

(Reprinted from Nature, Vol. 259, No. 5542, pp. 390-391, February 5, 1976)

Knowledge of magnetism in pre-Columbian Mesoamerica

THAT the pre-Columbian peoples of Mesoamerica were familiar with the property of magnetism has been suggested by numerous researchers, among them Coe and Fuson(1). Indeed, a flattened oblong piece of haematite discovered by Coe during the excavation of the Olmec site of San Lorenzo in southern Veracruz state in 1973, has been thoroughly examined by Carlson (2), who suggests that it probably was manufactured for use as a compass. Fuson has argued that the varied alignments of architectural complexes in many Mayan ceremonial centres may be explained by their having been oriented to compass directions which changed through time, and further, that the Mayas' knowledge of mercury would have permitted them to use vessels filled with this liquid, as well as the water-filled calabashes, to float their 'needles' or lodestones. In January 1975 during field studies at Izapa, in the Pacific coastal plain of south-eastern Chiapas state, I discovered strong circumstantial evidence that the people of this Late Formative ceremonial centre not only knew about magnetism but possibly even associated it with the homing instinct of the sea-turtle.

While examining astronomical alignments of various of the structures at Izapa, I took a bearing along the axis established by two large sculptures located ~ 30 m south east of the main pyramid (Fig. 1). In common with the river cobbles that make up the facing of the pyramids and platforms of the site, the sculptures consist of dark brown basalt. Apart



Fig. 1 Carvings of snake and turtle heads at Izapa, located 30 m SE of the main pyramid.

from the fact that they are larger and have been specially carved, they are in no way distinguished from the other exposed rock at the site. The smaller of the two sculptures measures 89 cm in length and is unmistakably a representation of a snakehead. Some 114

cm behind the snakehead, that is, further SE, stands an upright stone stela, roughly squared off but having no discernible carvings on any of its faces. A further 256 cm SE is a second stone sculpture, this one measuring 114 cm in length and 122 cm across at its widest point. This stone unquestionably depicts the head of a turtle. When a Brunton compass was brought near the turtlehead a sharp deflection of the needle was observed, of more than 60°. No matter where the compass was moved along the perimeter of the sculpture, the needle continuously pointed to the snout of the turtle (Fig. 2). Discovery of this magnetic field prompted the testing of all other exposed rock at the site for magnetic properties, but no others were detected. This would suggest that the Izapans knew about magnetism in that they had reserved a basaltic boulder rich in iron for their



Fig. 2 Close-up of turtle head, with compass needle pointing toward snout.

carving of the turtlehead, and had executed it so carefully that the magnetic lines of force all came to a focus in the snout of the turtle.

The magnetic turtlehead is not the only representation of this creature found at Izapa. Overlooking the western end of the ceremonial ball court is a large altar carved from a single piece of basalt that is also unmistakably a turtle. A few metres to the south of this altar, adjacent to the wall of the main pyramid, is another sculpture, which has the appearance of an upturned turtle shell, again carved from a single basalt boulder. The latter would obviously have become filled with water during the rainy season, and may well have provided the frictionless surface needed for a shaving or needle of lodestone, floating on a small piece of wood, a leaf, or a straw, to serve as a compass. Clearly the Izapans, a sea-faring people, were impressed by the navigational ability of turtle (3), which are common in this area. It may be interesting to note that the theory that turtles navigate by magnetism has not yet been discounted (3).

VINCENT H. MALMSTROM

Department of Geography,
Dartmouth College,
Hanover, New Hampshire 03755

Received August 1; accepted December 18, 1975.

- (1) Fuson, R., *Ann. Ass. Am. Geogr.* 59, 508-510 (1969).
- (2) Carlson, J. B., *Science*, 189, 753 (1975).
- (3) Carr, A., *So Excellent a Fishe*, 166, 171 (Natural History Press, Garden City, 1967).

Printed in Great Britain by Henry Ling Ltd., at the Dorset Press, Dorchester, Dorset

Science News Briefs - MAGNETISM AND TURTLES

When young loggerhead turtles enter the ocean off the Florida coast as hatchlings, they begin a years-long trip that takes them northeast across the Atlantic to Spain, south to the North African coast, then west and northwest to complete a giant circle that brings them back to their home waters.

A team of University of North Carolina researchers, reporting in the Oct. 12 Science, showed that the turtles apparently have a built-in sense of the Earth's magnetic field that keeps them swimming in the warm and nutrient-rich currents of the 8,000-mile circle, known as the North Atlantic Gyre.

The team placed loggerhead hatchlings in a tub of seawater surrounded by copper coils capable of duplicating the Earth's magnetic field at various points in the Gyre. When the field mimicked the north Florida coast, the hatchlings swam southeast - the quickest route to the Gyre.

When the field was oriented for northern Spain, the hatchlings swam south, and when the field reflected the southernmost limit of the Gyre, between the coasts of North Africa and South America, the swam northwest, homeward bound for the Florida coast.

Wire Reports (October, 22, 2001)

[\(Back to Table of Contents\)](#)

