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Tula, and wheeled animal effigies in Mesoamerica

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For *all* an *archaeologist's* or *anthropologist's professional* training in how ancient societies organize *themselves* with 'appropriate *technologies',* it is not *easy* to grasp how *very* different *those* ancient *civilizations* were from any society we *have* experienced. Nowhere is this clearer than in Mesoamerica, where cities and empires had no *need* of the 'basics' of urban *life* as we know it. One of those 'basics' is *wheels,* discussed here in the *sole, small context* in which they are *commonplace* in *pre-Columbian* America.

One of the major differences between the ancient civilizations of Eurasia and those ofthe Americas was the absence of wheeled transportation in the latter. Ironically, the principle of using wheels to facilitate horizontal movement was familiar to at least some peoples of Pre-Columbian Mesoamerica; and the existence of small clay animal effigies mounted on wheels - 'toys', as they are sometimes called - has been known since the 19th century. In this paper, we review the published literature dealing with wheeled animal effigies, report a new sample of 79 wheeled-effigy fragments from Tula, Hidalgo, and attempt to explain their origins and functions. In addition we review the problem of why Mesoamericans did not adopt the wheel as a utilitarian device.

Over 100 years ago, Desire Charnay reported the first Mesoamerican wheeled animal effigy (Charnay 1882 [1973]). While excavating at Tenenepango on the slopes of the volcano Popocatepetl near Mexico City, he found a small dog effigy with perforated legs associated with four wheels. He argued that the wheels were indeed wheels rather than spindle whorls, a conclusion accepted by everyone who has examined both types of artefact since then. Charnay's discovery was ignored or rejected outright, perhaps, as Ekholm (1946: 223) suggests, because of his exaggerated claims and false conclusions on many other topics. The issue of wheels in Pre-Columbian Mesoamerica remained dormant for 50 years. Linne, for example, recovered at least two wheeled animal fragments in his Xolalpan excavations at Teotihuacan, recognized them as such in his field notes, but did not mention them in his published report (S. Scott, pers. comm., 1982).

The issue was reopened in the 1940s with finds of wheeled effigies at Tres Zapotes, Veracruz, and the Pavon site at Panuco, Veracruz (FIGURE 1), reported in American Antiquity (Ekholm 1946) and a 'Mesa Rodante' in Cuadernos Americanos (Caso et 01. 1946). Almost all the numerous articles published since (e.g. Linne 1951; Lister 1947; von Winning 1950; 1951; 1960) describe objects in private collections whose lack of provenience and association data make them little more than interesting curiosities. The fullest recent discussion is a monograph (Boggs 1973) describing nine examples found in EI Salvador and summarizing then current knowledge about Mesoamerican wheeled animals.

The present state of knowledge

The published literature references at least 42 complete and fragmentary wheeled animal effigies, and Boggs (1973) estimated that at least 60 or 70 were known when he wrote his monograph. His analysis oftheir characteristics and his conclusions can be summarized as follows:

1 Bodies occur in both solid and hollow variants.

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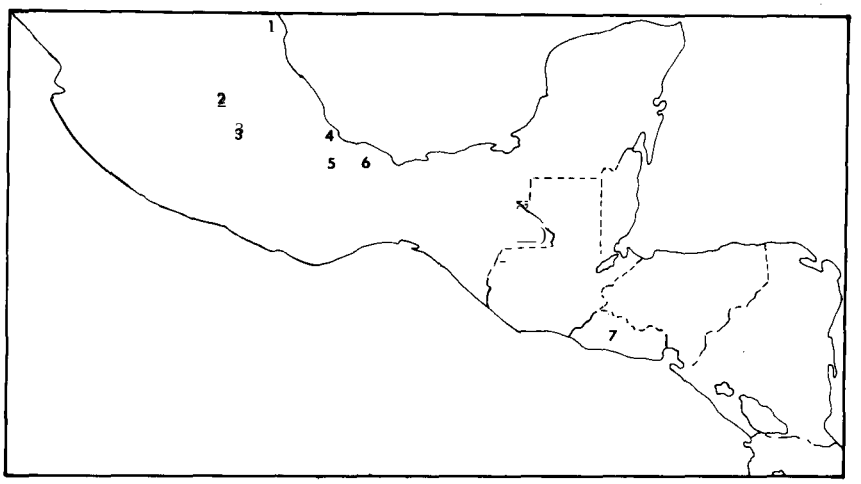

FIGURE 1. *Map of Mesoamerica showing the locations of sites mentioned in the text.*
1 Panuco, *Veracruz.*
2 *Tula, Hidalgo.*
3 *Teotihuacan, Estado de Mexico.*
4 *Remojadas, Veracruz.*
5 *Nopiloa, Vera cruz.*
6 *Tres Zapotes, Veracruz.*
7 *Cihuatan, El Salvador.*

Small solid examples are common in and adjacent to the Basin of Mexico but also occur in Veracruz, particularly in the central part of the state. Some may date to the Classic period (AD 200-900), but most belong to the Early Post-Classic or Second Intermediate period (AD 900-1250).

Larger hollow examples, known from central and northern Veracruz, Michoacan, Guerrero, and El Salvador, seem to date to the Early Post -Classic. Those often take the form of flutes with the animal's tail or posterior serving as the mouthpiece.

2 Two thematic classes can be defined: 'integral' effigies of standing animals with axle-holes through their limbs; and a 'composite' type in which animals or humans are mounted on wheeled platforms. Examples ofthe 'composite' type are rare but have been found in El Salvador, Nayarit, and central Veracruz.

3 The animals are always mammals or reptiles; dogs are the most common form, but jaguars, deer, monkeys, armadillos, crocodilians, and iguanas are also known.

4 Most effigies were made by hand, but a few mould-made wheels and heads have been identified.

5 The wooden axles on which the wheels were mounted were inserted through holes in the animal's body or legs.

The chronology of wheeled figurines is poorly known. Over half the known effigies, including most of the complete and semi-complete pieces, are in private collections and lack provenience beyond what a looter told a buyer, who told an art-dealer, who told a client, who told a scholar. After examining the published literature, we concluded that most, if not all, wheeled figurines were manufactured during the Early Post-Classic. The only possibly earlier examples come from Tres Zapotes, and a few other sites on the Gulf Coast plain between Veracruz City and the Tuxtla mountains. A. Medellin Zenil claims these pieces are Late Classic. We concur, but must note that the evidence is not very strong (Medellin 1960a; 1960b). Publications on Nopiloa, Remojadas, Cocuite, and other near-by sites provide only the scantiest of details and frequently do not even specify the number of wheeled figurines found. The Tres Zapotes finds are better reported (Drucker 1943; Stirling 1946; 1962) but the continuing controversy surrounding the site chronology creates difficulties (Coe 1965; Drucker 1943; Squier 1964; Weiant 1943). We follow Coe's (1965: 686) re-evaluation of the sequence in which his Tres Zapotes IV is equivalent to Weiant's Upper and Drucker's Upper II phases; this assigns the famous and somewhat aberrant figurines with tubular axle housings to the Late Classic (AD 600-900).

The case for Classic-period wheeled effigies at Teotihuacan is still unresolved. There are Linne's two Xolalpan pieces, mentioned earlier, and 1. Sejourne illustrated what may be a wheeled dog in her book Un *Palacio* en *10 Ciudad* de *los Dioses* (Sejourne 1959). Since the archaeological contexts of these pieces are not known, it seems prudent to assign them to the substantial early Post-Classic Mazapan phase

occupation at the site. There is certainly no convincing evidence that they were made during the Classic period.

Although some authors maintain that wheeled figurines continued to be made after AD 1250 (Boggs 1973; Ekholm 1946; von Winning 1950; 1951), the evidence does not support this claim. Two pieces said to be from the Basin of Mexico have been called Aztec because they differ stylistically from the others and have a distinctive paste, but this is a poor basis for chronological assignment. Boggs originally dated the wheeled effigies at Cihuatan, El Salvador, to the Lat~Post-Classic, but K. Bruhns has recently re-assigned them, to the Early Post-Classic (Bruhns 1980: 95-l?).

The Tula sample

The University of Missouri-Columbia conducted excavations and surveys at Tula, the ancient Toltec capital in Hidalgo State, Mexico, between 1970 and 1972 (Diehl 1981; 1983; Diehl & Benfer 1975). The primary emphasis of the research was the study of residential architecture and daily urban life through large-scale horizontal excavations in two areas near the northern edge of the urban zone. The Corral locality is situated just E of the El Corral mound, a round temple dedicated to Ehecatl, the Wind Deity (Acosta 1974). Here we excavated part of an elaborate residence which was constructed, used, and abandoned during the Tollan phase (AD950-1150/1200), the time of Tula's florescence (Mandeville 1985). The artefacts found on and above the floors belong to the Tollan phase, but the fill brought in to raise the area prior to construction included both Tollan-phase and earlier materials.

The Canal locality, several hundred metres to the E, was the primary focus of our excavation activities; here we uncovered 14 houses and a small temple platform (Healan 1977). Once again, all the architecture belongs to the Tollan phase.

Morphology

Seventy-nine wheeled animal effigy fragments were found in the excavations; they included 21 bodies (19 of which lacked hads), 27 heads, 16 wheels, 11 legs, 3 tails, and 1 neck. We did not find any complete specimens and thus cannot report accurate sizes, but they are similar to other known Mesoamerican examples (*c.* 10 em long by 8 em high). Twenty-six pieces (33% of the sample) were found in the Corral locality and 53 (67%) in the larger Canal locality. Their find contexts are no help to interpreting their function because virtually all were in trash deposits, structural fill, post-abandonment debris and other transposed primary contexts (Schiffer 1972). These contexts indicate only that they were manufactured, used, and discarded during the Tollan phase.

The identifiable animals in our sample include dogs, jaguars, and a wolf or other wild canid. Most heads can be readily classified by species, but the bodies are too stylized to permit reliable identification. Heads from hollow animal effigy flutes not placed on wheels were also found but these, fairly easy to distinguish from the wheeled effigies, have been excluded from the discussion.

Fourteen of the 27 heads (including one still attached to a body fragment) portray dogs with large, round, and erect ears. Eyes are almond-shaped with raised circular pupils, although one example has the entire eye shown as a raised circle; and the open mouths suggest that the animals are barking or panting.

Six heads depict jaguars. Their eyes are similarto those of the dogs and, although the ears are invariably broken off, the scars suggest they were similar to dogs' ears. Jaguars differ from dogs in their feline appearance with bulging foreheads, broad muzzles, and open mouths with a snarling countenance.

The third group of wolf-like animals are characterized by long muzzles, prominent brow-ridges, closed or only slightly-open mouths, underslung lower jaws, almond-shaped eyes with raised pupils, and erect, pointed ears.

Five heads in the collection fit no category. Two are completely unidentifiable, and the other three may conceivably represent a bear, a coyote, and a rodent. A few heads retain traces of paint depicting blue collars and blue ear tips.

All the heads are solid and all but two were made in moulds. When the clay was pushed into the mould, a protruding tab was left to facilitate removal; this tab later served as a core around which the neck was constructed.

The bodies are similar to the solid, hand-modelled examples described from elsewhere in Mesoamerica (FIGURES 2 & 3). They are relatively broad and flattened in the ventral-

FIGURE 2. *Wheeled animal* effigy *fragment from Tula* showing *tail stub and perforated leg. Length* 7em.

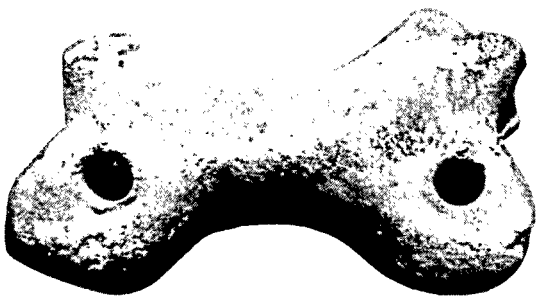

FIGURE 3. *Wheeled animal* effigy *body from Tula* showing *perforated leg. Length* 9 em.

dorsal dimension, and many have axle scars on at least part of the ventral surface. The straight, slightly tapered tails form an angle of about 140° with the haunches, and the slab-like legs are splayed outward from the body at an angle of about 120°. The leg position relative to the body suggests what von Winning (1960: 64) calls a 'prancing pose'. The perforations in the legs were generally made from the outside while the clay was still wet, and the displaced clay forms a rough collar around the inside of the hole. The body surfaces were not smoothed or polished, but four have traces of yellow paint. Two bodies, one with yellow paint, had blue collars or 'leashes'. One body has black 'tiger stripes' on the hind quarters, and another has a broad red band painted on the side.

As Charnay noted long ago, the wheels differ from spindle whorls in their size, shape, crudity and lack of decoration. They are hand-modelled clay disks with a central perforation (FIGURE 4),

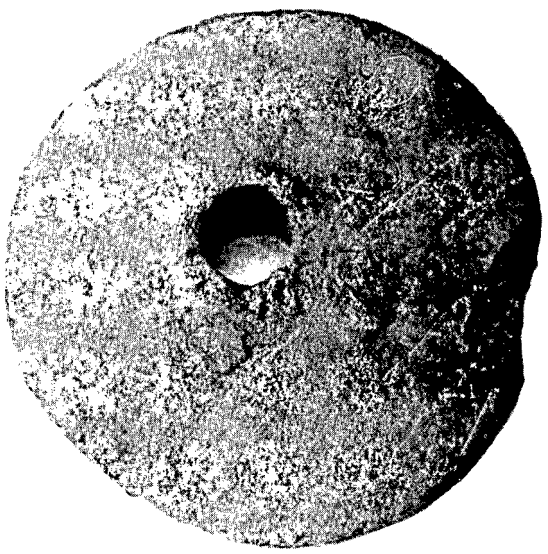

FIGURE 4. *Clay wheel from Tula.* Diameter 5 em.

and most are notably rough and lop-sided. In cross-section they are thickest at the centre and thin out towards the rim. Ths holes were punched through with a stick or similar tool while the clay was still wet, and the excess clay frequently forms a collar on the surface opposite the entry point.

Date

Most of the Tula examples can be confidently dated to the Early Post-Classic Tollan phase (AD 950-1200). The Canal locality examples, associated exclusively with Tollan phase ceramics, were certainly from that phase. The Corral locality examples occurred in all levels of the excavations. Those found above the building floors were associated with Tollan phase pottery and a few earlier sherds which seem to be older materials brought up into the later deposits; those beneath floors occurred in a mixture of Tollan phase and earlier materials. We assume the figurines in mixed deposits belong to the Tollan phase because there is no clear-cut evidence at Tula or elsewhere for their contemporaneity with the earlier Coyotlatelco-style ceramics. The Tollan phase is Tula's manifestation of the general central Mexican Mazapan tradition, and it is significant that every well-dated Mesoamerican wheeled effigy known except for the central Veracruz examples mentioned earlier belongs to this time period.

Function

The functions of wheeled effigies are not known. Since they were no longer being made at the time of the Spanish Conquest, we lack ethnohistoric accounts to guide our interpretations. Ekholm (1946) considered them to be toys but did not explain his reasoning, while Boggs (1973) and most recent writers think they were probably ritual objects employed in adult ceremonial contexts. We agree, and can cite two lines of evidence which support this view. The Tres Zapotes and Nopiloa figurines were found in dedicatory caches associated with mound-construction, a highly unlikely context for children's toys; Charnay's example appears also to have been part of a cache of some sort. In addition, most of the animals depicted have strong ideological connotations in ancient Mesoamerican belief systems. Jaguars, dogs, deer, and crocodilians were all associated with the supernatural world, in addition to whatever secular, dietary or other significance they may have had. At least some of the effigies were painted in iconographically significant colours such as blue, black and yellow.

If wheeled figurines were used in rituals at Tula, precisely how were they used? In what kinds of rituals were they employed? And were the rituals conducted at temples or in the privacy of individual homes? Their occurrence in midden deposits at two separate locales at the N edge of Tula indicates that the rituals were conducted at more than one place. But we cannot identify the specific origin of the debris in the middens, nor can we assume that the trash associated with our buildings was created by their inhabitants. Most of the debris found on an above house floors was deposited after the houses were abandoned, probably by residents of near-by structures, so the objects in them, including the figurines, were almost certainly used at spots close to our excavations. Since there were both large temple mounds and abandoned houses adjacent to both excavations, either type of building is a possible source. But Acosta did not report any wheeled figurines from his extensive excavations of Tula's major temples, which suggests a household use rather than involvement in a temple cult.

Wherever they were held, the rituals seem to have occurred with much more frequency than previously suspected: the 79 fragments of wheeled figurines in our sample constitute almost 9% of the 865 figurines of all types recovered in the excavations. This high percentage is frankly surprising but may **in** fact turn out to be the norm at Tula and elsewhere when more excavations have been done in residential zones.

The yellow dog figurines might go with some variant ofthe later Aztec beliefthat yellow dogs accompanied deceased humans on their journey through the afterworld. However, we did not find any wheeled effigies associated with burials - an association which has once been observed at Tlalixcoyan, Veracruz, a site located within the putative zone where the concept of wheels first appeared (Lopez Valdes 1966).

Discussion

The evidence suggests that wheeled animal effigies were ritual objects invented in central Veracruz some time after AD 600 and that the concept reached northern Veracruz, central Mexico, and the southern Mesoamerican frontier by AD 1000-1100. It is quite possible that this diffusion occurred a century or two earlier and that we simply lack evidence of it at the present time.

If this historical reconstruction is correct, the dissemination of the wheeled figurine concept may have been part of a larger diffusion process which archaeologists and art historians are only beginning to recognize. This larger process involved the spread of Gulf-coast architectural motifs, iconographic elements, the ball game and its associated paraphernalia, and other elite ritual concepts to many parts of Mesoamerica after AD600 (Parsons 1969; 1978; Pasztory 1978; Sharp 1978; 1981). The areas which received these influences included central Mexico; the Pacific coast, piedmont, and highlands of southern Mesoamerica; and Yucatan - and of these only Yucatan has not yet yielded evidence of wheeled effigies. Most of the artefact assemblages with wheeled effigies also contain whistles, flutes, special types of ceramic censers, and other exotic ceramic ritual paraphernalia. The present evidence suggests that at least some of these artefact types originated on the Gulf coast. Perhaps those of us who view the Gulf Coast as a quiet cultural backwater after its early Olmec florescence must reassess our ideas.

The lack of wheeled **transport in Mesoamerica**

A final issue is why Mesoamerican Indians never adopted the wheel as a practical transportation device - a step which seems so natural from our technologically oriented world-view that we have difficulty comprehending why it did not occur. However, anthropologists have long known that most 'unexplainable' facets of human culture are the result of factors which are quite logical once they are known. We believe that a set of environmental and cultural factors so reduced the potential advantages of the wheel that it was not adopted. Our ideas in this regard are not new; Ekholm presented many of them almost 40 years ago, and Piggott (1982) has an excellent discussion of the topic. Nevertheless they bear repetition.

We might begin by turning the question around and asking why anyone ever adopted the wheel and under what circumstances? Humans managed perfectly well without wheeled transportation during most of prehistory, suggesting that only very special circumstances and conditions led to development of the complex technology and organization necessary for the effective use of wheeled vehicles. What were these conditions?

Stuart Piggott (1968; 1983) concludes that wheeled vehicles first appeared in Mesopotamia during the Uruk period, prior to the 3rd millennium BC, and at the same time or a little bit later in South Russian Pit Grave culture (Piggott 1968: 309; 1983: 35). Both areas were open grassland or semi-desert environments with few or no physical obstacles to vehicle travel. Piggott argues that the earliest vehicles were used to move bulky surplus agricultural produce, although the use of battle-carts for warfare and wagons by pastoral nomads also figured in the diffusion of the wheel. He suggests several conditions necessary for the acceptance and development of wheeled transportation: 'adequate animal draught (especially oxen); suitable carpenter's equipment; appropriate terrain and subsistence economies of either pastoral or static agricultural type in which carts or waggons would perform a useful function' (Piggott 1968: 311). The Mesoamerican agricultural economy certainly involved the moving of large quantities of produce from the production zones to distribution centres and places of ultimate consumption, but the absence of two of Piggott's essential conditions, draught animals and appropriate terrain, inhibited and probably prohibited the development of wheeled transportation.

The absence of draught animals was the major obstacle. Wheeled vehicles laden with cargo offer no substantial advantages over human porters if they must be propelled by people, particularly over long distances and on sloping or broken terrain. This is especially true of the very heavy vehicles with solid wooden wheels and axles, the earliest type known in the Old World and logically the first types in the technological evolution of vehicles. Animal traction is essential.

Unfortunately for ancient Mesoamericans, the largest domestic animals in their environment were medium-sized hairless dogs, *Xoloitzcuintli,* which were clearly unable to pull large vehicles. Ironically, until the end of the Pleistocene, Mesoamerica did contain large animals which could have been domesticated; horses, camels, and even elephant forms inhabited Mexico and Central America until the Palaeoindian hunted them to extinction. Further south, in the Andes, there were llamas and alpacas which might have pulled wheeled vehicles - but the Incas and their predecessors were apparently unaware of the wheel.

Mesoamerican topography was another basic obstacle. One writer has compared the area to a giant piece of crumpled paper sitting on a table top. The highland areas have rugged mountain ranges with steep gorges, broken topography, and small valleys, while the coastal lowlands are covered with tropical forests, swamps, and a complex network of waterways. Wheeled vehicles would have been unusable in both environments without roads, bridges, causeways and gradient modifications. Mesoamerican Indians were clearly capable of constructing such facilities; the Maya, Aztecs and other groups built many kilometres of roads and causeways - but only on flat terrain, never in the mountains. With a transportation efficient enough to suit their needs, there was no cause for innovation.

Long before Mesoamerican Indians invented the wheel, they had developed a transportation system based on foot and canoe travel, a system which did not change substantially until the present century. By the beginning of the Christian era, complex trade and communications systems extended from coast to coast and from the northern deserts into thp. hp."rt nf

Central America. These systems included trade centres, professional merchants, specialized production of trade goods, governmental organizations which directed the commercial activities, and a host of other features integrated into elaborate institutional frameworks. Caravans of human porters, often slaves, trekked vast distances carrying goods on their backs using tumplines and backpacks (Sanders & Santley 1983). Water transportation was preferred wherever navigable lakes, rivers, and coastal waters allowed it. This transportation system, moving basic goods to near-by markets, tribute to overlords, and luxury items to distant consumers, was functioning at the time of the Spanish conquest, and the same basic modes of transport continued even after the Spaniards introduced wagons, carts, and draught animals. Indians preferred their tumplines and backpacks until railways, buses, and trucks penetrated their homelands in the present century.

This is one example of the conservatism which some writers believe to be a defining characteristic of Mesoamerican Indian culture since the Spanish conquest. In reality, however, it was a response to specific conditions and situations, a realistic appraisal of perceived benefits and costs. Even with suitable draught animals, colonial- and republican-period Indians found the costs of adopting wheeled transportation too high and the benefits too few. This is not surprising. Human cultures are integrated wholes, and changes in one sphere frequently lead to major, and at times, deleterious, changes in other aspects of life. In light of this, is it any wonder that Pre-Columbian Indians ignored the practical application of the wheel?

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