

Gloria Maris	54 (4)	108-116	Antwerp; 21 May 2016
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Description of *Theba isabelleae* sp. nov. from the Canary Islands (Gastropoda: Helicoidea: Helicidae)

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Keywords: MOLLUSCA, GASTROPODA, HELICIDAE, *Theba*, new species, Quaternary, Lanzarote, Canary Islands.

Abstract: *Theba isabelleae* sp. nov. is described from Quaternary deposits (Holocene sediments, northwestern Lanzarote, Canary Islands). This new species is extinct and characterised by a relatively small shell, varying in size (up to 13.6 mm in diameter and up to 7.2 mm in height). As new to science, *Theba isabelleae* sp. nov. is compared to its closest congener, *Theba impugnata* (Mousson, 1857). This newly described species is easy to separate from other species belonging to the genus *Theba* by means of conchological differences.

Abbreviations:

RBINS: Royal Belgian Institute of Natural Sciences, Brussels, Belgium.
MNHN: Muséum National d'Histoire Naturelle, Paris, France.
MMF: Museu Municipal do Funchal, Madeira, Portugal.
NHMUK: Natural History Museum of the United Kingdom, London, United Kingdom.
JFSG: Private collection of José Francisco Sicilia Guillén, Lanzarote, Spain.
FS: Private collection of Frank Swinnen, Belgium.
JSB: Private collection of Jesús Santana Benítez, Gran Canaria, Spain.
MA: Private collection of Miguel Artiles Ruiz, Gran Canaria, Spain.
RG: Private collection of Ramón Gustems Martínez, Lanzarote, Spain.
FD: Private collection of Francisco Déniz Guerra, Gran Canaria, Spain.

Introduction: The genus *Theba* is a member of the family **Helicidae** and well-known in the European continent by its nominated subspecies *pisana* of the type species *Helix pisana* Müller, 1774: 60 ["Italia"], Lectotype (designated by Pallary, 1921: 107, left figure), and is found widespread in the Mediterranean region, in parts of the Atlantic coasts of Western Europe and northwestern Africa. During fieldwork in Lanzarote, Mr. Rafael Mesa provided the first author with several shells. At that time (January 2014) the authors had not seen specimens of this kind before. They were totally different from the other species of *Theba* commonly collected at the Quaternary sediments of the island. After studying the specimens and consulting literature, we reached the conclusion that those specimens were endemic to the area, unknown to science and hence belonged to a new species hereby introduced as *Theba isabelleae* sp. nov.

Systematics:

Family: **Helicidae** Rafinesque, 1815
 Subfamily: **Helicidae** Rafinesque, 1815
 Tribe: **Euparyphini** Perrot, 1939
 Genus: *Theba* Risso, 1826

Theba isabelleae sp. nov.

Type material: **Holotype** RBINS I.G. 33203, MT.3361. Fuente de Gayo [Quaternary slope deposit]. **Paratype 1** MNHN, F. A 57365. El Valle (Valle Jurado) north, Los Bisquetos south, Magüez [colluvial deposit]. **Paratype 2** NHMUK, PI QG 5612. Fuente de Gayo [Quaternary slope deposit]. **Paratype 3** MMF, 44966. Fuente de Gayo [Quaternary slope deposit]. **Paratype 4** FS. Fuente de Gayo [Quaternary slope deposit]. **Paratype 5** FS. Fuente de Gayo [Quaternary slope deposit]. **Paratype 6** FS. Fuente de Gayo [Quaternary slope deposit]. **Paratype 7**

FS. Valle de Guinate south, El Jurado [Quaternary slope deposit]. **Paratype 8** FS. Fuente de Gayo [Quaternary slope deposit]. **Paratype 9** RG. Valle de Guinate north [Quaternary deposit]. **Paratype 10** FS. Fuente de Gayo [Quaternary slope deposit]. **Paratype 11** FS. Valle de Guinate south, El Jurado [Quaternary slope deposit]. **Paratype 12-14** FS. Valle de Los Castillejos north, La Mesa south, Magüez [Quaternary slope deposit]. **Paratype 15-19** JSB. El Valle (Valle Jurado) north, Los Bisquetos south, Magüez [colluvial deposit]. **Paratype 20-24** JSB. Fuente de Gayo [Quaternary slope deposit]. **Paratype 25-29** JFSG. El Valle (Valle Jurado) north, Los Bisquetos south, Magüez [colluvial deposit]. **Paratype 30-34** JFSG. Gallo (Haría) [colluvial deposit]. **Paratype 35-39** MA. Valle de Guinate south, El Jurado [Quaternary slope deposit]. **Paratype 40-44** FD. Valle de Guinate, south, El Jurado [Quaternary slope deposit].

	D1	D2	SH	BH
Holotype	15.3	13.2	8.5	8.2
Paratype 1	12.2	10.1	6.8	6.5
Paratype 2	14.2	12.0	6.7	6.1
Paratype 3	15.0	13.3	8.9	8.1
Paratype 4	13.3	11.5	7.0	5.9
Paratype 5	13.3	11.3	7.1	6.8
Paratype 6	12.0	10.6	6.9	5.9
Paratype 7	14.3	12.5	7.6	6.9
Paratype 8	12.2	10.4	5.6	5.0
Paratype 9	14.6	12.2	7.5	6.8
Paratype 10	14.3	12.8	7.3	6.5
Paratype 11	15.3	13.2	8.4	7.6

Table 1: *Theba isabelleae* sp. nov. Shell measurements in mm of the holotype and 10 paratypes. D1: maximum shell diameter; D2: shell diameter perpendicular to D1; SH: shell height; BH: body whorl height.

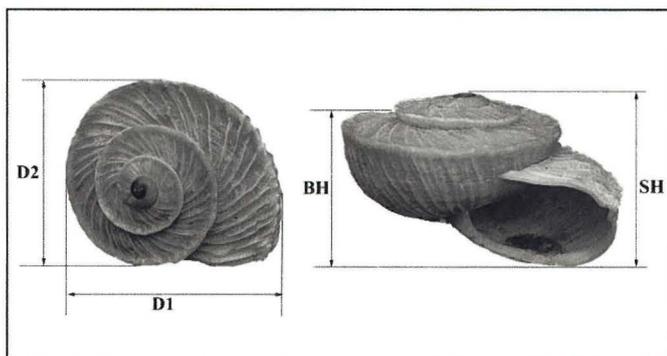


Fig. 1: Placements of the measurements from the holotype and paratypes obtained for Table 1.

Type locality: The confirmed distribution of this extinct species is restricted to northwestern Lanzarote, west Haría, lower southern slope of the mountain Matos Verdes, approximately 150 to 300 metres slope-upwards from the

Mirador at the end of the Valle del Rincón, at an altitude of about 400 metres above sea level.

Distribution: Lanzarote (Fig. 1) is the easternmost Island of the Canary archipelago and located in the Atlantic Ocean, between 28° 14' - 28° 49' N and 7° 13' - 7° 14' W. Lanzarote must be considered as a semiarid Island that has a relatively low altitude (670 metres above sea level). *Theba isabelleae* sp. nov. is found in colluvial deposits and Holocene fossil beds in shore cliffs in the northwestern part of the island, west of Haría.



Fig. 2: Map of Lanzarote, with the distribution of the new *Theba* species (shaded area).

Stratum typicum: *Theba isabelleae* sp. nov. is embedded in Quaternary layers, between narrow banks of petrified chalk-sand (Figure 2). There the shells become washed out while moving towards the ravine by the natural stream, producing wide colluvial deposit layers. There this species is frequently collected in damaged condition.

Collection sites: *Theba isabelleae* sp. nov. was collected during several trips to El Valle (Valle Jurado) north, Los Bisquetos south, Magüez [colluvial deposit] 28RFT4426, 474 m; Fuente de Gayo [Quaternary slope deposit] 28RFT4427, 499 mt.; Valle de Guinate south, El Jurado [Quaternary slope deposit] 28RFT4427, 449 m; Valle de Guinate, north [Quaternary deposit] 28RFT4528, 363 m; Valle de Los Castillejos north, La Mesa south, Magüez [Quaternary slope deposit] 28RFT4425, 473 m; Valle del Rincón, Barranco de Tenesía, Matos Verdes south, Haría [Quaternary slope deposit] 28RFT4425, 391 m.

Description: The shell of *Theba isabelleae* sp. nov. is small to medium-sized, with a flattened spire, solid with a rather lenticular to discoidal shape, having 4 to 4½ low to flat convex whorls. The protoconch is small, almost smooth, partly to completely reddishbrown, becoming immersed and concealed by the first teleoconch whorl. The periphery of the whorls forms a prominent, bulged carina (keel) which nearly reaches the apex, both in juvenile and adult shells. In juvenile shells the keel is more prominent than in adult specimens. The suture is situated below the keel and is relatively indented. The surface of the whorls is covered with irregular spiral grooves crossed by conspicuously raised radial ribs which are microscopically lamelliform in the early whorls. On the subsequent whorls the raised radial ribs become very prominent, giving the surface and keel a very rough sculpture conform to the shape of the previous position of the outer lip. The last whorl runs straight in the direction of the aperture. The aperture is oblique, transversely elongate-oval, with the peristome expanded, becoming outwardly slightly reflected. Towards the columellar region, the lower basal margin of the aperture is thickened, covering about half the umbilicus in adults. Juvenile and sub-adult specimens may have an open umbilicus. The columellar callus is inconspicuously to scarcely thickened within.

By the state of preservation, several specimens bear traces of the former colour pattern. The overall colour is light brown to creamy, but in a high percentage of the specimens a vague spiral pattern above the periphery of the last whorl and near the base is visible.



Fig. 3: *Theba isabelleae* sp. nov. in situ.

Discussion: We compared the shell of *Theba isabelleae* sp. nov. with the closest related species also occurring in the Holocene sediments (Guatify-Famara-massif): *Theba impugnata* (Mousson, 1857). The essential conchological differences can be noticed by the following features: the shell of the latter is characterised by a relatively gibbous (more rounded) shape with a significantly flattened spire (Plate 2). Under magnifying glass, the sculpture of the teleoconch whorls is much finer with riblet-like stripes, which are not lamelliform. On the subsequent whorls the surface has conspicuously faint irregular growth lines crossed by weak axial grooves of which one is deeply indented near the suture. In general this sculpture gives the shell a rather smooth appearance. The periphery of the last whorl is somewhat weakly keeled, and on former whorls this keel gives an impression of a continuous spiral band marking the junction. The umbilicus is nearly completely closed by the columellar fold.

In contradiction the main differences of *Theba isabelleae* sp. nov. are the sculpture of the surface and the umbilicus. As stated in the description, the shell is lenticular to discoidal in shape, the periphery of the whorls forms a prominent, bulged carina, the suture is situated below the keel and is relatively indented (Plates 1, 2). The surface of the early whorls is microscopically lamelliform (Plate 3). On the subsequent whorls the raised radial ribs become very prominent, giving the surface and keel a very rough sculpture. The lower basal margin of the aperture only covers about half the umbilicus.

Remarks: Based on the morphological features, *Theba isabelleae* sp. nov. also resembles other species: *Theba lindneri* K. Kittel, 2012 from Fuerteventura; the flat and keeled *Theba subdentata helicella* (Wood, 1828) from the western coast of southern Morocco; *Theba pisana*

cantinensis (Sacchi, 1955) from the western coast of central Morocco and *Theba pisana arietina* (Rossmässler, 1846) from southern Spain and SW Portugal. The new species is clearly different from all of these by its shell surface sculpture and shape.

Etymology: This new and fossil species is named *isabelleae* after Isabelle Swinnen, the beloved sister of the first author.

Acknowledgements: We would like to express our gratitude to Prof. Thierry Backeljau and Mr. Yves Samyn (RBINS, Brussels) for their valuable suggestions and helpful comments. Julien Cillis (RBINS, Brussels) is gratefully acknowledged for making the SEM photographs, as is Klaus Groh for the helpful suggestions and comments. Mr. Jesús Santana Benítez for searching relevant literature, for a critical reading of the manuscript, site's photographs, loan of material and helpful suggestions and comments. Mr. Rafael Mesa, Mr. Miguel Artiles, Mr. Francisco Sicilia, Mr. Ramón Gustems and Mr. Francisco Déniz for providing specimens for study. Also our thanks to David Monsecour for reading and correcting the manuscript.

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Plate 1: *Theba isabelleae* sp. nov.

- 1-1e: Holotype. Fuente de Gayo [Quaternary slope deposit].
- 2-2a: Paratype 1. El Valle (Valle Jurado) north, Los Bisquetos south, Magüez [colluvial deposit].
- 3-3a: Paratype 2. Fuente de Gayo [Quaternary slope deposit].
- 4-4a: Paratype 3. Fuente de Gayo [Quaternary slope deposit].
- 5-5a: Paratype 4. Fuente de Gayo [Quaternary slope deposit].
- 6-6a: Paratype 5. Fuente de Gayo [Quaternary slope deposit].

Plate 2

7-10: *Theba isabelleae* sp. nov.

- 7-7a: Paratype 6. Fuente de Gayo [Quaternary slope deposit].
- 8-8a: Paratype 7. Valle de Guinate south, El Jurado [Quaternary slope deposit and colluvial deposits].
- 9-9a: Paratype 8. Fuente de Gayo [Quaternary slope deposit].

10-10a: Paratype 9. Valle de Guinate north [Quaternary deposit].

11-14: *Theba impugnata* (Mousson, 1857)

- 11-11b: Lanzarote, W. Haría (fossil).
- 12-12a: Lanzarote, W. Haría (fossil).
- 13-13a: Ermita de las Nieves, Lanzarote (recent).
- 14-14a: Ermita de las Nieves, Lanzarote (recent).

Plate 3-5: Electron Microscopy (SEM) photographs, of protoconch, umbilicus, sculpture and micro-sculpture of *Theba isabelleae* sp. nov., *Theba impugnata* (Mousson, 1857) [fossil] and *Theba impugnata* [recent].

Plate 3: *Theba isabelleae* sp. nov.

Plate 4: *Theba impugnata* (Mousson, 1857) [fossil].

Plate 5: *Theba impugnata* (Mousson, 1857) [recent].

Plate 1



1



1a



1b



1c



1d



1e



2 - 2a



3 - 3a



4 - 4a



5 - 5a



6 - 6a



Plate 2



7 - 7a



8 - 8a



9 - 9a



10 - 10a



11



11a



11b



12 - 12a



13 - 13a



14 - 14a



Plate 3

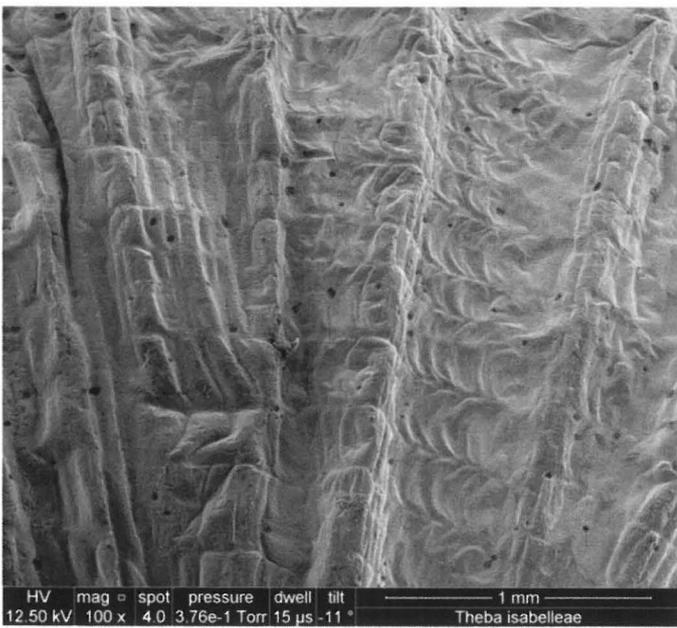
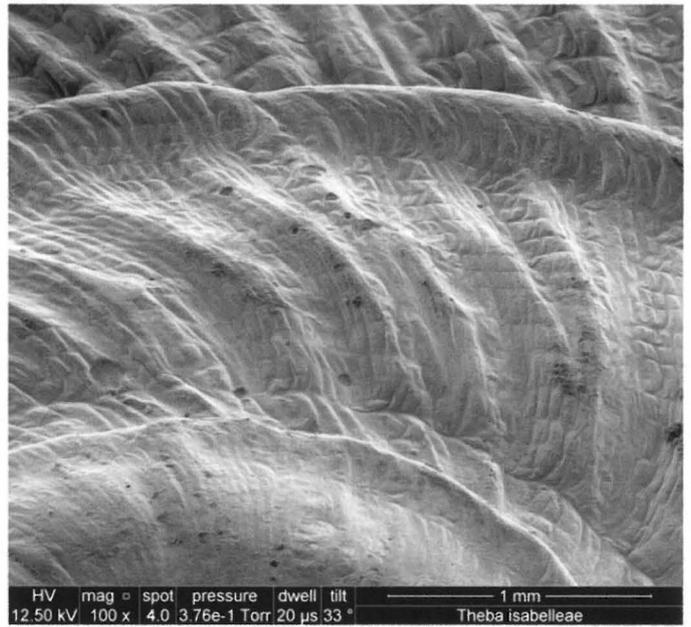
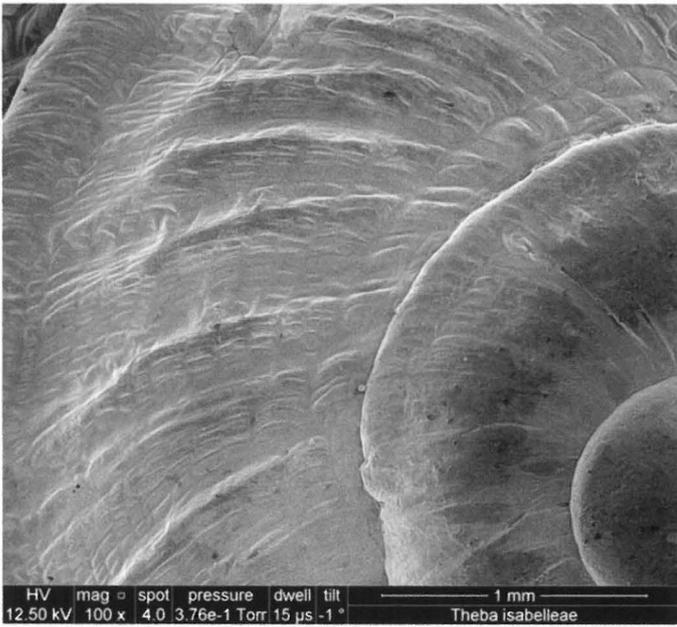
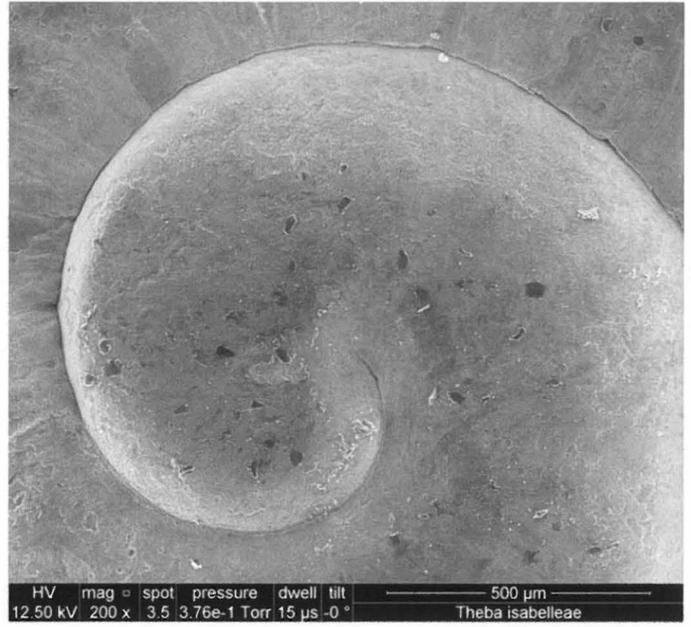
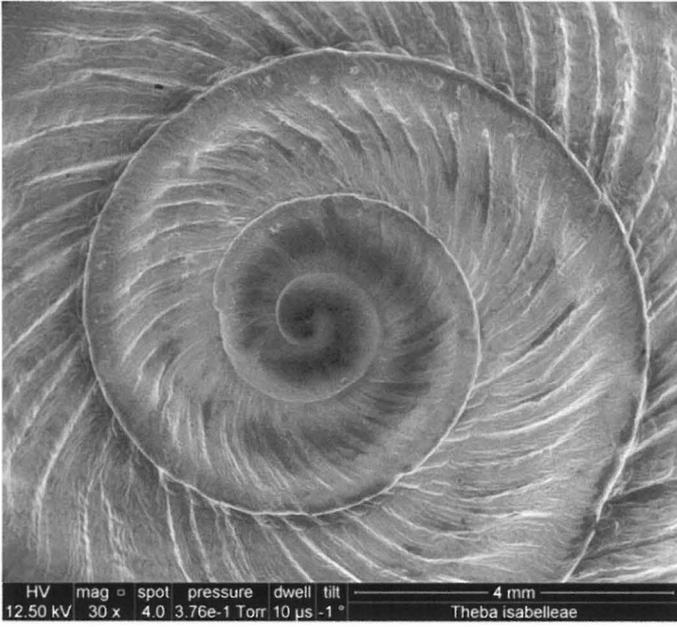


Plate 4

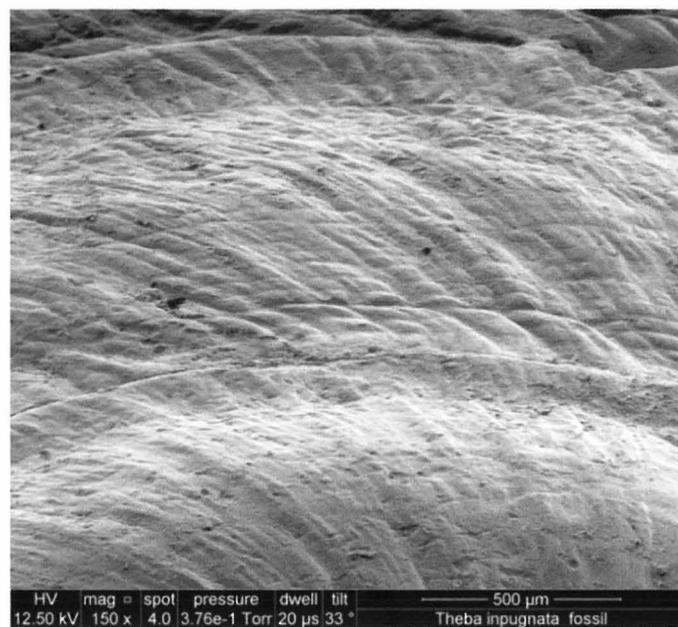
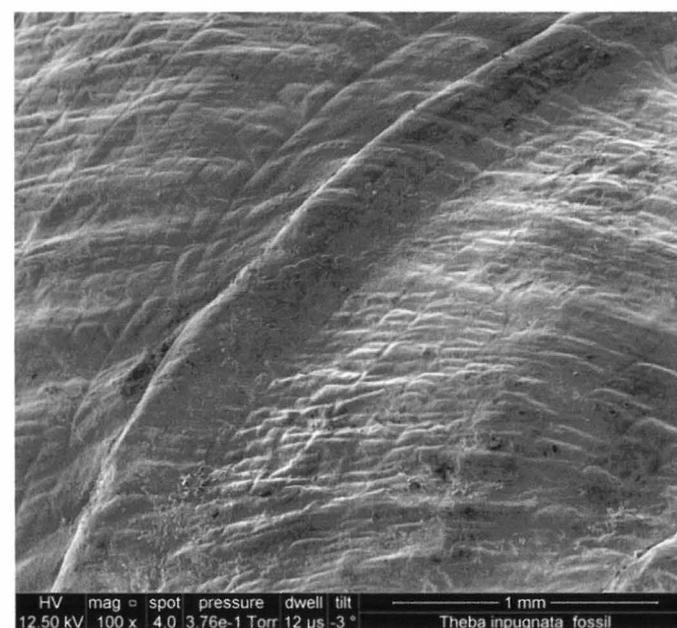
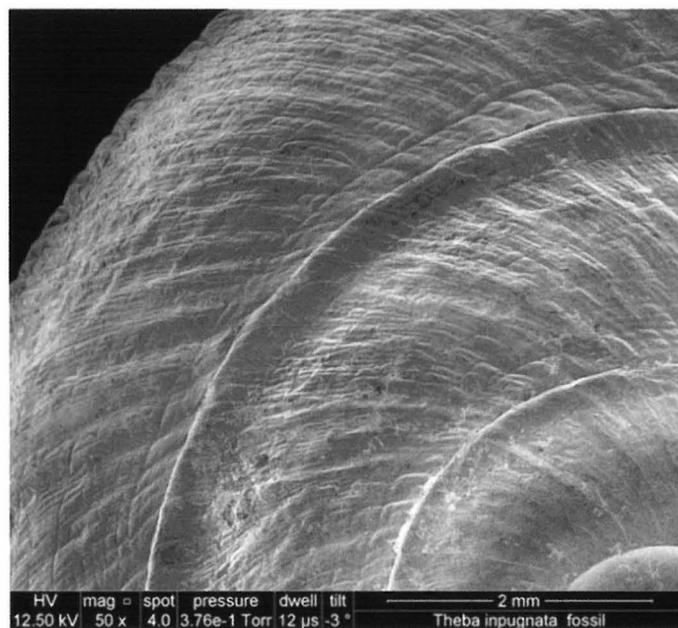
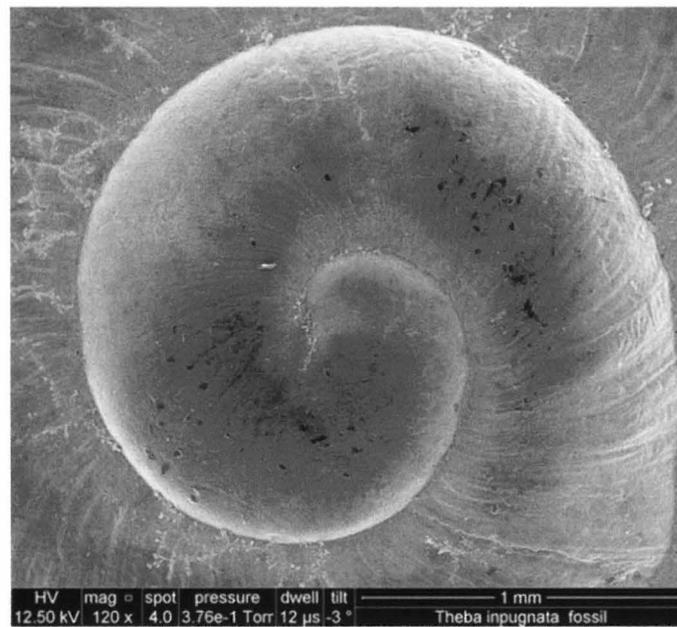
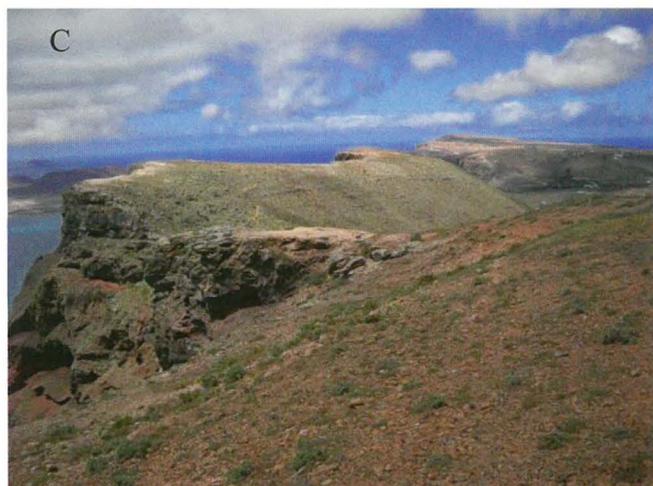


Plate 6: Fossil beds and coluvial deposits at the collecting sites.



A, B: Barranco de Guinate, south slope, fossil level; **C:** Fuente de Gayo – Barranco de Guinate, fossil site; **D:** Fuente de Gayo, fossil level; **E:** La Mesa, south slope; **F:** Los Bisquetos, south slope.