

QUATERNARY MARINE MOLLUSKS FROM TENERIFE, CANARY ISLANDS

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ABSTRACT

Seventy-six species of Gastropoda, 21 species of Bivalvia and one Cephalopod species are cited from the beach deposit at Tachero, near the eastern end of the north coast of Tenerife. Of these, 46, 8, and 1 species, respectively, are new to the Quaternary marine fauna of the Canary Islands. Species of special biogeographic significance include Ostrea (Ostrea) edulis L., Nucella lapillus (L.), Planaxis lineatus da Costa and Pisania variegata (Gray). A Mellahian-Flandrian age (+ 2 m level) is established as an approximate chronology for the deposit.

The discovery of this beach deposit containing an abundant marine fauna in a rather loosely consolidated limestone permits, for the first time, a stratigraphic-palaeontologic study of the marine Quaternary of the Island of Tenerife. Previous authors have referred to the existence of Pleistocene raised beaches on the island, but no mention of an associated fauna has been made.

Zeuner (1958) noted three Quaternary raised beach levels in Tenerife:

Epimonastiran—La Roqueta, Punta del Hidalgo, Bajamar.

Lower Monastiran—San Juan de la Rambla, Punta del Hidalgo.

Upper Monastiran—La Roqueta.

These divisions are based solely on altimetric data, without reference to the fauna, suggesting that the beaches were submerged somewhat lower than the normally established levels during the middle of the last interglacial.

Bravo (1965), in his study of the modifications of the littoral zone due to Quaternary volcanic effusions, refers to the Quaternary terraces of Lanzarote, Fuerteventura, and Gran Canaria, and the almost complete absence of raised shorelines in the westernmost Islands of Tenerife, Hierro, Gomera, and La Palma. Although Lécointre, Tinkler and Richards (1967) have investigated the marine Quaternary of the Canary Islands, they make no mention of Tenerife or the other western islands.

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THE TACHERO DEPOSIT

The outcrop studied (Figs. 14 and 15) is situated about 200 m to the west of the beach of Tachero, in the north of the Anaga Peninsula (inset map, Fig. 16). The fossil-bearing stratum is limited in lateral extent, the extremes of which are covered by a great mass of talus deposits, very abundant in this part of the island. Its exposure is due to strong wave cutting during some heavy storms of 1973 and 1974, and may again, at any time, be covered by the overlying detritus during future periods of turbulent wave action.

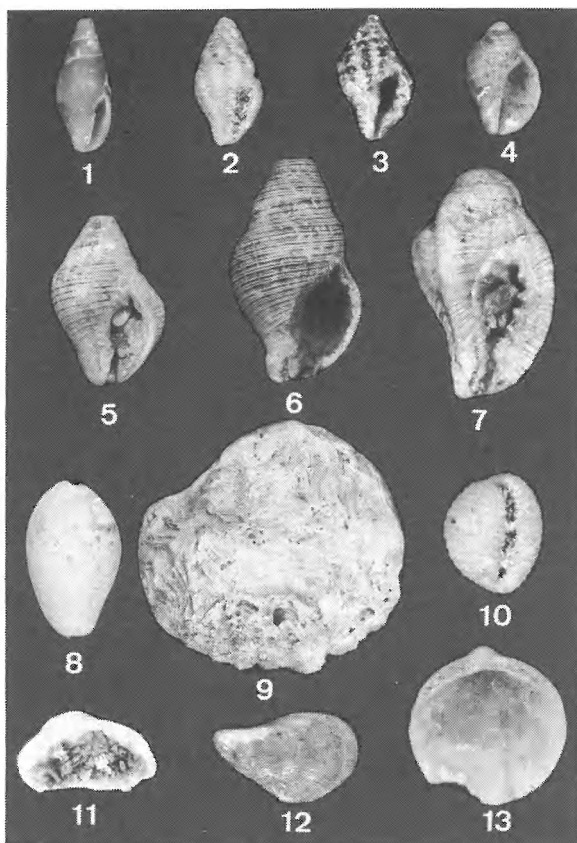
The following stratigraphic sequence is observed (Fig. 16):

A—a volcanic substratum containing numerous wave-leveled dykes, constituting an ancient littoral platform.

B—a mass of rolled lava pebbles, some of which are rubefacted, forming the base of the beach under study. Very little fauna is present, fragments of *Patella* being the most conspicuous components.

C—a thin faunal-rich gravel layer in which small mollusks are common.

D—a semi-consolidated limestone stratum about 40 cm thick, formed largely by calcareous algae (*Melobesia*), mollusks, coral, bryozoa and echinoderm fragments. The volcanic pebble content is poor, and increases toward the base. This layer stands out from the other components of the sequence due to its lighter color and greater compaction, thus forming a small terrace or step in relief at its upper surface (Fig. 15).



FIGS. 1-13. Quaternary marine mollusks from the Tachero deposit, Tenerife, Canary Islands. 1, *Mitra* (*Fuscomitra*) *cornea* Lamarck; 2, *Urosalpinx* *fusulus* (Brocchi); 3, *Ocenebrina* *fusiformis* (Gmelin); 4, *Nucella* *lapillus* (L.); 5-6, *Pisania* *variegata* (Gray); 7, *Cymatium* (*Septa*) *trigonum* Gmelin; 8, *Erosaria* (*Ravitrona*) *spurca* (L.); 9, *Ostrea* (*Ostrea*) *edulis* L.; 10, *Pusula* (*Dolichupis*) *candidula* (Gaskoin); 11, *Acar* (*Acar*) *nodulosa* (Müller); 12, *Brachidontes* *puniceus* (Gmelin); 13, *Glycymeris* (*Glycymeris*) *bimaculata* (Poli).

E—a sandy layer containing very little fauna.

F—a great mass of talus detritus superior to 50 m in height, covering all of this sequence except for the isolated zone exposed by wave action.

PALAEONTOLOGY

While the complete list of mollusks identified from the Pleistocene outcrop of Tachero is given in Table 1, the following species are significant and deserve further note:

Ostrea (*Ostrea*) *edulis* Linné

(Fig. 9)

This species was cited by Dollfus (1911) for the Quaternary of Senegal, where it reached its southernmost range during the Pleistocene. The Tachero specimens have a greater diameter than the latter, about 50 mm on the average. More or less rounded shape, presenting small sharp-angled undulations on the shell border. Some fragments exhibit the original rose-violet coloration. Its present-day distribution extends south to Cape Ghir, Morocco (Pallary, 1920), not being found living in the Canary Archipelago.

Nucella lapillus (Linné)

(Fig. 4)

The finding of this species is of special importance because we think it has been confused



FIG. 14 North coast of Anaga, Tenerife. The arrow (lower right) indicates the Tachero Pleistocene outcrop. (Photo: T. Bravo, 1974).

TABLE 1. Marine Mollusks from the Quaternary of Tachero (Tenerife)

GASTROPODA

- †*Amphissa costulata* (Contraire)
 †*Barleia rubra* (J. Adams)
 †*Bela fuscata* (Deshayes)
 †*Bittium incile* Watson
 Bursa (*Bufo*) (*scrobiculata*) (Linné)
 Calliostoma zizyphinum Linné
 †*Cancellaria* (*Bivetiella*) *similis* (Sowerby)
 †*Cancellaria* (*Bivetiella*) *cancellata* (Linné)
- Cassis* sp.
 †*Cerithium* (*Lithocerithium*) *strumaticum* (Locard)
 Clanculus bertheloti (Orbigny)
 †*Conus* (*Lithoconus*) *papilionaceus* Bruguière
 †*Conus guinaicus* Hwass
- Conus* sp.
 Columbella rustica (Linné)
 †*Coralliophila meyerendorffi* Calcara
 †*Cymatium* (*Monoplex*) *costatum* (Born)
 †*Cymatium* (*Septa*) *ficoides* (Reeve)
 †*Cymatium problematicum* Dautzenberg and Fischer
 Cypraeacassis testiculus (Linné)
 †*Charonia variegata* (Lamarck)
 †*Cheila equestris* (Linné)
 Diodora gibberula (Lamarck)
 Erosaria spurca (Linné)
 †*Eulimella pointelli* Folin
 Fissurella nubecula (Linné)
 †*Fossarus ambiguus* (Linné)
 †*Gadina garnoti* (Payraudeau)
 †*Gibberula coelata* (Monterosato)
 †*Gibbula candeï* (Orbigny)
 †*Haliotis* (*Sanhaliotis*) *coccinea* Reeve
 †*Hinia* (*Telasco*) *ferrussaci* (Payraudeau)
 Latirus armatus A. Adams
 †*Littorina* (*Melagraph*) *striata* (King)
 Luria lurida (Linné)
 †*Manzonina crassa* (Kammacher)
- Melampus* sp.
 †*Mitra* (*Fuscomitra*) *cornea* Lamarck
 †*Mitra* (*Fuscomitra*) *cornicula* (Linné)
- Mitra* sp.
 †*Mitrella suelta* (Monterosato) Kobelt
 †*Mitrella hidalgoi* Monterosato
 †*Mitrolumna crenipicta* Dautzenberg
 †*Naticarius dilwyni* (Payraudeau)
 †*Nitidella ocellata* (Gmelin)
 Nucella lapillus (Linné). (Fig. 4)
 Ocenebrina edwardsi (Payraudeau)
 †*Ocenebrina fusiformis* (Gmelin). (Fig. 3)
 †*Opalia* cf. *pumilio* Mörch
 †*Osilinus atratus* (Wood)

- †*Osilinus trappei* F. Nordsieck
 Ovatella micheli Mittre
 Patella aspera Lamarck
 Patella caerulea Linné
 Patella candeï Orbigny
 Patella lowei Orbigny
 †*Patella ordinaria* Mabilie
 Pisania variegata (Gray). (Figs. 5, 6)
 †*Pedipes afer* (Gmelin)
 †*Philippia pseudoperspectiva* (Brocchi)
 †*Propilidium scabrosum* (Jeffreys)
 Petalocochus subcancellatus (Bivona)
 †*Petalocochus vermicellus* (Lamarck)
 †*Planaxis lineatus* (da Costa)
 Pusula (*Dolichupis*) *candidula* (Gaskoin). (Fig. 10)
 Semicassis (*Tylocassis*) *undulata* (Gmelin)
 Strigatella zebrina (Orbigny)
 Spiroglyphus glomeratus (Bivona)
 †*Terebra lepida* Hinds
 Thais (*Stramonita*) *haemastoma* (Linné)
 Thais (*Stramonita*) *haemastoma* var.
 Tricolia pulla (Linné)
 †*Triphora obesula* Monterosato
 †*Truncatella subcylindrica* (Linné)
 †*Urosalpinx fusulus* (Brocchi). (Fig. 2)
 †*Zebina vitrea* (Adams)

BIVALVIA

- †*Acar* (*Bentharca*) *obliqua* (Philippi)
 †*Acar* (*Acar*) *nodulosa* Müller. (Fig. 11)
 Arca afra Gmelin
 Arca none Linné
 Arcopsis (*Galactella*) *lactea* (Linné)
- Barbatia* sp.
 Beguina (*Mytilicardita*) *calyculata* (Linné)
 †*Beguina* (*Glans*) *trapezia* (Linné)
 †*Brachidontes puniceus* Gmelin. (Fig. 12)
 †*Codakia eburnea* (Gmelin)
 Chama (*Chama*) *gryphina* Lamarck
 Chlamys corallinoides (Orbigny)
 †*Donax* (*Hecuba*) *semistriatus* Poli
 Glycymeris (*Glycymeris*) *bimaculatus* (Poli). (Fig. 13)
 Lima (*Radula*) *lima* (Linné)
 †*Lithophaga* (*Lithophaga*) *lithophaga* (Linné)
 †*Lithophaga* (*Myoforceps*) *aristata* (Dillwyn)
 Ostrea (*Ostrea*) *edulis* Linné. (Fig. 9)
- Pseudochama* sp.
 Spondylus gaederopus Linné
 Venus (*Venus*) *verrucosa* Linné

CEPHALOPODA

- †*Spirula spirula* Linné

(†) Species new to the Quaternary marine fauna of the Canary Islands. This material has been deposited in the Museo Insular de Ciencias Naturales, Santa Cruz de Tenerife.

with *Thais (Acanthina) crassilabrum* (Lamarck). Recently Lecointre (1952), Lecointre, Tinkler and Richards (1967) have recorded *T. crassilabrum* as being present in the Pleistocene of Morocco and the Canaries respectively, and they stress the fact that this species is found living now in the waters of Peru. We think that although it shows similarities with this species, it is simply a form of *Nucella lapillus* (L.), a species which is found today living in the waters of Europe, North Africa and North America, but not in the Canaries, and one that shows a great deal of variation in size, shape and color.

Planaxis lineatus da Costa

This small gastropod is very common in the Tachero outcrop. It is not present in the Recent molluscan fauna of the Canaries, but is found living on the coasts of French Guinea and Angola

(Nicklés, 1950), and in the western Atlantic, from the lower Florida Keys and the West Indies, on rocks in the intertidal zone (Warmke and Abbott, 1962).

Pisania variegata (Gray)

(Figs. 5 and 6)

This species is characteristic of the fauna associated with *Strombus latus* Gmelin (formerly *S. bubonius* Lamarck) in the Quaternary of the Mediterranean. An abundant form at Tachero, found in two varieties: 1) very common, having varices and a thick labrum (outer lip); 2) much less frequent, smooth, and generally larger. It is presently found living in the Canaries and on the African coast from Mauritania to Angola.

AGE OF THE TACHERO DEPOSIT

Although no absolute chronology is presently available for the Tachero site, a relative correlation may be made with the deposits of the eastern Canaries, based on the fossil assemblage and similar level.

Lecointre, Tinkler and Richards (1967) relate the marine Quaternary of the eastern Canaries with that of Morocco, designating a Neotyrhenian—marine Ouljian age for the Las Palmas outcrops (Alcaravaneras, Confital and Santa Catalina). They present a radiocarbon date of greater than 35,000BP for mollusk shells from the Confital locality, and a date of 100,000 $\pm$ 30,000 years for a Thorium-Uranium analysis, which may be correlated with the marine Ouljian of Morocco.

The fauna and level (+2 m) of the Tachero site suggests that it may be assigned to the European Mellahian: Flandrian, which corresponds to an approximate age of 6,000 BP (Lecointre, 1963), thus being more recent than the Las Palmas deposits.

We believe that the tectonic movements, generally of large blocks displaced toward the sea, the effects of which are observed in the north of Anaga, have not affected the Quaternary deposit to any great extent. Volcanic activity has not been recognized in this area since the early Quaternary. The only morphologic perturbations in this zone are due to erosion. A slight westward

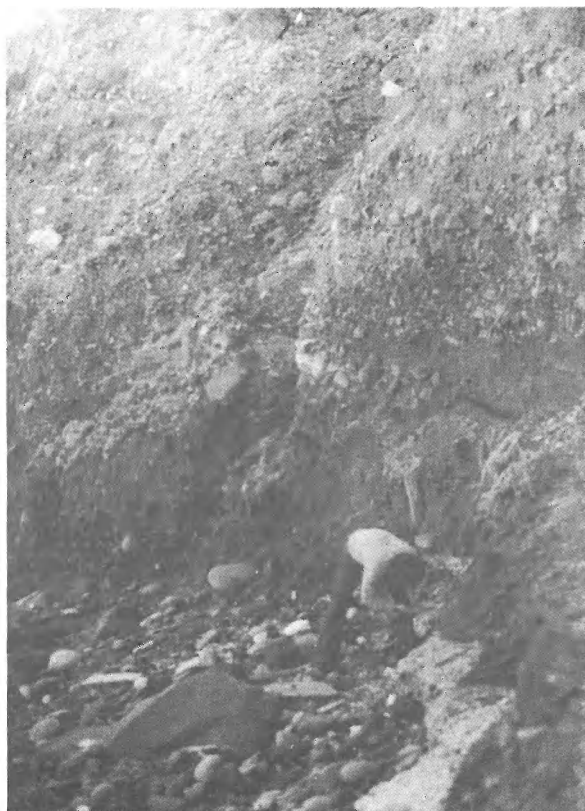


FIG. 15 The Quaternary deposit of Tachero; the fossiliferous stratum is seen as a light colored band at the lower right. (Photo: T. Bravo, 1974).

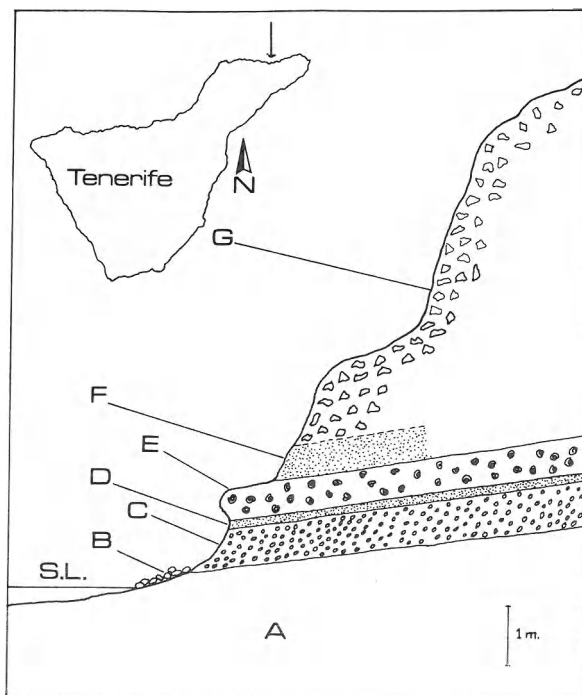


FIG. 16 Schematic Section of the Tachero Deposit. A—volcanic substratum. B—present beach. C—rolled lava pebbles. D—gravel. E—fossiliferous limestone stratum. F—sand. G—talus deposit. S.L.—sea level. The arrow indicates the location of the Tachero site on the inset map of Tenerife.

displacement of the entire surface unit is noted at the Tachero site, possibly due to a solifluction phenomena.

CONCLUSIONS

The Tachero beach site may be dated as Mellahian-Flandrian. It was deposited in shallow water, somewhat warmer than at present, during the Mellahian-Versilian (2 m) transgression. About 15% of the fauna collected now lives in more southerly areas of the African coast, being substituted by species of more recent appearance. The zone has not been affected by important tectonic movements, since at least the Late Pleistocene.

Although *Strombus latus* is not found, a number of associated species are observed: *Thais haemastoma*, *Pisania variegata*, etc. It seems probable that *S. latus* emigrated southward at the beginning of the Ouljian (it is now found living in the Cape Verde Islands, and the coasts of equatorial Africa), or that it disappeared from

the waters of the Canary Archipelago when environmental conditions became more adverse, being able to survive in the warmer zones of Senegal and Cape Verde, where it lived in the Quaternary.

The discovery of *Nucella lapillus* in the Mellahian of Tenerife is most significant in that it is possibly the last epoch in which it lived in the Canaries before completely disappearing from this latitude.

Finally, it is necessary to record the extraordinary abundance of species in the deposit of Tachero. We think that it is an exceptional occurrence for so small a deposit.

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