

**Revision of the genus *Hemicycla* SWAINSON 1840
on Tenerife: The group of *Hemicycla plicaria* (LAMARCK 1816)
(Mollusca: Helicidae).¹⁾**

By

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With 2 tables, 9 textfigs. and 4 plates.

Introduction.

With this article we initiate a revision of the genus *Hemicycla*, which constitutes one of the most interesting endemics of the Canarian archipelago due to the great variability of some of its species, reflecting the active evolutionary process to which this group is subjected. Accordingly, GUDE (1896) mentions 130 nominal taxa, 122 of which are quoted as occurring only on one island, 6 on two islands and 2 on three islands; actually there are much more nominal taxa quoted, more than 45 of which are fossils (GROH 1985); they were first described by LAMARCK (1816—1822), FÉRUSSAC (1821), WEBB & BERTHELOT (1833), ORBIGNY (1839), L. PFEIFFER (1848), SHUTTLEWORTH (1852 a, b), GRASSET (1856), LOWE (1861), MORELET (1864), MOUSSON (1872), WOLLASTON (1878), MABILLE (1882—1885), GUDE (1896) and O. BOETTGER (1908). However most recent authors, such as ODHNER (1931) or WALDÉN (1984) propose that the actual number of species will have to be reduced considerably after a more detailed study.

On the other hand, it is an undisputable fact that until now the anatomy of the genital system is unknown for the majority of the species, hence the difficulties to find living

¹⁾: Notes on the Malacofauna of the Canary Islands, Nr. 8; Nr. 7: La familia Vitrinidae (Gastropoda: Pulmonata) en Canarias. — III. 3 nuevas especies de La Gomera. — Arch. Moll. (in print); Frankfurt a. M.

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specimens. The first anatomical informations were published by KRAUSE (1895), who described and illustrated the anatomy of „*pouchet*“ (FÉRUSAC 1821) [= *adansoni* WEBB & BERTHELOT 1833] and „*malleata*“ (FÉRUSAC 1822) [= *bidentalis* LAMARCK 1822], which were again described by HESSE (1912), [*adansoni* sub nomine *plicaria* LAMARCK]; subsequently, ODHNER (1931) described the genital tract of „*chersa*“ (MABILLE 1882) [= *plicaria* LAMARCK 1816], *glasiana* (SHUTTLEWORTH 1852) and *gaudryi* (ORBIGNY 1839), and finally HESSE (1931) added the genital anatomy of „*plicaria*“ (LAMARCK 1816) [= *pouchet* FÉRUSAC 1821] and *bethencourtiana* (SHUTTLEWORTH 1852). Similarly, the morphology of the radula and many aspects of the shells microsculpture are unknown.

Our study begins with the island of Tenerife where nearly 30 recent and 20 fossil or subfossil nominal taxa have been recorded and where we have collected living specimens of most of the actually existing species; following close examination, we consider these can be divided into 3 groups:

1) *plicaria* group: characterized by exhibiting ribs on the shell and having a diverticle in the genital system.

2) *adansoni* group: characterized by exhibiting a granulated shell and by lacking the diverticle of the genital system.

3) *bidentalis-consobrina* group: characterized by possessing malleations on the shell and a diverticle in the genital system.

In this article we are concerned with the *plicaria* group.

Apart from the material collected by us between October 1982 and June 1985 which is mostly deposited in the ALONSO & IBÁÑEZ collection in the Zoology Department of La Laguna University (DZUL), we also studied the private collections of GROH, SUBAI and HEMMEN, as well as specimens collected by LOBIN and SALTIN, and material from several museums, which we abbreviated as follows:

- ANSP = Academy of Natural Sciences, Philadelphia.
- BMNH = British Museum (Natural History) London.
- FMNH = Field Museum of Natural History, Chicago.
- MCHN = Museum Cantonale d'Histoire Naturelle, Genève.
- MCNT = Museo de Ciencias Naturales de Tenerife.
- MHNP = Museum National d'Histoire Naturelle, Paris.
- NHMB = Natural History Museum, Bern.
- SMF = Naturmuseum Senckenberg, Frankfurt/Main.
- RNHL = Rijksmuseum van Natuurlijke Historie, Leiden.
- ZMUZ = Zoological Museum of the University, Zürich.

Genus *Hemicycla* SWAINSON 1840.

Type species: *Helix plicaria* LAMARCK 1816.

Type designation: SWAINSON 1840: 164.

Because of its conchological characteristics, *Hemicycla* is intermediate between *Macularia* and *Leptaxis* and is closely linked to both, according to PILSBRY (1888). For the latter this is in fact completely wrong; according to recent studies, *Leptaxis* forms an own tribe or even subfamily, close linked to the Hygromiidae and not to the Helicidae. GERMAIN (1927) argued that they appeared in the Miocene and considers them related to the circum-mediterranean *Otala*. ODHNER (1931) however, after studying them anatomically, places

the genus *Hemicycla* not in proximity to *Otala* but to the species of the genus *Levantina* which inhabit the eastern Mediterranean and are consequently separated from the species of *Hemicycla* by large geographical distances.

As far as its distribution is concerned, it is restricted to the Canarian archipelago. There is a conchological similarity between some *Hemicycla* species (such as *bidentalis*) and certain forms of *Dentellaria* and *Eurycratera* from the West Indies (*E. lima*, *D. obesa* and *dentiens*), but in the view of PILSBRY (1888) it is probable that this similarity is due to an adaptive convergence caused by similar environments, and not to any taxonomic relationship between these specialized forms. Nevertheless, could be shown later that the similar West Indian species belong to the family of Camaenidae.

The external appearance of the animals is the same as in any other Helicidae: the body is greyish with a rugose epidermis covered with mucus, and a smooth foot of a whitish or yellowish tone.

The shell can be imperforated or umbilicated, of a globose or depressed form, solid and opaque. The colour often is light or dark brown, although there are species with shells of an olive-green shade or with light coloured blotches. Usually they exhibit 5 darker bands, but frequently the number is reduced, due to the absence of the fifth band or through coalescence of the second and third bands, which are sometimes diffused so that they are hardly discernable. The surface can be costulated, granulated or malleated, occasionally exhibiting combinations of these 3 types of sculpture. Usually they have from 4 to 6 whorls the last of which (body whorl) may exhibit a keel. In adult individuals the final zone of the body whorl inclines in a way that the aperture tends to curve towards the basal surface of the shell, and in many species produces a constriction of the spire just before the peristome, evoking the appearance of a small gibbosity. The aperture is often oblique or rounded, with or without angulation, and the peristome can be expanded or recurved; in both cases it is thickened inside, usually presenting a longitudinal callosity at the columellar margin.

The radula has the typical characteristics of Helicinae, being relatively variable in number and size of the teeth, as well as in the number of teeth rows.

The retractor muscle of the right ommatophorus is located between the male ducts and the dart pouch.

With respect to the genitals, there is at present no information on many of the species of the genus and only very few specimens have been dissected. However it is an exceptional fact that at least in 2 of them the diverticle is missing and in *bidentalis* the dimensions of all the genital ducts varies considerably within the same population.

Furthermore, in all the species which have been studied the penis is provided with a small accessory papilla, transversally located and situated between the atrium and the penis papilla. The retractor muscle of the penis is attached to the epiphallus.

Hemicycla plicaria (LAMARCK 1816).

Textfigs. 1, 7; Pl. 1 Figs. 1-2; Pl. 3 Figs. 11-12.

1816 *Helix plicaria* LAMARCK, Encycl. meth.: pl. 462 fig. 3 [nom. et fig.].²⁾

1821 *Helix (Helicogena) plicaria*, — FÉRUSAC, Prodr. Limaç.: 32.

1822 *Helix (Helicogena) plicaria*, — FÉRUSAC, Tabl. syst., (14): pl. 42 fig. 4.

²⁾ In the synonymies the following symbols are used: v = vidi, original material examined; * = reference of nomenclatoric importance; ? = doubtful, but probably referable to the taxon.

- v * 1822 *Helix plicatula* LAMARCK, Anim. s. Vert., 6(2): 87 [non FÉRUSAC 1821; nom. nov. pro *plicaria* LAMARCK 1816; loc. typ.: Tenerife, hic. restr.: environments of Candelaria].
- 1825 *Helix plicatula*, — BLAINVILLE, Man. Malac. Conchol.: 460, pl. 39 fig. 1.
- ? 1828 *Helix orbiculata* WOOD, Suppl. Index Test.: 20, pl. 7 fig. 2 [nom. et fig.; non FÉRUSAC 1821].
- 1850 *Helix plicaria*, — DESHAYES, in FÉRUSAC & DESHAYES, Hist. nat., 1: 112 [partim].
- 1852 *Helix plicaria*, — REEVE, Conch. Icon., 7: pl. 135 fig. 837.
- 1852 *Helix plicaria*, — CHENU, Ill. conch.: 84, pl. 6 fig 9 [dated after SHERBORN & SMITH 1911].
- 1882 *Helix chersa* MABILLE, Bull. Soc. philom. Paris, (7) 6: 144 [loc. typ.: Tenerife, hic restr.: environments of Candelaria; n. syn.].
- 1884 *Helix chersa*, — MABILLE, Nouv. Arch. Mus. Hist. nat., (2) 7: pl. 15 fig. 13.
- 1885 *Helix chersa*, — MABILLE, Nouv. Arch. Mus. Hist. nat., (2) 8: 33.
- 1896 *Hemicycla bethencourtiana* var. *chersa*, — GÜDE, Proc. malac. Soc. London, 2 (1): 19.
- 1931 *Hemicycla chersa*, — ODHNER, Ark. Zool., 23 A (14): 92-93, fig. 43 [genitalia], fig. 44 B [jaw].
- 1931 *Hemicycla chersa*, — HESSE, Zoologica, 31: 96, pl. 12 fig. 106 a-c [genitalia].
- 1951 *Helix plicatula*, — MERMOD, Rev. suisse Zool., 58 (40): 697, fig. 54 [original fig. 54-1 hic design. lectotype of *Helix plicaria* LAMARCK 1816 and *H. plicatula* LAMARCK 1822 (Pl. 1 Fig. 2)].

Note: For the explanation of *chersa* synonymies, see the discussion of *pouchet*.

Material examined:

Type material: Photos of the lectotype (MCHN 1091/87-1; ex LAMARCK) and a paralectotype (MCHN 1091/87-2). Two possible syntypes of *chersa* MABILLE have been found in the collection of MHNP (ex MAUGE).

Further material: 14 shells (SMF 75617) from Igueste of Candelaria; 1 shell (SMF 222632/2 partim) from Candelaria; and 4 (SMF 33571), from Güímar, with 2 more unnumbered specimens. 3 specimens from „Tenerife“ (SMF 3097) and 7 from Güímar (leg. APPENHAGEN: SMF 3413 + 33571) in alcohol. 6 shells from Bco. Martin (Candelaria) and 49 from Candelaria (MCNT).

Collected by us: 112 shells and 6 living specimens; the inhabited area is quite small (textfig. 7) and is characterized by arid terrain, exhibiting generally high temperatures during the whole year, and has some influence from the coastal climate. The vegetation is typical for the lowland.

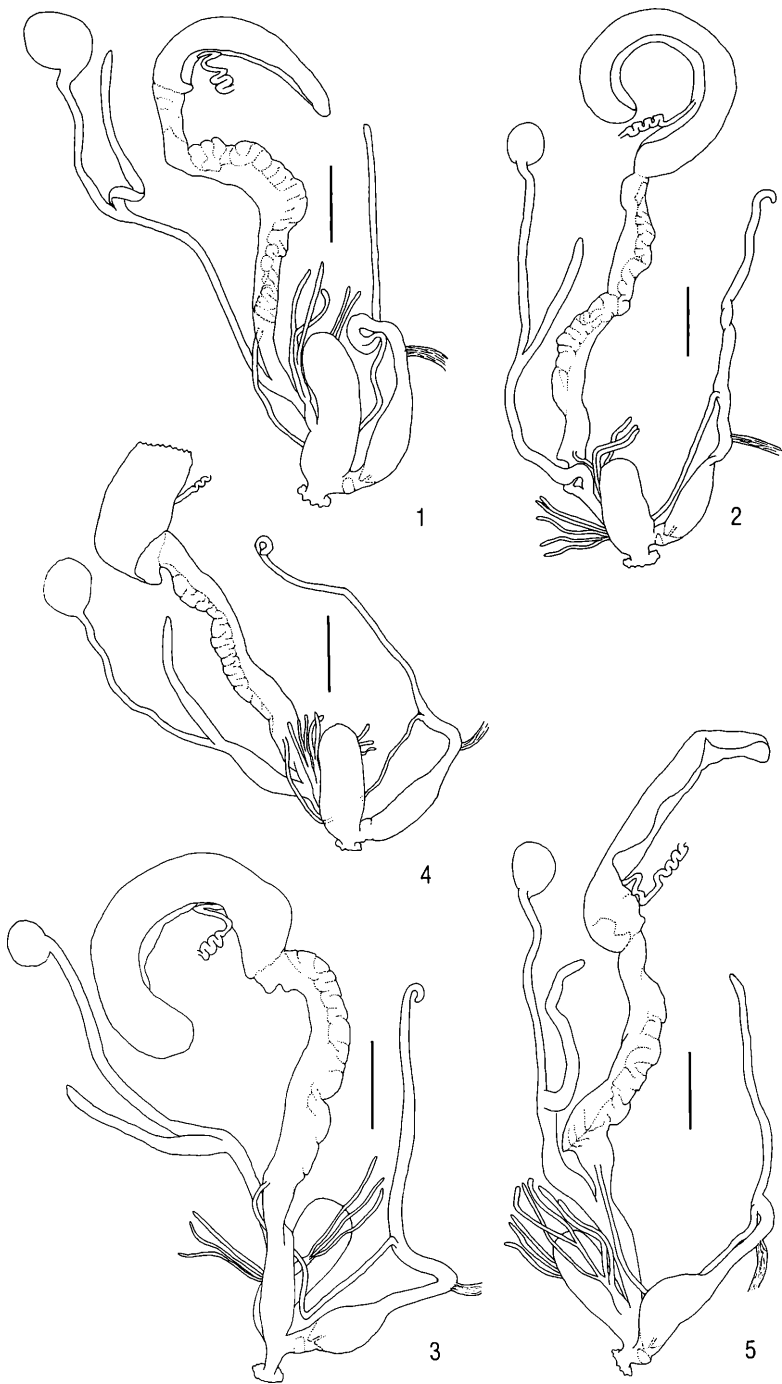
This species which is one of the most beautiful and elegant of the genus is usually found under rocks and in crevices of the stone walls which limit the abandoned fields and frequently in the small ravines of the area.

Unfortunately, the species is en route to extinction due to extensive developments and construction of tourist complexes in the area.

Description: The shell is imperforated, solid and opaque, of a depressed-conical form, with 4 whorls (Pl. 1 Fig. 1+2) with suture strongly marked, of a uniform light brown colour and without gloss. Its most pronounced characteristic is the strong radial laminar costulation, with smooth ribs which gradually diverge from the protoconch to the aperture. The interstices which separate the ribs are usually rugose due to the presence of a weak spiral striation which forms granules (Pl. 3 Fig. 11). The protoconch is slightly rugose and of a slightly more reddish tone (Pl. 3 Fig. 12). On the first whorls the suture is lineal but is deeply marked on the body whorl, which is large with a weak keel which sometimes disappears before reaching the end of the whorl.

The aperture is wide, oval and the margins have the tendency to converge towards the center of the shell. The peristome is very wide and flattened with a lip which has a width of 2 mm; it is greyish and has the columellary margin slightly thickened, forming a small fold towards the interior.

Textfigs. 1-5: Genital system (scale: 4 mm). 1) *Hemicycla plicaria* (LAMARCK 1816). 2) *Hemicycla bethencourtiana* (SHUTTLEWORTH 1852). 3) *Hemicycla pouchet* (FÉRUSAC 1821). 4) *Hemicycla inutilis* (MOUSSON 1872). 5) *Hemicycla incisogranulata* (MOUSSON 1872). ►



The diameter varies from 17–75 to 23–3 mm (average: 20·0 mm) and the height from 10·8 to 13·5 mm (average: 12·0 mm) (measurements obtained from 54 specimens).

The genital system (textfig. 1, table 2) exhibits a short flagellum. The pendunculus of the spermatheca and the diverticle have a similar length and the common duct to both is longer than these, being also somewhat longer than the flagellum. The mucous glands have 2·5 digitations each.

Discussion: According to PILSBRY (1888) this species is considered intermediate between „*plicaria*“ [= *pouchet*] and *bethencourtiana*. However, we only consider it closely related to the second, since *pouchet* exhibits thickened ribs and has transverse striations. However, regardless of their taxonomic proximity, we do not agree with GUDE (1896) who considers „*chersa*“ [= *plicaria*] as a variety of *bethencourtiana*. Both clearly differ because of their conchological characteristics and we have not found specimens with intermediate characteristics.

The variation of size which our specimens of *plicaria* present include the measurements provided by MABILLE (1882) in his description of *chersa* and are slightly smaller than the type specimens of *plicaria* in MCHN. The description, figures and measurements of the genital system provided by HESSE (1931) sub nomine „*chersa*“ coincide with ours, as the locality reported for his specimens and the dimensions of the shells. The same does not apply to the drawing of the genital system of „*chersa*“ by ODHNER (1931), in which the diverticle appears notably shorter than the pendunculus of the spermatheca, something that does not occur in our specimens.

Hemicycla bethencourtiana (SHUTTLEWORTH 1852).

Textfigs. 2, 6, 9; Pl. 1 Figs. 3-5; Pl. 3 Figs. 13-14.

v * 1852 *Helix bethencourtiana* SHUTTLEWORTH, Mitth. naturforsch. Ges. Bern, **241/242**: 143 [loc. typ.: Santa Cruz, Teneriffe].

1852 *Helix bethencourtiana*, — REEVE, Conch. Icon., 7: pl. 145 fig. 937.

1872 *Helix bethencourtiana*, — MOUSSON, Revis. Moll. Canar.: 84, pl. 5 fig. 3-4.

1878 *Helix (Hemicycla) bethencourtiana*, — WOLLASTON, Test. atl.: 347.

1931 *Hemicycla bethencourtiana*, — HESSE, Zoologica, **31**: 96, pl. 12 fig. 105 a, b [genitalia].

1975 *Helix bethencourtiana*, — SHUTTLEWORTH, in BACKHUIS (edit.), Tabul. inedit.: pl. 5 fig. 3.

Material examined:

Type material: Lectotype (NHMB, SHUTTLEWORTH coll. No. 8).

Further material: 14 shells (SMF 33568, 33569, 33570, 75616, 75634/3 partim, 187073, 187084 and 187088) without exact locality; 2 shells (SMF 75626) from Güímar; 2 shells (SMF 212632/2 partim and 212648) from Candelaria; 5 shells (SMF, without number) from the Bajadoz and Güímar ravines; and 27 subfossil shells (SMF 296685) from the volcano of Güímar; 4 shells (FMNH 158173) from Güímar; 9 shells (RNHL 705) between Güímar and Socorro; 4 shells (MCNT) from Güímar, 38 shells (MCNT) from Laderas de Güímar and 6 subfossil shells (MCNT) from Grana-dilla.

Collected by us: 377 shells and 137 living specimens; *bethencourtiana* has a rather variable distribution in the eastern part of the island (textfig. 8), from sea level to 1400 m altitude, which reflects a great adaptation to different biotopes.

On the coast it appears frequently sympatric with *inutilis* in the „malpais“ of recent or subrecent lava of the lowland, almost always sheltered by the shade of teasels (*Euphorbia canariensis*), or dug in between roots, with higher humidity.

With increasing altitude the temperatures decrease is leading to a typical transitional vegetation; here the species appears principally at the bottom of the ravines and in abandoned agricultural land, hidden under rocks and in the crevices and cracks of the rocky walls.

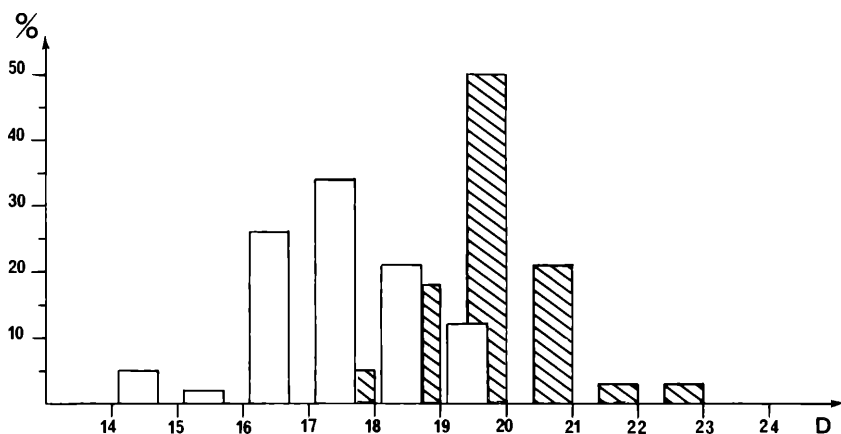
Description: We have found 2 different types of populations which principally differ in the size of their shells. The populations of the highland, like Arafo and Arico, comprise shells of larger dimensions than the populations of the lowland, as Güimar or Fasnía (Pl. 1 Fig. 3).

In the coastal zones (lowland) the shell typically is imperforated, of a depressed-conical or flattened form, with $3\frac{1}{2}$ whorls united by a lineal or scantily deep suture (Pl. 1 Fig. 5); it is opaque and of a clear brown colour which becomes paler or yellowish at the base. Apart from that it can have 5 darker rather diffuse bands.

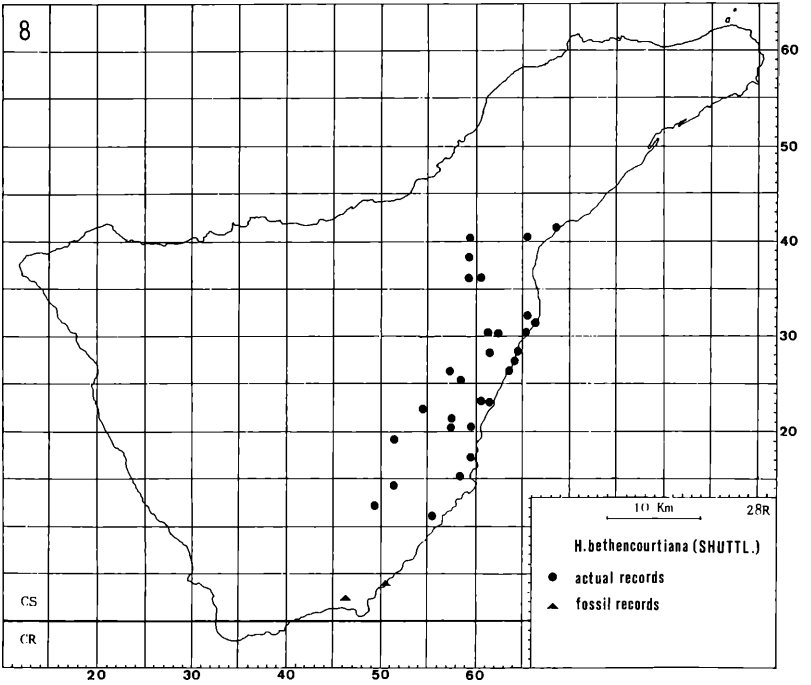
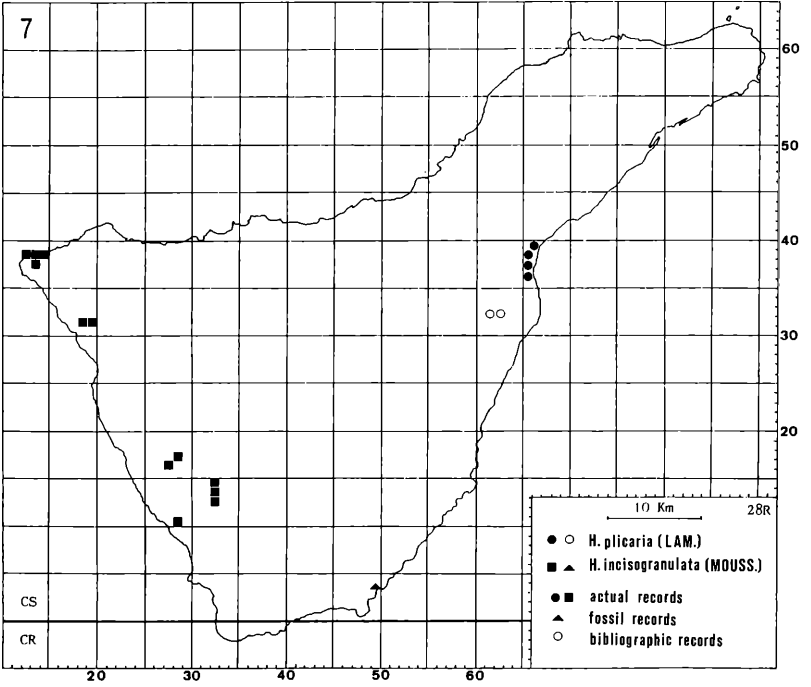
The most outstanding characteristic is the laminar and radial costulation of the shell, which gives it a similar appearance as *plicaria*, but it differs clearly because its costulations are more numerous and are closer to each other; these ribs are smooth and quite uniform (Pl. 3 Fig. 13), while the interstices between them are usually rugose, because of an interrupted spiral striation, which forms some granules. On the base of the shell the ribs converge towards the columellary zone.

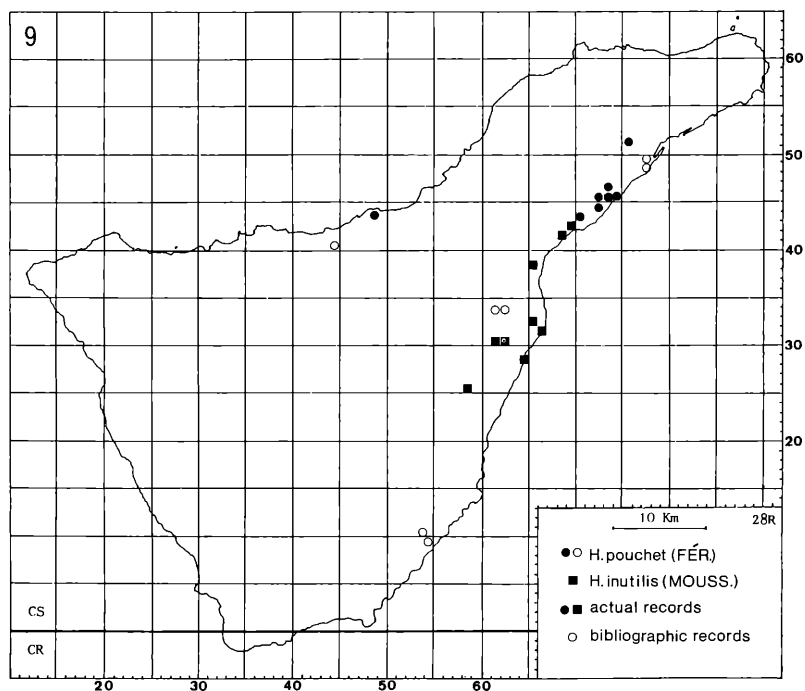
The protoconch is slightly rugose or striated and minutely granulated (Pl. 3 Fig. 14). The body whorl does not possess a keel and near the aperture it becomes more globose. The aperture is oval with parallel margins, which only slightly converge at the points of insertion. The aperture neither exhibits teeth nor angularities. The peristome is wide and flattened like in *plicaria* but more narrow (1 mm). It is brownish-greyish and has the columellary margin slightly thickened inside.

In the highland the shell is more globose and conical, with 4 whorls united by a fairly pronounced suture (Pl. 1 Fig. 4). It is slightly more solid, of a darker brown colour, that also turns pale on the base, and presents no differentiated dark bands. The costulation is slightly more marked. The body whorl is more globose, the peristome is darker and the lip slightly wider.



Textfig. 6: *Hemicycla bethencourtiana* (SHUTTLEWORTH 1852). variability of the dimensions of the shell. D: diameter; H: height; HUV: height of the body whorl; %: percentage of specimens for each range. □ population of lowland; ▨ population of highland.





Textfigs. 7-9: Distribution on Tenerife. 7) *Hemicycla plicaria* (LAMARCK 1816) and *Hemicycla incisognulata* (MOUSSON 1872). 8) *Hemicycla bethencourtiana* (SHUTTLEWORTH 1852). 9) *Hemicycla pouchet* (FÉRUSAC 1821). and *Hemicycla inutilis* (MOUSSON 1872).

Table 1: Variability of shell dimensions of *Hemicycla bethencourtiana* (SHUTTLEWORTH 1852) from low- and highland populations [measurements in mm].

		Diameter	Height	Height of the body-whorl
lowland population	max.	20.80	14.20	10.00
	min.	14.90	9.50	7.25
	average	18.28	11.56	9.30
highland population	max.	22.70	15.00	10.50
	min.	18.80	12.00	9.00
	average	20.78	13.54	9.76

The measurements of the shells are given in textfig. 6 and table 1. When compared it can be observed that the body whorl has a similar height in both populations, whereas the difference in size between them is due to the remaining whorls, which have a more conical appearance in the shells of the populations of the highland. Similarly the differences in diameter are due to the fact that the populations of the highland have 1/2 a whorl more than those of the lowland population.

The genital system (textfig. 2, table 2) is characterized by a medium sized flagellum; the diverticle is shorter than the pedunculus of the spermatheca and the common duct to both is long, but shorter than the flagellum. The mucous glands have 3-5 digitations each.

Discussion: Traditionally this species has been considered closely related to „*plicaria*“ [= *pouchet*] by authors as WOLLASTON (1878), MOUSSON (1872) and ODHNER (unpublished ms.), up to the consideration to be only a variety of it. However, these 2 species clearly differ by their type of sculpture, since *pouchet* has the ribs cut by thickened transversal striae, while the ribs of *bethencourtiana* are completely smooth, as in *plicaria*.

We believe that these 2 species (*bethencourtiana* and *plicaria*) are closely related because they share the same type of sculpture and aperture, and they also coincide in inhabiting very similar biotopes. Furthermore, they both have a long common duct to the diverticle and pedunculus of the spermatheca, while in the 3 former species it is notably shorter, as shown in table 1. However, we do not consider them as one single species, because they differ by their conchological characteristic and because we have not found specimens with intermediate features.

In addition, we want to point out that the shell measurements of our specimens differ from the ones given by SHUTTLEWORTH (1852) in his original description (diameter = 22 mm, height = 11 mm). The populations of the lowland have a smaller diameter, and a variation in height which comprises the values given by the author, while the highland populations exhibit a variation in diameter which includes the one given by SHUTTLEWORTH, but have a larger height than the specimens measured by him.

Hemicycla pouchet (FÉRUSSAC 1821)

Textfigs. 1, 7; Pl. 2 Fig. 6; Pl. 4 Figs. 15-16.

- 1757 Le Pouchet ADANSON, Voy. Afr. occ.: 18, pl. 1 G. V fig. 2 [non binominal].
- 1821 *Helix (Helicogena) pouchet* „ADANSON“ FÉRUSSAC, Prodrom. Limac.: 32 [folio] = 36 [quart] [nomen et indicatio].
- ? 1821 *Helix planorbula* GRAY; fide VILLA 1841:17 [non WOOD 1818].
- 1839 *Helix plicaria*, — PFEIFFER, in MARTINI & CHEMNITZ, Conch. Cab., 1 (12, 2): 41, pl. 71 fig. 13, 14 [non LAMARCK 1816].
- 1850 *Helix plicaria*, — DESHAYES, in FÉRUSSAC & DESHAYES, Hist. nat., 1: 112 [partim].
- 1869 *Helix plicaria*, — HIDALGO, Mol. Pacif., 1: 35.
- 1872 *Helix plicaria*, — MOUSSON, Revis. Moll. Canar.: 81.
- ? * 1885 *Helix plicaria* var. *minor* MABILLE, Nouv. Arch. Mus. Hist. nat., (2) 8: 30 [subfossil; loc. typ.: Tenerife, depot quarternaire du phare d'Anaga].
- 1931 *Hemicycla plicaria*, — HESSE, Zoologica, 31: 97, pl. 13 fig. 107 a-c [genitalia].
- 1942 *Helix (Hemicycla) plicaria*, — FISCHER-PIETTE, J. de Conch., 85 (2): 185, pl. 1 fig. 9 + 10.
- 1946 *Hemicycla plicaria*, — FISCHER-PIETTE, Mém. Soc. Biogéogr., 8: 260, fig. 2.
- 1960 *Hemicycla plicaria*, — ZILCH, Hdb. Paläozool., 6 (2, 4): 716, fig. 2487.
- 1975 *Helix plicaria*, — SHUTTLEWORTH, in BACKHUYS (edit.), Tabul. inedit.: pl. 5 fig. 4.

Table 2: Comparison of the lengths (median values in mm) of the ducts of the genital system in the 5 species of the *Hemicycla plicaria*-group. P: penis; E: epiphallus; F: flagellum; CC: common duct to SP and D; SP: pedunculus of the spermatheca; D: diverticle; n: number of measured specimens.

species	P	E	F	CC	SP	D	n
<i>plicaria</i>	7.7	3.3	11.8	13.3	9.7	9.8	3
<i>bethencourtiana</i>	6.6	4.2	14.1	12.5	9.6	8.3	34
<i>pouchet</i>	8.0	3.5	12.0	6.5	12.0	8.0	2
<i>inutilis</i>	6.8	3.3	12.9	5.7	9.3	6.6	9
<i>incisogranulata</i>	7.5	2.5	12.0	6.0	12.0	9.0	1

Material examined:

Type material: 2 syntypes of *Helix pouchet* FÉRUSSAC 1821 [Orig.-fig. FISCHER-PIETTE 1942: pl. 1 fig. 9+10] (MHNP; ex ADANSON).

Further Material: 9 shells (SMF 33563 [orig.-fig. ZILCH 1960], 33565, 33567, 75634/3 partim, 187074) from „Tenerife“; 1 from Santa Cruz (SMF 33664), 28 from Barranco Hondo (SMF 212650/4), 1 from La Resbalea (SMF 212649); in alcohol, 7 specimens from Puerto Orotava (= Puerto de la Cruz: SMF 3511, leg. K. L. PFEIFFER); 3 shells (FMNH 93398) from Santa Cruz de Tenerife; 4 shells (ANSP 6170) from „Tenerife“; 21 shells (MHNP) from „Tenerife“; 6 shells (RNHL) from Barranco Martiane, near the Puerto de la Cruz. And 20 shells from Barranco de la Leña; 28 from Taco mountain; 3 from Las Mesas; 10 from Santa Cruz (near the Camposantus); 1 subfossil from the pozo la Espinoza (Valle Guerra) (all in MCNT). Collected by us: 41 shells and 2 living specimens from different localities (textfig. 9). They are found in lowland of the eastern part of the island (formed by herbaceous plants and xeric bushes among which stand out the tabaibas (*Euphorbia balsamifera* and *E. obtusifolia regis-jubae*) under rocks, in crevices or among the roots of the bushes. 4 subfossil fragments from San Andrés (SMF 296591); 3 possible syntypes of *Helix plicaria* var. *minor* MABILLE from quaternary deposits of Anaga-mountains (MHNP; ex VERNEAU).

Description: The shell (Pl. 2 Fig. 6) is imperforated, solid and opaque, without gloss; it is of a depressed-conical form and has 4 to 4 1/4 whorls (counted according to the method of KERNEY & CAMERON 1979). The suture is lineal on the first whorl and more pronounced on the last ones. The colour is a uniform dark brown although in some specimens 4 very diffused darker bands insinuate themselves.

The shells most outstanding characteristic is the sculpture, formed by a series of radially thickened ribs which have a strong transversal striation produced by a series of spiral grooves, very numerous, fine and dense (Pl. 4 Fig. 15). On the base of the shell the ribs converge towards the umbilical region.

The protoconch (Pl. 4 Fig. 16) exhibits a relatively thickened granulation arranged in radial rows and has a coloration that is slightly lighter than the rest of the shell.

The body whorl is large, slightly acute near the beginning but without forming a keel. In the final part it becomes more globose.

The aperture is irregularly oval since it is slightly angular in the superior margin. The peristome is greyish with a 1.5 mm wide lip; the margins converge slightly at their insertion points and in some specimens they appear united by a very fine lamina. The columellar margin is slightly thickened inside.

The diameter varies from 17.35 to 22.2 mm (average: 19.53 mm), and the height from 11.0 to 13.9 mm (average: 12.08 mm) (measurements obtained from 17 specimens).

The radula (Pl. 3 Fig. 10) is similar in all species studied, it belongs to the typical *Helicinae* type (a total of 42 radulas have been examined) and does not supply information of taxonomical value for the differentiation of the species; the following description is therefore common to the different species of the genus. The radula possesses 100-150 teeth rows with the following formula: C + 10 - 14 L + 15 - 37 M; the number of rows and the number of teeth per row is variable in the different species and is also variable within members of the same species. The central tooth is small, triangular, with a rounded point and with 2 very small ectocones, hardly delineated. The first lateral teeth are larger and more voluminous than the central one, having a rounded mesocone, a hardly delineated endocone and a small ectocone; in the extreme lateral teeth the endocone becomes more visible and the ectocone appears clearly differentiated; in the first marginal teeth the mesocone, ectocone and endocone differ noticeably, the last 2 being triangular; in the last marginal teeth of each row the size of the denticles is similar, sometimes exhibiting additional cusps.

The genital diverticle (textfig. 3, table 2) is shorter than the pedunculus of the spermatheca. This does not appear to be the case in the specimen figured by HESSE (1931), possibly due to a simple individual variation; in addition, the duct common to both is shorter than these. The flagellum is of medium length. The mucous glands have 3-5 digitations each.

Biotope: The habitat is typically a dry lowland ground with some endemics of the genus *Euphorbia*. In this biotope *pouchet* appears preferently under rocks.

Discussion: Probably since DESHAYES (1850) (in FÉRUSSAC & DESHAYES 1819-1851), a general nomenclatorial confusion has taken place between *plicaria* and this species; the descriptions of the different authors are not in accord with the type specimens of *plicaria* in MCHN (figured by MERMOD 1951). Thus, DESHAYES (1850: 112) remarks: „costis aliquando simplicibus, aliquando granulosis“; and: „Les plis ne sont pas semblables dans tous les individus; dans le plus grand nombre, ils sont crenelés, subgranuleux sur leur tranchant; dans d'autres individus ils sont simples, lisses et moins epais“; but only the specimens with „costis simplicibus“ and „plis simples, lisses et moins epais“ are *plicaria*, while the remainder very probably are *pouchet*.

Already MOUSSON (1872) gives a mistaken version of *plicaria* by indicating: „... gros plis, dont l'arête est rendu rude par de fines lignes incisées decurrentes“. And WOLLASTON (1878) repeats this mistake: „... and the remote but extremely elevated and transversely-sculptured costate ridges with it is beset, giving it a character essentially its own. The very minute impressions which crenulate its oblique transverse ribs will be seen, when closely inspected, to be to the result of a system of densely-packed spiral lines, — which are conspicuous on the summits, or edges, of the costae, but are obsolete in the spaces between them“.

Probably for the reason of not studying the authentic *plicaria*, MABILLE (1882) described these again as a new taxon (*Helix chersa*) and this name was considered hitherto as the correct name for this species, while „*plicaria*“ in the sense of most authors proved to be *pouchet* (FÉRUSSAC 1821).

Some authors, as ORBIGNY (1839), indicated that „*Plicaria*“ [= *pouchet*] has much similarity with „*pouchet*“ [= *adansoni*] and probably both represent the same species.

This suggestion is erroneous, since *pouchet* differs from *adansoni* by having smaller dimensions, by its more depressed and less conical form, by its ribbed sculpture, which is as WOLLASTON (1878) indicates it for „*plicaria*“ very characteristic, and by its aperture. But above all, because the lack of a diverticle in *adansoni*. It is necessary to emphasize that HESSE (1912) believed that he was describing and representing the genital anatomy of „*plica-*

ria" (but in reality of *adansoni*) pointing out the absence of diverticle; but 19 years later the same author (HESSE 1931) redescribed the genital anatomy indicating that he was probably mistaken about the identity of the material studied by him in 1912 (of which he did not have the shell anymore) and that the authentic „*plicaria*“ [= *pouchet*] does indeed possess a diverticle in its reproductive system.

Hemicycla inutilis (MOUSSON 1872).

Textfigs. 3, 8; Pl. 2 Figs. 7-8; Pl. 4 Figs. 17-18.

- ? 1850 *Helix planorbella*, — DESHAYES, in FÉRUSAC & DESHAYES, Hist. nat., 1: 45 [non LAMARCK 1822].
1872 *Helix inutilis* MOUSSON, Revis. Moll. Canar.: 80, pl. 5 fig. 1-2 [loc. typ.: Tenerife, hic restr.: SE-coast].
1878 *Helix (Hemicycla) inutilis*, — WOLLASTON, Test. atl.: 348.
1951 *Helix planorbella*, — MERMOD, Rev. suisse Zool., 58 (40): 699, fig. 55.
? 1975 *Helix planorbella*, — SHUTTLEWORTH, in BACKHUYS (edit.), Tabul. inedit.: pl. 5 fig. 5.

Material examined:

Type material: 1 probable syntype of *inutilis* (ZMUZ 507168).

Further material: 1 shell (SMF 212648), from Candelaria; 2 shells (SMF 75626), from Güímar; 3 shells (RNHL, coll. ALTIMIRA), from Candelaria; 1 shell (FMNH 37419) from „Tenerife“; 6 shells (MCNT) from Güímar and 8 shells (MCNT) from Candelaria.

Collected by us: 85 shells and 11 living specimens in the southeast coast of the island (textfig. 9), in lowland between the sea level and 500 m of altitude, being frequently located in the „malpaises“ under large rocks or buried beside the roots of large bushes. Also found were 20 subfossil shells at the volcano of Güímar.

Description: The shell is small, umbilicated, of a globose-depressed form with $3\frac{1}{2}$ -4 whorls united by a lineal suture (Pl. 2 Figs. 7-8). It is solid and opaque, of a uniform light brown colour, paler on the base and without gloss, with a more or less uniform oblique costulation which is not smooth but transversed by incisive lines giving it a rugose appearance (Pl. 4 Fig. 17). The interstices are also striated in the same way as the ribs and the intercostular grooves are very deep. At the base of the shell the costulation converges towards the umbilicus. The protoconch (Pl. 4 Fig. 18) is not costulated being slightly rugose and granulated. The body whorl does not exhibit a keel or a gibbosity at its extreme end. The aperture is rounded with its margins very proximate in its insertion point. The collumellary margin exhibits an internal callosity. The peristome is flattened and expanded in manner of a lamina, measuring less than 1 mm wide; of a whitish or greyish-brownish colour.

The diameter varies from 14–75 to 18–45 mm (average: $16 \cdot 57$ mm), and the height from 7·7 to 10·5 mm (average: $8 \cdot 97$ mm) (measurements obtained from 47 specimens).

The genital system (textfig. 4, table 2) has not been described before. The flagellum is short. The length of the diverticle is shorter than that of the pedunculus of the spermatheca. The common duct to both is also very short and exhibits a shorter length than that of these, of the flagellum and of the penis. The mucous glands have 2-5 digitations each.

Discussion: Several authors, such as PILSBRY (1888), WOLLASTON (1878) and MOUSSON (1872) himself, place this species in the taxonomic proximity of *planorbella* (LAMARCK 1822) and differentiate it from the latter because of the aperture and the costulation. There is much confusion in the bibliography and contradictions by some authors in relation

to both species resulting from the fact that the original description of the *planorbella* is very inaccurate and misleading, making it easy to confuse both species: in fact, the specimens of *inutilis* that were sent to us from some museums were erroneously identified as *planorbella*. In his work about the LAMARCK types from the MCHN, MERMOD (1951) described as the „type“ of *planorbella* a specimen labeled with this name, but indicated that he was not sure of the designation because the specimen did not correspond with the figures of FÉRUSAC and CHENU. After the examination of the MERMOD figure and the photograph that Dr. VAUCHER (MCHN) send us of this specimen, we could confirm that it is *inutilis*.

We consider that *inutilis* is proximate to *pouchet* and to *incisogranulata*, sharing with both a similar sculpture. It differs from the first by its smaller size and by always presenting an umbilicus and from the second because of its smaller dimensions and by a wider ribbing, the ribs are more pronounced and closer to each other.

WOLLASTON (1878) points out the possibility that *inutilis* could represent a variation of „*plicaria*“ [= *pouchet*] in which the umbilicus is not closed by the expanded lamina of the lower lip of the peristome. Although the degree of relationship of the 2 species is fairly close, we consider that they are perfectly differentiated because of their dimensions, the presence or absence, respectively, of the umbilicus and the fact that *inutilis*, though being small of size has a longer flagellum than *pouchet*.

Hemicycla incisogranulata (MOUSSON 1872).

Textfigs. 5, 7; Pl. 2 Fig. 9; Pl. 4 Figs. 19-20.

- 1822 *Helix strigata* var. β , — FÉRUSAC, Hist. nat., (3): 45 [partim; non LAMARCK 1816].
- ? 1832 *Helix planorbella*, — FÉRUSAC, Hist. nat., Atlas (25): pl. 67 fig. 8 [non LAMARCK 1822].
- ? 1850 *Helix planorbella*, — DESHAYES, in FÉRUSAC & DESHAYES, Hist. nat., 1: 45.
- 1868 *Helix planorbella*, — PFEIFFER, Novit. conch., 2: 297 [partim], pl. 72 fig. 8-10 [non 11-12!].
- 1872 *Helix planorbella* var. *incisogranulata* MOUSSON, Revis. Moll. Canar.: 176 [loc. typ.: Tenerife, hic restr. by design. of neotype: Teno-mountains, NW-coast, above road Buenavista — Punta de Teno, 150 m].
- 1878 *Helix (Hemicycla) planorbella* var. β *incisogranulata*, — WOLLASTON, Test. atl.: 349.
- ? 1975 *Helix planorbella*, — SHUTTLEWORTH, in BACKHUYS (edit.), Tabul. inedit.: pl. 5. fig. 5.

Material examined:

Type material: No types of *incisogranulata* were found in the MOUSSON collection (ZMUZ, MEIER in litt.). As there are also no types of this taxon in SMF, MHNP and BMNH, we believe the types lost and designate herewith a neotype for this taxon (Pl. 2 Fig. 9), which is stored in the ALONSO-IBÁÑEZ collection in DZUL. The locus typicus is at the NW-coast of Tenerife, above the road between Buenavista and the Punta de Teno in an altitude of 150 m.

Further material (collected by us): 281 shells and 1 living specimen; also 3 fossil specimens were collected in quaternary deposits of the Punta de Teno and 12 in Médano (Playa Jaquitas).

It inhabits the western part of the island (textfig. 7), between 50 and 1000 m altitude, with a vegetation that varies from the lowland to the lower limits of the pine forest.

Description: The shell is umbilicated, of a globose-depressed form, with $4\frac{1}{2}$ whorls united by a suture lineal in the first whorls and more pronounced on the last ones (Pl. 2 Fig. 9); it is of a solid consistency and opaque, without gloss, of a uniform clear brown colour, clearer on the base and without dark bands.

Its sculpture is similar to the one of *inutilis*: oblique costulation more or less uniform, with a striation that gives it a rugose appearance (Pl. 4 Fig. 19). In the interstice between

the ribs there is no striation, but a fine granulation. The protoconch is of a more reddish tone and weakly striated, exhibiting thickened granules (Pl. 4 Fig. 20). On the base of the shell the costulation converges towards the umbilicus.

The body whorl is angular but does not form a keel. The aperture is wide and rounded, with more or less parallel margins which do not converge. The peristome extends into a 1.5 mm wide lip which partially covers the umbilicus and its margins are united by a callosity. It is of a greyish-white to greyish-brownish colour and the columellary margin is slightly thickened inside.

The diameter varies from 18.05 to 22.4 mm (average: 20.42 mm) and the height from 10 to 13 mm (average: 11.36 mm) (measurements obtained from 53 specimens).

The genital system (textfig. 5, table 2) has not been described up to this date. It exhibits a short flagellum; the diverticle is shorter than the pedunculus of the spermatheca, and the duct common to both is shorter than these and than the penis. The mucous glands have 3-5 digitations each.

Discussion: As we have already indicated in the „discussion“ of *inutilis*, the original description is very inaccurate and misleading, making it easy to confuse both species; *incisogranulata* was therefore described as a variety of the *planorbella* from La Gomera by MOUSSON, since he considered that this species comprised 2 totally different forms: the one from La Gomera, with smooth ribs corresponding to the *planorbella* type described by LAMARCK, and the other from Tenerife more depressed, keeled and with ribs sculptured in a different way.

When MOUSSON (1872) described this last form as the *incisogranulata* variety he indicated that the specimens of the LAMARCK collection originated from La Gomera and Tenerife, and that the specimens of Tenerife had striated ribs. In his opinion LAMARCK probably had not paid attention to the smooth or striated character of the ribs. L. PFEIFFER (1848) and MABILLE (1885) considered the Tenerife form as the actual *planorbella*.

However, since the original description by LAMARCK refers to a species of La Gomera lacking the granules and the Tenerife taxon described by MOUSSON does not correspond to this, we consider that it represents a different species.

As we have already indicated, it much resembles *inutilis* but differs from it because the latter exhibits significantly smaller dimensions, it also has ribs that are more prominent and marked, more thickened and are present in larger number. Similarly, it could be of taxonomic significance that *inutilis* exhibits a longer flagellum than the *incisogranulata* regardless of its smaller size. It is also related to *pouchet*, but differs from it since it is more depressed, has a larger diameter and has an umbilicus.

Conclusions.

The 5 species of the *plicaria* group which are distributed throughout the dry zones of the southern slope of Tenerife island can be divided into 2 subgroups: the first formed by *bethencourtiana* and *plicaria* which are characterized by possessing smooth ribs without traces of spiral striation and which have the common duct notably longer, almost double than in the following three species; the other formed by *pouchet*, *inutilis* and *incisogranulata*, with ribs that are grooved through the spiral striation of the shell and with a short common duct to the spermatheca and the diverticle.

Resumen.

Se inicia la revisión del género *Hemicycla*, del que se han descrito más de 130 taxones nominales, siendo el número real de especies mucho menor. En su mayor parte están incompletamente conocidas, tanto en cuanto a su variabilidad como a su anatomía interna y a su distribución geográfica; y su estudio es más complejo por tener el material tipo de sus diferentes taxones distribuido entre los Museos de varios países.

En este artículo se revisa un grupo de 5 especies de Tenerife, el grupo de *plicaria*, que se distribuye por las zonas secas de la vertiente Sur de la isla, con las siguientes especies: *plicaria* (LAMARCK 1816), *bethencourtiana* (SHUTTLEWORTH 1852), *inutilis* (MOUSSON 1872), *incisogranulata* (MOUSSON 1872) y *pouchet* (FÉRUSSE 1821). Se designa el lectotipo de *plicaria* y de *bethencourtiana* y se establece un neotipo para *incisogranulata*.

Summary.

We initiate a revision of the genus *Hemicycla*; there are more than 130 reported nominal taxa, however the real number of species is much smaller. On the other hand, the conchological variability, anatomy of the genital system and the geographical distribution are unknown for the majority of them and their type material is distributed over different museums in several nations.

In this article, a group of 5 *Hemicycla*-species from Tenerife (Canary Island) is revised, the *plicaria*-group which is distributed throughout the dry zones of the southern slope of the island with following species: *plicaria* (LAMARCK 1816), *bethencourtiana* (SHUTTLEWORTH 1852), *inutilis* (MOUSSON 1872), *incisogranulata* (MOUSSON 1872) and *pouchet* (FÉRUSSE 1821). Of all species is given the anatomy of genitalia, morphology of the shell and actual as well as fossil distribution in detail. Lectotypes of *plicaria* and *bethencourtiana* are designated and for *incisogranulata* a neotype is established.

Zusammenfassung.

Es wird mit einer Revision des Gattung *Hemicycla* begonnen, aus der mehr als 130 nominelle Taxa beschrieben sind, wenngleich die wahre Artenzahl wesentlich geringer sein dürfte. Erschwerend wirkt sich aus, daß die meisten Arten eine hohe conchologische Variabilität zeigen, Anatomie und genauere geographische Verbreitung von vielen Taxa unbekannt sind und das Typusmaterial über zahlreiche Museum in einigen Ländern zerstreut ist.

In dieser Arbeit wird die *Hemicycla plicaria*-Gruppe von Teneriffa (Kanarische Inseln) revidiert, die mit 5 Arten die trockenen Zonen der Südhänge Teneriffas besiedelt. Sie umfaßt *plicaria* (LAMARCK 1816), *bethencourtiana* (SHUTTLEWORTH 1852), *inutilis* (MOUSSON 1872), *incisogranulata* (MOUSSON 1872) sowie *pouchet* (FÉRUSSE 1821). Von allen Arten werden die Gehäusemorphologie, Genitalanatomie sowie rezente und fossile Verbreitung ausführlich dargestellt. Für *plicaria* und *bethencourtiana* werden Lectotypen festgelegt, für *incisogranulata* ein Neotypus bestimmt.

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Explanations of plate 1.

Phot. K. GROH.

Magnification 2/1.

Figs. 1-2. *Hemicycla plicaria* (LAMARCK 1816).

Tenerife.

1) Las Caletillas, 20 m [DZUL, coll. ALONSO-IBAÑEZ]

2) Lectotype [MCHN 1091/87-1, ex LAMARCK].

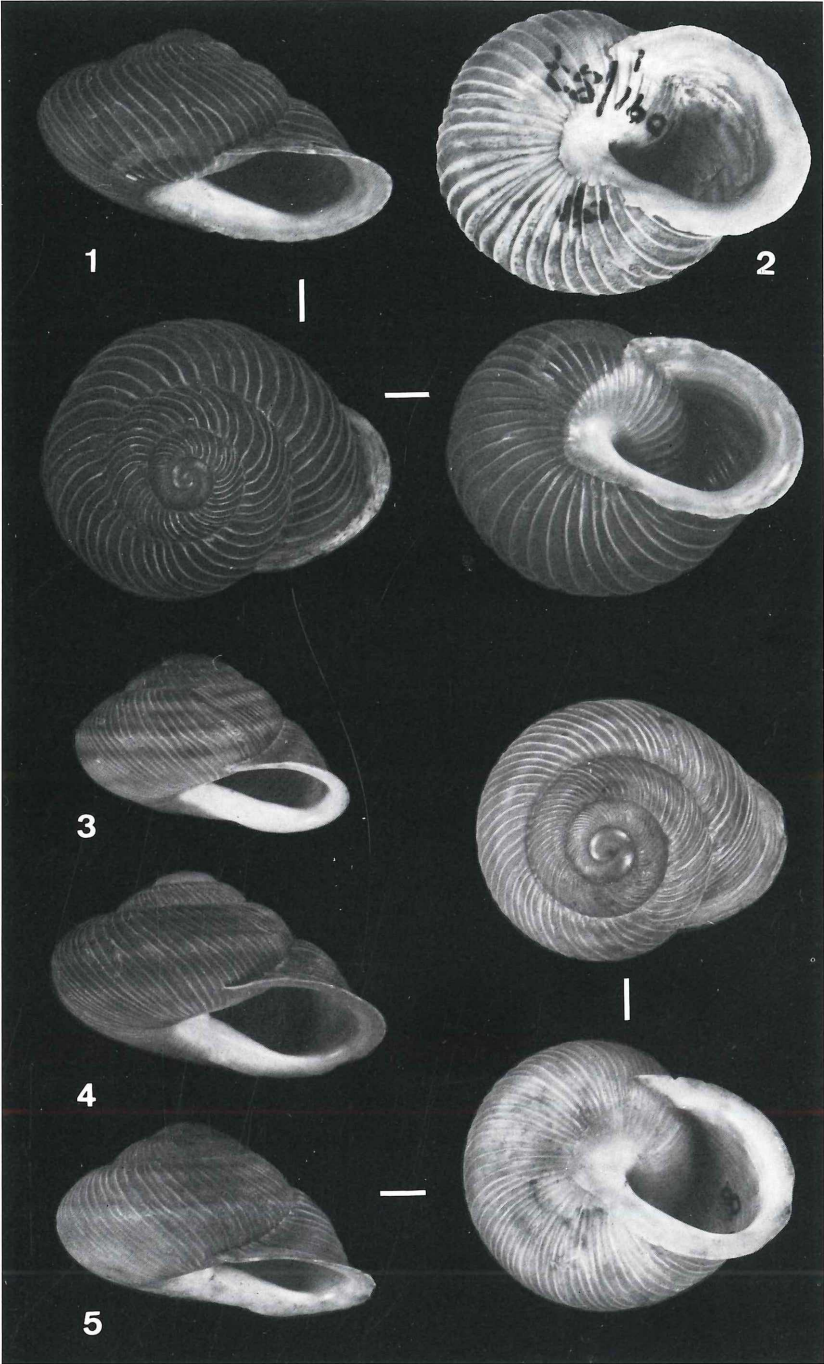
Figs. 3-5. *Hemicycla bethencourtiana* (SHUTTLEWORTH 1852).

Tenerife.

3) Mirador de Güimar (lowland population), 800 m [DZUL, coll. ALONSO-IBAÑEZ].

4) Road Arafo — La Esperanza (highland population), 800 m [DZUL, coll. ALONSO-IBAÑEZ].

5) Lectotype [NHMB, SHUTTLEWORTH coll. No. 8].



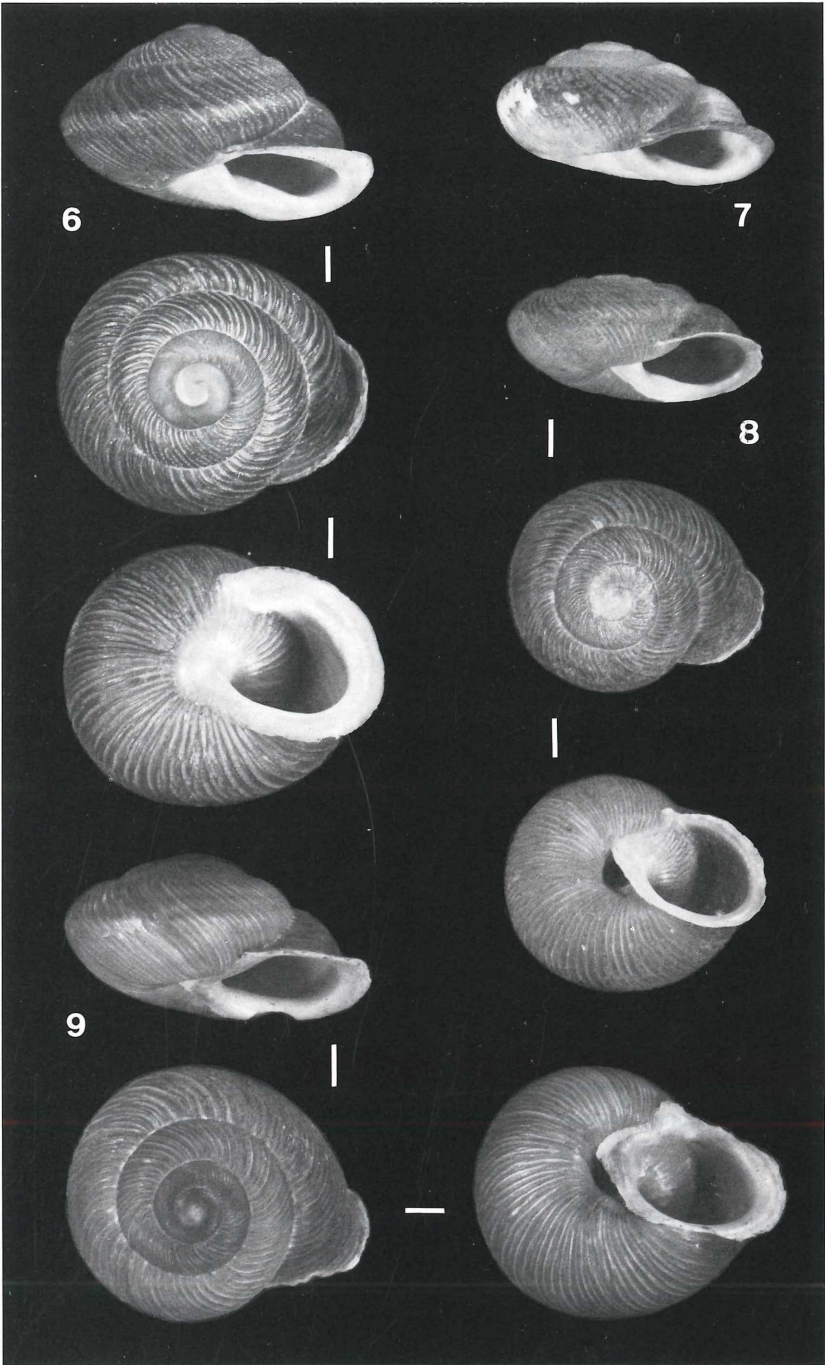
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Explanations of plate 2.

Phot. K. GROH.

Magnification 2/1.

- Fig. 6. *Hemicycla pouchet* (FÉRUSSAC 1821).
Tenerife, Santa Cruz, Bco. de la Lena, 150 m [DZUL, coll. ALONSO-IBAÑEZ].
- Figs. 7-8. *Hemicycla inutilis* (MOUSSON 1872).
Tenerife.
7) Probable syntype [ZMUZ 507168].
8) Mirador de Güimar, 400 m [DZUL, coll. ALONSO-IBAÑEZ].
- Fig. 9. *Hemicycla incisogranulata* (MOUSSON 1872).
Tenerife, NW-coast, road Buenavista — Punta di Teno, 150 m; Neotype [DZUL, coll. ALONSO-IBAÑEZ].



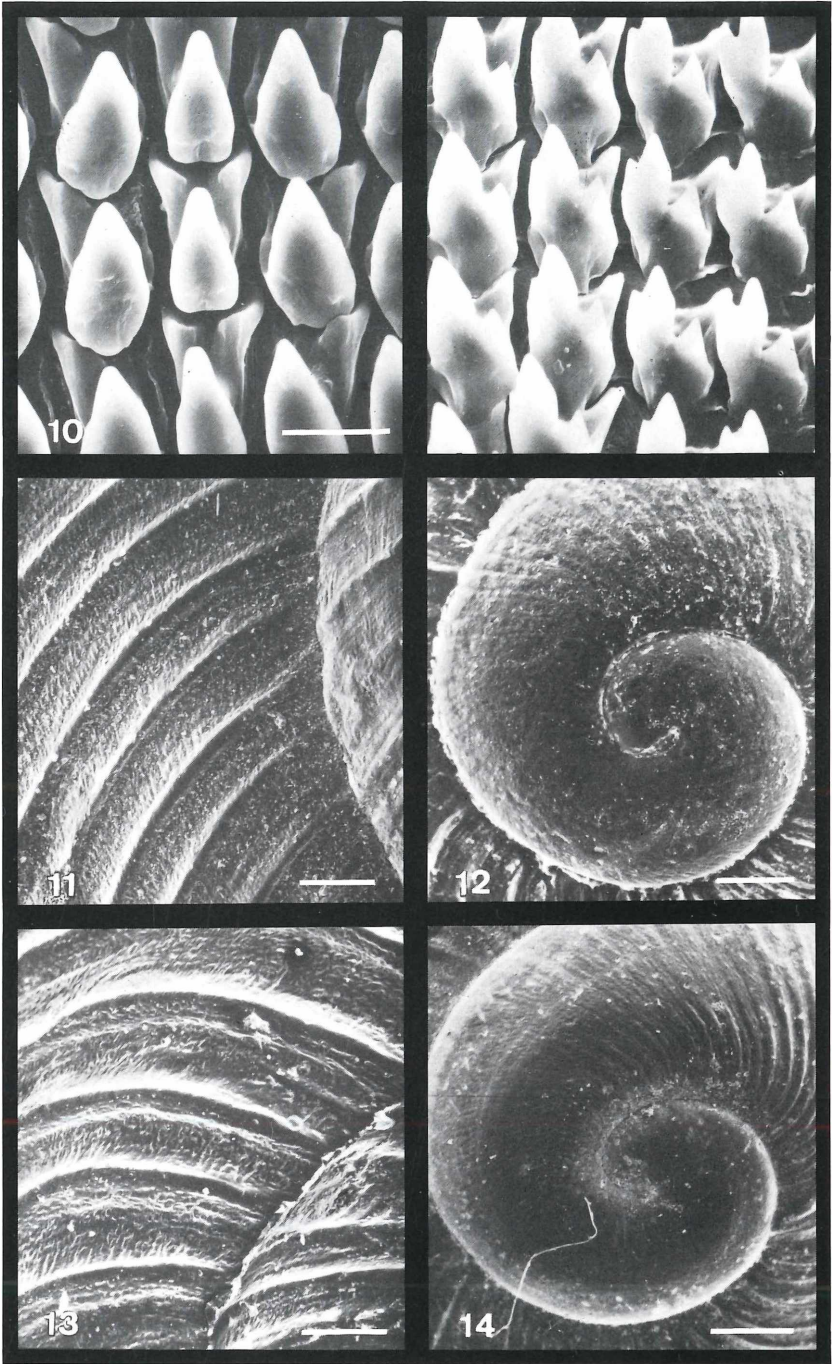
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Explanations of plate 3.

SEM-phot. M. IBAÑEZ.

Radula, scale: 25 μm ; Protoconch and shell, scale: 600 μm .

- Fig. 10. *Hemicycla pouchet* (FÉRUSAC 1821).
Tenerife, Santa Cruz; Radula [DZUL, coll. ALONSO-IBAÑEZ].
- Figs. 11-12. *Hemicycla plicaria* (LAMARCK 1816).
Tenerife, Las Caletillas.
11) Detail of the body-whorl [DZUL, coll. ALONSO-IBAÑEZ].
12) Protoconch [DZUL, coll. ALONSO-IBAÑEZ].
- Figs. 13-14. *Hemicycla bethencourtiana* (SHUTTLEWORTH 1852).
Tenerife, Mirador de Güimar.
13) Detail of the body-whorl [DZUL, coll. ALONSO-IBAÑEZ].
14) Protoconch [DZUL, coll. ALONSO-IBAÑEZ].



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Explanations of plate 4.

SEM-phot. M. IBAÑEZ.

Protoconch and shell, scale: 600 μm .

Figs. 15-16. *Hemicycla pouchet* (FÉRUSAC 1821).

Tenerife, Santa Cruz.

15) Detail of the last two whorls [DZUL, coll. ALONSO-IBAÑEZ].

16) Protoconch [DZUL, coll. ALONSO-IBAÑEZ].

Figs. 17-18. *Hemicycla inutilis* (MOUSSON 1872).

Tenerife, Mirador de Güimar.

17) Detail of the body-whorl [DZUL, coll. ALONSO-IBAÑEZ].

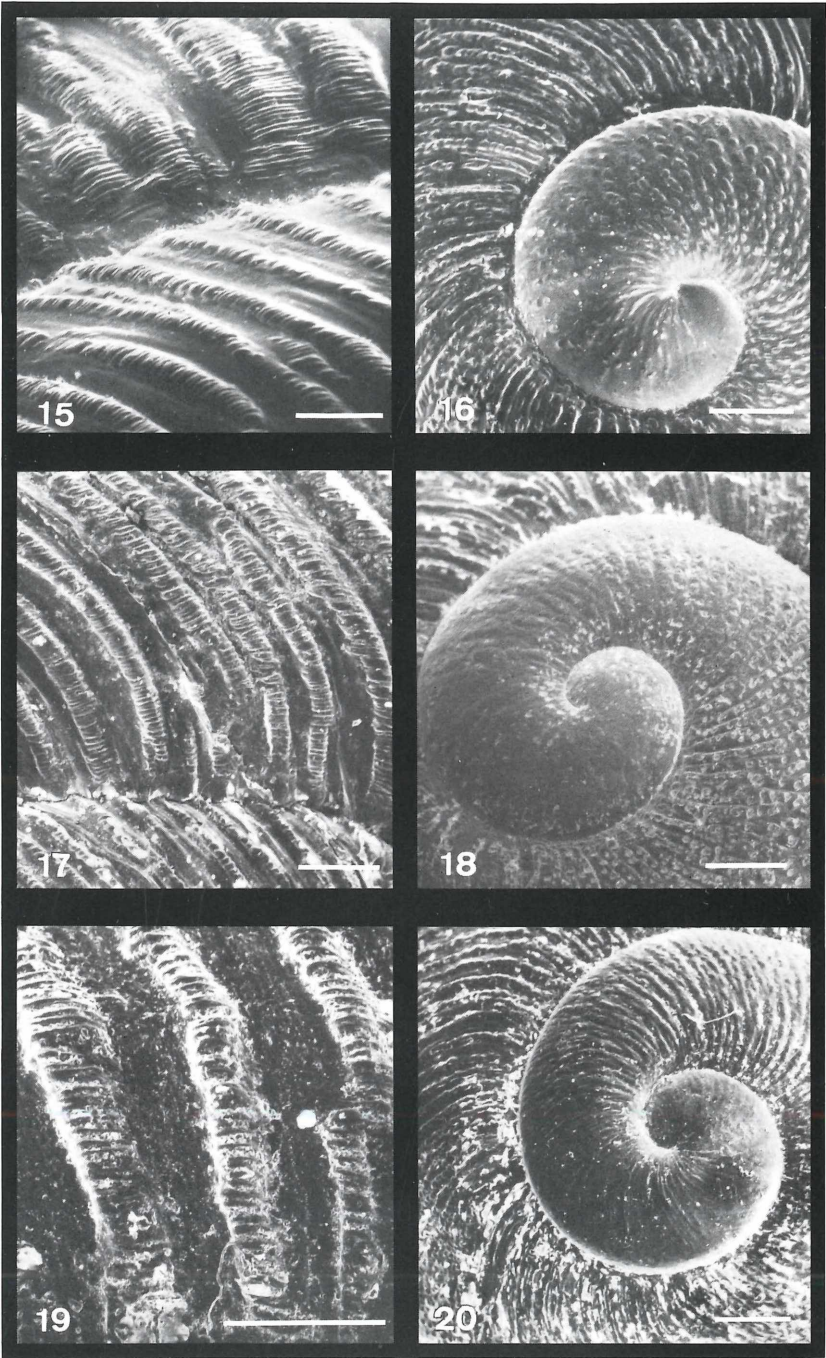
18) Protoconch [DZUL, coll. ALONSO-IBAÑEZ].

Figs. 19-20. *Hemicycla incisogranulata* (MOUSSON 1872).

Tenerife, Teno-mountains.

19) Detail of the body-whorl [DZUL, coll. ALONSO-IBAÑEZ].

20) Protoconch [DZUL, coll. ALONSO-IBAÑEZ].



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Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Archiv für Molluskenkunde](#)

Jahr/Year: 1987

Band/Volume: [118](#)

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