

A new giant land tortoise from the Pliocene of Gran Canaria (Canary Islands)

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Abstract: A new species of giant land tortoises extinct during the Pliocene of Gran Canaria is described under the name of *Geochelone vulcanica*. Comparisons with similar osteological material of *G. burchardi* (Tenerife island) show great differences between both taxa. Fossil eggs of giant land tortoises described from Gran Canaria island can be considered as belonging to the new species.

Key Words: Pliocene, Canary Islands, Testudinidae, New species

Resumen: Una nueva tortuga gigante terrestre del Plioceno de Gran Canaria (Islas Canarias).- Una nueva especie de tortuga terrestre extinguida en el Plioceno de Gran Canaria es descrita con el nombre de *Geochelone vulcanica*. La comparación con el material óseo similar de *G. burchardi* en la isla de Tenerife, demuestra las grandes diferencias existentes entre ambos taxones. Los huevos fósiles de tortugas terrestres descritos en la isla de Gran Canaria se consideran pertenecientes a la nueva especie.

Palabras clave: Plioceno, Islas Canarias, Testudinidae, Nueva Especie

INTRODUCTION

The known fossil vertebrates from the Canary Islands come mainly from recent epochs (Holocene and Pleistocene). Nearly all the species described to date are large lizards (see the synopsis provided in LOPEZ-JURADO, 1991), and murid rodents (CRUSAFONT- PAIRO & PETTER, 1964; LOPEZ-MARTINEZ & LOPEZ-JURADO, 1987; HUTTERER *et al.*, 1988). Prior to this geological time, only ostrich-like eggs from the island of Lanzarote are known (SAUER & ROTHE, 1972) which some recent authors suggest belong to large flying birds of the Order Odontopterygiforms (GARCIA-TALAVERA, 1989), and are dated from the Miocene.

Giant land tortoises are typical inhabitants of oceanic and continental islands, both as living species (Galapagos and Seychelles) and as extinct taxa (Indian Ocean Islands and Caribbean Sea Islands; ARNOLD, 1976, 1979; AUFFENBERG, 1976). In the Canary Islands, only one species of extinct giant land tortoise, *Geochelone burchardi*, has been described to date from Tenerife island (AHL, 1925, 1928; BURCHARD

& AHL, 1928; BURCHARD, 1934). But on the island of Fuerteventura, eggs of extinct giant land tortoise have been found (ROTHER & KLEMMER, 1991; LOPEZ-JURADO, 1991). Similar material occurs in Gran Canaria Island (MACAU-VILAR, 1958; LOPEZ-JURADO, 1985); its identity is confirmed by ultrastructural analysis of the shell (HIRSCH & LOPEZ-JURADO, 1987). The westernmost islands of Gomera, La Palma and Hierro are, perhaps together with Lanzarote, the only Canary Island where no remains attributable to land tortoises have been found.

We present here the description of a new species of extinct giant land tortoise, based on a single bone found on Gran Canaria island on November 28, 1984. Since then, we have searched extensively for more remains of these animals but without success. The volcanic nature of the Canary Islands means that vertebrate fossils are rare. It is likely that this bone belongs to a specimen of the species that laid the eggs found on this island by MACAU-VILAR (1958), and was dated as Pliocene (HIRSCH & LOPEZ-JURADO, 1987).

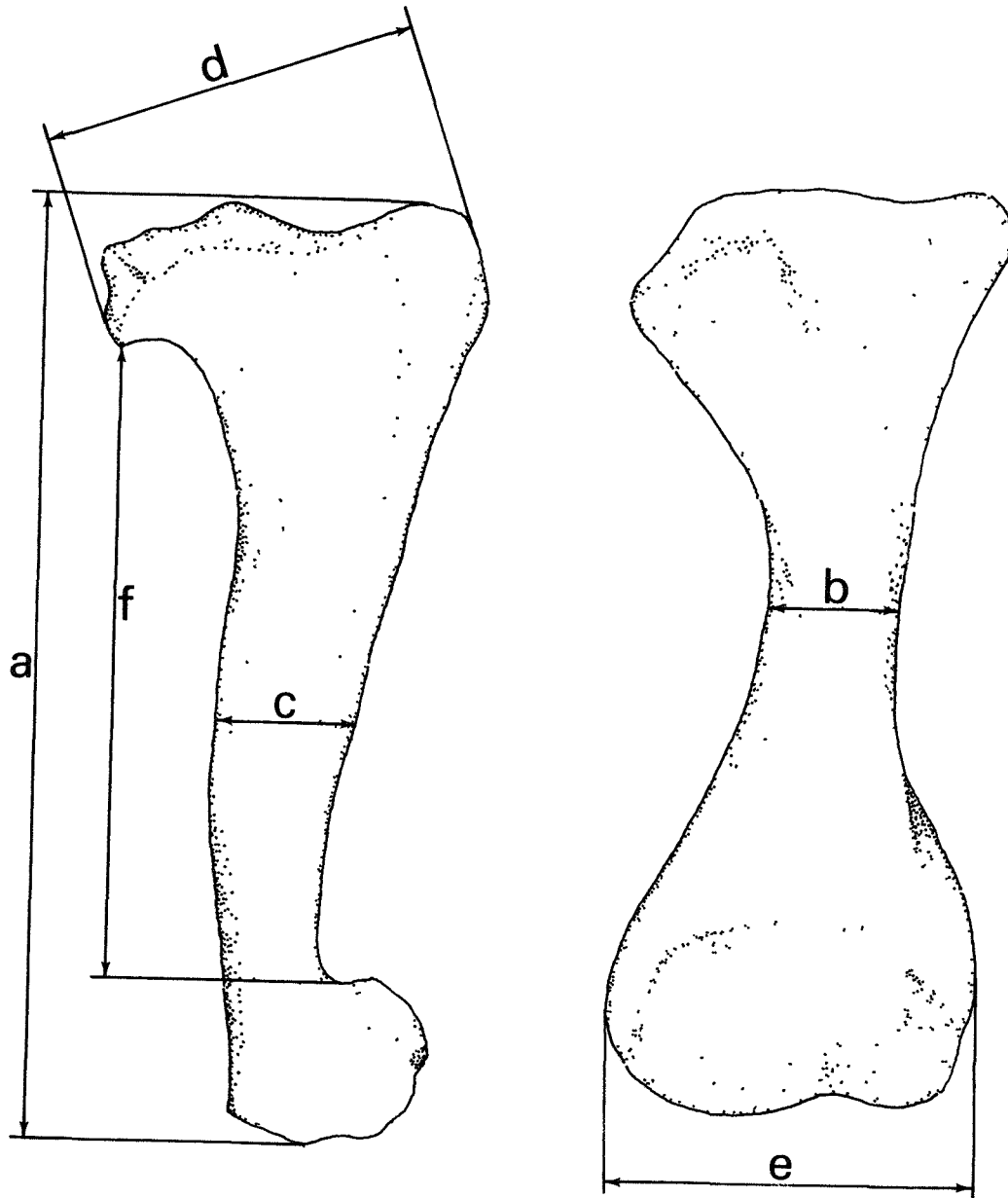


Figure 1: Diagram showing the measurements taken from the femur of *G. vulcanica*
Figura 1: Esquema mostrando las medidas efectuadas sobre el femur de *G. vulcanica*

MATERIALS AND METHODS

A single bone was found on Gran Canaria island on November 28, 1984. The bone was found in Barranco de la Ballena, located at the

west end of the city of Las Palmas de Gran Canaria, one kilometer from the coast and buried on the left side of the ravine in a sandy layer of inorganic origin. It is stored in the collection belonging to the Department of Biology of the

Table 1: *Geochelone vulcanica* holotype measurements
Tabla 1: Dimensiones del holotipo de *Geochelone vulcanica*

Maximum length	(a)	136.5 mm
Minimum diaphysis lateromedial width	(b)	18.8 mm
Minimum diaphysis ventrodorsal width	(c)	24.0 mm
Maximum length of the proximal epiphysis	(d)	55.6 mm
Maximum width of the distal epiphysis	(e)	60.4 mm
Length of the diaphysis	(f)	122.7 mm

University of Las Palmas de Gran Canaria. The comparisons were made with three femurs of the species *Geochelone burchardi*, from the collection belonging to the Natural History Museum of Santa Cruz de Tenerife.

RESULTS AND DISCUSSION

Geochelone vulcanica n. sp.

Description of the holotype

The holotype (and only specimen) consists of a highly mineralized left femur, complete except for a portion of the head, neck and large trochanter which are quite eroded. However, a portion of the head still retains its original surface as well as the bottom of the trochanteric cissure, so it is possible to carry out a reconstruction of the external morphology of the bone at this level.

Etymology

The name "*vulcanica*" is referred to the volcanic events presumptively involved in the species extinction.

Measurements

The bone measurements are shown in Table 1. FIG.1 illustrates a diagram of the measurements taken on the bone.

Comparisons

Comparisons were made with three femurs of the species *Geochelone burchardi*, from the collection belonging to the Museum of Natural History of Santa Cruz de Tenerife. Two of them were complete and similar in length to our bone and the third was much larger and rather incomplete. No variation was found in the morphology of the three bones from Tenerife island. The

photographic comparisons between the different views of the femur from Gran Canaria and one of those of *G. burchardi* are shown in fig. 2 (A,B,C,D,E,F). A considerable number of differences can be seen:

1. All the parts of the femur of *G. burchardi* are much more proportionate than in the femur of *G. vulcanica* (fig. 2: A, B).
2. The epiphysis and the proximal third of the femur of *G. vulcanica* is much more robust than in *G. burchardi* (fig. 2: A, B).
3. The step of the longitudinal axis along the diaphysis in both bones is very different (fig. 2: A, B, C, D and E).
4. Despite the fact that the bone of *G. vulcanica* is incomplete on this level, the proximal part of the diaphysis of this specimen seems to have a much smaller total articular surface than *G. burchardi*, and its orientation is also very different in relation with the sagittal axis of the diaphysis (fig. 2: A, B, F).
5. The neckline below the articular head is much deeper and much more pronounced in *G. burchardi* (fig. 2: A, B).
6. The cranial view of both epiphysis shows two very different superficial outlines between both species (fig. 2: F).
7. In *G. vulcanica*, the diaphysis becomes noticeably narrower in the ventrodorsal direction, just before the distal epiphysis; while in *G. burchardi* it remains quite the same (fig. 2: A, B).
8. The longitudinal curvature of both bones is different from the ventral view (fig. 2: D).
9. In the distal epiphysis of *G. vulcanica*, the lateromedial measurement is much larger than the ventrodorsal measurement (fig. 2: F).

The other two femora of *Geochelone burchardi* as well as the femora shown in the papers of Ahl (1925, pp. 577 and 579), were morphologically identical to the one used for the comparison in the fig. 2.

Very possibly, the strong differences found between the femora of both species are indications of different lifestyles or even different origins, but this is a speculative question whose resolution will have to wait further material.

As for the size of these tortoises, the measurement of the eggs from Gran Canaria previously described (MACAU-VILAR, 1958, HIRSCH

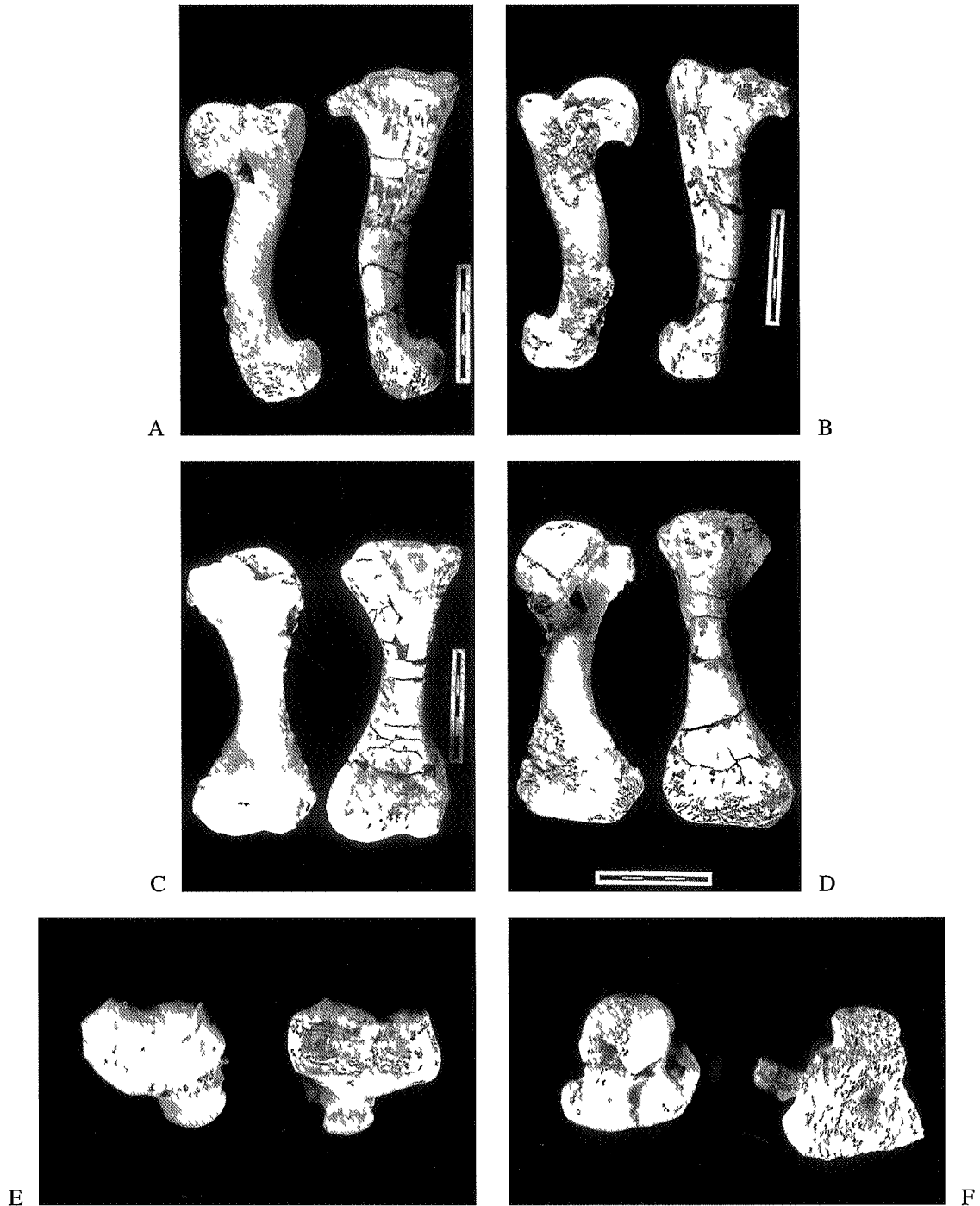


Figure 2: Comparisons between the femora of *G. burchardi* (1) and *G. vulcanica* (2) A anterior lateral view, B posterior lateral view, C dorsal view, D ventral view, E caudal view, F cranial view

Figura 2: Comparación entre los fémures de *G. burchardi* (1) y *G. vulcanica* (2) A vista lateral anterior, B vista lateral posterior, C vista dorsal, D vista ventral, E vista caudal F vista craneal

& LOPEZ-JURADO, 1987) correspond with the eggs laid by living species such as *Chelonoidis elephantopus* and *Aldabrachelys gigantea* (EWERT, 1979); therefore the fossil tortoise would reach a maximum length, if adults showed the same relationship to egg size, between 1.00 and 1.10 meters (LOPEZ-JURADO, 1985). However, the maximum length of the described femur (136.5 mm) does not seem to correspond with the possible maximum length indicated by the egg measurements. For *Geochelone burchardi*, AHL (1928) calculated a maximum carapace size of approximately 50 cm, based on two femurs measuring 148 mm in length; and for an incomplete but much larger femur, the same author calculated a carapace length of 60 cm based on comparisons with recent giant tortoises (AHL, 1927).

Acknowledgements

Special thanks are due to Dr. E.N. Arnold (British Museum) for his suggestions and revision of the English version of the manuscript. To the staff of the Tenerife Museum of Natural History (specially to the Director Dr. J. J. Bacallado) for his help in the comparisons with the material of *G. burchardi*.

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Recibido 05/02/93

Aceptado 20/04/93