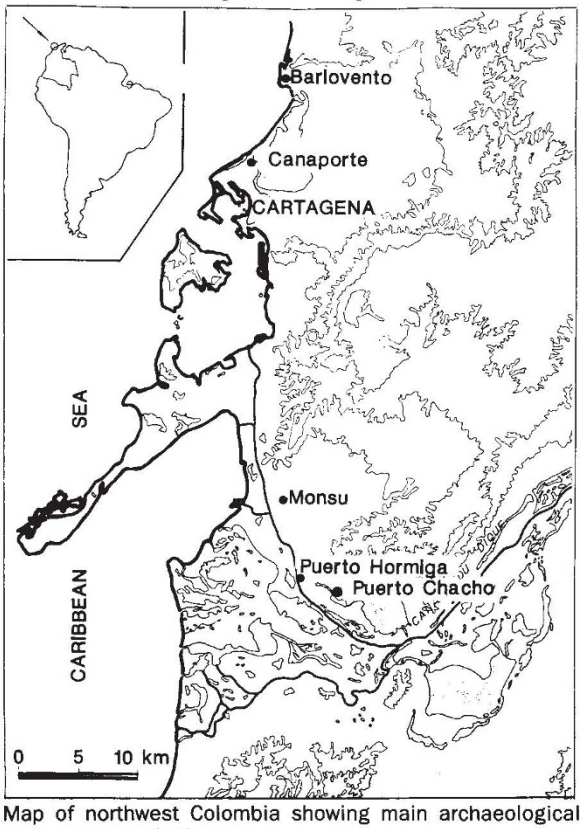
This case was strengthened when earlier, more primitive pottery (San Pedro ware) was discovered stratified beneath Valdivia pottery at Valdivia itself[4]; although this also had incised decoration, it bore little resemblance to Jomon motifs. Yet even San Pedro pottery was still too sophisticated to be a first step in ceramic production, so the problem of its origins remained. The most likely source appeared to be Colombia.



Map of northwest Colombia showing main archaeological sites discussed in the text.

The first archaeological work of note in the alluvial plain just south of Cartagena near the Caribbean coast (see map) was carried out in the 1960s[5]. Puerto Hormiga, for example, was a camp of fisher–gatherers of the early third millennium BC. The nearby site of Monsú[6] was earlier, but its pottery was much the same as at Puerto Hormiga, and both were similar in date and style to the San Pedro ware.

The French team[1] began work in the region in 1987, and recorded about 30 sites. Puerto Chacho, close to Puerto Hormiga, is an elongated shell mound, 100 m long, 30 m wide and up to 1.2 m deep, located by the ancient terrace of a tributary and a few metres above a mangrove. Its stratigraphy comprises four main levels: layer 2b in the second level, containing pottery, has produced an uncalibrated radiocarbon date of 3270 ± 90 years BC.

Puerto Chacho seems to have been both a habitation and a refuse dump. At the periphery, where shells are absent, there are traces of a simple dwelling structure from the site's final occupation. Most of the inhabitants' food came, inevitably, from the nearby aquatic resources: primarily oysters and limpets from the mangrove. A large type of shell, *Strombus gigas*, did come from the sea, and was used to make utensils. A preliminary study of fish remains shows a high degree of human selection among the many species available: two marine species alone (*Centropomus* and *Eugerres*), which come up-river during spawning, account for over 50 per cent of the remains. The inhabitants fished mainly in the river, systematically exploiting the available resources according to season: they seem to have camped at Puerto Chacho in late autumn. In addition, a few other animals (turtle, cayman, iguana, manatee) were taken from time to time, as well as the occasional deer. As yet, no trace of agriculture or horticulture has been detected at the site, but this is hardly surprising given that it was occupied seasonally.

The early pottery's forms are simple, mostly hemispherical, and resemble the ware of Puerto Hormiga in the frequent use of plant fibres as tempers. Decoration includes incised lines, straight or curved, forming complex but highly organized motifs; dotted ornamentation; and zoomorphic handles, mostly depicting birds. Many of the decorated vessels still bear traces of a red colouring material on their surface. Although fired at low temperature, the pottery reveals a mastery of pyrotechnology which, together with the sophistication and variety of decoration, strongly supports the idea that ceramic production was already well established, and hence that its origins must lie further back in the fourth millennium, if not before.

The finds at Puerto Chacho have no clear links with the Ecuador material. They suggest that the inhabitants of America, like those of other parts of the world, may have invented pottery quite independently, and possibly in more than one area. □

*Paul G. Bahn, 428 Anlaby Road, Hull HU3 6QP, UK, is a freelance writer on archaeology.*

1. Legros, T. *Les Dossiers d'Archéologie* **145**, 60–63 (1990).
2. Meggers, B. J. & Evans, C. *Sci. Am.* **214**, 28–35 (1969).
3. McEwen, G.F. & Dickson, D.B. *Am. Antiq.* **43**, 362–371 (1978).
4. Bischof, H. & Gamboa, J.V. *Am. Antiq.* **37**, 548 (1972).
5. Reichel-Dolmatoff, G. *Antropología* (Bogotá) **2** (1966).
6. Reichel-Dolmatoff, G. *Arqueología de Colombia: un texto introductorio* (Fundación Segunda Expedición Botánica, Bogotá, 1986).

DAEDALUS

# Seven-metre boots

**Our upright stance and walking gait have evolved very recently, and are still quite imperfect. In particular, we are designed to plod slowly through bush and rough country, and our legs are seriously undergeared. Evolution has still not reacted to that crucial invention, the smooth road. With the aid of a bicycle, we can propel ouselves at up to ten times normal walking pace on such a road. Daedalus is now devising a simpler way of matching us to our terrain. Inspired by the humble roller-skate, his new 'active boots' gear up the human stride to match any type of surface.**

**These cunning boots intercept the energy of each stride and use it to drive small wheels under their soles via a variable gearbox. At each stride, therefore, the wearer travels an additional distance provided by wheel rotation. The highest gear-ratio, appropriate for very smooth, level floors and roads, sends the wearer scudding a full ten stride-lengths for each stride he takes, speeding him along at bicycle velocity. Lower gears give less speed but more power, for rougher terrain like carpet or uneven tarmac. The lowest gear of all, for really rough ground or obstacles like stairs, gives zero gain. It locks the wheels, converting the boots back to normal passive footwear.**

**DREADCO engineers are wrestling to implement this ingenious concept. Their prototype captures stride-energy very simply, by means of a cord connecting the two boots. As the wearer strides along, the cord unwinds and rewinds from a tiny windlass in each boot; a spring-and-ratchet mechanism stores the captured energy and feeds it to the wheels via a continuously variable automatic gearbox. This sets its ratio from the tension in the cord, thus matching the wearer's muscular effort to the resistance being felt by the wheels. A free-wheel system lets the wearer 'coast' between strides, saving energy and preventing sudden changes of velocity which might tip him over.**

**The final design should be so well adapted to human walking and balancing reflexes as to be hardly noticeable. The wearer of DREADCO's 'Hyperboots'® will have no sense of pedalling a mechanism; he will just find himself speeding along as if walking on a moving conveyor-belt. Life will be utterly changed. The postman, the shopwalker, the canvasser, even the housewife and laboratory technician who walk unnoticed miles in the course of a day will all feel a wonderful new ease and freedom. Hyperboots will magically shrink all distances, indoors and outside, wonderfully increasing the 'strolling range' we can traverse without vehicular assistance. Exciting new sports, from Hyperboot racing to high-speed dancing, should also emerge.**

David Jones