay datos indicando que instituciones como las acllas, muy popular durante el tiempo de auge incaico, parecen haber existido ya con Wari. ¿Son estas simples coincidencias y/o resultado solo del uso del modelo inca para explicar varios aspectos del Estado Wari? ¿O existe una relación entre Wari e Inca, una relación que ha sido opacada no solo por el transcurso del tiempo, sino al parecer también con la participación del mismo Estado Inca? Por razones que siguen siendo desconocidas, los incas, consultados por los conquistadores acerca de su origen, señalaron a la región del lago Titicaca (Betanzos 1996: 13-14; Sarmiento de Gamboa 1999: 48-50). Esta versión ha sido frecuentemente repetida, llegando incluso a tener fuerte influencia en la forma como los especialistas explican el origen de los incas.

En contra de la versión que señala al lago Titicaca, otros documentos poco conocidos, como el de Fernando de Montesinos citado por McEwan (2006: 60), indican que el origen de los incas se encontraba en un lugar denominado Tampu. Se trata, supuestamente, del valle del Urubamba, el valle sagrado de los incas. El documento de Montesinos, escrito en 1642, da referencia a un total de 108 reyes, extendiéndose desde Huáscar hasta los tiempos de la existencia del Estado Wari. En este contexto, el reciente descubrimiento hecho en Vilcabamba tiene muchas implicancias específicas para trazar el origen del Estado Inca.

REFERENCIAS

Betanzos, J. de. 1996. *Narrative of the Incas*. Austin: University of Texas Press. [1.ª edición editada por R. Hamilton y D. Buchanan.]

D'Altroy, T. N. 2003. *The Incas*. Malden, MA: Blackwell Publishing.

McEwan, G. F. 2006. *The Incas: new perspectives*. Nueva York y Londres: W. W. Norton Publishing.

Menzel, D.

— 1964. Style and Time in the Middle Horizon. *Ñawpa Pacha* 2: 1-106.

— 1977. *The Archaeology of Ancient Peru and the work of Max Uhle*. Berkeley: R. H. Lowie Museum of Anthropology, University of California.

Raymond, J. Scott. 1992. Highland colonization of the Peruvian montaña in relation to the political economy of the Huari Empire. *Journal of the Steward Anthropological Society* 20 (1-2): 17-36.

Sarmiento de Gamboa, P. 1999. *History of the Incas*. Mineola, Nueva York: Dover Publications, Inc.

EL ROSTRO OCULTO DE ESPÍRITU PAMPA, VILCABAMBA, CUSCO

Javier Fonseca Santa Cruz

Ministerio de la Cultura, Cusco, Perú

ABSTRACT. *Recent archaeological studies carried out in the Vilcabamba region, northwest of Cusco, resulted in the unprecedented discovery of an elite Wari burial at the site of Espíritu Pampa. This finding is unique in many respects: first, rich burials belonging to the Wari State have not been excavated scientifically; second, this is the first tangible evidence for the existence of high rank individuals within the Wari State; and third, this finding is the first of its kind coming from the tropical rain forest region. In this report, I describe the main finding coming from Espíritu Pampa, thus making available the new data to the scientific community.*

En abril de 2010 se iniciaron las investigaciones arqueológicas en el sitio de Espíritu Pampa, en Vilcabamba, Cusco. Las excavaciones se efectuaron a raíz de la información proporcionada por los vecinos del lugar, quienes afirmaron que por los años setenta el anterior propietario condujo trabajos de saqueo, logrando recuperar valiosas piezas arqueológicas tanto en cerámica como en metales. En parte para confirmar las informaciones recuperadas y en parte para verificar la asociación cultural de Espíritu Pampa, se decidió llevar a efecto las primeras excavaciones arqueológicas en el sitio. Con estos trabajos se pusieron al descubierto nu-

Fig. 1. Unidad arquitectónica n.º 6. La tumba principal se encuentra en la esquina inferior izquierda.

merosas estructuras de diferentes tamaños y formas, además de estructuras mortuorias. Entre estas destaca una tumba hallada en su contexto original y como tal tiene mucho significado. Este reporte tiene el propósito de describir el referido hallazgo.

La tumba que se describe en las líneas que siguen fue ubicada en el interior de la unidad arquitectónica n.º 6. Esta tiene un diámetro interior de 12.65 x 4.88 metros. En esta unidad arquitectónica se hallaron un total de 11 cistas, de las cuales 2 habían sido profanadas. Tres de estas cistas fueron definidas como tumbas, la primera de las cuales corresponde al personaje principal, mientras que las otras dos posiblemente a individuos allegados al personaje principal. En el resto de las cistas se halló una variedad de objetos, depositados a modo de ofrenda de las tumbas. La tumba principal se encuentra en la esquina noroeste de la unidad arquitectónica n.º 6 (fig. 1). Luego de retirar el desmonte producto de la caída de las estructuras (muro), primero se llegó a definir el piso compacto de la estructura y, en seguida, precisamente en la esquina noroeste de la estructura, se detectó un apisonado de arcilla amarillenta y textura arcillosa, depositado a modo de sello. Una vez retirada dicha formación, quedaron expuestas dos lajas grandes que miden 1.50 m de largo y 0.65 m de ancho (fig. 2). En la parte central donde ambas lajas se unían, había un orificio circular de 5 cm de diámetro. La arcilla amarillenta había sido colocada para sellar ambas lajas que constituyen la cubierta de la tumba.

Una vez definida la cubierta, se procedió a retirar las lajas, exponiéndose una estructura cilíndrica, ligeramente ovoide (fig. 3), con paredes construidas de piedras unidas con barro (fig. 4) y finalmente enlucidas con una arcilla muy fina de color gris. El diámetro de la estructura es de 1 metro y una profundidad de 1.70 metros. Parte del enlucido había llegado a desprenderse y depositarse en el interior de la estructura. Luego de retirar la acumulación de arcilla fina que se desprendió del enlucido, se expuso un lente de arcilla bastante fina que cubría la parte inferior de la estructura. Retirada dicha cubierta, se llegaron a observar varios objetos depositados como parte del ajuar funerario (fig. 4). Entre estos destacan dos cetros, ambos hechos de madera de chonta (uno de los cuales estaba fragmentado) y forrados con láminas de plata. Además, se expuso la pechera (fig. 5) y una máscara, ambos hechos de plata, pertenecientes al personaje allí depositado. La máscara mantenía una orientación hacia el noreste y posiblemente cubría el rostro del personaje. Al mismo tiempo, se halló un total de 687 cuentas de turquesa, calcita, malaquita, serpentina, todas descubiertas en la parte inferior de la máscara. Del mismo modo, en el interior de la máscara se constató la presen-

Fig. 2. La tumba principal antes de retirar la cubierta.

Fig. 3. La tumba principal una vez retirada la cubierta.

Fig. 4. Aspecto del interior de la tumba.

cia de cinabrio (sulfuro de mercurio) y óxido de hierro, ambos, al parecer, fueron untados en el rostro del personaje. El material cultural recuperado del interior de la estructura de referencia es numeroso y variado. Además de los antes mencionados, la lista incluye una variedad de láminas de plata y cuatro plumas cefálicas, también hechas en plata. En directa asociación con la pechera,

Fig. 5. La pechera de plata del personaje principal.

Fig. 6. Brazaletes de oro con representaciones antropomorfas y zoomorfas típicos de la cultura Wari.

también se hallaron dos brazaletes de oro (fig. 6), ambos con representaciones antropomorfas y zoomorfas, estilísticamente típicas de la cultura Wari. Al mismo tiempo, se recuperó un total de 230 pequeñas láminas de plata, de forma ovoide, cada una con dos orificios en uno de sus extremos. Las láminas debieron ser parte de la ornamentación del vestido del personaje allí depositado.

Considerando que el hallazgo se hizo en una región tropical y húmeda, no se logró recuperar material óseo alguno con las excavaciones. Una excepción fueron los dientes. De acuerdo con los resultados iniciales de dicho estudio, el personaje allí enterrado vendría a ser un individuo masculino de una edad aproximada que oscila entre 25 y 35 años.

Resumiendo, lo aquí descrito de manera bastante breve es único en el contexto de la arqueología andina en general, en tanto que nunca antes se había expuesto un contexto mortuorio perteneciente a la cultura Wari (*circa* 550-1000 d. C.) de magnitudes similares. La importancia de este hallazgo radica en el hecho de que constituye la primera evidencia concreta de la existencia de individuos de alta jerarquía y poder dentro de la estructura social de la cultura Wari. La segunda importancia del hallazgo de Espíritu Pampa es que este proviene de una zona que forma parte de la región amazónica. Tradicionalmente, todo estudio relacionado con el Estado Wari se ha centrado en la sierra y la costa del Pacífico. Una vez culminado con los respectivos análisis, se espera discutir las implicancias de este descubrimiento en términos más amplios.

© 2011 ARQUEOLOGÍA IBEROAMERICANA 10: 8–16. ISSN 1989–4104. http://www.laiesken.net/arqueologia/.

LEWIS BINFORD AND HIS MORAL MAJORITY

Alice Beck Kehoe

Emeritus Professor, Marquette University, Milwaukee, Wisconsin, USA

ABSTRACT. *This essay looks at the late Lewis Binford's career from the standpoint of sociology of science. His thinking and manner reflect his socialization in Virginia Baptist subculture. As convinced of his authority on science as Jerry Falwell was of his authority on Biblical morality, Lewis Binford and his third wife Sally Rosen Binford excited a group of 1960s students to follow Lewis in an outmoded version of science (hypothetico-deductive) and in trusting statistics. The "frames of reference" he laboriously constructed are* naïve *on environmental interpretation and, because he expressed contempt for "political" aspects of archaeology, fail to take into account effects of colonialism. His work is often scientistic, in the "modern" mode that historian Dorothy Ross describes as characteristic of twentieth-century American social sciences.*

KEYWORDS. *Lewis Binford, biography, processual archaeology.*

Received: *6-6-2011*. ***Accepted***: *11-6-2011*. ***Published***: *30-6-2011*.

TÍTULO. *Lewis Binford y su mayoría moral.*

RESUMEN. *En este ensayo se analiza la etapa final de la carrera de Lewis Binford desde el punto de vista de la sociología de la ciencia. Su pensamiento refleja su socialización en el seno de la subcultura de la Virginia baptista. Tan convencido de su autoridad en la ciencia como Jerry Falwell lo fuera sobre la moralidad bíblica, Lewis Binford y su tercera esposa Sally Rosen Binford animaron a un grupo estudiantes de los sesenta a seguir a Lewis a través de una versión anticuada de la ciencia (hipotético-deductiva) y a confiar en la estadística. Los "marcos de referencia" que laboriosamente construyó son ingenuos en la interpretación del medio ambiente y, como expresó el desprecio por los aspectos "políticos" de la arqueología, no tienen en cuenta los efectos del colonialismo. Su trabajo es a menudo cientificista, en el sentido "moderno" que la historiadora Dorothy Ross describe como una característica de las ciencias sociales norteamericanas del siglo XX.*

PALABRAS CLAVE. *Lewis Binford, biografía, arqueología procesal.*

The only way to understand Lewis Binford and his impact on American archaeology is to approach from the standpoint of sociology of science. As a close contemporary (three years younger), I watched from the sidelines as he drew disciples into a cohesive little army, assaulted our elders, and claimed the mantle of genius theoretician. From the sidelines, I saw that this emperor was as naked as they come, and puny. Like many emperors, he owed his throne to the gifted, determined woman at his side—Sally Rosen Binford. Like many emperors, he was blinded by the glitter of gold from his crown, abusing his partner until she took the dog and drove away. Lewis, like Henry Tudor, went on to a total of six wives and a reign over a kingdom built on confiscated centers of learning and labor. His vassals evangelized the new religion he proclaimed, the Only True Science. When he turned forty, he wrote his autobiography (Binford 1972). Sally had left him a couple years before.

Lewis Binford was born in Norfolk, Virginia, in 1931. His parents, he said, on his father's side were "hills-south, hard-working, coal-mining" (although his father was an electrician and then managed the H.J. Heinz warehouse in Norfolk), and on his mother's, "in the nostalgic world of the antebellum south" (Binford 1972: 340). For college, Binford chose Virginia Polytech in Blacksburg, the heart of Southern Baptist fundamentalist evangelicalism; Jerry Falwell lived in nearby Lynchburg where he was building up his Thomas Road Baptist Church, and not long after Binford graduated, VA Polytech hired Henry Morris to chair its civil engineering department—Morris who in 1961 co-authored *The Genesis Flood* purporting to use strict science to prove Noah's flood. A *Pacific Stars and Stripes* interview with Corporal Binford, stationed on Okinawa,[1] states: "Binford theorizes that the world

[1] Binford claimed he was appointed interpreter for Japanese when he was drafted and sent to the Pacific Theater. He states he learned Japanese in military language school; it must have been a short course, given his other assignments during his two-year stint (Sabloff

flood, mentioned in religion and verified by geologists, was responsible for the mass migration to the Ryukyus and for the high location of the [pithouse] holes" (*Pacific Stars and Stripes* 10(74): 8).

After completing his army draft stint, Binford enrolled at the University of North Carolina to study anthropology and archaeology, and went on to complete graduate work in archaeology at the University of Michigan, 1964. I, too, received the Ph.D. in 1964, from Harvard. My first professional presentation, a paper organizing ceramics from the Northwestern Plains into wares and types (Kehoe 1959), was given at a Central States Anthropological Society annual meeting in Madison, Wisconsin, in 1959 as I recall. A handsome, tall, broad-shouldered, fair young man was another presenter in the session; I would remember Lewis Binford only for standing out against the boring old guys in the session. It likely was his first professional presentation, too.[2]

Potsherds dominated American archaeology then, and James B. Griffiin dominated archaeology east of the Rockies by his incomparable familiarity with sherds. His sherd collections at Ann Arbor were the type specimens, and his identifications, made with lightning speed and usually no explanatory comment, were unassailable. Lewis Binford could not challenge Jimmy. Lewis Binford turned to lithics. Lithics were called "projectile points," never mind that nearly every one excavated came from domestic contexts, plus were not sufficiently symmetrical to allow a projectile to fly straight. Being a housewife, I could see that practically all these points are kitchen knife blades, they are the size of my indispensable little kitchen knife and like it, have one side of the tip thinned and sharp, the opposing side lightly ground so one can put one's finger on it to press in cutting. Guys didn't know kitchen knives.

Lewis Binford saw lithics as hunters' tools, taking him into hunter research. At the time, this was called hunter-gatherer studies. Gatherers being women, their dull business had nothing to engage a big guy like Lew. Lewis Binford changed the term to "foragers," evoking images of Thirty Years War cavalry swooping through the countryside, helmets gleaming, raping women and bayonetting babies and grabbing all the goodies. At least that is the image historians come up with. Agricultural scientists know that foragers are herbivores that graze forage (*Google* the Department of Agriculture's Forage Unit) (Kehoe 1993). With his introduced terminology, Lew could evangelize a new field and do something Griffin didn't, use Michigan professor Albert Spaulding's faith in statistics to "discover" patterns in ancient behavior that no one had seen by merely eyeballing. Entering measurement and location data into statistical formulae, Binford claimed to revolutionize Paleolithic archaeology by identifying lithic variations as functional rather than stylistic (i.e., culturally distinctive). He challenged the doyen of Paleolithic archaeology, François Bordes, and the much lesser light at Harvard, Hallam Movius, on their interpretations of their Dordogne excavation projects. His *entrée* to the Dordogne was Sally, who had spent the summer of 1960 on the Harvard project at Abri Pataud. The Bordes, François and his equally distinguished archaeologist wife Denise de Sonneville-Bordes, had befriended Sally (S. Binford 2005). Her excavations at a Mousterian cave in Israel provided the data she and Lewis used for their statistical approach to analysis.

AGONISTIC ARCHAEOLOGIST

According to his own picture of himself, Lewis Binford considered human culture to be our extrasomatic means of adaptation for survival, carried out through symboling (as in language) (Renfrew 1987: 692). He was parroting Leslie White, the anthropologist at Michigan who inspired the generation who came out of World War II desperate, like Henry Adams after the Civil War, to find an exonerating explanation for the devastation they had witnessed (Adams 1918: 224-226; Peace 2004 on White). Like Adams nearly a century earlier, they eagerly accepted Spencerian evolution, passionately defended by White, evolution as a Vital Force inexorably pushing mankind into Progress, let the chips fall as they may. White's version extolled harnessing energy as the mechanism of Progress, from which Americans in the 1950s could infer that dropping nuclear bombs on hundreds of thousands of civilians proved the United States to be the

---

1998: 67-69). His disciple Robert Kelly recounted "About 1984, when I was living in New York, Peggy Nelson invited Lew up to the State University of New York (Buffalo) for a talk. She suggested I come up too, just to visit, and so I did. One night she, Lew, Ben Nelson and I were at dinner at a Japanese restaurant. When the check came, there was the usual scramble and Lew won, apparently by saying something in Japanese to the waitress. I had heard that Lew spoke at least some Japanese (that he had learned in the 1950s while stationed in Japan), but I wondered how well he actually spoke it. So, while the others were putting on their shoes I sought out the waitress and asked her what my friend had said. 'Oh, I have no idea' she said in heavily accented English, 'I'm Korean.' I still don't know how well Lew spoke Japanese" (Kelly 2011b).

[2] I e-mailed Binford, through his final wife Amber Johnson who was handling his mail after they moved to Kirksville, inquiring whether that was in fact his first professional presentation. Central States was trying to compile a list of the famous anthropologists who had first presented in its meetings. Dr. Johnson replied that she had asked her husband, he said he recalled being in a Central States meeting in a session with me, but not whether it was his first presentation. Parenthetically, young women giving archaeology papers were unusual enough then that I can believe he did notice me.

pinnacle of Progress. In spite of armed forces experience, the students who made White's simplistic cultural evolutionism their anthropological framework did not, or would not, perceive he was purveying Socialist Labor dogma (personal communication, Robert Carneiro, September 2001).

However he gave lip service to White (Binford 1972: 6-8), Binford's work does not exhibit much debt there. He accepted the more basic Enlightenment schema of stages of unilinear cultural evolution, restricting his work to the hunter-gatherer "stage". What he did take from White was labeling his work "science" (e.g., White 1959: 49; Binford 1972: 111) and lambasting his predecessors and their students (Peace 2004: 148-153 on White; Sabloff 1998:40 for Binford). Memories of Binford posted after his death frequently mention his house-building skill learned from his first father-in-law, how "he loved to pick up a hammer" (Richard "Dickie" Taylor, posted on ArchaeoAnth 5/10/11). Hammering was his mode of argumentation, too: "He was never retiring when he wanted to argue his point of view. He had a commanding presence and he would plant his feet, move forward as he made his points, and never, ever retreat" (Ezra Zubrow, posted on ArchaeoAnth 4/25/11). Disdain for those he perceived as competitors is replete in his books, for example of his predecessors (Binford 1978: 238-242), and of European archaeologists in general and most particularly Ian Hodder and his 1980 Cambridge students (Binford 1983: 14-18).

Interviewed in Dallas in 1997 by former Chicago student Melburn Thurman, Binford stated concisely, "I want to know how things were constrained by structure and pushed by dynamics, repetitively over time" (Thurman 1998: 40). Tom Riley, in a review of Paula Sabloff's book of interviews, mentions seeing a student paper Binford wrote in 1958 "where he outlined as an engineer [or ecologist] might, how culture was an integrated system, and that culture change was systemic" (Riley 1998: 23). Systems theory was cutting-edge in the 1950s (Wiener 1950). Twenty years later, ensconced in Albuquerque with eager graduate students, Binford articulated the foundation of his work. Seeking domains in which "uniformitarian assumptions" could be supported, he singled out:

1. Ecology, specifically living organisms of species available to humans in the past. Constraints on their availability or use, and the dynamics of their desirability for food and other necessities, can be studied in the present and projected reliably into the past.

2. Anatomy of animals, which is even more constant than their habitat preferences. Bones are often part of the archaeological record. Field and farm butchering of animals whose bones are found archaeologically[3] can be observed today.

3. Space use, usually outdoors as in hunters' camps. In his 1983 book he uses a photo taken by Susan Kent[4] of a Navajo woman cooking outdoors (1983: 150) and a "c. 1920" photo of a Blackfoot woman near a hearth outside a tipi ("house" in the caption) (1983: 176). These support the uniformitarian assumption that non-modern people who live in small shelters in undeveloped landscapes probalistically cooked outdoors.

These three domains of research fit the "middle-range theory" he advocated as neither trivial nor inordinately ambitious (Binford 1977: 8-9). Compare Lewis Binford's weeks of summer hunting trips with contemporary Inuit, with Franz Boas' entire year living with nineteenth-century Baffin Land Inuit. One of Boas' hunting trips with Inuit hosts trapped them in a hastily-made iglu, waiting out a blizzard, hoping it would abate before they starved. What impressed Boas during his year with Inuit? Not the formidable constraints of their environment, nor the pushing dynamic of a will to survive, but their songs, poetry, humor, and arts. Binford saw the archaeologist's task to figure out "What are the conditions in the past that brought into being what you see today?" and "to justify your inferences" (quoted in Sabloff 1998: 41). The archaeological record was his universe of inquiry. Spaulding had taught that significance is revealed when statistical manipulations show patterns. Most of what impressed Boas as the essentially human aspects of Inuit life were, to Spaulding and Binford, epiphenomena. Binford's archaeology was highly reductionist in scope while touted as "a vast body of behaviorally controlled material" (his 1978 Nunamiut book) (Binford 1981: 195).

---

[3] Binford recalled "I arrived in France [in 1968] with a copy of the then very new study by [T.] Kehoe (1967). I hoped that I could use faunal variability to inform me about the causes of lithic assemblage variability" (i.e., functions as cause of variation) (Binford 1981: 195). I did the laboratory identification of the bones from the Boarding School Drive, using Ted White's forms that Tom had learned working on a River Basin site with White (Kehoe & Kehoe 1960). The site is on the Blackfeet Reservation, the crew was mostly Blackfoot, and we brought elders to the excavations to discuss how the occupation strata compared to what their grandparents had told them about nineteenth-century bison pounds. In 1969, Tom and I volunteered at Jean Combier's Solutré excavation to compare the reindeer and horse strata there with our experience excavating several major bison pound sites, and during the 1980s Tom visited principal Paleolithic painted caves, recognizing schematic drawings of drive lanes and pounds and paintings of herds driven toward them (T. Kehoe 1989).

[4] Lewis Binford used Susan Kent's dissertation work on Navajo ethnoarchaeology and she dedicated her 1990 edited volume on "domestic architecture" to him "whose friendship transcends theoretical differences," but he seldom cites her important series of field studies and theoretical discussions (see Ashmore, Dobres, Nelson & Rosen 2006 for Kent's work, tragically cut short by her death at age 50; Binford was invited but did not contribute to this *festschrift* in her memory).

At the core of Binfordian archaeology is his uniformitarian assumption that climate can be deduced from immense amounts of data statistically analyzed. Amber Johnson Binford explains:

> "We [she as research assistant, and Lewis] went through lots during those years completing the program—entering thousands of weather station records (for a while, I could convert from degrees/minutes to decimal degrees in my head), measuring the area of vegetation types from maps *by hand*, starting over on the linear regression equations for all projected variables after they announced the floating point error in the original Pentium chip.
>
> Once we had the program working through the environmental frames of reference, Lew started the pattern recognition work that fueled *Constructing* [*Frames of Reference*, 2001]. He would come to the lab nearly every day with his canvas bag full of figures. He would spread them out one-by-one on the big table in the lab and say "Look at that!" We would work together to decide which of the HG variables we would try to include in the projections—then I would get to work on the linear regression equations that project the hunter-gatherer frames of reference.
>
> My thesis was the first archaeological research to take advantage of the calculated frames of reference" (Johnson, posted on ArchaeoAnth 6/2/11).

When I read this, I wondered why this young woman spent so much time on basic research that sounds like that performed for decades in Reid Bryson's lab at University of Wisconsin, Madison. Bryson worked closely with archaeologist David Baerreis in the 1960s and remained actively collegial with archaeologists until his death in 2008. Charles Reher's paper in Binford's 1977 edited volume cites and uses several Bryson publications that force him to conclude that bison populations fluctuated and their relation to human societies in Wyoming is not straightforward in the archaeological record (Reher 1977: 36). I asked William Gartner, an archaeologist and geographer who had studied with Bryson, whether Binford had called upon Bryson's expertise. Gartner generously replied with a profoundly insightful note:

> "Bryson's approach to reconstructing past climate change uses forcing factor inputs and correlation & regression. One takes the inputs of modern forcing factors (earth-sun geometry, volcanic eruptions, etc.) and correlates them with modern weather observations at a locale. One then regresses past forcing factor inputs to construct past climate at that locale. There is no room for system complexity and feedback in this approach (e.g., El Niño and La Niña are irrelevant). I'll let you be the judge if there are any similarities in the structure of uniformitarianism and analogical arguments underlying the 'explanations' of Bryson and Binford.

Bryson, in my opinion, never received credit for his role in bringing about a 'scientific archaeology'. Bryson's multi-disciplinary Mill Creek project was in the grant application stages when Binford wrote 'Archaeology as Anthropology'. It was one of the few examples of a priori, as opposed to post priori and other ad hoc approaches, to [explicit] hypothesis testing in Midwestern archaeology. (Another notable example is Fowler's original Mound 72 excavations which tested Fowler's prediction of the location of post pit 1). That said, the stratigraphy of the Mill Creek sites excavated by Bryson *et al.* was greatly simplified and interpreted incorrectly in their report—as suggested by Karl Butzer (who fought with Bryson often) and demonstrated by myself in my dissertation. Rather than climate change over a several century time period, Bryson *et al.* demonstrated local scale human impacts to the environment over a single generation. There are no Pompeii's in Midwestern archaeology. There are no simple nature-society linkages when the environment changes. Environmental change is undeniably important in human affairs. But, so too are social choices, a point well made by Jared Diamond (of all people!) in *Collapse*.

Although I greatly appreciate Binford's Herculean efforts at synthesizing tomes of Hunter Gatherer information (the bibliography is very useful), his book is difficult to read for the same reasons that it is difficult to read most approaches to climate-driven culture patterns and culture change in archaeology. Weather and Climate (and ethnography for that matter) do not conform to the kind of typological thinking that is inherent to archaeology. The frequency, direction, and magnitude of climate change is typically time transgressive and, moreover, vary over small distances. I often use the example of the 1993 floods in the Midwest, which were also a time of record drought in the Southeast. Type in the term 'drought' in *Google News* right now and you'll read about multiple droughts occurring right now somewhere in the U.S. Only, you wouldn't know about it from all of the flooding stories on the National News, would you?

Another example comes to mind. Multiple paleoenvironmental proxies show that the mid-Holocene dry period is time transgressive in the Upper Midwest, on the order of millennia in some cases, and was also quite variable in magnitude. Yet we still read about terms such as the altithermal and, if you are in 'the know', the hypsithermal in archaeology. These terms are meaningless—they imply that this time-transgressive interim of environmental change during the mid-Holocene was the same everywhere. Environmental and culture change happen

> continuously. It is always possible to correlate them. Yet, archaeologists rarely explore the myriad nature-society linkages that accompany such correlations. Binford never did. If you look at his bibliography, you will see that he cites very few works by climatologists or earth scientists. His citations largely consist of works that suggest time and space patterns that suit his needs (E-mail message to Kehoe, William Gustav Gartner, 6/3/11).[5]

Perhaps the most remarkable aspect of Lewis Binford's processual archaeology (he deplored calling it "the New Archaeology" [Binford 1983: 15]) is its thoroughly "modern" American character, described by Dorothy Ross in her 1991 study of American social sciences. By the 1920s, "under the banner of positivist science, [h]istory was no longer the solution [to understanding society], it was the problem. Only a hard, technological science seemed capable of controlling so... slow-moving and retrograde a public consciousness as existed in America" (Ross 1991: 388). "The emphasis on fluid process in their work [1920s American social scientists] constituted perhaps its chief novelty... Process placed them at the intersection of history and nature, seeking to capture both the concrete particularities of experience and universal natural forms... A great deal of the creative richness of their work, as well as the contradictions they never resolved, grew out of these divergent impulses locked together in the metaphor of process" (Ross 1991: 387). It's uncanny how well this historian who likely never read anything by or about Lewis Binford describes his science. She titles her final chapter "Scientism", "with science now defined by its method, scientism demanded that the requirements of natural scientific method dominate the practice of social science" (Ross 1991: 390).

Binford's genius was to intuit what people wanted to buy: in the heyday of Eisenhower's military-industrial complex, production systems schematized as closed-loop adaptations of populations to given environments. NSF was the principal source of funding for archaeological projects in the 1960s, an outgrowth of mid-century patronage for social-science efforts to control societies (Ross 1991: 400-401). Ralph Linton, certainly inclined to be a humanist, wrote in 1945, "The aim of this science [anthropology] is the same as that of all sciences. It seeks to ascertain the processes and continuities involved... with a view to the prediction of events and ultimately their control" (Linton 1945: 17). Lewis Binford expressed this conservative, one could even say fascist, goal as archaeologists' aspiration. Fittingly, he advocated philosopher of science Carl Hempel's already outmoded hypothetico-deductive method, apparently oblivious to its tautology of stating a hypothesis, deducing what data could validate it, then looking for those data. *Where does the hypothesis come from?* From what one already is familiar with. Truly an ivory-tower science, unlikely to bring in questions arising from experiencing other societies' realities,[6] or even to notice variables not amenable to Indo-European morphemes and syntax.

BINFORD AS A SOUTHERN BAPTIST PREACHER

The appeal of Binford and his New Archaeology is, to me, best understood by seeing him within the Virginia Baptist society he grew up in. "Lew would often slip into a southern Baptist preacher mode and talk... and talk", remarked his disciple Kelly (Kelly 2011: 928). Longtime colleague Charles McNutt said that "I learned that Lew was a compulsive story teller. By 'compulsive' I mean that Lewis would begin to recount some situation, then warm to it, and finally elaborate it to a climax that could usually be refuted quite easily. And Lewis was completely aware of this—but he frequently ploughed ahead" (McNutt 2011).[7] This is exactly the technique that linguist Susan Harding identifies in the Baptist preachers Binford heard as a child and college student. She "listens to the cadence and phrasing of [the preacher's] words, to the esthetic shape of his story and the multidimensional... universe it presupposes, and hears nothing but the truth, that is, the world evoked, the world constituted, by the story" (Harding 2000: 54). Jerry Falwell's public discourse, she reports, was "a system of narrative gaps. The storied gaps... captured attention, induced interpretive action, and wove semiotic webs between a preacher and his people" (Harding 2000: 98). These Baptist preachers look listeners directly in the eye, they speak with passion, they talk on and on, to weave those semiotic webs.

[5] For examples of Gartner's work, see his dissertation (Gartner 2003) and his rich blend of scientific ecological analyses, archaeology, ethnohistory, and First Nations traditions in Gartner 1997.

[6] My Blackfoot colleague Darrell Robes Kipp said in August 2010, at the Blackfoot History Symposium in Browning MT, that he no longer uses the word "culture," what he as a Pikuni experiences and knows is a reality different from that he experienced and learned during his graduate work at Harvard University.

[7] Sally Binford said the same as McNutt: "One of Lew's fatal flaws is that he's a pathological liar—and most of the time he didn't know he was doing it. He is truly incapable of distinguishing what he wants to believe from what is real. He had a distressing tendency to 'improve' data. He would generate a large number of original and intriguing ideas—90% of which bore little or no relationship to reality, but the 10% that were valid were great. I would attempt to steer him away from his more imaginative notions and help him in finding data to support the sounder ones, then help him write them up in comprehensible English" (S. Binford 2005).

They brim with self-conviction. Yes, Binford thought himself an atheist, but his faith in scientism is not dissimilar to the faith of Scientific Creationists (Kehoe 2007 on these).

As I expounded in my 1998 book, Lewis Binford's version of science is the nineteenth-century science that expected to find immutable laws in nature, because God created a lawful universe. Clerk Maxwell, Joule, the Thomson brothers (William became Lord Kelvin) and their Scottish circle of physicists and engineers worried about entropy, the dissipation of energy: does it prove the Calvinist doctrine of our fallen world, or is energy conserved within the universe so that Progress is possible? (Smith 1998). Seemingly purely scientific questions may reflect profound philosophical issues. Binford's disciples were a Moral Majority convinced their leader spoke the one and only truth. His own unshakeable belief infused them with confidence and a sense of power, the way Jerry Falwell's self-belief inspired his followers with confidence the Holy Spirit moved them. Robert Chapman said in *Antiquity*'s page of eulogies, "Enthusiasm, optimism and challenge were as important as theory" (Chapman 2011).

Some of us cannot agree. Lewis Binford convinced most of a generation that primary research is to be pursued to validate propositions, that simply adding to the store of knowledge is feckless. He talked and talked about philosophy of science although he admitted to Colin Renfrew that he hadn't read much of it before he went to Chicago, 1961, and his publications indicate little serious reading in the field subsequently (Renfrew 1987: 686). Contrast Guy Gibbon, who spent a sabbatical at the London School of Economics to study with leading philosophers of science there [Gibbon 1989], or Jane Holden Kelley, who co-authored *Archaeology and the Methodology of Science* with a degreed philosopher of science [Kelley & Hanen 1988]. Binford relied on Carl Hempel, already rejected by historians and the great paleontologist George Gaylord Simpson when Binford took him up, and on Wesley and Merrilee Salmon's expositions on formal logic in science (Salmon 1982). He seemed unfamiliar with Peirce's stimulating discussion of induction, deduction, and abduction, the logic of dealing with surprising facts, or Kuhn's development of that to highlight anomalies as the crux of scientific breakthroughs. Constraints limiting dynamic pushes make a very narrow research domain.

Particularly disturbing is Binford's tendency to assert a finding that his own documentation fails to support—presumably arising from that enthusiasm for a story that overrides veracity. Binford considered his 2001 tome, *Constructing Frames of Reference: An Analytical Method for Archaeological Theory Building Using Ethnographic and Environmental Data Sets*, his magnum opus. Michael Shott published a detailed review of the book in *Antiquity*, 2002. Shott took the trouble to carefully examine the plethora of tables and statistics, revealing gross errors and lack of congruence with text. He was forced to conclude, "throughout, analysis rests on subjective interpretation of evidence. CFR suggests much, and is worth reading for this reason, but does not persuade of its chief theses" (Shott 2002: 268). Ernst Mayr called laying-on of statistics "window-dressing" (Mayr 1982: 850; parenthetically, Mayr's masterpiece is thoroughly pertinent to archaeology, the one book I would advise for every archaeologist who aspires to work intelligently).

Constructing a frame of reference is a necessary step in scientific method. Premising that statistics will be key to interpreting the human past is not only not necessary, it can be a crucial error. Singular occurrences are statistically insignificant. The single Pachuca obsidian flake in Craig Mound at Spiro is only a far outlier in any statistical rendering of obsidian sources in the Spiro collections. Looked at in a frame of reference constructed on accepted Mississippian sourced trade contacts, it is an anomaly. Peirce's science can accommodate that, requiring scientists to accept "surprising facts" (the Pachuca source of the blade in a mound on the middle Arkansas River) by widening the frame of reference, in this case to Mississippian-Mesoamerican contacts (Barker *et al.* 2002).[8] Similarly, Cahokia's unique, for America north of Mexico, grid of plazas surrounded by large mounds, and the number of filed teeth found in Cahokia and environs, unique north of Mexico except for some in contemporary Chaco, can be accommodated in a similar frame of reference that includes the Mesoamerican Early Postclassic. Cahokia's engineered site plan and the modified teeth are as much facts as any sherd or lithic artifact. Science dealing with humans needs to stretch frames of reference, as Boas learned in Baffin Land.

CONCLUSION

Historical particularism needs scientific methods to identify myriad elements of the environment and human biology, and how they change. Binford despised British archaeology's practice of allying with other sciences, "little technical subfields treating archaeological remains in their own frameworks" (Binford 1983: 16). Such collaboration has become common in the United States, too,

[8] It is pertinent that Alex Barker was my student, learning my holistic empirical approach to archaeology. Binford's Chicago student James A. Brown, considered the expert on Spiro Craig Mound, had not recognized the significance of the green obsidian scraper.

primarily because consulting archaeological businesses have been adding "little technical subfields" to their staffs. In this respect and because consulting archaeologists work on closely specified projects within the framework of "heritage," historical particularism characterizes most of archaeological practice today. None of these practitioners tried to overthrow Lewis Binford, he was simply irrelevant to their profession. Where is American archaeology at today? Take a look at SRI's website <http://www.sricrm.com/>, the mission statement[9] for a multimillion dollar business led by Jeffrey Altschul, a 2011 candidate for presidency of the Archaeology Division of the American Anthropological Association. Ironically, SRI is the acronym for the company's original name, Statistical Research, Inc.; Altschul long ago outgrew equating that with archaeology.

Susan Trencher lamented that the late-twentieth-century generation of "postmodern" anthropologists represent a retreat from truly engaged scholars, from the tireless civic responsibility exemplified by Boas and Mead, to a "me generation" deriding past practices, overweeningly confident in their own capacities, seeing no need to advocate for the less-privileged "Others" they wrote about (Trencher 2000: 188-189, 191 n. 6). Binford was a member of this generation. He seems to have seen himself as pure scientist, objectifying the several hundred small nations, nearly all in colonial situations, he termed "foragers." NAGPRA, WAC, "indigenous archaeologies," First Nations' struggles, were outside the science that he advocated. He took no part in the Society for American Archaeology's heavily attended debates about NAGPRA and about accepting non-academic, especially non-Western, histories and interpretations of data.

Objectifying small non-Western nations as resources for quantifiable data on our remote ancestors is nineteenth-century archaeology, like John Lubbock's 1870 *The Origin of Civilisation and the Primitive Condition of Man*. There is, of course, an unconscious racism in this supposedly scientific attitude, tellingly described by Choctaw archaeologist Joe Watkins (Watkins 2000, 2010). Reflecting on his graduate studies during the heyday, 1960s, of the Binfords' assault on the discipline, Watkins concludes that "the 'hard science' its practitioners felt it needed to be... [was] pseudo-science, social science, or non-science... Its practitioners were afraid to admit they were humanists rather than scientists" (Watkins 2010: 322). Perhaps Watkins should have phrased it, "they were all too human, socialized into racism".

I read deeply into history/philosophy of science in the 1970s and 1980s in an effort to understand the loudly touted New Archaeology. In 1989, I took a sabbatical in Edinburgh in order to research Daniel Wilson's creation of "prehistory", and equally valuable, to discuss archaeology from the standpoint of sociology of science with the "Edinburgh School", Barry Barnes, David Bloor, and Steven Shapin. Joe Watkins and I are not just friends, we have been outsiders watching the emperor parade at the head of his horde of admirers. Standing with us are several dozen archaeologists who are members of First Nations, and others who, like me, hang out with collaborators in First Nations communities—not for brief shepherded visits but year after year. Now the parade has passed, its emperor entombed in his massive unreliable database culled without evaluation of colonial effects. The field is free for an empirical archaeology that begins with the syntagm in the ground and moves along a careful chain of signification to a paradigm drawn from rich compendia of ethnographic and historical data, nuanced by firsthand experience with First Nations collaborators and postcolonial appreciation of their histories.

NOTE

For a fuller treatment of Binford's philosophy of science and the New Archaeology, please see my *The Land of Prehistory* (1998), chapter 7, pages 115-149. Some of the book can be read online on Amazon (Look Inside).

About the author

Alice Beck Kehoe (akehoe@uwm.edu) (Barnard '56, Harvard Ph.D. '64) has carried out archaeological and ethnographic fieldwork in Montana and Saskatchewan and in Bolivia. With her husband Thomas F. Kehoe, she excavated three major bison pounds and investigated the Moose Mountain "medicine wheel" astronomical observatory, Saskatchewan, dated to late first millennium B.C.E. (this in collaboration with astrophysicist John Eddy), and with her own crew excavated François' House, an early fur trade post. In Bolivia she assisted her former student Alan L. Kolata on Tiwanaku raised field reconstruction with Aymara. She works with Blackfoot and Cree First Nations, and in history of archaeology and analyses of theory and method in archaeology. She has held office in American Anthropological Association, Central States Anthropological Society, Archaeological Institute of America-Milwaukee Society, and on Society for American Archaeology committees.

[9] "SRI was established in 1983 by [Dr.] Jeffrey H. Altschul to provide a vehicle for creative people to do interesting and exciting work on the human condition. In meeting the goals of this unique mission, we respond to our nation's goal of preserving its diverse historical and cultural values by integrating exciting research with compliance work."

REFERENCES CITED

ADAMS, H. 1918. The Education of Henry Adams. New York: Random House. [1931 Modern Library edition.]

ARCHAEOANTH listserv <http://mailman.swcp.com/cgi-bin/mailman/listinfo/archaeoanth>.

ASHMORE, W., M.-A. DOBRES, S. MILLEDGE NELSON & A. ROSEN, EDS. 2006. *Integrating the Diversity of Twenty-first Century Anthropology: The Life and Intellectual Legacies of Susan Kent.* Archeological Papers of the American Anthropological Association, Number 16. Washington, D.C.: American Anthropological Association.

BARKER, A.W., C.E. SKINNER, M.S. SHACKLEY, M.D. GLASCOCK & J. D. ROGERS. 2002. Mesoamerican Origin for an Obsidian Scraper from the Precolumbian Southeastern United States. *American Antiquity* 67(1): 103-108.

BINFORD, L.R.

— 1972. *An Archaeological Perspective*. New York: Seminar Press.

— ED. 1977. *For Theory Building in Archaeology: Essays on Faunal Remains, Aquatic Resources, Spatial Analysis, and Systemic Modeling*. New York: Academic Press.

— 1978. *Nunamiut Ethnoarchaeology*. New York: Academic Press.

— 1981. *Bones: Ancient Men and Modern Myths*. New York: Academic Press.

— 1983. *In Pursuit of the Past: Decoding the Archaeological Record*. Editorial assistance by J.F. Cherry & R. Torrence. London: Thames & Hudson.

BINFORD, S.R. 2005. Interview. In *Our Elders: Six Bay Area Life Stories*, by J. Clinger. Bloomington, IN: Xlibris.

BINFORD, S.R. & L. R. BINFORD, EDS. 1968. *New Perspectives in Archeology*. Chicago: Aldine.

CHAPMAN, R. 2011. Appreciation. *Antiquity* online. <http://antiquity.ac.uk/tributes/binford.html#binford12>.

GARTNER, W.G.

— 1997. Four Worlds without an Eden: Pre-Columbian Peoples and the Wisconsin Landscape. In *Wisconsin Land and Life*, ed. R. C. Ostergren & T.R. Vale, pp. 331-350. Madison: University of Wisconsin Press.

— 2003. *Raised Field Landscapes of Native North America.* Unpublished Ph.D. dissertation. Madison: Department of Geography, University of Wisconsin.

GIBBON, G. 1989. *Explanation in Archaeology*. Oxford: Blackwell.

HARDING, S.F. 2000. *The Book of Jerry Falwell: Fundamentalist Language and Politics*. Princeton: Princeton University Press.

KEHOE, A.B.

— 1959. Ceramic Affiliations in the Northern Plains. *American Antiquity* 25: 237-246.

— 1993. How the Ancient Peigans Lived. In *Research in Economic Anthropology* 14, ed. B. Isaac, pp. 87-105. Greenwich, CT: JAI Press.

— 1998. *The Land of Prehistory: A Critical History of American Archaeology*. New York: Routledge.

— 2007. Why Target Evolution? The Problem of Authority. In *Scientists Confront Intelligent Design and Creationism*, edited by A.J. Petto & L.R. Godfrey, pp. 401-425. New York: W.W. Norton.

KEHOE, T.F. 1989. Corralling: Evidence from Upper Paleolithic Cave Art. In *Hunters of the Recent Past*, edited by Leslie B. Davis & Brian O.K. Reeves, pp. 34-45. London: Unwin Hyman.

KEHOE, T.F. & A.B. KEHOE. 1960. Observations on the Butchering Techniques at a Prehistoric Bison-Kill in Montana. *American Antiquity* 25: 421-423.

KELLEY, J.H. & M.P. HANEN. 1988. *Archaeology and the Methodology of Science*. Albuquerque: University of New Mexico Press.

KELLY, R.L.

— 2011a. Lewis R. Binford (1931-2011). *Science* 332: 928.

— 2011b. Appreciation. *Antiquity* online. <http://antiquity.ac.uk/tributes/binford.html#binford9>.

LINTON, R. 1945. Introduction. *The Science of Man in the World Crisis*. New York: Columbia University Press.

MAYR, E. 1982. *The Growth of Biological Thought*. Cambridge: Belknap Press.

PACIFIC STARS AND STRIPES 10(74): 8. 16 March, 1954. Interview with Cpl. Lewis R. Binford.

PEACE, W.J. 2004. *Leslie A. White: Evolution and Revolution in Anthropology*. Lincoln: University of Nebraska Press.

REHER, C.A. 1977. Adaptive Process on the Shortgrass Plains. In *For Theory Building in Archaeology: Essays on Faunal Remains, Aquatic Resources, Spatial Analysis, and Systemic Modeling*, pp. 13-40. New York: Academic Press.

RENFREW, C. 1987. An Interview with Lewis Binford. *Current Anthropology* 28(5): 683-694.

RILEY, T.J. 1998. Review of Conversations with Lew Binford: Drafting the New Archaeology. *SAS Bulletin* 21(4): 22-23.

ROSS, D. 1991. *The Origins of American Social Science*. Cambridge: Cambridge University Press.

SABLOFF, P.L.W. 1998. *Conversations with Lew Binford: Drafting the New Archaeology*. Norman: University of Oklahoma Press.

SALMON, M.H. 1982. *Philosophy and Archaeology*. New York: Academic Press.

SHOTT, M. 2002. Review of Constructing Frames of Reference: An Analytical Method for Archaeological Theory Building Using Ethnographic and Environmental Data Sets. *Antiquity* 76(291): 266-268.

SMITH, C. 1998. *The Science of Energy: A Cultural History of Energy Physics in Victorian Britain*. Chicago: University of Chicago Press.

THURMAN, M.D. 1998. Conversations with Lewis R. Binford on Historical Archaeology. *Historical Archaeology* 32 (2): 28-55.

TRENCHER, S.R. 2000. *Mirrored Images: American Anthropology and American Culture, 1960-1980*. Westport, CT: Bergin & Garvey.

WATKINS, J.

— 2000. Indigenous Archaeology: American Indian Values and Scientific Practice. Walnut Creek, CA: AltaMira.

— 2010. Becoming One of "Them"... In *Being and Becoming Indigenous Archaeologists*, ed. G. Nicholas, pp. 321-326. Walnut Creek, CA: LeftCoast Press.

WHITE, L.A. 1959. *The Evolution of Culture*. New York: McGraw-Hill.

WIENER, N. 1950. *The Human Use of Human Beings: Cybernetics and Society*. Boston: Houghton-Mifflin.

© 2011 ARQUEOLOGÍA IBEROAMERICANA 10: 17–29. ISSN 1989–4104. http://www.laiesken.net/arqueologia/.

THE INTRODUCTION OF THE FIRST FARMING COMMUNITIES IN THE WESTERN MEDITERRANEAN: THE VALENCIAN REGION IN SPAIN AS EXAMPLE

Gabriel García Atiénzar & Francisco Javier Jover Maestre

University of Alicante, Spain

ABSTRACT. *The process of neolithisation of the Mediterranean face of the Iberian Peninsula has traditionally been associated with the Cardial paradigm of the Franco-Iberian region. However, better knowledge of the material record from the arc of the north-western Mediterranean, the revision of various archaeological sites of the central Valencian region, Spain and observation of the patterns of occupation and exploitation of territory in the western Mediterranean allow us to propose a process of Neolithic introduction more complex than considered until now, that can be linked with the phase of Mediterranean impressed pottery.*

KEYWORDS. *Neolithic, impressed pottery, patterns of occupation, landscape, Mediterranean.*

Received: *15-12-2010.* ***Accepted***: *21-3-2011.* ***Published***: *30-6-2011.*

TÍTULO. *La introducción de las primeras comunidades agrícolas en el Mediterráneo occidental: la región valenciana en España como ejemplo.*

RESUMEN. *El proceso de* neolitización *en la fachada oriental de la Península Ibérica se ha asociado tradicionalmente con el paradigma cardial francoibérico. Sin embargo, el mayor conocimiento del registro material del arco nororiental del Mediterráneo, la revisión de varios yacimientos de la región central valenciana (España) y el análisis de los patrones de ocupación y explotación del territorio en el Mediterráneo occidental, permiten proponer un proceso de implantación neolítica mucho más complejo del considerado hasta ahora, que se puede vincular con el horizonte de la cerámica impresa mediterránea.*

PALABRAS CLAVE. *Neolítico, cerámica impresa, patrones de ocupación, paisaje, mediterráneo.*

INTRODUCTION

Explanations for the appearance of the first farming groups in the western Mediterranean basin are currently founded on diffusionist/migrational theories. These are underpinned by theories based on the Ammerman and Cavalli Sforza (1973, 1984) wave-of-advance model that advocates a migratory movement in a west-east direction from the Near East through Western Europe.

For the western Mediterranean in particular, the Maritime Colonisation model, proposed by J. Zilhão (2001) and supported by a larger number of scholars, is used to explain this settlement process that was characterized by continuous and non-random movement, so they colonised territories not occupied previously by Mesolithic groups. This explanation acknowledges that both coastal colonisation and direct and indirect acculturation of the local Epipaleolithic people occurred (Bernabeu 1996; Carvalho 2008).

Other researchers emphasize the role played by hunter-gatherer groups in the dissemination of the Neolithic. These works, which derive from the concept of agricultural frontier of Alexander (1978), offer an image of possible interactions between hunter-gatherers and the first farmers. In this regard, the work of Zvelebil (2000) suggests that a series of mechanisms that involve the acceptance of Neolithic components on the part of the Mesolithic communities (replacement) and the final Neolithic consolidation in the midst of the ancient communities of hunter-gatherers would begin after the initial contacts between these two communities (availability) (Zvelebil & Lillie 2000).

Furthermore, these theories, which are based mainly on the gradual sequence of radiocarbon dates in an east-west direction and in the absence of domesticated animals and plant types in the Mediterranean basin, become even more established with the corroboration of new ar-

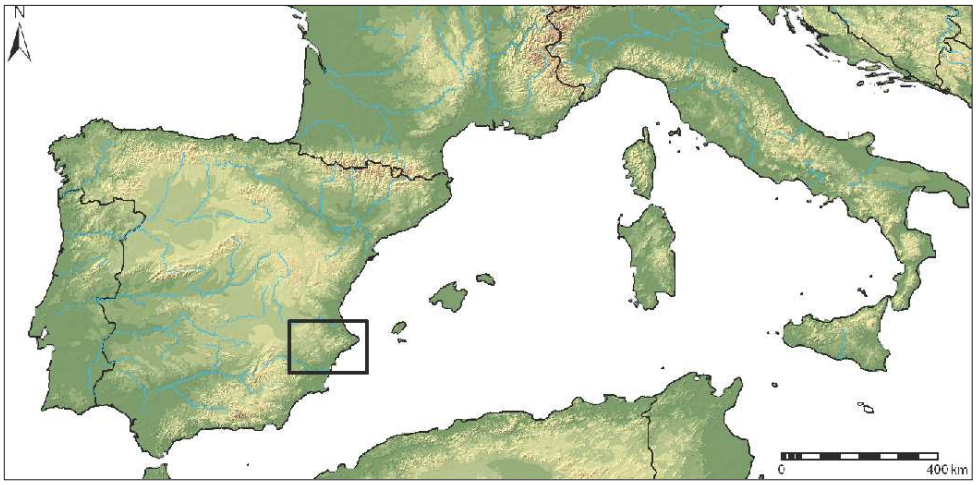

Fig. 1. Localisation of the study area.

chaeological evidence which indicates that the initial processes of colonisation took place during the 6th millennium BC throughout the central and western Mediterranean basin. This situation has undergone profound analysis for central Europe, as we can see from the work of several researchers (Bogucki 2000; Price *et al.* 2001; Price 2003); works that have allowed us to characterize the process of expansion and the different situations that occurred in the neolithisation of this area.

These new empirical theories are based principally on the almost simultaneous presence of similar cultural traits at different points on the Mediterranean coast. Similarly, certain decorated pottery types and some lithic materials can be used to indicate the existence of cultural groups that originated in the central Mediterranean area (Manen 2000; Fugazzola 2002) and which later spread towards the western coasts to make up these various pioneering groups. An example of this can be seen in the central Mediterranean coastal areas of the Iberian Peninsula.

THE PROCESS OF NEOLITHIC SETTLEMENT IN EASTERN IBERIA

Archaeological investigations of the Neolithic period began more than a century ago in the Levant of Spain and have notably been intensified in the last few decades. These studies have shown that farming societies were already established in some river basins of the Southern Valencian region by the second half of the 6th millennium BC. These communities are characterized by developing an economy based on crop cultivation, mainly wheat, barley and legumes, animal husbandry (sheep, goats, pigs and cows) and, very rarely, by gathering wild fruits and by hunting wild animals. With respect to the material culture, these groups have in the impressed Cardial ceramic their best exponent; this element also allows us to link the first Neolithic groups of the east of the Iberian Peninsula with the rest of the western Mediterranean ones at this time and is defined by the presence of impressed pottery as the most representative element.

Excavations carried out on open air sites and archaeological surveys in the Serpis valley (Bernabeu *et al.* 2002, 2003, 2006; Barton *et al.* 2002, 2004; Molina 2001; García & Aura 2006; Esquembre *et al.* 2008) and Vinalopó valley (Torregrosa & López 2004; García *et al.* 2006; Rosser 2007) have corroborated that the initial process of colonisation by the first Neolithic communities in this area involved the settlement and integral use of these lands. Open air settlements were established on the valley floors, near to endorheic areas and water courses in order to make use of the best agricultural lands and to take advantage of the important existing biotic resources.

In addition, some natural rock cavities were occupied to develop a wide variety of socioeconomic and ideological activities (García 2004). In this respect, the caves and rockshelters with evidence of Neolithic occupation should not only be interpreted as living spaces but as places used systematically as collective tombs (Bernabeu *et al.* 2001), as sheepfolds and occasional shelters (García 2006), as well as places of special social and ideological significance. This has been proposed for some cave sites such as Cova de l'Or or Cova de la Sarsa, due to their outstanding archaeological record, basically their profusely decorated ceramics with symbolic motifs representing anthropomorphic, zoomorphic and solar symbols (Martí & Hernández 1988) and filled in some cases with similar colors to those used in rock painting (García Borja *et al.* 2004), bone tubes made of ulnas of large raptors interpreted as musical instruments associated with ceremonial practices (Martí *et al.* 2001), an extraordinary amount of ornaments made of indigenous and non-local materials (Pascual 1998).

However, the process of settlement by the first farming groups in these areas was not as rapid as it was thought, nor as constant as researchers had previously proposed. J. Zilhão's model of maritime colonisation (Zilhão 2001), which is supported by various scholars (Bernabeu 1996), offers some clues to explain the initial colonisation of the area, but it does not explain the whole process of subsequent settlement and development. By referring to the

available empirical evidence, this initial colonisation, which was localised in the areas near to some estuaries such as the Serpis river, would have been followed by a phase of expansion towards the different sections of the river and a gradual increase in the number of settlements and their consolidation. In social terms, this would bring with it the territorial organisation of a segmentary society based on farming (Vargas 1988; Sarmiento 1992).

This paper aims to develop this series of theories by bringing together the evidence recorded in the central-southern areas of the Valencian region (Bernabeu *et al.* 2003; Molina 2001; García & Aura 2006) with that from the territories located to the south of these areas (Guilabert *et al.* 1999; Soler & López 2001; Torregrosa *et al.* 2004). Difficulties appear when trying to simplify the development of the evolutionary process of neolithisation in such a complex geographical framework, because there are countless variables within this area that may have had an impact. Many of those variables may not have left any mark on the archaeological record.

However, starting from the proposal developed by Alain Gallay (1989) for other areas of the Mediterranean, we believe that various sequential episodes can be proposed for the process of establishing the first farming communities in the central area of the eastern Mediterranean facade of the Iberian Peninsula:

FIRST STAGE. Initial colonisation: this corresponded with the pioneering phase in which groups with a farming economy, recently arrived by sea after following the coastal trade routes, settled in the fluvial plains of various river basins. They settled close to water sources where labour requirements for agricultural activities would be low given the limited labour resources available.

SECOND STAGE. Process of settlement growth and consolidation: this took place immediately after the initial episode of colonisation and can be identified with the neopioneering phase of A. Gallay (1989). During this phase the process of social segmentation began and the initial model of occupation was repeated. However, in this moment, the socio-economic and political dynamics of the community were concentrated and defined.

THIRD STAGE. Colonisation of external river basins outside the initial territories: settlement growth of the neopioneering phase would also have affected nearby river basins where there were reoccupations of Mesolithic settlements abandoned around 6000 cal BC and there have been recorded occupations *ex novo*. In this episode, the differences between the various rivers – those occupied initially and those occupied subsequently from the earlier ones – are now practically nonexistent, with similar material culture and farming practices established in both. Territorially, the only difference is that there was probably a higher density of settlements in the initial territories due to the fact that the process of segregation took place earlier and was more intense.

THE INITIAL COLONISATION PROCESS IN THE MEDITERRANEAN CENTRAL FACADE OF THE IBERIAN PENINSULA

According to the maritime colonisation model (Zilhão 2001) and the empirical evidence, the first coastal Neolithic groups spread from various river estuaries, such as the Serpis river. These groups moved towards Southern Iberia following fluvial courses and settled the lands around them. The archaeological evidence and the radiocarbon dates suggest that this process probably took place in a relatively short period of time.

The first settlements of groups with a production economy and impressed decorated wares spread around 5600/5500 cal BC to the areas between the Serpis and Algar rivers, creating what is known as the Valencian Cardial Group (Bernabeu 1996). This settlement came to an area in which the Mesolithic settlements had disappeared about 500 years before during the Recent Mesolithic Phase B (Juan-Cabanilles & Martí 2002), that is, the archaeological evidence supports a luck of interaction between Neolithic pioneering groups and Mesolithic societies in the Serpis basin.

The evidence recorded so far from El Barranquet in Oliva (Valencia) is important to explain this initial occupation. This site, located just 300 metres from the present day coast line, has revealed a stratigraphic layer within a natural paleochannel (Esquembre *et al.* 2008). This layer contains a relatively low number of pottery fragments, amongst which there were even fewer examples of Cardial wares in comparison to other types of grooved and tool impressed decorated wares (Esquembre *et al.* 2008: fig. 4).

The characteristics of this pottery collection are similar to those of the *sillon d'impressions* one, which has been identified and defined in various sites in the French Provence region (Peiro Signago, Grotte de Bize, Grotte de Fées, etc.) (Manen 2002). This is dated to between 5800 and 5400 BC and is characterized by a decorative technique founded in geometric designs with bands, zigzags, short impressions, larger impressions forming triangular motifs and other designs. Other decorative techniques are also represented, including Cardial and tool impressed wares and grooved ware, but only in small numbers of pieces. The US 79 of El Barranquet has been dated between 5500 and 5460 cal BC using the 1 sigma calibration obtained from an *Ovis aries* (Beta-221431: 6510 ± 50 BP). Furthermore, the characteristics of the pottery evidence indicate that the initial occupation of

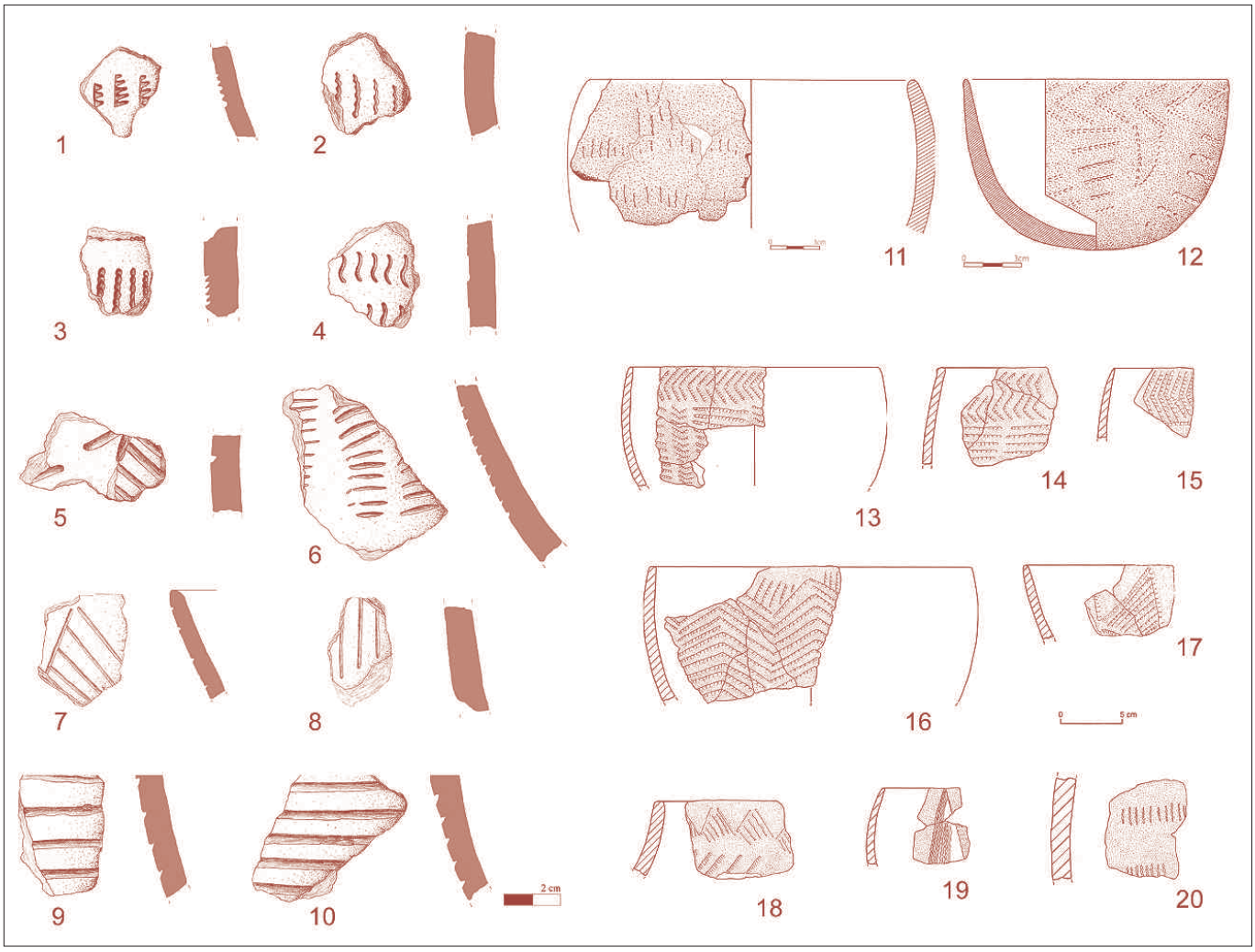

Fig. 2. Ceramics decorated by the technique of "sillon d'impressions", impressed with shell and incised. 1-10: El Barranquet (Esquembre *et al.* 2008); 11-12: Pont de Roque-Haute (Manen & Guilaine 2007); 13-20: Peiro Signado (Manen 2002).

the site in Oliva is similar to that found in other early Neolithic contexts in the French Provence region (Bernabeu *et al.* 2009).

Early Neolithic horizons of Cova de les Cendres (Teulada-Moraira, Marina Alta) (levels XI, IX and X of the sector A) are, like those at Barranquet, ones of intensive exploitation of marine resources. Another characteristic of the first occupation of the cavity is the discovery of several fragments with painted decoration (Bernabeu 1995: 40; Bernabeu & Molina 2009: 82), poorly documented in the classical Cardials contexts and more typical of the forms of southern Italy.

The Cova Ampla del Montgó (Xàbia-Jávea, Marina Alta) could also be related to the contexts given in central Italy from some ceramic fragments with decorative patterns reminiscent of the style known as *linee dentellate* or BPF – Basi-Pienza-Filiestru – (Soler Díaz 2007: 38), a typical style of the Italian coastal basin situated between the Arno and the Tiber and the Tuscan islands that can be distinguished due to decorations of vertical impressions using a shell with jagged edges (mainly Cardium), the so-called *ceramica impressa* style Guadone (Tine 2002), although its presence is also evident in different areas of the western Mediterranean.

However, the timing of ^{14}C is not limited to the initial presence of Neolithic coastal sites, because it also occurs at an early stage in the interior valleys of occupations. This could be considered simultaneous to the beginning of the Neolithic occupation at this point in the Mediterranean coast of the Iberian Peninsula. In this aspect, the level VIII of Cova d'En Pardo (Planes, El Comtat/Condado de Cocentaina), defined by the existence of a hearth with hunting remains, is characterized by the presence of a ceramic vessel with a decoration of imprints made with a simple pointed instrument which allows us to relate it with different Mediterranean regions, especially Liguria. Characteristics of this set allow us to infer the existence of a sporadic presence that must be placed chronologically in the last moments of the first half of the 6th millennium cal BC (Beta-231880: 6660 ± 40 BP; 5626-5558 cal BC). This occupation overlaps another level – VIII – immediately separated from the previous one by

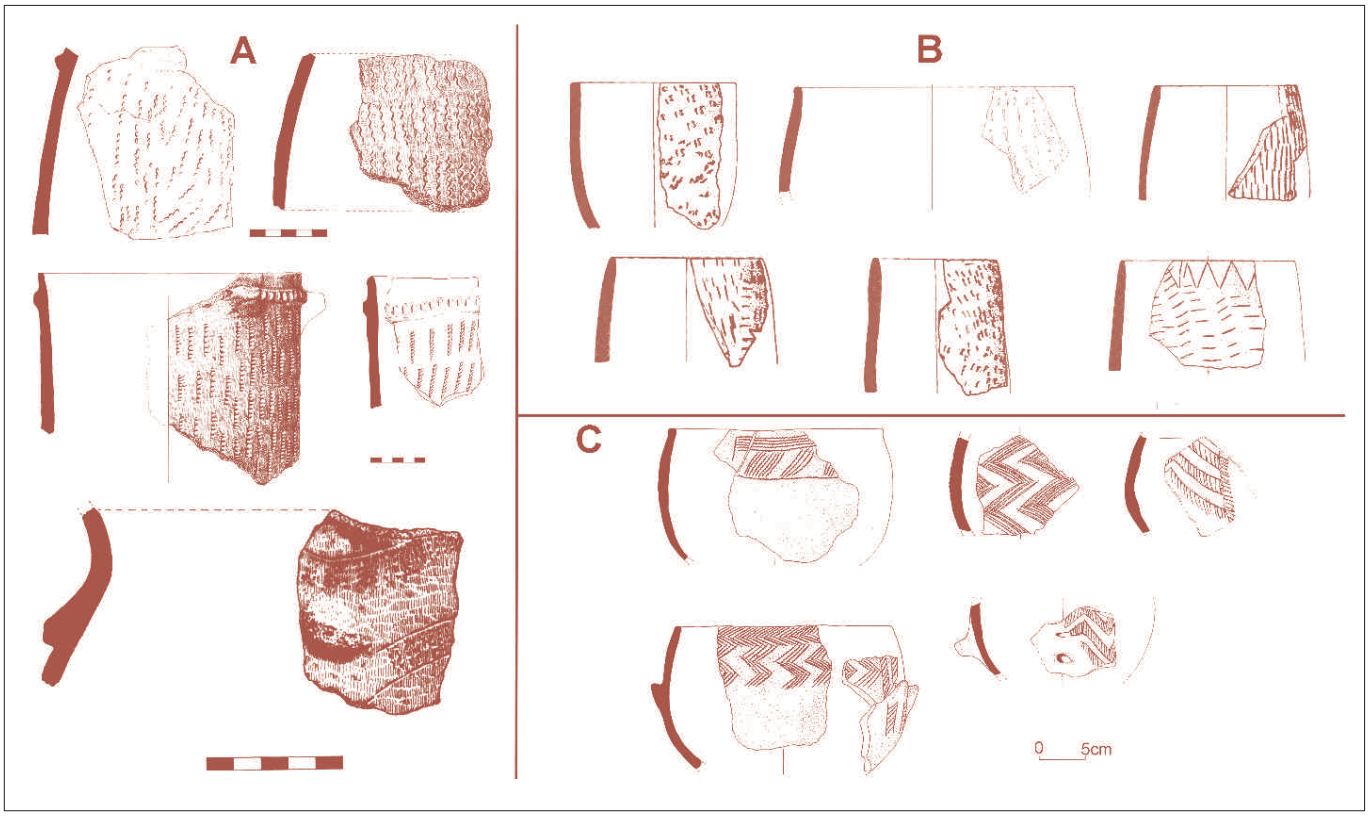

Fig. 3. Ceramics of Cova Ampla del Montgó (A: Esquembre & Torregrosa 2007), *ceramica impressa* style Guadone (B: Tiné 2002) and impressed pottery of the Tyrrhenian (C: Grifoni 2001).

just 50 years, which, given for its ceramic record, should be characterized as Cardial (Soler *et al.* in press).

The presence of evidence before the Cardial Ware, also documented in other caves, as in the case of the Cova de Sarsa (Bocairent-Bocairente, Vall d'Albaida-Valle de Albaida), suggests possible relationships with the *sillon d'impressions* horizon in the Ligurian-Provencal regions (Cortell & García 2007).

However, the current radiocarbon framework does not exclude the presence of pioneers to this coastal sector, because it also occurs in the interior valleys of occupations in that moment; those occupations should be simultaneous or appear immediately after those in the beginning of the Neolithic occupation of the Mediterranean coast of the Iberian Peninsula at this point. The choice of sites in the interior of valleys is supposed to respond to a desire to control those resources in a more assiduous way (in terms of exploitation) by a community with a production economy, always choosing the best land to locate settlements in a stable model of occupation which is reflected perfectly in the area of Les Puntes (Benifallim-Benilloba-Penàguila/Penáguila, L'Alcoià-El Comtat/Hoya de Alcoy-Condado de Cocentaina) (Bernabeu *et al.* 2002, 2003). Currently the pioneering occupation in the center of this ancient

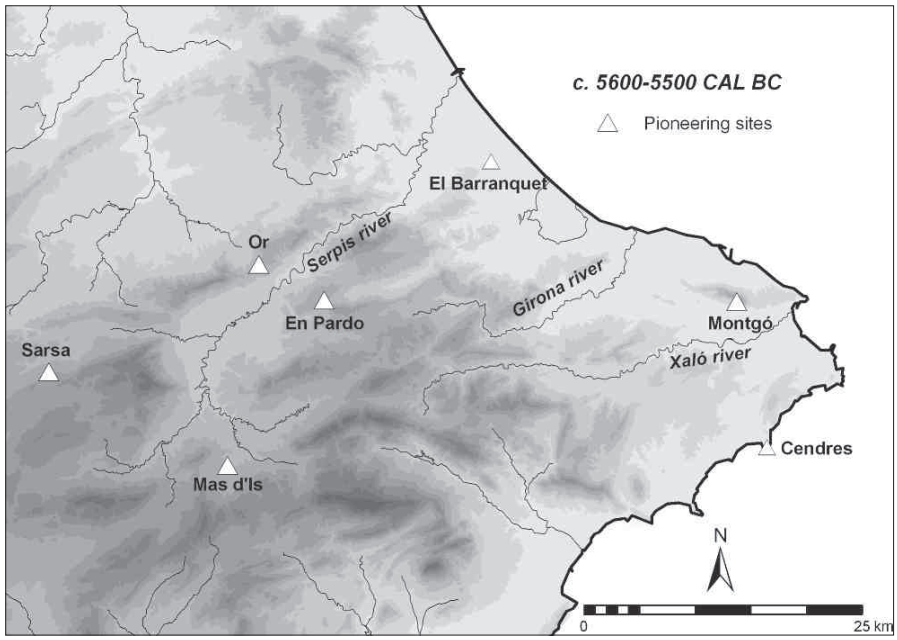

Fig. 4. Location of the archaeological Neolithic sites mentioned in the text linked to the process of pioneering expansion.

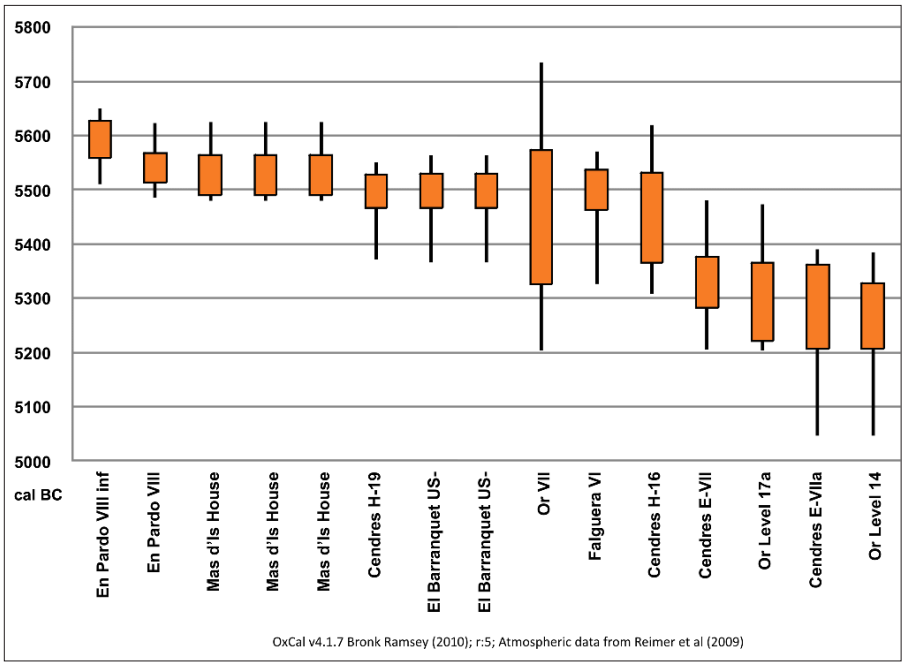

Fig. 5. Radiocarbon cronology for pionner contexts.

The structures recorded on French sites associated with this pioneering phase do not indicate a long occupation (Manen 2002), but more isolated periods of occupation. This pattern can also be seen in the occupation of El Barranquet in Oliva and in some of the domestic structures in Mas d'Is (Houses 1 and 2). The evidence from these sites is closely related to the isolated nature of the pioneering communities which spread to different points of the western Mediterranean around the middle of the 6th millennium BC.

endorheic basin provides evidence for a number of scattered huts that have no tangible physical demarcation; locations that could correspond to structures that would house family units with a degree of self-sufficiency (farms), a conclusion supported by the association with small domestic structures (pits, homes, grinding stones, etc.). This independence can also be inferred from the technological characteristics of ceramics that point, according to analysis of ceramic fragments in House 1 (sector 52; Beta-166727: 6600 ± 50 BP; 5620/5481 cal BC) and House 2 (sector 80; Beta-162092: 6600 ± 50 BP; 5620/5481 cal BC) in Mas d'Is, to fully independent productions that might relate to a system of vertical technology transfer between generations (McClure 2007: 500). Furthermore, the site of Mas d'Is can also be linked to contexts distinguished by the presence of several ceramic fragments decorated with *sillon d'impressions* (Bernabeu *et al.* 2009) that appear in some of the oldest structures (House 1 and Ditch 5) jointly with a typical ceramic of the Cardial horizon.

According to J. Guilaine and C. Manen (2002), the presence in the Ligurian-Provencal region of decorated pottery associated with the different Italian facies of the impressed ware horizon is most likely the result of occasional incursions by sea and of an initial occupation of these sites. This means that there would have been pioneering settlements established ca. 5750-5500 cal BC, at the same time that the facies of impressed potteries in southern Italy were at their point of maximum development, and which probably influenced various areas along the Tyrrenian (Fugazzola 2002), Ligurian (Binder & Maggi 2001; Manen 2000), French Provence coasts (Manen 2002; Guilaine & Manen 2007) and possibly the east coast of the Iberian Peninsula.

THE CONSOLIDATION OF SETTLEMENTS AND TERRITORIES BY NEOLITHIC GROUPS

There is no doubt that once the first farming groups were established in open air sites, a process of demographic growth and consolidation began which brought with it social stabilisation. This is substantiated by the appearance of a series of characteristic elements which reflect the organisation of a defined social territory.

This consolidation can be linked culturally to the Cardial horizon *sensu stricto* (ca. 5500-5300 cal BC) and results from a process of structured demographic expansion. It coincides with a socio-economic system better suited to environmental diversity and a wide range of economic systems. This episode coincided with the development of the Franco-Iberian Cardial group which is defined by the predominance of impressed decorated pottery, followed by applied decorations and occasionally by incised and grooved decoration. There is also a close relationship between large vessels and decorated cordons.

Within the Franco-Iberian region there are certain regional variations characterised by the scarcity of perpendicular impressed decoration using the edge of a shell, which is more representative of the Italian facies and the dominance of impressed decoration using the natis of the *Cerastoderma edule*, primarily seen in the Catalonian and Valencian regions. Decorative impressed motifs appear arranged in well defined bands and are frequently filled with geometric motifs; a decorative syntax that separates the Cardial culture from that of the Italian facies observed within the pioneering episode of the early settlements.

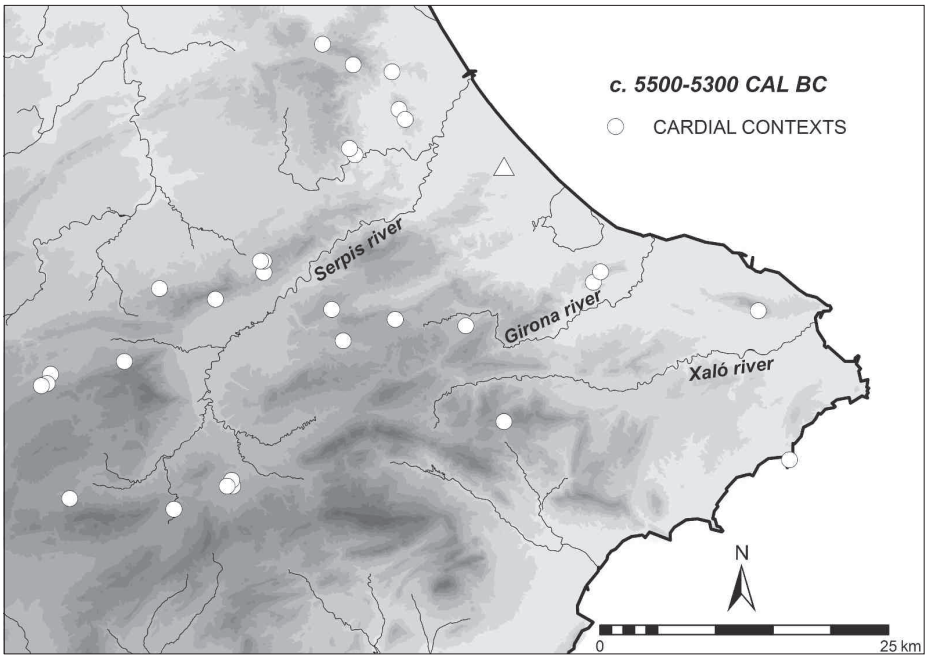

Fig. 6. Location of the archaeological sites with ancient cardial contexts in the central-southern region of Valencia.

According to J. Guilaine and C. Manen (2002), this Cardial horizon is directly associated with the process of consolidation and expansion of the Neolithic period in Provence and Languedoc (France). From the recent findings mentioned earlier, a similar scenario can be considered for the coastal and pre-littoral areas localed in central-south Valencian region. As we have seen in previous works (Garcia 2007, 2009), this expansion probably corresponds with the period when the farming economies in these lands were fully consolidated. The territorial organisation is characterised by a wide range of settlement types on the plains, as well as in the caves which were aimed at the integral management of agricultural and livestock resources, but also for hunting and other resources associated with the seasonal vegetation of the area.

A good example of this process of territorial segregation, strengthening and consolidation is found in the Penáguila valley (the areas of Les Puntes and Els Dubots) which are documented in eight new sites characterized by the presence of Cardial pottery (Molina 2001). This points to the possible existence of various settlement sites in a territory covering approximately 17 km^2. The relationship between these groups is difficult to establish, and they could be understood as just one group which exploited different areas simultaneously or as various family groups which were spread out in the valley. The variety of activities which appear to have been developed in these settlements and the long time period indicated by the monumental ditches at Mas d'Is show stable occupation of these settlement sites. The presence of these monumental ditches has been explained as an element of social aggregation associated with social practices designed to strengthen tribal ties (Bernabeu *et al.* 2003).

The distance between settlements varies, with the nearest sites being 0.5 km apart and the furthest 3 km apart, with a mean distance of 1.07 km. There are also differences in the distribution of the sites. The distance between sites located on the valley floors (where the fertile lands are more abundant and of better quality) is constant, around 0.5 km. Whereas the settlement sites located on the sides or in the upper areas of the valleys are further apart, about 2 km. This is where potentially cultivable lands are less abundant and it coincides with the pioneering Neolithic phase suggested by Gallay (1989), which is also observed in Catalonia (Mestres 1992).

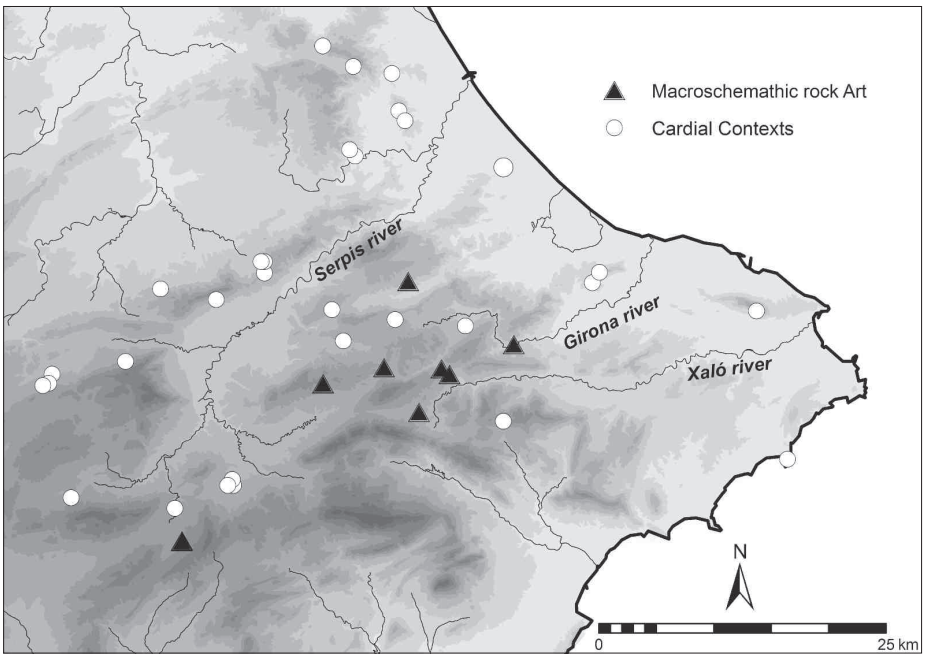

Fig. 7. Location of the archaeological sites with ancient cardial contexts in the central-southern region of Valencia and the sites with Macroschematic rock Art.

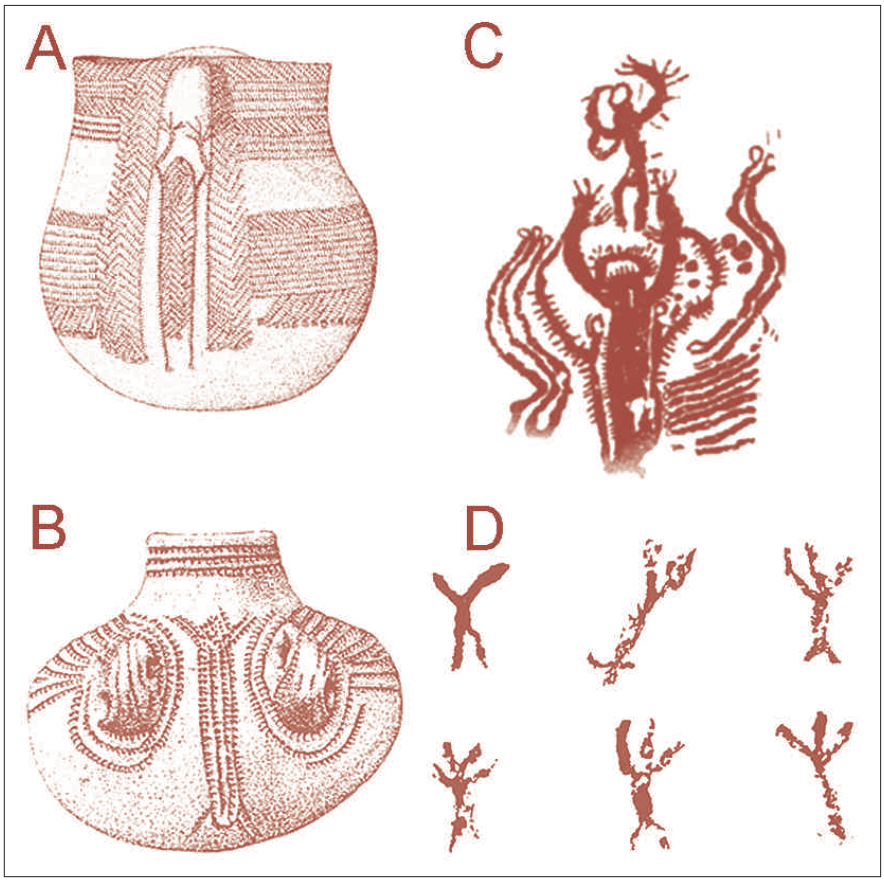

Fig. 8. Macroschematic Art. A: Impressed cardial ceramic from Cova de l'Or (Martí & Hernández 1988); B: Anthropomorphic figure in prayer position in rock art (Pla de Petracos; Hernández *et al.* 1988). Schemathic Art. C: Impressed cardial ceramic from Cova de l'Or (Martí & Hernández 1988); D: Anthromorphic motifs of a double "Y" (Abric de Benialí; Hernández *et al.* 1988).

To sum up, there are a number of indicators which allow us to propose that the effective occupation of the Valencian lands occurred during the first centuries of second half of the 6th millennium BC. This occupation began with the process of segregation and territorial expansion in the lands between the Serpis and Algar rivers with the aim of consolidating a social entity based on agricultural subsistence. These indicators include: the construction of the large ditches at Mas d'Is, which span a considerable period of time; the increase in the number of sites with Cardial pottery within the initially occupied territories; the use of caves for burial practices; and the development of a series of unique artistic manifestations such as Macroschematic and Schematic rock art.

The analysis of the spatial distribution of Macroschematic and Ancient Schematic Art has indicated that both appear to be closely associated with the territorial expansion of the pioneering production economy groups. In this respect, the distribution of Macroschematic Art and some Schematic Art motifs (especially the anthromorphic motifs of a double "Y", the sun and lineal branch motifs, representations that have their parallels in the Cardial pottery) appear to define an area within the initial Cardial territory (Hernández, Ferrer & Catalá 1988; Torregrosa 2001), located among Benicadell, Aitana and Mariola mountain ranges (Martí & Juan 1987).

Therefore, we propose that there was an initial nuclear zone – the pioneering phase – which probably coincided with the area defined by the limits of the distribution of Macroschematic Art. This area probably increased in size later – the Neo-pioneering phase – to include the lands between the sources of the Clariano, Serpis and Algar rivers and the Mediterranean Sea. In this way, Schematic Art, including portable art as well as rock art, could be considered as another indicator which, together with other material culture evidence, can be used to define the territory where the pioneering groups were consolidated (Torregrosa & Galiana 2001; Fairen 2004, 2006).

THE NEO-PIONEERING EXPANSION AND COLONISATION TOWARDS SOUTHERN AREAS

At the end of the 6th millennium BC (5300-4900 cal BC, Epicardial Neolithic), at the same time as the episode of settlement strengthening and territorial consolidation by the producing groups established in the initially colonised river basins, a certain homogeneity can be observed in the archaeological record.

As indicated by the archaeological record and chronologically documented, the various structures in Mas d'Is (Bernabeu *et al.* 2003, 2006), were joined by the construction of Ditch 4 about 300/400 years later (ca. 5050 cal BC) which seems to have a relation of concentricity with Ditch 5, which at present appears to be partially clogged. This horizontal stratigraphy would indicate that the outer ditch (4) inherited the social function of the former. The amount of recognized evidence of the final centuries of the 6th millennium BC increases on the surface over the previous periods. This evidence, now characterized by the presence of incised and printed pottery, is available throughout the Penáguila river valley. This is recorded in the areas initially occupied, as well as in those located more to the south of the Serpis valley. The empirical base currently available suggests that there are

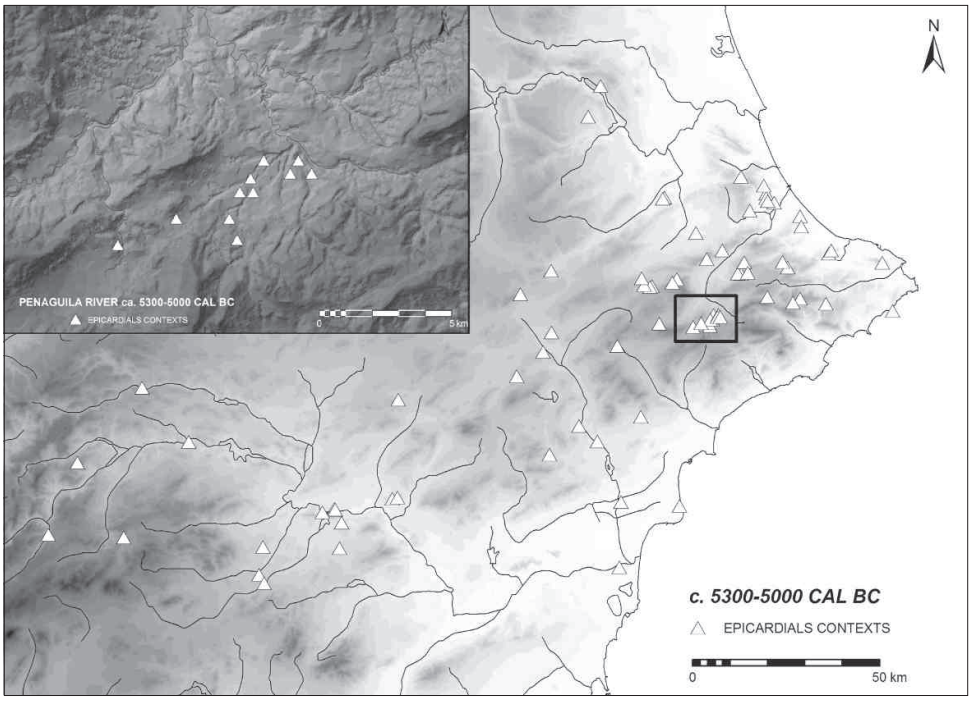

Fig. 9. Localisation of the archaeological sites with epicardials contexts in the Mediterranean central area of the Iberian Peninsula.

two distinct ways in which the colonisation of the river basins located to the south of the Serpis river could have occurred.

The first way is corroborated by the sites located in the Villena basin and also in those close to the main nucleus of farming communities. In these areas it has been traditionally considered that contacts between Neolithic Cardial groups and local Epipaleolithic groups with a Tardenoisian industry existed. However, and as shown by J. Juan-Cabanilles and B. Martí (2002), the sites of Casa de Lara and Arenal de la Virgen were probably reoccupied by farming groups during the expansion phase from the original nucleus. This assertion is supported by the absence of elements for Recent Mesolithic Phase C (6000-5500 cal BC) at these sites, a fact which would invalidate the proposal neolithisation process of the last hunter-gatherers of the Upper Vinalopó valley. This is indicated by the abundance of incised and relief decorated pottery, tool impressed wares and combed decorated wares, in contrast to the limited quantities of Cardial pottery recorded. This pottery evidence from later phases in the ancient Neolithic sequence, together with a significant number of "Jean Cros" trapezoids, arrows points exclusive to the ancient Neolithic Cardial. This is a process similar to that seen on sites in the Serpis river basin where a technological and temporal hiatus between the Recent Mesolithic and Neolithic occupations has been recorded.

The second way is indicated by sites without evidence of earlier geometric Mesolithic occupation, and which therefore may have been created *ex novo* during the colonisation of these new lands in the Valencian region (Guilabert *et al.* 1999; Soler & López 2000/2001; García 2007) and the south-east Iberian Peninsula (Martínez 1994; Salmerón 1999). Studies of these sites, including the relief and incised-impressed decorated wares, as well as the available dates (Colon: Beta 227572: 6390 ± 40 BP, 5470/5330 cal BC 1σ, García *et al.* 2006; Abrigos del Pozo: I-16783: 6260 ± 120 BP, 5360/5050 cal BC 1σ, Martínez 1994), suggest that they date to the last centuries of the 6th millennium BC. The expansion process from the pioneering zones coincides with a considerable increase in the number of settlements located near the initial Neolithic settlements that have been discussed earlier.

Therefore, the effective colonisation of the river basins situated to the south of the consolidated pioneering area nucleus had already taken place by the beginning of the 5th millennium BC. It is apparent that the process of expansion and colonisation of new lands took place along the natural corridors which communicated with the interior Meseta area and the south-east of the Iberian Peninsula. The lands were colonised from the upper Clariano river to the south-west following the Vinalopó and the Yecla/Jumilla corridor.

This process of expansion probably occurred in a similar way in areas even further away, such as the basin of Segura river and the source of the Mundo-Segura river. The colonisation also took place in the opposite direction, towards the south-south-east, along the Vinalopó valley (Hernández 1997) to its estuary and continuing towards the lower fertile plains of the Segura river. This process also took place from the source of the Montnegre river towards the Campo de Alicante as well as from the source of the Penáguila river along La Torre valley.

The new sites recorded in the Vinalopó, Montnegre and Segura river basins, along the Yecla-Jumilla corridor, are situated within the space of a number of kilometres from each other, and they occupy the different lower areas of the river basins. They are located in places with abundant water resources and great agricultural potential; therefore they tried to minimize the risks of poor harvests, to reduce the investment of labour required for agricultural tasks and to repeat the model of settlement

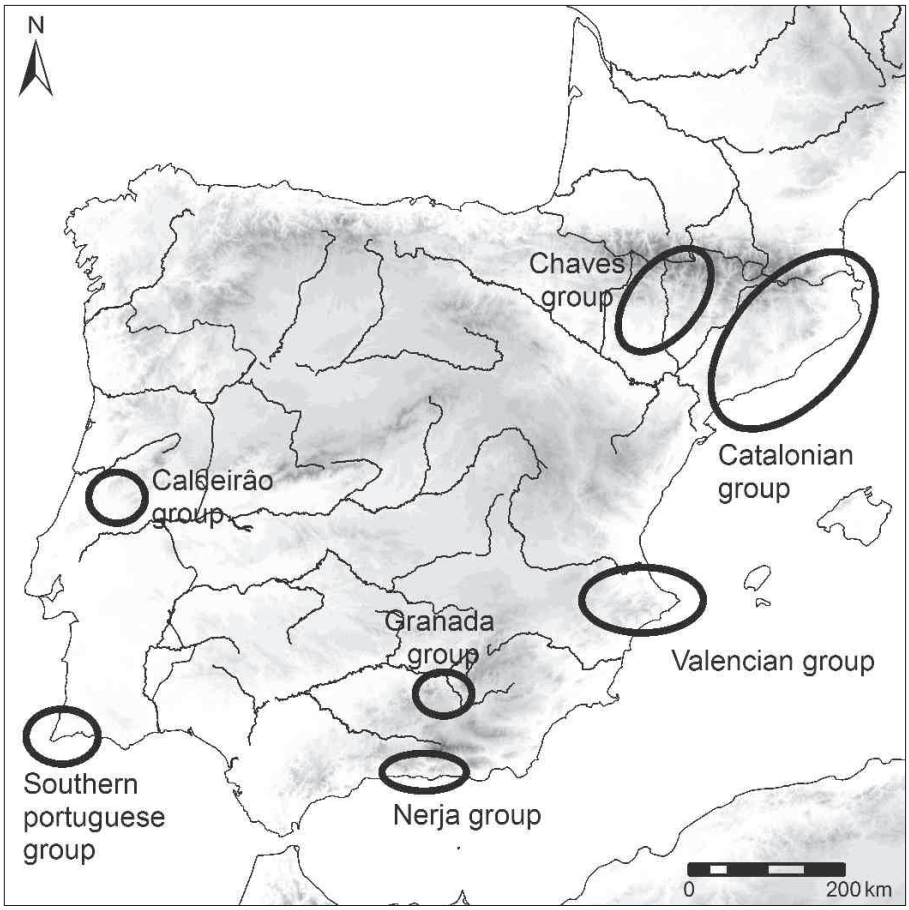

Fig. 10. Localisation of ancient Neolithic groups in the Iberian Peninsula.

and establishment which occurred in the initially colonised territories.

CONCLUSIONS

The data presented fit the idea of a progressive process of establishment and segregation of extended family communities that occupied the best lands preferentially to develop agricultural practices, but without implying that their economy was based solely on the development of an agrarian economy. Perhaps, the most significant aspect is the effective colonisation of the valley floor areas but with a much lower demographic density in the valley margins. The archaeological record currently has two ways to understand the Valencian central regions and, by extension, the Mediterranean area of the Iberian Peninsula.

On the one hand, it could be a pioneering settlement related to elements of the Tyrrhenian area and/or Ligurian coast later evolving an independent and native Cardial horizon in each area. This option, which is supported by the evidence of El Barranquet will require the dating of a larger number of archaeological contexts to be confirmed. However, it is true that this settlement could be a unicum within a more extensive and complex area characterized by the polymorphism of the first Neolithic horizon in which different groups could intervene with cultural roots without being homogeneous at all.

On the other hand, it also considers a settlement linked to the Cardial horizon of the Provencal region in which cultural elements are maintained (i.e. *sillon d'impressions*) reflecting its central Mediterranean roots. The presence of Ligurian elements within the Cardial complex in stratified contexts relegates these intrusive elements to mere cultural memories associated with Franco-Iberian Cardial traditions. Moreover, lithic production in early Neolithic contexts of the Iberian Peninsula has obvious similarities with the Cardial contexts in western Languedoc and Provence, and shows clear differences with the Tyrrhenian contexts. Regardless, it is clear that the neolithisation from the east of the Iberian Peninsula is related to an arrhythmic expansion phenomenon, probably with its origin in different sources.

After this deployment of pioneering occupations, characterized by multi-functional tasks and linked to the natural environment to minimize the inherent risks to the farming economy which was unconsolidated territorially or demographically, each of the Cardial Neolithic groups would have developed independently as evidenced by the differences observed in the archaeological records of the different Cardial areas: Valencian group (Serpis basin) Catalonian group (Vallés-Panadés plains with probable extension into the Gironés and Roussillon) and Chaves group (prepirinean region of Huesca) that have their own characteristics, but always with common elements of the Cardial Neolithic. Similar to the independence of these Cardial areas, other significant differences can be found, as in the presence of the unique Valencian ceramic shapes (handle-spout, barrels, double cups, cylindrical flat bottom) (Willigen 2004: 476), but also the extraordinary baroque decorations of Cardial pottery in the Serpis area, which represents its best display of figurative motifs (Martí & Hernández 1988), or the development in this same region of Macroschemathic rock Art (Hernández 2003), an artistic horizon common in the central Valencian region and that has no analogies in other areas of Cardial introduction.

During the final years of the 6th millennium cal BC, the same strategy of occupation and exploitation of the territory was still used, but there were significant changes that resulted in an expansion of settlements outside the nuclear area of the Penáguila valley. Thus, in this moment, coinciding with the abandonment of Ditch 4 of Mas d'Is, there were profound changes that resulted in an expansion of settlements outside the nuclear area of the Penáguila basin and there was also more diversity in the pattern of settlements. The locations around the Penáguila river are not anymore the only known Neolithic presence, although there is still evidence of them, as demonstrated by the reuse of the land formerly occupied by the ditches and the presence of a series of excavated structures that have been interpreted as palisades (Bernabeu *et al.* 2006).

During these times (Epicardial Neolithic; ca. 5300-4900 cal BC) this proliferation of settlements out of the Penáguila basin could be the response to the segmentation of the different housing units settled in the valley, due to the growth of the population and/or the need for extra systems of fields. But this segregation is not a complete break from the model of occupation and of land management observed so far. The sites detected outside Penáguila replicate the system known until now, that is, they occupied areas closely linked to water resources. This obvious following of the settlement pattern suggests a continuation of the agricultural methods and of the production system.

In the final moments of the 6th millennium cal BC changes can also be seen in the functionality and the seasonality of several caves or rock shelters, although they may represent more an intensification of the occupation than a change. Several fields that were previously used as places of habitat, sporadic occupations or shelters had transformed intensity of occupation, becoming pens for livestock.

Thus, the decrease in Cardial pottery, the abandonment of the monumental ditches of Mas d'Is and the disappearance of the Macrosquemathic rock Art are clear evidence of the breakdown of social patterns established after the initial unity and the loss of traits crucial in the identity of the Cardial society.

Acknowledgements

Translation by Maite Martínez García.

About the authors

Gabriel García Atiénzar (G.Garcia@ua.es) is an Assistant Professor at the Department of Prehistory, Archaeology and Ancient History, University of Alicante, Spain. A Doctor in History (Prehistory), he specializes in the study of early farming communities in the eastern Mediterranean, especially in the east of the Iberian Peninsula. His main research is on the process of establishment and growth of the early Neolithic groups in the Iberian Peninsula and the analysis of patterns of occupation and exploitation of the territory through the use of GIS.

Francisco Javier Jover Maestre is a Professor at the Department of Prehistory, Archaeology and Ancient History, University of Alicante, Spain. A Doctor in History (Prehistory), he specializes in the study of societies of the Bronze Age in the east of the Iberian Peninsula. His main research focuses on the analysis of lithic production and observation of the processes of emergence of social inequalities between the fifth and the second millennium cal BC.

REFERENCES

Alexander, J. 1978. Frontier studies and the earliest farmers in Europe, in *Social Organisation and Settlement*, eds. D. Green, C. Haselgrove & M. Spriggs. British Archaeological Reports, International Series 47(1), pp. 13-29. Oxford.

Ammerman, A.J. & L.L. Cavalli-Sforza.

— 1973. A population model for the diffusion of early farming in Europe. In *The explanation of Culture Change: Models in Prehistory*, ed. C. Renfrew, pp. 343-357. Gloucester Crescend: Duckworth.

— 1984. *The Neolithic transition and the genetics of population in Europe*. Princeton: Princeton University Press.

Barton, C.M., J. Bernabeu, J.E. Aura, O. García Puchol & N. La Roca. 2002. Dynamic landscapes, artifact taphonomy, and land use modeling in the western Mediterranean. *Geoarchaeology* 17: 155-190. <http://onlinelibrary.wiley.com/doi/10.1002/gea.10008/pdf>.

Barton, C.M., J. Bernabeu, J.E. Aura, O. García Puchol, S. Schmich & L. Molina. 2004. Long-term socioecology and contingent landscapes. *Journal of Archaeological Method and Theory* 11: 253-295.

Bernabeu, J. 1996. Indigenismo y migracionismo. Aspectos de la neolitización en la fachada oriental de la Península Ibérica. *Trabajos de Prehistoria* 53(2): 51-65.

Bernabeu, J., L. Molina, M.A. Esquembre, J.R. Ortega & J.D. Boronat. 2009. La cerámica impresa mediterránea en el origen del Neolítico de la Península Ibérica. En *De Méditerranée et d'ailleurs... Mélanges offerts à Jean Guilaine*, pp. 83-95. Toulouse: Archives d'Écologie Préhistorique.

Bernabeu, J., L. Molina, A. Díez & T. Orozco. 2006. Ine-

qualities and power. Three millennia of Prehistory in Mediterranean Spain (5600-2000 cal BC), in *Social inequality in Iberian Late Prehistory*, eds. P. Díaz-del-Río & L. García. British Archaeological Reports, International Series 1525, pp. 97-131. Oxford.

Bernabeu, J., T. Orozco, A. Díez, M. Gómez & F. J. Molina. 2003. Mas d'Is (Penàguila, Alicante): aldeas y recintos monumentales del neolítico inicial en el valle del Serpis. *Trabajos de Prehistoria* 60(2): 39-59. <http://tp.revistas.csic.es/index.php/tp/article/view/80/80>.

Binder, D. & R. Maggi. 2001. Le Néolithique ancien de l'arc liguro-provençal. *Bulletin de la Société Préhistorique Française* 98 (3): 411-422. <http://dx.doi.org/10.3406/bspf.2001.12528>.

Bogucki, P. 2000. How agriculture came to north-central Europe. In *Europe's First farmers*, ed. T.D. Price, pp. 197-218. Cambridge: Cambridge University Press.

Bronk Ramsey, C. 2009. Bayesian analysis of radiocarbon dates. *Radiocarbon* 51(1): 337-360.

Esquembre, M.A., J.D. Boronat, F.J. Jover, F.J. Molina, A. Luján, J. López, R. Martínez, P. Iborra, C. Ferrer, R. Ruiz & J.R. Ortega. 2008. El yacimiento neolítico del Barranquet (Oliva). In *IV Congreso del Neolítico de la Península Ibérica (Alicante, 2006)*, pp. 217-230. Alicante: MARQ.

Fairén, S.

— 2004. Rock art and the transition to farming. The Neolithic landscape of the central Mediterranean coast of Spain. *Oxford Journal of Archaeology* 23(1): 1-19.

— 2006. *El paisaje de la neolitización: arte rupestre, poblamiento y mundo funerario en las comarcas centro-meridionales valencianas*. Alicante: Servicio de Publicaciones, Universidad de Alicante.

Fernández, J. 1999. *El yacimiento prehistórico de Casa de Lara, Villena (Alicante). Cultura material y producción lítica*. Villena: Fundación José María Soler.

Fortea, J. 1973. *Los complejos microlaminares y geométricos del Epipaleolítico mediterráneo español*. Salamanca: Universidad de Salamanca.

Fugazzola, M.A. 2002. Le facies a ceramica impresa dell'area medio-tirrenica. In *Le ceramiche impresse nel Neolitico antico. Italia e Mediterraneo*, eds. M.A. Fugazzola, A. Pessina & V. Tiné, pp. 97-116. Roma: Istituto Poligrafico.

Gallay, A. 1989. La place des Alpes dans la néolithisation de l'Europe. In *Néolithisations*, eds. A. Aurenche & J. Cauvin. British Archaeological Reports, International Series 516, pp. 227-254. Oxford.

García Atiénzar, G.

— 2004. *Hábitat y territorio. Aproximación a la ocupación y explotación del territorio en las comarcas centro-meridionales valencianas durante el Neolítico Cardial*. Villena: Fundacion José María Soler.

— 2006. Abrigos, valles y pastores. Análisis espacial del paisaje pastoral en tierras centro-meridionales valencianas. In *La Aplicación de los SIG en la Arqueología del Paisaje*, ed. I. Grau, pp. 149-170. Alicante: Universidad de Alicante. <http://gabrielgarciaatienzar.files.wordpress.com/2009/02/12-garcia-atienzar.pdf>.

— 2007: *La neolitización del territorio. El poblamiento neolítico en el área central del mediterráneo español*. Alicante: Universidad de Alicante. <http://rua.ua.es/dspace/handle/10045/7752>.

— 2009. *Territorio Neolítico. Las primeras comunidades campesinas en la fachada oriental de la Península Ibérica (ca. 5600-2800 cal BC)*. British Archaeological Reports, International Series 2021. Oxford.

García, G., F.J. Jover, C. Ibáñez, C. Navarro & D. Andrés. 2006. El yacimiento neolítico de la Calle Colón (Novelda). *Recerques del Museu d'Alcoi* 15: 19-28. <http://www.raco.cat/index.php/RecerquesMuseuAlcoi/article/viewFile/172605/224957>.

García, O. & J.E. Aura, eds. 2006. *El abric de la Falguera (Alcoi, Alacant). 8.000 años de ocupación humana en la cabecera del río de Alcoi*. Alcoy: Ayuntamiento de Alcoy.

García, O. 2005. *El proceso de neolitización en la fachada mediterránea de la Península Ibérica. Tecnología y tipología de la piedra tallada*. British Archaeological Reports, International Series 1430. Oxford.

Guilabert, A.P., F.J. Jover & J. Fernández. 1999. Las primeras comunidades agropecuarias del río Vinalopó (Alicante). In *II Congrés del Neolític a la Península Ibèrica*. Saguntum-PLAV, Extra 2, pp. 283-290.

Guilaine, J. & C. Manen. 2002. La ceramica impressa della Francia meridionale. In *Le ceramiche impresse nel Neolitico antico. Italia e Mediterraneo*, eds. M.A. Fugazzola, A. Pessina & V. Tine, pp. 37-49. Roma: Istituto Poligrafico.

Hernández, M.S. 1997. Agua, río, camino y territorio. A propósito del Vinalopó. In *I Congreso de Estudios del Vinalopó (Petrer, 1997)*, pp. 17-34. Petrer: Centre d'Estudis Locals.

Hernández, M.S., P. Ferrer & E. Catalá. 1988. *Arte rupestre en Alicante*. Alicante: Banco Exterior.

Juan, J. & B. Martí. 2002. Poblamiento y procesos culturales en la Península Ibérica del VII al V milenio a. C. *Saguntum*, Extra 5, pp. 45-87.

Manen, C.

— 2000. Implantation de faciès d'origine italienne au Néolithique ancien: l'exemple des sites liguriens du Languedoc. In *Rencontres meridionales de Préhistoire récente. Troisième session*, pp. 35-42. Toulouse: Éditions Archives d'Écologie Préhistorique.

— 2002. Structure et identité des styles céramiques du Néo-

lithique ancien entre Rhône et Ebre. *Gallia Préhistoire* 44: 121-165. <http://dx.doi.org/10.3406/galip.2002.2033>.

— 2007. La production céramique de Pont de Roque-Haute: Synthèse et comparations. In *Pont de Roque-Haute. Nouveaux regards sur la néolithisation de la France Méditerranéenne*, J. Guilaine *et al.*, pp. 151-166. Toulouse: Archives d'Écologie Préhistorique.

MARTÍ, B. & M.S. HERNÁNDEZ. 1988. *Neolític valencià. Art rupestre i cultura material*. Valencia: Diputación de Valencia.

MARTÍ, B. & J. JUAN.

— 1987. *El Neolític Valencià. Els primers agricultors i ramaders*. Valencia: Diputación de Valencia.

— 1997. Epipaleolíticos y neolíticos: población y territorio en el proceso de neolitización de la Península Ibérica. *Espacio, Tiempo y Forma*. Serie I, 10: 215-264.

MARTÍNEZ, C. 1994. Nueva datación de C-14 para el Neolítico de Murcia: Los Abrigos del Pozo (Calasparra). *Trabajos de Prehistoria* 51(1): 157-161

MAZURIÉ, K. 2003. *Genèse et diffusion de l'agriculture en Europe*. Paris: Ed. Errance.

MESTRES, J. 1992. Neolitització i territori. In *Estat de la investigació sobre el Neolític a Catalunya, 9è Col·loqui Internacional d'Arqueologia de Puigcerdà (1991)*, ed. M. Cura-Morera, pp. 72-75. Andorra: Institut d'Estudis Ceretans.

MOLINA, F.J. 2001. Nuevas aportaciones al estudio del poblamiento durante el Neolítico I en el área oriental de las comarcas de l'Alcoià y El Comtat (Alicante). *Recerques del Museu d'Alcoi* 11-12: 27-56. <http://www.raco.cat/index.php/RecerquesMuseuAlcoi/article/viewFile/175579/227930>.

PRICE, T.D. 2003. The arrival of agriculture in Europe as seen from the North. In *Migrations in prehistory. The Neolithic Transition in Europe: Looking Back, Looking Forward*, ed. R.H. Thompson, pp. 273-294. Boston: Academic Institute of Archaeology.

PRICE, T.D., R.A. BENTLEY, J. LUNING, D. GRONENBORG & J. WAHL. 2001. Prehistoric human migration in the Linearbandkeramik of Central Europe. *Antiquity* 75: 593-603. <http://antiquity.ac.uk/ant/075/Ant0750593.htm>.

ROJO-GUERRA, M.A., M. KUNST, R. GARRIDO & I. GARCÍA. 2006. La neolitización de la Meseta Norte a la luz del C-14: análisis de 47 dataciones absolutas inéditas de dos yacimientos domésticos del Valle de Ambrona, Soria, España. *Archivo de Prehistoria Levantina* 26: 39-100. <http://www.museuprehistoriavalencia.es/resources/files/APL/APL26/APL26.pdf>.

ROSSER, P. 2007. *Tossal de les Basses. Seis mil años de historia de Alicante*. Alicante: COPHIAM.

SALMERÓN, J. 1999. La cueva-sima de La Serreta (Cieza). Santuario de arte rupestre, hábitat neolítico y refugio tardorromano. *Memorias de Arqueología* 8: 140-154. <http://www.arqueomurcia.com/archivos/publicaciones/memo08/09SERRET.PDF>.

SARMIENTO, G. 1992. *Las primeras sociedades jerárquicas.* Colección Científica 246. México: INAM.

SOLER, J. & J.A. LÓPEZ. 2001. Nuevos datos sobre el poblamiento entre el Neolítico y la Edad del Bronce en el sur de Alicante. *Lucentum* XIX-XX: 7-26. <http://publicaciones.ua.es/filespubli/pdf/02132338RD11518500.pdf>.

TORREGROSA, P. 2001. Pintura rupestre esquemática y territorio: análisis de su distribución espacial en el Levante peninsular. *Lucentum* XIX-XX: 39-64. <http://publicaciones.ua.es/filespubli/pdf/02132338RD16296182.pdf>.

TORREGROSA, P. & F. GALIANA. 2001. El arte esquemático del Levante peninsular: una aproximacion a su dimensión temporal. *Millars, Espai i Història* 24: 153-198.

TORREGROSA, P. & E. LÓPEZ, EDS. 2004. *La Cova Sant Martí (Agost, Alicante)*. Alicante: MARQ.

VARGAS, I. 1988: La formación económico-social tribal. *Boletín de Antropología Americana* 15: 15-27.

WILLIGEN, S. VAN. 2004. Aspects culturels de la néolithisation en Méditerranée occidentale: le Cardial e l'Epicardial. *Bulletin de la Société Préhistorique Française* 101(3): 463-495. <http://dx.doi.org/10.3406/bspf.2004.13028>.

ZILHÃO, J. 2001. Radiocarbon evidence for maritime pioneer colonization at the origins of farming in west Mediterranean Europe. *Proceedings of the National Academy of Sciences* 98(24): 14180-14185. <http://dx.doi.org/10.1073/pnas.241522898>.

ZVELEBIL, M. 2000. The social context of the agricultural transition in Europe. In *Archaeogenetics: DNA and the Population Prehistory of Europe*, eds. C. Renfrew & K. Boyle, pp. 57-79. Cambridge: McDonald Institute for Archaeological Research.

ZVELEBIL, M. & M. LILLIE. 2000. *Transition to agriculture in eastern Europe*. In *Europe's First Farmers*, ed. T.D. Price, pp. 47-92. Cambridge: Cambridge University Press.

© 2011 ARQUEOLOGÍA IBEROAMERICANA 10: 30–42. ISSN 1989–4104. http://www.laiesken.net/arqueologia/.

THE MOCHE BOTANICAL FROG

Donna McClelland †

Moche Archive, University of California at Los Angeles, USA

ABSTRACT. *Plants and animals with features which identify them as supernaturals characterize the art of the Precolumbian Moche culture of northern Peru. Among these animals is a frog with feline attributes and a consistent association with manioc tubers, stalks, and plants, the Botanical Frog. The Botanical Frog appears to have been patterned on* Leptodactylus pentadactylus. *It is shown copulating with felines. Fine line painted vessels and ones with low relief decoration show the Botanical Frog performing as part of a ritual involving other animals and cultivated crops, suggesting that the Botanical Frog was associated with agriculture.*

KEYWORDS. *Peru, Moche, agricultural rituals, supernatural animals, frogs, manioc.*

Received: *25-1-2011*. ***Accepted***: *6-3-2011*. ***Published***: *30-6-2011*.

TÍTULO. *La rana botánica mochica.*

RESUMEN. *El arte de la cultura mochica de la costa norte del Perú presenta plantas y animales mostrando rasgos sobrenaturales. Uno de los animales es una rana con elementos felinos y asociada con tubérculos, ramas y plantas de yuca. La Rana Botánica probablemente tiene su origen en* Leptodactylus pentadactylus, *una rana carnívora de la selva amazónica. La Rana Botánica copula con felinos y, en vasijas pintadas con líneas finas o con escenarios representados en bajorrelieve, toma parte en ceremonias involucrando a otros animales y cosechas domésticas. Parece ser que la Rana Botánica era un ser sobrenatural asociado con la agricultura.*

PALABRAS CLAVE. *Perú, mochica, ritos agrícolas, animales sobrenaturales, ranas, yuca.*

The Moche people of the north coast of Peru (ca. AD 200-800) are noted for realism in their art. They are also noted for their portrayal of a complex supernatural world inhabited by anthropomorphic and zoomorphic mythical beings. Although the mythical beings seem alien, they are created with elements taken from humans, animals, and plants. One of these composite creatures is the Botanical Frog. The elements that compose this supernatural creature were identified by studying three-dimensional ceramic sculptures portraying the creature. Using these elements, the Botanical Frog can be identified in two different scenes portrayed in fine line drawing and low relief. There are 24 modeled Botanical Frogs in the sample. The Archive of Moche Art at the University of California, Los Angeles is the primary data source used in this study.

IDENTIFYING THE BOTANICAL FROG

The Botanical Frog is a composite of different animals and plants (fig. 1). Although many Moche deities are combinations of a single animal and a fruit—e.g., owl/gourd, bird/squash, crab/manioc, and snake/corn or snake/gourd—only the Botanical Frog is a combination of multiple plants and animals. The morphological features of frogs and plants are the most prominent. All frogs and toads belong to the order Anura and are called Anurans. Toads are members of the family *Bufondae*, but may be called frogs in a broad sense. Although all toads are frogs, not all frogs are toads (Duellman & Trueb 1986: 2). I use the general term, frog, to refer to Moche depictions of Anurans.

When the Botanical Frog is compared with a Moche naturalistic frog (fig. 2), it is evident that some features, such as the nose, are feline (fig. 3). The Botanical Frog's front legs are straight and frequently striped (fig. 1), suggesting that they are also feline. Curved feline ears are often added. Some modeled Botanical Frogs (Kutscher 1954: fig. 43 D; Lehmann 1975: plate 62)—this Botanical Frog was identified as a tortoise by Lehmann (1975: 61), probably because of its clawed feet and the carapace appearance of the manioc fruit covering its back—have pelage markings on their bodies and claws on their feet, further showing the frog-feline blend of this mythical creature. Rafael Larco Herrera (1948: 44) noted the plant/frog/feline blend of the Botanical Frog in his description, "*... la divinidad agrícola —el sapo jaguar...*" (the

Fig. 1. A Botanical Frog combines many natural and supernatural attributes. Museo de Arqueología, Universidad Nacional de Trujillo. Photograph by Christopher B. Donnan.

agricultural deity—the toad-jaguar). The broad-banded mouth of the Botanical Frog is distinctive and is a primary identifier of the creature. Sometimes it is unnaturally filled with teeth (fig. 4), and in a few rare examples they are fanged like those of other supernatural beings (fig. 5).

The Botanical Frog's body incorporates or is adorned with a composite of plants. All representations have elongated tubers of manioc (*Manihot esculenta*), the other primary identifier, hanging from the rear of the frog. A stalk of manioc frequently forms the frog's spine on modeled pieces (figs. 1, 5). They are similar to those on the manioc deity (see Donnan 1978: fig. 234). Not all Moche representations of frogs can be identified because some are too stylized and some are without markings. Occasionally, the Botanical Frog has manioc stalk "horns" projecting from the top of its head (fig. 5). Tubers sometimes appear out of the corner of its mouth (fig. 6).

A variety of plants and fruits can adorn the sides of the Botanical Frog, including stalks or ears of corn (figs. 1, 6). Although it is difficult to identify some of the plants, those we can identify are food plants. As early as 1916 Seler (192, fig. 16) noted the frog/agriculture aspects of a modeled Botanical Frog, "*... procurador de los alimentos...*" (procurer of foodstuffs). This is a common association since frogs are related to agriculture in cultures all over the world. The reproduction of most frogs is related to temperature, humidity, and the availability of water

Fig. 2. A Moche naturalistic frog. Private Collection. Photograph by Donald H. McClelland.

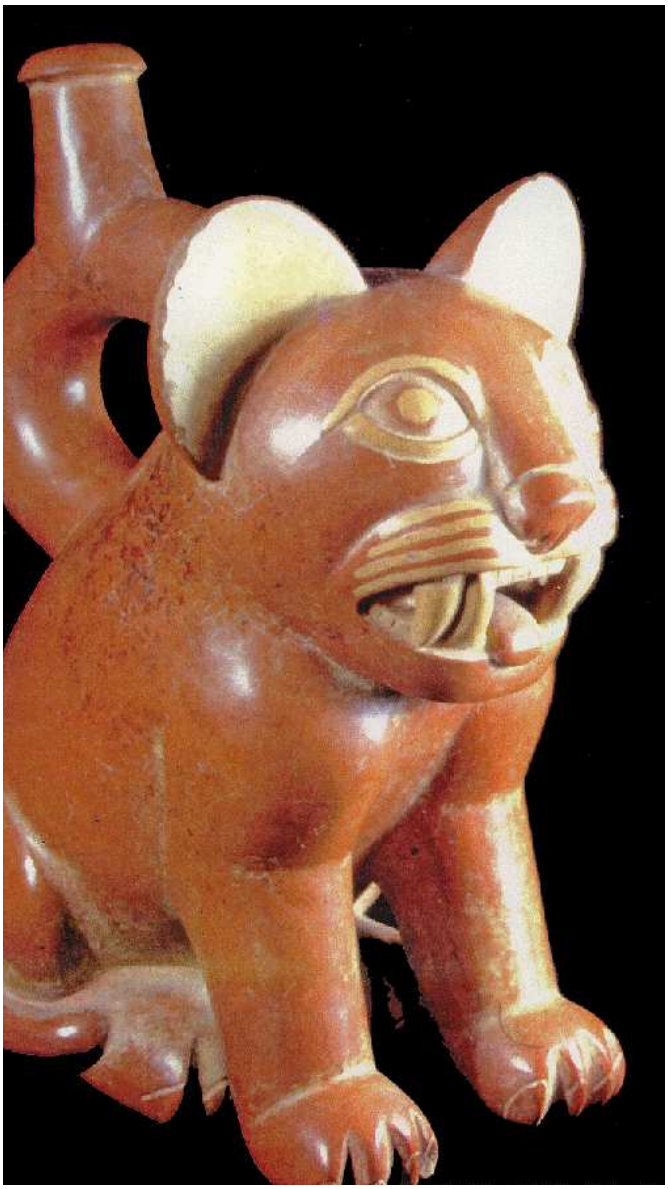

Fig. 3. Botanical frogs show some feline characteristics as exemplified in this naturalistic puma. Private Collection. Photograph by Christopher B. Donnan.

(Duellman & Trueb 1986: 19-21)—the same factors critical to farming. The loud mating calls of frogs often foretell the arrival of favorable planting conditions. Because frogs are so closely related to water and are so prolific, they are associated with the growth of crops and fertility (Mattison 1987: 142). Often the upper eyelid of the Botanical Frog extends down into a spiral to form what appears to be an "ear" (figs. 1, 5, 6). This curious "ear" is unique to this mythical creature. As noted above, the Botanical Frog often has rounded feline ears. Interestingly, some modeled Botanical Frogs have both spiral "ears" and feline ears (Kutscher 1955: 47), and a few have no ears (fig. 4). It is difficult to generalize about frog behavior because the thousands of species (Duellman & Trueb 1986: 313) are so remarkably adapted to their varied environments. Therefore, it is important to identify the naturalistic frogs portrayed in Moche art in order to identify the attributes and behavior that the Moche might have given to the Botanical Frog.

William E. Duellman, a specialist in the biology of amphibians at the University of Kansas, identified several frog species from the realistic Moche representations of natural frogs (Duellman & Trueb 1986). The most frequently depicted frog is the *Bufo marinus* (fig. 2), a large poisonous toad common on the north coast of Peru today. Another modeled frog portrays *Rana bwana* (fig. 7), a frog that lives only in the Piura area. Professor Duellman was able to identify the frogs in a pepino (*Solanum muricatum*) bush in a fine line drawing (fig. 8) as a tree frog, *Ololyon quinquefosciata*. None of these frogs had any traits that could be related to those of the Botanical Frog.

An example has been found of a Moche modeled naturalistic frog with a wide-banded mouth (fig. 9), a primary identifier of the Botanical Frog. It has stripes on top of its head, like the Botanical Frog. Professor Duellman identified it as *Leptodactylus pentadactylus* (fig. 10), a frog that lives in the eastern Andean forest, but not on the north coast of Peru. This frog is common throughout the Amazon basin. It has been noted in many departments of Peru, e.g., Ayacucho, Huánuco, Loreto, San Martín, and Ucayali (Heyer 1979: 29). It is very aggressive. The

Fig. 4. A Botanical Frog often has a mouth filled with teeth. Private Collection. Photograph by Christopher B. Donnan.

Fig. 5. Rare examples have fangs, a common supernatural indicator in Moche art. Duke University Museum of Art.

males have spines on their thumbs which they use in bouts with other males (Duellman & Trueb 1986: 55). Even the tadpoles are aggressive and eat other tadpoles (*ibid.*: 273). The frogs have a lumbar gland, between the rib cage and the pelvis, from which they exude poison to protect themselves (*ibid.*: 370). This large frog has several interesting characteristics that may relate directly to the Botanical Frog.

The structure of a frog ear is hidden beneath the skin, but in some species an external ear-drum, the tympanum, can be seen behind the eye as a circle (Mattison 1987: 22). *L. pentadactylus* has a fold that extends from above the tympanum to part way down the side of the body (Heyer 1979: 26). This is strikingly like the spiral "ears", unique to the Botanical Frog. The stripes on top of the head of the real frog (fig. 10) were painted on the head of the modeled Moche frog (fig. 9).

Feline-like markings are notable on *L. pentadactylus*. Its legs have white and black stripes (fig. 10) similar to the striping on the Botanical Frog (fig. 1). Markings on the sides of *L. pentadactylus* resemble pelage markings. The slender digits have the appearance of claws. Perhaps the most vivid feline characteristic is described by Duellman and Trueb (1986: 103): "Upon being seized, these large frogs sometimes emit a loud scream reminiscent of that given by a cat in distress". Considering the feline characteristics of this frog which the Moche imitated, it is not surprising that the Botanical Frog has a feline nose and ears.

The Botanical Frog is often depicted with a white circle on its throat. This marking is also displayed on a variety of Moche modeled frogs, but it is not visible on the real frogs they portray. This suggests that it is not an identifying feature. Perhaps the Moche wanted simply to note the vocal sac, which is not visible until it is inflated.

THE BOTANICAL FROG AND THE FELINE

There is more of a relationship between the Botanical Frog and the feline than just shared markings and features. In two modeled examples (figs. 11, 12), the Botanical Frog and the feline are face-to-face holding fast to one another. Curiously, the two are the same size. Male frogs are usually smaller than females (Duellman & Trueb 1986: 54), a fact that the Moche recognized. The position suggests sexual activity, but not that practiced by either frogs or felines. The only time we see this intertwining of legs in Moche art is in human copulation. Moche artists depicted naturalistic frogs mating (Larco 1966: 76), but always in the amplectic position—a male

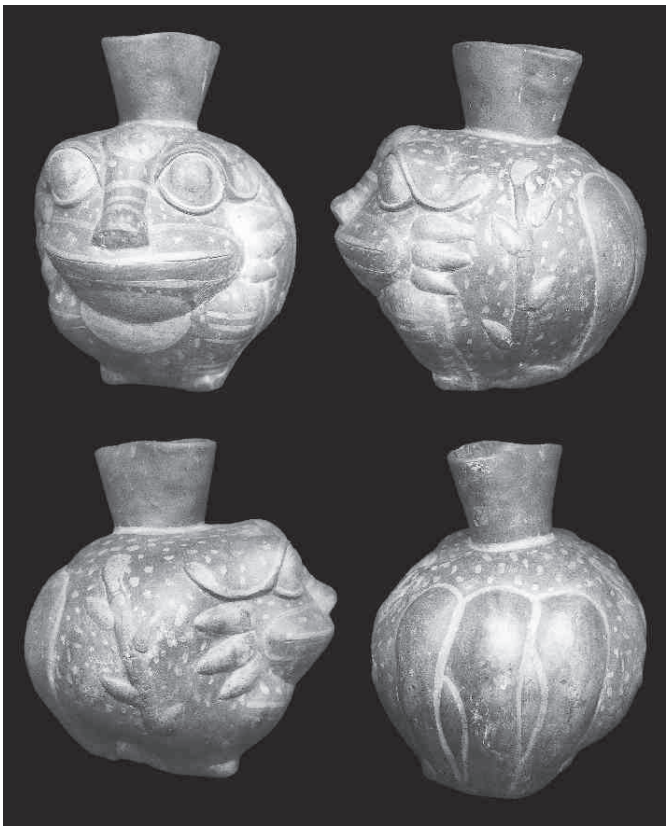

Fig. 6. Tubers sometimes hang from the corners of the mouth of the Botanical Frog as well as off his back. Museo Nacional de Antropología y Arqueológico, Lima. Photograph by Luis Jaime Castillo Butters.

frog standing on the back of the female frog. Moreover, they certainly would have been aware of the rear mounting position of felines. Perhaps by showing the Botanical Frog and feline in a human copulation position, they are suggesting that they have some human characteristics. It should be noted that the feline is under the frog in fig. 11 and on top in fig. 12. When the feline is on top, its body rather than the frog's is covered with fruits; however, some pelage markings remain on its legs and shoulders. This suggests a metamorphosis or exchange of traits during this activity.

One bottle (Larco 1966: 141) illustrates a feline on the back of the Botanical Frog, suggesting a more natural animal copulation position. In this position the feline maintains its pelage markings. Again the animals are the same size. In contrast, the Moche realistically portrayed the relative sizes of a naturalistic frog and feline in fig. 13. The behavior of the feline—covering its eyes with its front paws—further demonstrates a bizarre relationship between frogs and felines.

Fig. 7. A Moche modeled depiction of *Rana bwana*, a native of the far northern Piura Valley. Private Collection. Photograph by Christopher B. Donnan.

MANIOC AND THE BOTANICAL FROG

The Botanical Frog shares many characteristics with the manioc plant. As noted earlier, a stalk of manioc frequent-

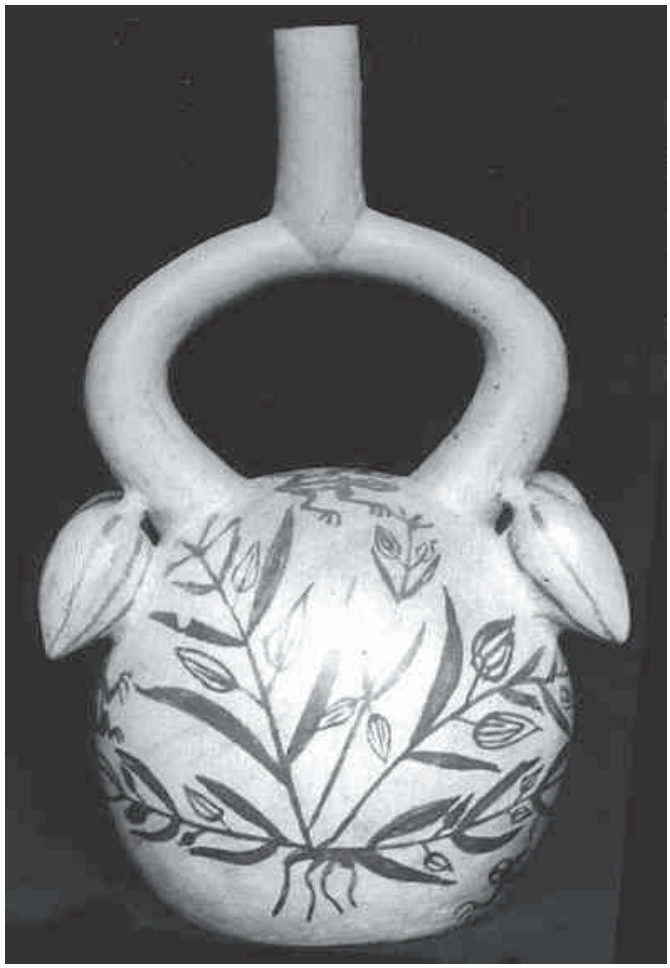

Fig. 8. Tree frogs, *Ololyon quinquefosciata*, shown here in a pepino bush. Private Collection. Photograph by Christopher B. Donnan.

Fig. 9. A naturalistic modeled depiction of *Leptodactylus pentadactylus*, a carnivorous Amazonian frog. Private Collection. Photograph by Donald H. McClelland.

ly forms the spine or the horns of the creature. Manioc is propagated by a cutting from a stalk of the bush. It is set in the ground horizontally and then covered with soil. The stalk of the new bush grows up at a right angle from one end of the cutting, and the clustered tubers grow down from the buried stalk (fig. 14). In this configuration, the manioc plant resembles the Botanical Frog, without the frog's body.

The manioc tubers that hang from the rear of the Botanical Frog are the other primary identifier of the Botanical Frog. Like the frog *L. pentadactylus*, manioc tubers are poisonous. There are several hundred known varieties of manioc, but they all belong to the same species, *Manihot esculenta* (Nye 1991: 48-49). All varieties contain hydrocyanic acid in varying concentrations from high to low, but they cannot be classified according to their relative toxicity. Manioc (*Manihot esculenta* Krantz) is also known as cassava, tapioca, and yucca. Although manioc has been classified as either bitter (toxic) or sweet (non-toxic), current research indicates that this is an unsupported classification or division (Nye 1991: 48-49).

Although the tubers deteriorate rapidly once they are harvested, they can be left in the ground for three to four years (*ibid.*: 51) and can be harvested throughout the year. In hot as well as arid climates many frogs retreat during the day to conserve their moisture. They hide in moist places, and some burrow in the soil (Duellman & Trueb 1986: 198-199). Many frogs remain underground during dry seasons or drought to prevent loss of body fluids. Like manioc tubers they are capable of remaining underground for long periods (Duellman & Trueb 1986: 207). Since the Botanical Frog always displays manioc tubers on its rear, the Moche may have associated the ability of frogs and tubers to remain underground for long periods.

THE BOTANICAL FROG IN CONTEXT

Analysis of the depictions of the Botanical Frog in three dimensional sculpture provide abundant information about its identification and combination of frog, feline, and plant features, but it is only when the Botanical Frog is seen in complex depictions with other objects and individuals that we can begin to appreciate its status and role in the Moche supernatural realm. Fortunately, there is one depiction of the Botanical Frog in a complex fine line drawing (fig. 15), and several others that show it in

Fig. 10. *Leptodactylus pentadactylus*. Photograph by William E. Duellman.

Figs. 11. Botanical frog-feline copulation scenes. The animals are shown copulating like humans (figs. 11-12). Field Museum of Natural History, Chicago. Photograph by Christopher B. Donnan.

an unusual scene depicted in low relief. Rafael Larco Hoyle (1966: figs. 59-60) published two photographs of one of these bottles; however, the photographic coverage of the low-relief scene that encircled the chamber was incomplete. Recently, I photographed the bottle in the Museo Arqueológico "Rafael Larco Herrera" and subsequently produced a rollout drawing of the scene. The museum has three more spout and handle bottles and one Phase V stirrup spout bottle portraying the same scene. Thanks to the generosity of Director Isabel Larco, I was able to study these bottles in detail, and to photograph two of them. The chronological sequence, Phases I-V, for Moche ceramics was also developed by Rafael Larco Hoyle (1948).

In the fine line drawing, the Botanical Frog appears in a procession featuring a supernatural figure carried in a pod-shaped litter. The supernatural figure is surrounded by anthropomorphized animal warriors wielding clubs and shields. Each of the anthropomorphized warriors represents a single animal, e.g., an owl, a dragonfly, and a fox. The Botanical Frog is one of the anthropomorphized warriors. Although it is anthropomorphized, it is readily identified by its broad-banded mouth, the manioc stalk and three tubers that extend down its back, and the many other food plants that adorn it. The supernatural figure in the litter is the uppermost figure on one side of the chamber. The Botanical Frog occupies the

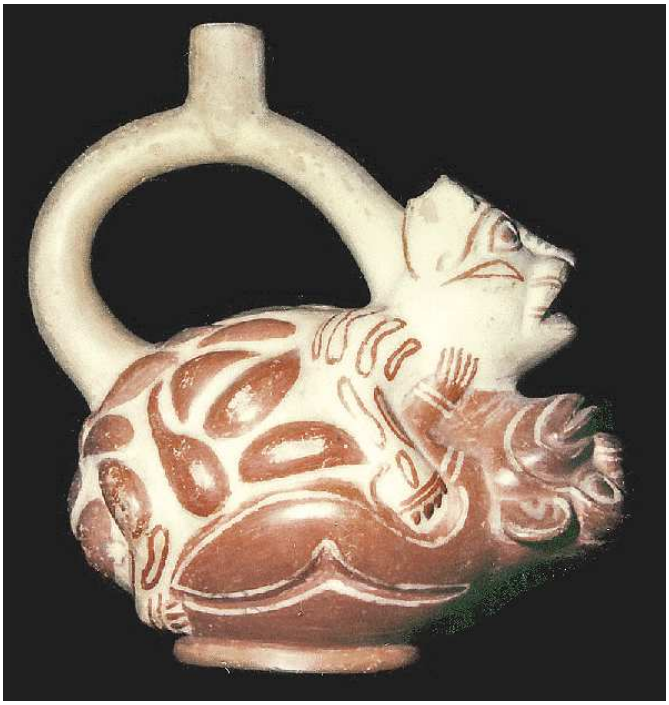

Fig. 12. The Art Institute of Chicago. Photograph by Christopher B. Donnan.

Fig. 13. Realistic representation of the relative sizes of feline and frog. Museo Nacional de Antropología y Arqueológico, Lima. Photograph by Christopher B. Donnan.

Fig. 14. Manioc plant showing stalk and tubers still in the ground. Source unknown.

same position on the opposite side, suggesting that it was the second most important figure in the scene.

Although the Moche anthropomorphized many food plants, such as ears of corn (fig. 16), manioc (Donnan 1978: fig. 234), squash, potatoes (Towle 1961: plate XI, fig. A), and peanuts (*ibid.*: plate VIII, fig. B), no anthropomorphized plants are present in this scene. Even anthropomorphized beans, which are frequently depicted as warriors in Moche art (Donnan 1978: figs. 62-64), are absent. Perhaps in this warrior procession the Botanical Frog, with its multiple plant appendages, is meant to represent all food plants.

All the depictions of the Botanical Frog in low relief are similar to one another. They show it as a major participant in a complex supernatural scene. The scene appears on six Moche bottles: five spout and handle bottles (figs. 17, 18), and one Phase V stirrup spout bottle (fig. 19). This is an interesting sample since spout and handle bottles comprise less than two per cent of Moche ceramics, and complex low-relief scenes also comprise less than two per cent.

No two of the bottles appear to be from the same mold, but there are only minor variations in the scene (compare, for example, figs. 17 and 18). On all the bottles the figures appear on two levels, and the scene can be divided into three activities, two on the upper level and one on the lower level. One upper level activity includes the Botanical Frog with its broad banded mouth and manioc tubers. Beans form the body joints and rounded ears. There are two round fruits hanging from its lower jaw. Each appears to be tipped with remnants of calyx lobes, a distinctive feature of guava fruits (Neal 1984: 632) illustrated in fig. 20.

The Botanical Frog faces a supernatural figure who holds eared snakes that form a U-shape (figs. 17, 18). Within the U-shape the deity stands among ears of corn and perhaps another type of fruit. More corn and other objects that may be fruits rest on the ground between the Botanical Frog and the deity. An unidentified object ap-

Fig. 15. Anthropomorphized birds, animals, sea creatures and plants populated the Moche mythological universe, as seen in this fine line painting of the Rayed God travelling with his warrior cortege. Museum für Völkerkunde, Berlin, Staatliche Museen Preussischer Kulturbesitz. Drawing by the author.

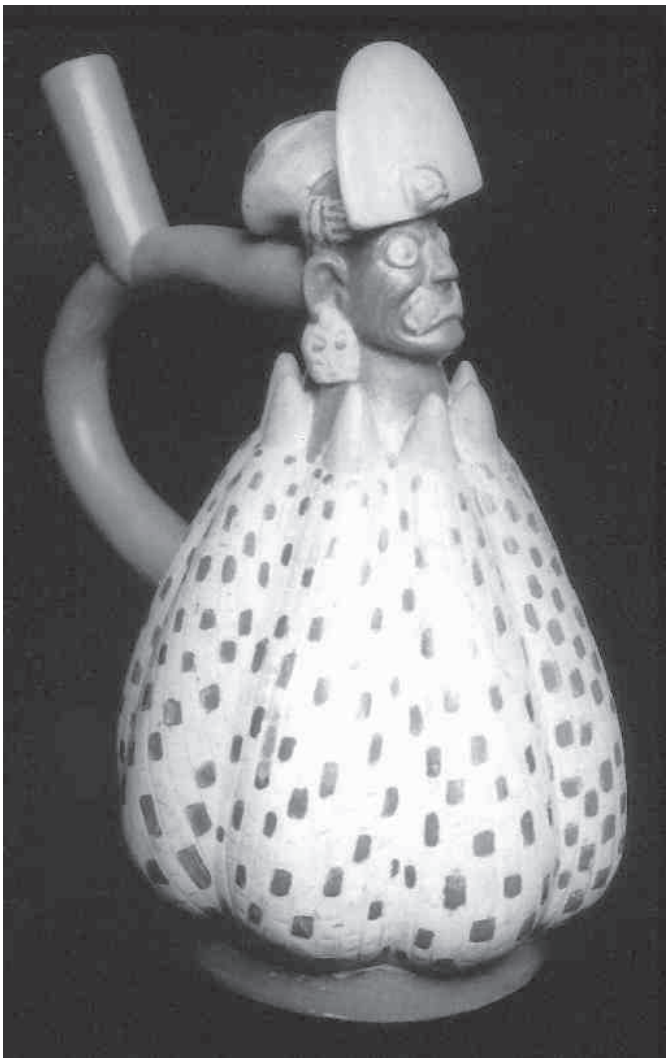

Fig. 16. An anthropomorphized squash. Private Collection. Photograph by Christopher B. Donnan.

Fig. 17a and b. Single spout and handle bottle with relief designs of the Botanical Frog in context. Mint Museum of Art Collection. Lent by Mrs. William Barnes. Charlotte, North Carolina. Photograph by Donald H. McClelland. Drawing by the author.

pears below the U-shape in some examples of this scene (fig. 17) but not in others (fig. 18). The object looks like a container with handles. On each bottle two anthropomorphized bird attendants and a seated animal stand behind the deity facing the Botanical Frog.

The second activity on the upper level occurs behind the Botanical Frog and is directed away from it. An anthropomorphized iguana stands behind a supernatural figure. This iguana has the same bird headdress, sash-like bag tied around his waist, and reptilian features as the figure identified as Iguana in the Burial Theme (Donnan & McClelland 1979: 6). Iguana holds a spout and handle bottle in one hand and a penis-shaped object in the other. This object has not been found elsewhere in Moche art. The supernatural figure in front of Iguana points to a stack of corn and holds an *ulluchu* fruit (the fruit of a number of species of the genus *Guarea* [*Meliaceae*], Bussman & Sharon 2009, McClelland 1979: 435-452). He is dressed identically to the deity in the U-shape except that his belt has two ties, instead of one, each terminating in an eared serpent. This suggests that the same deity participates in both activities. The focus of this second activity appears to be the stack of corn, although beans conspicuously fill the space between Iguana and the deity. In four of the six representations a dog stands in the pile of corn facing the supernatural figure and Iguana (fig. 18). In Moche art a dog is frequently associated with a supernatural figure

Fig. 17b.

Fig. 18. Another single spout and bridge bottle with the same scene as in figs. 17 a & b. Museo Arqueológico "Rafael Larco Herrera", Lima. Photograph by Luis Jaime Castillo Butters.

Fig. 19. A stirrup bottle with a relief depiction of the ceremony in which the Botanical Frog performs. Photograph by Donald H. McClelland.

and Iguana, but the presence or absence of a dog from a scene does not appear to change it.

Within this small sample of low-relief bottles, the unidentified object under the U-shaped structure is absent when the dog is present. A row of monkeys, each carrying a large net bag, appears on the lower level. They face an anthropomorphized animal holding a staff with one hand and raising his other hand. He always wears the same headdress and stands in the same position. At the other end of the line a figure, holding a whip in front of him, escorts the monkey. He holds the lash of his whip against the handle in one hand. Like the staff holders, the whip holders always wear the same headdress and stand in the same position.

Activity on the lower level of the Botanical Frog scene focuses on the row of burdened monkeys. In Moche art monkeys are frequently associated with a variety of net bags. Some wear net bags suspended from their necks; often, pairs of monkeys are modeled with bags slung in this manner (Donnan 1978: figs. 95-96). Monkeys are also associated with fruits. Modeled bottles show them holding fruit (fig. 21) and they are the only animals shown picking fruit, climbing among the limbs of the *ulluchu* plant where they pick *ulluchus* (McClelland 1979: fig. 4). Some fine line drawings show that the Moche kept monkeys tethered (Donnan 1979: 41). It is possible that these monkeys were a part of a ceremonial harvest. In the Botanical Frog scene it is not evident what their bags contain. They may be carrying corn to add to the stack in front of the deity, or removing corn as part of a planting ceremony. Since the deity holds an *ulluchu* he could just as well be receiving bags of *ulluchus* from the monkeys, as these animals are shown in Moche art picking this specific fruit. In the Botanical Frog scene the number of monkeys does not seem to be relevant; there can be seven, eight, or nine. The size of the bottle does not determine the number because the smallest bottle known has eight monkeys. No musicians accompany the procession of monkeys, suggesting that dance was not a part of the ceremony. Like *L. pentadactylus*, monkeys may be native to the eastern tropical forest.

Fig. 20. Guava fruits. Photograph by Donald H. McClelland.

The diversity of plant material in the Botanical Frog scene indicates that this ritual did not center on a single plant. All these plants must have been important since the plants were carefully portrayed by different artists in the same place on all six bottles. Since the plants that we can identify on the Botanical Frog's body and in the scene are food plants, the Botanical Frog may embody the Moche's concept of agriculture. The abundance of food plants coupled with the penis-shaped object held by Iguana suggest fertility. Perhaps this represents a planting ritual to insure a successful crop, or the celebration of a bountiful harvest.

Fig. 21. Modeled bottle showing a monkey holding a pepino fruit. Private Collection. Photograph by Christopher B. Donnan.

Colonial chroniclers' accounts of Inca food plant rituals demonstrate that using "fertility" to describe a scene may be a simplistic explanation of a very complex activity. The use of corn as money emphasizes its value to the Inca (Cobo 1979: 34-35). Divination (Arriaga 1968: 34), curing, sacrifices to bring good crops (*ibid.*: 77), and foretelling the future (*ibid.*: 184) were rituals associated with corn. Arriaga noted that some huacas (sacred sites or shrines) were worshiped to benefit the corn and potato fields (*ibid.*: 118). There was a corn festival to keep the corn from drying out (*ibid.*: 49), and a celebration of the corn harvest in which a dance was performed with stalks of corn (*ibid.*: 176). In addition there was a festival to aid the ripening of avocados (*ibid.*: 58) demonstrating that each phase of the agricultural cycle was recognized and celebrated.

John Murra's article (1960), *Rite and Crop in the Inca State*, describes even more rituals associated with corn that were reported by the chroniclers. This is not to suggest that an interpretation of this Moche scene can be found in the Inca culture, which postdated the Moche by almost 1,000 years. However, the sixteenth century doc-

uments demonstrate a complex tradition of agricultural rituals in the Andean area.

SUMMARY

Although the Botanical Frog is a mythical creature, this study demonstrates that it is composed of parts from real animals and plants. Because these elements are so realistically depicted, it has been possible to identify them with some precision. The large sample of Moche ceramics used in this study made it possible to see the varied ways in which this creature was depicted and to demonstrate that certain features, such as the broad-banded mouth and rear manioc tubers, are always present, while others are not. The "spiral" ear, for example, is unique to the Botanical Frog, but it is not always added. Other features that may or may not be depicted include a manioc spine and horns; feline ears, leg striping, and pelage markings; and a variety of food plants.

The Botanical Frog is associated so consistently with Moche food plants that it seems clearly related to agriculture. The animals and plants that comprise the Botanical Frog have interconnecting characteristics; for example, the toxic nature of the frog, *L. pentadactylus* and manioc; the analogous form of the Botanical Frog to the configuration of the manioc plant underground; and the markings and behavior of *L. pentadactylus* to those of a feline. These interconnecting characteristics suggest more than a simple explanation of the frog as a fertility symbol.

The identification of the Botanical Frog in the modeled pieces led to its identification in a complex fine line drawing of anthropomorphized warriors and an agricultural ritual rendered in a low-relief scene in which it is a major participant. The Botanical Frog may appear in another complex fine line drawing: the Animated Objects Theme (Lyon 1989: 63). A small animal faces a figure seated under a "bush". The small size of the figure makes its identification as a Botanical Frog uncertain, but manioc tubers are present at the rear of the animal. However, the modeled Botanical Frogs and those portrayed in the complex scenes clearly are encoded with the same information. The identification of the frog as a *L. pentadactylus*, a poisonous cat-like frog that lives in the tropical forest, poses questions about the relationship of the Moche to this region. For example, the ritual in the low-relief scene may observe the origin of food plants from the tropics instead of celebrating a single agricultural event such as harvest or signifying only fertility. The study of the Botanical Frog shows the complexity of Moche art and the many levels of meaning that can be attributed to a single modeled piece.

Acknowledgements

I wish to thank the many individuals and museums that helped make this research possible. My special gratitude goes to Christopher B. Donnan for offering invaluable comments on the manuscript and keeping the research focused. I am indebted to Alana Cordy-Collins who is responsible for my interest in this subject. As always my husband, Don, was very supportive and patiently edited many versions in addition to providing expert computer assistance. Donna Horie and Dorie Reents-Budet at the Duke University Museum of Art, Durham, North Carolina and Martha Tonissen Mayberry, Registrar, at the Mint Museum, Charlotte, North Carolina graciously gave me access to the museums' collections. Guillermo Cock was always generous with his knowledge of Peruvian ethnohistory. A special thanks to Isabel Larco de Álvarez Calderón, Director, Museo Arqueológico "Rafael Larco Herrera", Lima, Peru, for allowing me to study and photograph in the museum. Luis Jaime Castillo Butters greatly facilitated my research in Lima and I am very grateful for the hospitality and friendship of his family in Lima. Finally, my deepest gratitude goes to William E. Duellman at the University of Kansas who gave up his research time to identify Moche "frogs". His identification was crucial to our understanding of the Moche Botanical Frog.

About the author

† The late Donna McClelland *was, for more than thirty five years, a student of the Moche culture of northern Peru. Working with Christopher Donnan at the University of California, Los Angeles, she helped with the establishment and formation of the Moche Archive, a photographic record of Moche artifacts based on the* Corpus Vasorum Antiquorum. *Ms. McClelland developed a technique to reproduce the intricate narrative paintings of late Moche vessels and produced almost 800 of these drawings, a boon to scholars of Moche art and culture. Her drawings have been widely reproduced in books, journals, exhibitions, and television documentaries. Out of her careful observations of Moche art, combined with her experience from participating in Moche archaeological excavations, she developed a number of important insights into the Moche mythical world of plants and animals.*

REFERENCES CITED

Arriaga, Father P.J. de. 1968. *The extirpation of idolatry in Peru* (1621). Translated and edited by L. Clark

Keating. Lexington: University of Kentucky Press.

Bussman, R.W. & D. Sharon. 2009. Naming a Phantom—the quest to find the identity of ulluchu, an unidentified ceremonial plant of the Moche culture of northern Peru. *Journal of Ethnobiology and Ethnomedicine* 5(8). <http://www.ethnobiomed.com/content/5/1/8>.

Cobo, Father B. 1979. *History of the Inca empire* (1653). Translated and edited by R. Hamilton. Austin & London: University of Texas Press.

Domingo, M. Cuesta. 1980. *Cultura y cerámica mochica*. Madrid: Ministerio de Cultura, Dirección General de Patrimonio Artístico, Archivos y Museos.

Donnan, C.B.

— 1978. *Moche art of Peru, Pre-Columbian symbolic communication*. Los Angeles: Museum of Cultural History, University of California.

— 1982. Dance in Moche art. *Ñawpa Pacha* 20: 97-120. Berkeley: Institute of Andean Studies.

Donnan, C.B. & D. McClelland. 1979. *The burial theme in Moche iconography*. Studies in Pre-Columbian Art & Archaeology, no. 21. Dumbarton Oaks, Washington, D.C.

Duellman, W.E. & L. Trueb. 1986. *Biology of amphibians*. New York, St. Louis, San Francisco: McGraw Hill Book Company.

Heyer, W.R. 1979. Systematics of the pentadactylus species group to the frog genus Leptodactylus (Amphibia: Leptodactylidae), *Smithsonian Contributions to Zoology* 301: 1-43.

Krochmal, A. & C. Krochmal. 1990. Tapioca. *The Bulletin* 20(2): 25-30. Lawai, Hawaii: National Tropical Botanical Garden.

Kutscher, G.

— 1954. *Nordperuanische keramik: figurlich verzierte gefasse der Fruh-Chimu. Cerámica del Perú septentrional; figuras ornamentales en vasijas de los chimúes antiguos*. Monumenta Americana I. Berlin: Gebr. Mann Verlag.

— 1955. Ancient art of the Peruvian north coast. Translated by Walter Hermann Bell. Berlin: Gebr. Mann.

Larco Hoyle, R.

— 1948. *Cronología arqueología del norte del Perú*. Buenos Aires: Sociedad Geográfica Americana.

— 1966a. *Checan*. Geneva: Nagel.

— 1966b. *Peru*. Archaeologia Mundi Series. Translated by J. Hogarth. Cleveland & New York: World Publishing Company.

Lehmann, W. 1975. *The art of old Peru*. Assisted by H. Doering. New York: Hacker Art Books, Inc. [First published in 1924 by the Ethnological Institute, Berlin.]

Lyon, P.J. 1989. Archaeology and mythology II: A re-consideration of the animated objects theme in Moche art. In *Cultures in conflict: Current archaeological perspectives*. Edited by D.C. Tkaczuk & B.C. Vivian. Proceedings of the Twentieth Annual Chacmool Conference. Calgary: The Archaeological Association of the University of Calgary.

Mattison, C. 1987. *Frogs and toads of the world*. New York: Facts on File, Inc.

McClelland, D.D.

— 1979. The ulluchu: a Moche symbolic fruit. In *Pre-Columbian art history, selected readings*, edited by A. Cordy-Collins & J. Stern, pp. 435-452. Palo Alto, California: Peek Publication.

— 2009. Ulluchu: an illusive fruit. In *The art and archaeology of the Moche: An ancient Andean society of the Peruvian North Coast*, edited by S. Bourget & K.L. Jones, pp. 43-65. Austin: University of Texas Press.

— MS. *The Muscovy duck in Moche Art*.

Murra, J.V. 1960. Rite and crop in the Inca state. In *Culture in history, essays in honor of Paul Radin*, edited by S. Diamond, pp. 393-407. New York: Published for Brandeis University by Columbia Press.

Neal, M. C. 1984. *In Gardens of Hawaii*. Special Publication 50. Honolulu: Bishop Museum Press.

Nye, M.M. 1991. The mis-measure of manioc (Manihot esculenta). *Economic Botany* 45(1): 47-57. Published for The Society for Economic Botany by the New York Botanical Garden.

Seler, E. 1916. Ein altperuanisches besticktes Gewebe. *Jahrbuch der preussischen Kunstsammlungen* 37: 181-201. Berlin.

Towle, M.A. 1961. *The ethnobotany of pre-Columbian Peru*. Chicago: Aldine Publishing Company.

NORMAS EDITORIALES • *INSTRUCTIONS FOR AUTHORS*

1. *ARQUEOLOGÍA IBEROAMERICANA* es una revista científica arbitrada, internacional e independiente, de acceso abierto, dedicada al estudio arqueológico de las sociedades prehistóricas, protohistóricas, antiguas e históricas de Iberoamérica, Estados Unidos, la Península Ibérica, las Filipinas y otros países ibéricos. Su objetivo primordial es servir a la comunidad investigadora con la máxima calidad y rapidez y sin fin de lucro. *ARQUEOLOGÍA IBEROAMERICANA is a peer-reviewed, open access international scientific journal, devoted to the archaeological study of prehistoric, protohistoric, ancient and historical societies of Latin America, the United States, the Iberian Peninsula, the Philippines and other Iberian countries.*
2. Publica *trimestralmente* (4 números al año), a través de Internet, avances y artículos de investigación sobre la arqueología de los pueblos americanos, ibéricos y filipinos. *It is published online four times a year in PDF electronic format and contains research articles on the archaeology of the American, Iberian and Filipino peoples.*
3. Sus lenguas principales son el español, el inglés y el portugués, sin menoscabo de alguna otra que pueda incluirse. *Spanish, English and Portuguese are the primary languages.*
4. Los autores cuyo manuscrito haya sido aprobado por el *Consejo Asesor* serán invitados a efectuar un donativo voluntario destinado a costear mínimamente la publicación y difusión gratuita de sus artículos. Si declinan la donación, los manuscritos se publicarán cuando lo considere oportuno el Editor. Los originales aprobados cuyos autores hayan efectuado un donativo siempre gozarán de prioridad en su publicación. *Authors whose manuscript has been approved by the* Advisory Board *are encouraged to make a voluntary donation toward the cost of publishing their article through the open access format, and will thus become sponsors of the journal. Choosing not to make a donation will not negatively affect the manuscript publication. It will be published when the Editor deems it appropriate but, to obtain priority in the publication, author needs to make a donation.*
5. Los autores deberían garantizar la corrección ortográfica, gramatical y literaria de sus textos, especialmente cuando se empleen las lenguas inglesa y portuguesa. De todas formas, el editor efectuará la revisión de los escritos en lengua española según la normativa de la Real Academia Española, consultando también a asesores, editores ayudantes y ayudantes editoriales para corregir los textos en inglés de las colaboraciones.
6. La revista se imprime en *formato electrónico PDF*, asegurando de este modo una completa fidelidad visual a la impresión clásica y agilizando enormemente todo el proceso de publicación.
7. El *Consejo Asesor*, órgano consultivo autónomo integrado por autoridades académicas de reconocido prestigio, velará por la excelencia científica de la revista, examinando con objetividad la idoneidad de los trabajos remitidos para su publicación a través de una política de revisión paritaria mediante dos evaluadores externos para cada caso, dictaminando justificadamente sobre su aceptación, modificación o rechazo en función de la calidad de los mismos. *The* Advisory Board *is an independent advisory entity responsible for ensuring the scientific excellence of the journal. Composed of prestigious academic authorities, it examines the adequacy of the manuscripts submitted for publication with a peer review polity by two external evaluators for each case, ruling justly on their acceptance, revision or rejection on the basis of the scientific quality of them.*
8. Todas las colaboraciones deberán ser originales inéditos y estar escritas en formato digital estándar (Word, OpenOffice, RTF, TXT), incluyendo ilustraciones (JPEG, TIFF o BMP) con la mejor resolución posible. *Manuscripts submitted cannot have been previously published in any form or language. Authors should send manuscripts, including illustrations (JPEG, TIFF or BMP) at the best possible resolution, in electronic format (Word, OpenOffice).*
9. La extensión máxima de los manuscritos no podrá sobrepasar las 10.000 palabras. *The maximum length of manuscripts may not exceed 10,000 words.*
10. *Normas de Estilo*:
    Nunca deben usarse **negritas** ni <u>subrayados</u> en las citas bibliográficas, ni MAYÚSCULAS para escribir nombres de autores o títulos de obras. Sólo se aceptarán VERSALITAS para los nombres de autores.
    Para enfatizar una palabra o una frase, empléense cursivas y entrecomillado español («») para los textos redactados en ese idioma, o inglés (“”) para los demás. Para enmarcar dentro del entrecomillado, úsense comillas simples (‘’) para manuscritos ingleses o portugueses y las comillas voladas en el caso de los españoles.
    Hágase constar el año de la publicación tras el autor, separado por un punto y un espacio. Cuando los autores sean tres o más, refiérase a los mismos citando al primero de ellos seguido de la expresión *et al*. También se aconseja emplear *íd.* (el mismo autor) e *ibíd.* (allí mismo, en la misma referencia) u *ob. cit.* para evitar repeticiones superfluas.
    Recomendamos se incluyan las citas bibliográficas intercalándolas en el texto entre paréntesis (Autor año:

página(s)), destinando las notas a pie de página a otros menesteres como mayor abundamiento sobre la cuestión tratada. Siguiendo esta pauta, la bibliografía aparecerá listada al final del trabajo, ordenada alfabéticamente por autores y cronológicamente, de menos a más reciente, cuando correspondan a una misma autoría.
Se ruega revisar la accesibilidad en tiempo real de todos los hipervínculos listados en la bibliografía o en las notas a pie de página. *All references should appear in the text or in footnotes as follows: (author year: page(s)).*

11. Los trabajos se remitirán por correo electrónico como documentos adjuntos para acelerar el proceso de edición.
12. Las *ilustraciones*, *tablas estadísticas* y *cuadros*, cuyo número no debe ser excesivo, se citarán correlativamente a lo largo del texto. Se adjuntarán en formato digital JPEG (o bien en TIFF o BMP cuando ocupen poco espacio), guardando justa proporción entre resolución y tamaño para aceptar su calidad. Serán originales y, si proceden de otras publicaciones, se citará su fuente. Asimismo, irán acompañadas de una lista donde conste la numeración y sus respectivas leyendas (pies de figuras). Las tablas que planteen problemas técnicos al transformarlas en imágenes deberán remitirse en su formato original (hoja de cálculo). *Tables should be sent as illustrations, i.e., in graphical format. Do not scan black and white images as if they were photographs.*
13. Los autores deben incluir un *resumen* de su colaboración con una extensión limitada a unas diez líneas. Se redactará en dos lenguas por lo menos: la empleada en la colaboración (español o portugués) y la versión inglesa. También se permite añadir *palabras clave* definitorias del contenido del artículo hasta un máximo de cinco. *Authors should also enclose a short curriculum vita and a brief abstract of their paper in English and Spanish, and keywords in both languages.*
14. Igualmente, adjuntarán un *curriculum* breve sobre su trayectoria profesional, donde deberían figurar los siguientes datos: año y lugar de nacimiento, grados académicos (universidad, año), docencia, investigación, publicaciones principales, especialidades, institución a la que pertenecen y cargo que desempeñan actualmente en la misma.
15. Se enviarán pruebas de imprenta a los autores antes de su publicación, pero sólo se aceptarán correcciones menores de las mismas que deberán notificarse lo antes posible. *Digital proofs will be sent to authors before their final publication, but only minor corrections will be accepted.*
16. Esta publicación se distribuye gratuitamente a través de Internet, al amparo de la licencia Creative Commons Reconocimiento 3.0 España (CC BY 3.0), para alcanzar una máxima difusión. Plenamente comprometida con la filosofía del acceso abierto al conocimiento científico, permite a los autores archivar personal o institucionalmente las separatas digitales de sus artículos, a fin de maximizar la distribución gratuita de los contenidos publicados y alcanzar su mayor difusión posible.
17. Acerca de la *Propiedad Intelectual* y los *Derechos de Autor*, en virtud de los arts. 1 y 8 del Real Decreto Legislativo 1/1996, de 12 de abril, por el que se aprueba el texto refundido de la Ley de Propiedad Intelectual (BOE núm. 97 de 22-04-1996), si bien la propiedad intelectual de los artículos pertenece a los autores, los derechos de edición y publicación de esta obra colectiva corresponden al editor de la revista. *This publication is distributed freely over the Internet to achieve maximum dissemination. The journal, fully committed to the philosophy of open access to scientific knowledge, will allow authors to archive digital reprints of their articles, personally or institutionally.*
18. *Fechas de publicación (2011)*: 31 de marzo (número 9), 30 de junio (número 10), 30 de septiembre (número 11) y 31 de diciembre (número 12). *Scheduled dates for final publication: March 31, 2011 (9th issue); June 30, 2011 (10th issue); September 30, 2011 (11th issue); December 31, 2011 (12th issue).*
19. *Fechas límite* para la recepción de originales: 28 de febrero de 2011 (número 9), 31 de mayo de 2011 (número 10), 31 de agosto de 2011 (número 11), 30 de noviembre de 2011 (número 12). *Call for Papers Deadline: February 28, 2011 (9th issue); May 31, 2011 (10th issue); August 31, 2011 (11th issue); November 30, 2011 (12th issue).*
20. Enviar originales y correspondencia por vía electrónica a Dr. Pascual Izquierdo-Egea, Editor y Director de *ARQUEOLOGÍA IBEROAMERICANA*: <http://www.laiesken.net/arqueologia/contacto/>. *Manuscripts and correspondence should be sent to the Editor of* ARQUEOLOGÍA IBEROAMERICANA*: <http://www.laiesken.net/arqueologia/contact/>.*

Acabóse de imprimir digitalmente la décima edición de la revista
ARQUEOLOGÍA IBEROAMERICANA el día 30 de junio del año 2011
en el taller del editor Pascual Izquierdo-Egea, villa de Graus (España).