

PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES
FOURTH SERIES

Vol. XXX, No. 18, pp. 381-399; 24 figs.

September 30, 1968

**THE DIGUET-MABILLE LAND AND
FRESHWATER MOLLUSKS OF
BAJA CALIFORNIA**

By

G Dallas Hanna

and

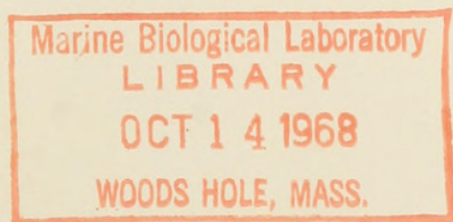
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In 1895, Jules Mabille published a rather large list of mollusks collected in the Gulf of California and on the peninsula of Baja California by Léon M. Diguët. The latter is known to have travelled extensively in that area and to have made collections in the fields of botany, zoology, and anthropology, as well as conchology. Because the results of Diguët's work in Baja California are not well known we have included two of his published papers in our list of references at the end of this report. A rather complete list has been compiled by Barrett (1957, 1967).

The Mabille list contains the names of 134 marine species and subspecies of mollusks. In addition, there are names of 26 land and freshwater forms. Eight of the marine and 18 of the land and freshwater species were described as new. Not one was illustrated.

Although the land and freshwater forms were described rather fully, the identification of Mabille's species has given a great deal of trouble. This arises chiefly in most instances because no comparisons were made with species that already had been described and illustrated. When Dr. H. A. Pilsbry prepared the volume on the American Bulimulidae in the Manual of Conchology he commented on his inability to verify Mabille's names; about all he attempted was to



publish English translations of the original descriptions in French. When the senior author worked on the large collection brought back from Baja California as a result of the California Academy of Sciences' 1921 Expedition to the Gulf of California the same difficulties were encountered; there were grave doubts whether some of the species that were then described as new (Hanna, 1923) were not actually some that Mabilie had described previously.

Therefore, when it became possible for the senior author and Mrs. Hanna to visit some European museums during the summer of 1966, arrangements were made in advance to work at the Paris Museum of Natural History August 2 to 4. Through the kindness of Dr. Edouard Fischer-Piette and Dr. H. Chevallier, the collection in question had been segregated in order that the specimens might be photographed. They were most courteously received by Dr. and Mrs. Bernard Salvat and Miss Anne Marie Testud of the Department of Malacology. As a result of this pleasant visit it is now possible to illustrate Mabilie's new land and freshwater species for the first time, which is the primary purpose of this report.

In addition to the 18 new species of land and freshwater shells covered in Mabilie's list, there are eight named previously that were recognized and correctly identified by him; these need not be considered further. Two species—*Helix* (*Polygyra*) *solidens* and *H. (P.) triangularis* (and var. *minor*)—are from Guaymas, Sonora, on the west Mexican mainland and not from Baja California. These are also illustrated.

Unfortunately, the type lots of three species of *Bulimulus* could not be found among Diguët's Baja California shells in the Paris Museum. These are *Bulimulus* (*Leptobysus*) *lapidovagus*, *B. (L.) dentifer*, and *B. (Thaumastus) digueti*. Mabilie's published paper contains brief locality information, which helps somewhat in placing the species. This is especially true of *Bulimulus* (*Leptobysus*) *dentifer* recorded from Isla Tortuga, a volcanic island in the Gulf of California. A large series of specimens was collected on this island during the Academy's 1921 Expedition and only a single species could be found. Some of these shells have been deposited in the Paris Museum for comparison in the event the original lot of *B. dentifer* is found later.

Although Mabilie did not publish designations of types with his descriptions, labels in his handwriting do have the word "type" or "types" on them, leaving no doubt that type lots are represented. Notes were made of this in each instance and measurements were made at the time the shells were photographed for a check with those included by Mabilie in his descriptions.

Without a direct comparison of pertinent type material in various museums with Mabilie's type specimens in the Paris Museum (N. H.), any attempt to determine the validity of his new names must be speculative; in most instances decisions must be based on subjective evidence. Although the opportunity for direct comparisons seems remote, we believe some contribution can and should be made now toward settling the confusion caused by Mabilie's new names by a

study of the photographs and an evaluation of these and other available information. Our opinions and conclusions, contained in the following systematic list, may be summarized as follows:

Mabille, 1895	Probable Equivalent
<i>Planorbis mysarus</i>	<i>Planorbella tumida</i> (Pfeiffer, 1839)
<i>Helix indigena</i>	<i>Micrarionta indigena</i> (Mabille, 1895); syn. <i>M. peninsularis</i> (Pilsbry, 1916)
<i>Helix steganella</i>	<i>Micrarionta lohrii</i> (Gabb, 1868)
<i>Helix invecta</i>	<i>Micrarionta lohrii</i> (Gabb, 1868)
<i>Helix digueti</i>	<i>A nomen inquirendum</i>
<i>Helix (Polygyra) solidens</i>	<i>Polygyra anilis</i> (Gabb, 1865)
<i>Helix (Polygyra) triangularis</i>	<i>Polygyra behri</i> (Gabb, 1865)
<i>Helix (Polygyra) triangularis</i> var. <i>minor</i>	<i>Polygyra behri</i> (Gabb, 1865)
<i>Bulimulus (Leptobysus) lapidovagus</i>	<i>A nomen inquirendum</i>
<i>B. (Leptobysus) dentifer</i>	<i>Rabdotus (Leptobysus) dentifer</i> (Ma- bille, 1895)
<i>B. (Leptobysus) subspirifer</i>	<i>Bulimulus (Leptobysus) subspirifer</i> Mabille, 1895
<i>B. (Leptobysus) dismenicus</i>	<i>Bulimulus (Hannarabdotus) beldingi</i> Cooper, 1892
<i>B. (Scutalus) acholus</i>	<i>Bulimulus (Puritanina) acholus</i> Ma- bille, 1895
<i>B. (Scutalus) cosmicus</i>	<i>Bulimulus (Puritanina) species inquir- endum</i>
<i>B. (Scutalus) cacotycus</i>	<i>Bulimulus (Hannarabdotus) excelsus</i> (Gould, 1853)
<i>B. (Thaumastus) digueti</i>	<i>A nomen inquirendum</i>
<i>B. (Globulus) recognitus</i>	<i>Rabdotus (Rabdotus) sufflatus</i> (Gould, 1859)
<i>Berendtia digueti</i>	<i>Coelocentrum (Spartocentrum) digueti</i> (Mabille, 1895)
<i>Berendtia minorina</i>	<i>Coelocentrum (Spartocentrum) mino- rina</i> (Mabille, 1895)

Family PLANORBIDAE

Planorbis mysarus Mabille.

Planorbis mysarus MABILLE, 1895, pp. 63, 64. GERMAIN, 1921, p. 54.

TYPE LOCALITY. Lower California (Diguët).

TYPE LOT. Problematical. See remarks.

There were no specimens in the Paris Museum collection under the name *Planorbis mysarus* Mabille. There were, however, other lots of *Planorbis* collected by Diguët in Baja California. We are indebted to Drs. Fischer-Piette and Chevallier for the following information:

Diguët's shells were studied and identified later by Germain (1921), who placed Mabille's new species in the synonymy of *Planorbis* (*Pierosoma*) *tumidus* Pfeiffer, 1839. There are five lots, as follows:

- Lot 1. The label, in Germain's handwriting, reads: "*Planorbis* voisins du *tumidus* Pfr., rivière de San Jose del Calvo [= Cabo]. Sud de la Basse Californie."
- Lot 2. Germain's label reads: "*Planorbis tumidus* Pfr., Sud de la B. C."
- Lot 3. A similar label reads: "*Planorbis tumidus* Pfr., San Jose del Calvo."
- Lot 4. The label reads: "*P. tumidus* Pfr.,—*P. caribaeus* d'Orb.—*P. guatemalensis* Clessin, S. Jose."
- Lot 5. The label in Mabille's handwriting reads: "*Planorbis tenuis* Phil., Basse Californie, Diguët, 1893"; an accompanying label by Germain reads: "*Planorbis tumidus* var. *major*." One of these specimens has the following dimensions: maximum diameter, 23.2 mm.; height, 8.4 mm.; height of aperture, 9.1 mm. The largest, (fig. 24a-c), measures: maximum diameter, 23.9 mm.; aperture height, 9.3 mm.

Lot 5 is perhaps the significant one. The name "var. *major*," preoccupied at least once by Gassies, 1863 (see Germain, 1923, p. 148), appears only on a

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FIGURE 1. *Bulimulus* (*Scutalus*) *cosmicus* Mabille. Lectotype. Length, 46.7 mm.; maximum diameter, 25.7 mm.

FIGURE 2. *Bulimulus* (*Scutalus*) *cosmicus* Mabille. Paralectotype. Length, 50.3 mm.; maximum diameter, 29.7 mm.

FIGURE 3. *Bulimulus* (*Leptobyrsus*) *dismenicus* Mabille. Lectotype. Length, 31.3 mm.; maximum diameter, 15.0 mm.

FIGURE 4. *Bulimulus* (*Leptobyrsus*) *subspirifer* Mabille. Lectotype. Length, 46.9 mm.; maximum diameter, 19.7 mm.

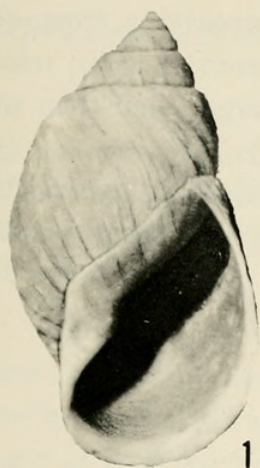
FIGURE 5. *Bulimulus* (*Scutalus*) *cacotycus* Mabille. Lectotype. Length, 58.0 mm.; maximum diameter, 26.4 mm.

FIGURE 6. *Bulimulus* (*Scutalus*) *cacotycus* Mabille. Paralectotype. Length, 53.0 mm.; maximum diameter, 24.9 mm.

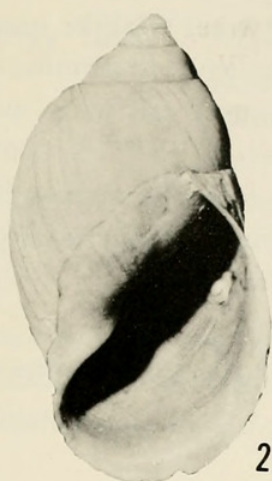
FIGURE 7. *Bulimulus* (*Scutalus*) *cacotycus* Mabille. Paralectotype. Length, 48.5 mm.; maximum diameter, 23.8 mm.

FIGURE 8. *Bulimulus* (*Scutalus*) *acholus* Mabille. Lectotype. Length, 45.1 mm.; maximum diameter, 25.0 mm. Figure 8a, entire shell. Figure 8b, enlarged portion of body whorl to show sculptural detail.

FIGURE 9. *Bulimulus* (*Globulus*) *recognitus* Mabille. Lectotype. Length, 24.0 mm.; maximum diameter, 16.4 mm.



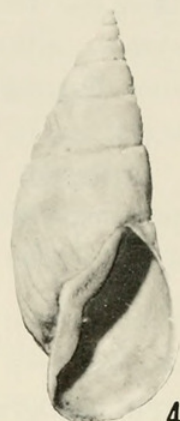
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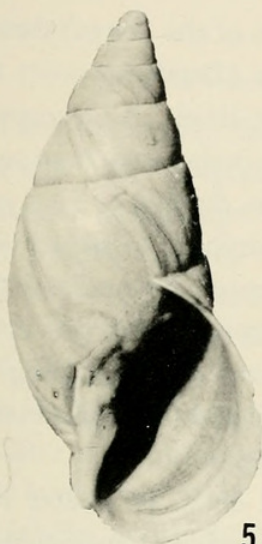
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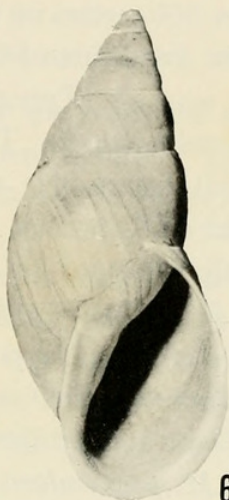
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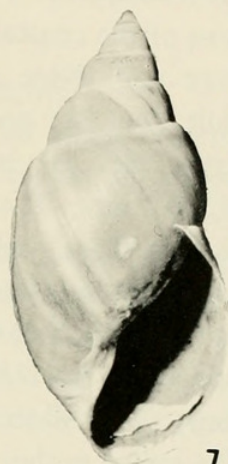
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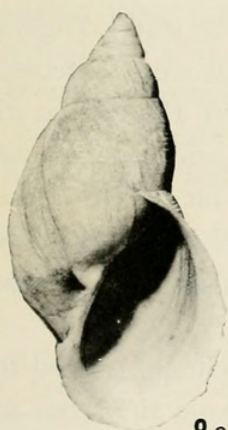
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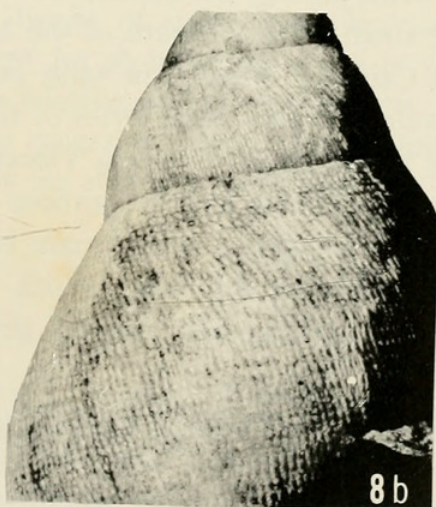
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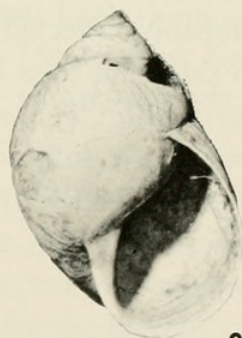
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8a



8b



9

museum label and thus has no taxonomic significance. These specimens (or others like them) possibly represent what Mabilie used in describing *Planorbis mysarus*, although the dimensions he gave (maximum diameter, 28 mm.; minimum diameter, 20 mm.; height, 8 mm.) call for a much larger shell than the largest one of "var. *major*" in lot 5.

Although Mabilie's *P. mysarus* evidently cannot be related to a particular specimen with any certainty, we follow Germain in relegating it to the synonymy of *P. tumidus*.

Family HELMINTHOGLYPTIDAE

***Helix indigena* Mabilie.**

(Figures 22, 23.)

Helix indigena MABILLE, 1895, p. 64. PILSBRY, 1916, p. 99.

TYPE LOCALITY. Found above 800 meters on the peaks of the Sierra, throughout most of the central part of the Peninsula of California (Diguët).

TYPE LOT. Nine specimens marked "Types" on the label. All except one subadult (fig. 22) are dead, bleached shells. The shell designated here as the lectotype (fig. 23) is fully adult measuring: maximum diameter, 19.4 mm.; height, 10.2 mm. The other eight shells become paralectotypes. Pilsbry (1916), stated that these shells evidently belonged to the group of *Sonorella* [= *Micrarionta*] *lohrii* (Gabb). That *H. indigena* is different from *H. lohrii* is evident from an examination of Mabilie's type lot, supported by the accompanying illustrations (figs. 22, 23). It is doubtless the same as *Micrarionta peninsularis* (Pilsbry, 1916) described and illustrated in the same paper.

The senior author discussed *M. peninsularis* in some detail in a later report (Hanna, 1923, pp. 503, 504), placing the locality of the original specimens collected by Gabb as being about 30 miles south of the Mission San Borja in the foothills of the Sierra de Calmalli. This is the same general area where Diguët probably collected *M. indigena*. Two large series of these snails were collected in this same area by the junior author during a Vizcaíño Desert Expedition of the California Academy in 1961, the station locations being 5 miles northwest and 1 mile south of Rancho Mesquital on the main road not far north of the southern border of Baja California del Norte, which is 28° N. latitude. The species was also collected by Hanna and Wiggins about a mile north of the Mission San Borja in 1959.

Several named Baja California species of *Micrarionta* seem closely related to *M. indigena*. Although a determination of their validity is beyond the scope of this report, a list of them is included for the benefit of those interested in this desert group:

Name	Type Locality
<i>Micrarionta inglesiana</i> Berry, 1928	North slope of Red Rock, 3 miles from the sea and ½ mile from Hamilton Ranch, West of Santo Domingo (Berry)
<i>M. merrilli</i> (Bartsch, 1904)	Below San Quentin (Bartsch)
<i>M. evermanni</i> Pilsbry, 1916	Bahia Tortuga (Hanna & Jordan)
<i>M. ellipsostoma</i> (Pilsbry, 1894)	San Juan del Norte (Gabb) ¹
<i>M. ultima</i> (Pilsbry, 1916) ²	Sinaloa, Mexico (Gabb)

While available evidence points to the fact that *M. indigena* and *M. peninsularis* are conspecific (Mabille's name taking precedence over Pilsbry's), this can be determined with finality only by a detailed comparison of the type specimens of both species.

***Helix steganella* Mabille.**

(Figures 16a-c.)

Helix steganella MABILLE, 1895, pp. 64, 65. PILSBRY, 1916, pp. 98-100.

TYPE LOCALITY. Same as for the preceding species (Diguët).

TYPE LOT. A single specimen, marked "Type" on the label, becomes the lectotype. It measures: maximum diameter, 24.0 mm.; minimum diameter, 19.0 mm.; height, 9.8 mm.

There is no doubt that this species is the same as *Micrarionta lohrii* (Gabb, 1867). According to Dr. Chevallier, an anonymous worker subsequently added the following note to the tray holding Mabille's shell: "C'est *Sonorella lohrii* Gabb." Pilsbry (1916) came to the same conclusion based on his analysis of Mabille's description which he translated into English, and placed *H. steganella* in the synonymy of *M. lohrii*.

Mabille evidently had more than one specimen; his measurements show ranges in diameter and height of shell. The dimensions of the lectotype lie within these ranges except for shell height, which is 9.8 mm., the range being stated as 7.5 to 8 mm., a relatively minor discrepancy. It seems likely from our present knowledge of the geographic range of *M. lohrii* that Diguët must have collected his specimens in an area well over 100 miles south of the spot where he found *M. indigena*.

***Helix invecta* Mabille.**

Helix invecta MABILLE, 1895, p. 65. PILSBRY, 1916, p. 100.

TYPE LOCALITY. Lower California (Mabille).

TYPE LOT. A single dead shell marked "Type" on the label, which becomes

¹ Gabb's "San Juan del Norte" is on the east side of the peninsula about 20 miles north of Loreto.

² *M. ultima* was reported from the mainland where no species of *Micrarionta* of the *M. indigena* group have been collected subsequently.

the lectotype. It measures: maximum diameter, 22.3 mm.; height, 9.8 mm., which compares with Mabilles dimensions of 21 mm. and 7 mm. respectively.

Pilsbry (1916) allocated this species to his "Group of *Sonorella lohrii*" and said it "seems nearer to *S. lohrii* than any other species I have seen." His view is certainly correct. The unique type specimen is so little different from the lectotype of *Micrarionta steganella* that no illustration of it seems necessary. *Helix invecta* Mabilles, therefore, becomes a synonym of *Micrarionta lohrii* (Gabb, 1868).

***Helix digueti* Mabilles.**

Helix digueti MABILLE, 1895, p. 65. PILSBRY, 1916, p. 100.

TYPE LOCALITY. Not stated by Mabilles.

TYPE LOT. Not found in the Paris Museum.

Mabilles description, rendered into English by Pilsbry (1916), gives little or no information that might help to recognize the species. It calls for a shell measuring 20.0 mm. to 20.5 mm. in maximum diameter and 8 mm. to 9 mm. in height. Pilsbry thought it might be allocated to his "group of *Micrarionta lohrii*" but the statement that the reflexion of the basal part of the peristome nearly covers the umbilicus places it more closely to *M. indigena* (Mabilles, 1895), *M. lohrii* having a large, wide-open umbilicus.

Helix digueti, therefore, must remain a *nomen inquirendum* until Mabilles type material can be found.

Family POLYGYRIDAE

***Helix (Polygyra) solidens* Mabilles.**

(Figure 21.)

Helix (Polygyra) solidens MABILLE, 1895, pp. 65, 66.

TYPE LOCALITY. South of the village of Guaymas, Sonora, Mexico (Mabilles).

TYPE LOT. A single dead shell labeled "Type." This becomes the lectotype. Measurements are: maximum diameter, 14.0 mm.; height, 5.7 mm.

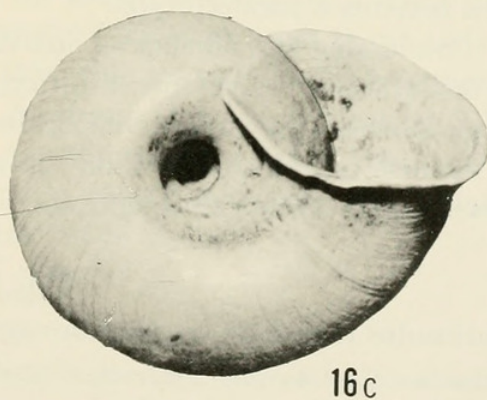
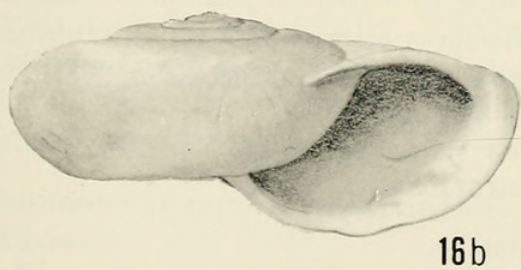
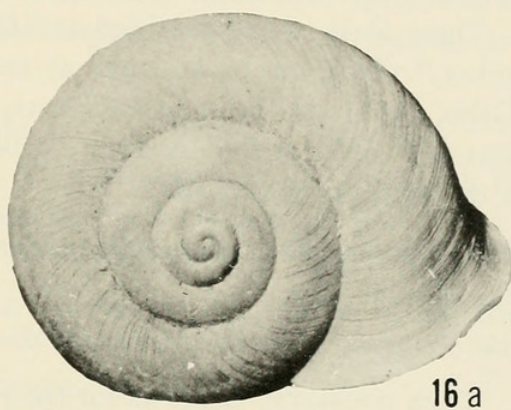
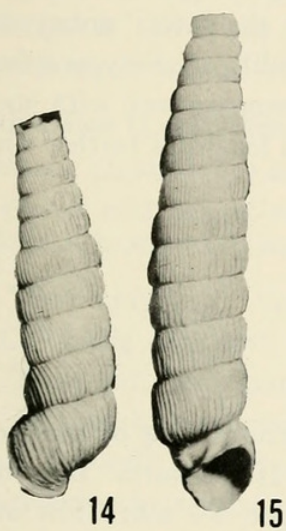
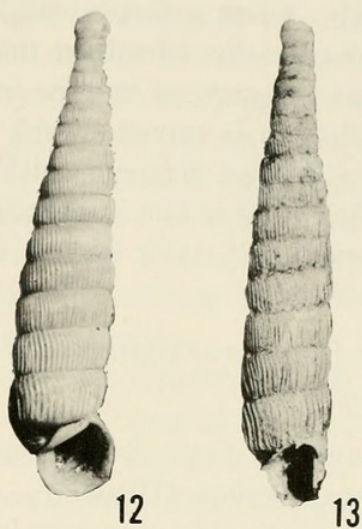
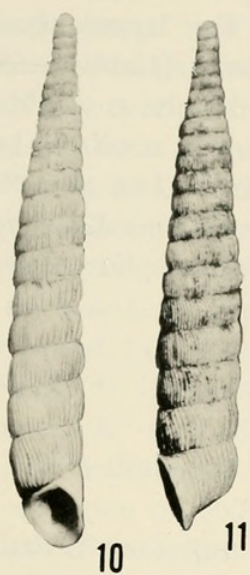
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FIGURES 10, 11. *Berendtia digueti* Mabilles. Figure 10. Lectotype. Length, 32.5 mm.; maximum diameter, 4.3 mm. Figure 11. Paralectotype. Length, 31.5 mm.; maximum diameter, 5.1 mm.

FIGURES 12, 13. *Berendtia minorina* Mabilles. Figure 12. Lectotype. Length, 20.2 mm.; maximum diameter, 3.9 mm. Figure 13. Paralectotype. Length, 20.1 mm.; maximum diameter, 3.9 mm.

FIGURES 14, 15. *Berendtia minorina* Mabilles. Two paralectotypes from a series of four specimens. Figure 14. Length, 15.5 mm.; maximum diameter (not including body whorl), 3.8 mm. Figure 15. Length, 20.0 mm.; maximum diameter, 4.0 mm.

FIGURES 16a-c. *Helix steganella* Mabilles. Lectotype. Maximum diameter, 24.0 mm.; minimum diameter, 19.0 mm.; height, 9.8 mm. Figure 16a, dorsal; figure 16b, apertural; figure 16c, ventral view.



This species belongs to the typical section of the genus *Polygyra*, as now restricted. It has a simple, single, columellar tooth. The "anonymous worker" mentioned earlier identified this shell as *Polygyra anilis* (Gabb, 1865), which also has Guaymas as its type locality, and there seems to be no doubt that this identification is correct. Gabb gave the dimensions of *P. anilis* as being 0.55 inch in greatest diameter, with a height of 0.23 inch, or 14.0 mm. $\times$ 5.8 mm. Mabilles's shell is almost exactly this same size. The single columellar denticle distinguishes *P. anilis* from *P. behri*, which has a more complicated set of apertural denticles.

***Helix (Polygyra) triangularis* Mabilles.**

(Figures 17a-c.)

TYPE LOCALITY. Sandy plains at the edge of the sea south of the village of Guaymas, Sonora (Diguets).

TYPE LOT. Six specimens labeled "Types." The largest one is designated as the lectotype; the remaining 5 as paralectotypes. Measurements of the lectotype are: maximum diameter, 17.5 mm.; minimum diameter, 14.9 mm.; height, 6.9 mm.

These shells were identified as "*H. behri* Gabb" by the later "anonymous worker," which can be accepted as correct, the type locality of *Polygyra behri* (Gabb, 1865) also being at Guaymas. Mabilles's shells compare well with specimens of *P. behri* in the Academy's collection from coastal localities farther south on the Mexican mainland.

***Helix (Polygyra) triangularis minor* Mabilles.**

(Figures 18, 19, 20.)

Helix (Polygyra) triangularis var. *minor* MABILLES, 1895, p. 66.

TYPE LOCALITY. Same as for the preceding species.

TYPE LOT. Two specimens labeled "Types." An apertural view of the larger shell, selected as the lectotype, is shown in figure 18. It measures: maximum diameter, 14.2 mm.; minimum diameter, 11.9 mm.; height, 5.2 mm. The other shell becomes a paralectotype.

Considering the amount of individual variation that may occur in species of this group of polygyrids, a difference of 3 to 4 mm. in maximum diameter is not unusual. As no other important differences are apparent in the sculpture or denticle configuration within the aperture, Mabilles's subspecies or "variety" *minor* has no biological significance.

Family BULIMULIDAE

***Bulimulus (Leptobysus) lapidovagus* Mabilles.**

Bulimulus (Leptobysus) lapidovagus MABILLES, 1895, pp. 66, 67. PILSBRY, 1898, vol. 11, p. 161. HANNA, 1923, p. 492.

TYPE LOCALITY. Sierra de Cacachila, south of La Paz (Diguets).

TYPE LOT. Not found in the Paris Museum.

The lack of type material of this species makes it practically impossible to determine whether the snails Diguët collected are new or whether they should be referred to a species already described. Pilsbry (1897) did not include it in his key to species in the subgenus *Sonorina* [= *Leptobyrsus*], not knowing the details of the internal characters. Hanna (1923) included it in the group represented by peninsular species *B. spirifer*, *B. lamellifer*, and others, including several endemic Gulf island species. Mabilles's mention of a "columella obliquely straight, thickened, passing into a twisted, profoundly entering lamina" is not definitive enough to differentiate it from several other species.

The Sierra de Cacachila, according to Gerhart and Gulick's "Lower California Guidebook" (3rd ed., 1962, p. 175), is a barren range of mountains between La Huerta (about 15 miles southeast of La Paz) and Los Planes, which reach an elevation of 2000 feet. So far as known, only *Bulimulus sufflatus* (Gould) and *B. excelsus* (Gould) have been collected in this general area. Mabilles's shell measurements call for a snail of fairly large size, 40 to 43 mm. in length, which approximates the length of *B. excelsus*. Until more specimens are collected in the Sierra de Cacachila, *B. lapidovagus* Mabilles must remain as a *nomen inquirendum*.

***Bulimulus (Leptobyrsus) dentifer* Mabilles.**

Bulimulus (Leptobyrsus) dentifer MABILLE, 1895, p. 67. PILSBRY, 1898, vol. 11, pp. 161, 162.

HANNA, 1923, pp. 492-494, pl. 8, figs. 16-20 and text fig. 1 (genitalia and jaw).

Rabdotus (Leptobyrsus) dentifer (Mabilles). EMERSON AND JACOBSON, 1964, pp. 319-321.

TYPE LOCALITY. Volcanic island of La Tortuga, in the middle of the Gulf of California (Diguët).

TYPE LOT. Not found in the Paris Museum.

As already mentioned, this endemic island species can be identified readily from its locality; loss of the original shells collected by Diguët is unfortunate but not a serious calamity.

In order to fix the species permanently for taxonomic purposes a series from over 1000 shells collected during the Academy's 1921 Expedition to the Gulf of California is designated as the neotype lot, this being the next available authentic series from the type locality. California Academy of Sciences Geology Type Collection plesiotype no. 1048 is selected as the neotype (Hanna, 1923, pl. 8, fig. 16; nos. 1049-1052 become neoparatypes). No. 1048 includes the mounted radula; no. 1052 has genitalia and jaw preserved in alcohol.

***Bulimulus (Leptobyrsus) subspirifer* Mabilles.**

(Figure 4.)

Bulimulus (Leptobyrsus) subspirifer MABILLE, 1895, p. 67. PILSBRY, 1898, vol. 11, pp. 162, 163.

HANNA, 1923, p. 492.

TYPE LOCALITY. Lower California (Diguët).

TYPE LOT. A single shell, which becomes the lectotype. It measures: length, 46.9 mm.; maximum diameter, 19.7 mm.

Mabille's unique specimen has the general aspect of *Bulimulus excelsus* (Gould) although it is somewhat more slender in outline. As there seems to be no sure way of identifying it with any described species, *B. subspirifer* will stand as a valid species until similar snails can be collected in Baja California that will assist in a final determination of its validity.

***Bulimulus (Leptobysus) dismenicus* Mabille.**

(Figure 3.)

Bulimulus (Leptobysus) dismenicus MABILLE, 1895, pp. 67, 68. PILSBRY, 1898, vol. 11, p. 162. HANNA, 1923, p. 492.

TYPE LOCALITY. Sierra de la Puna, Lower California, at 1800 meters elevation (Diguet).

TYPE LOT. A single specimen labeled "Type," which therefore becomes the lectotype. It measures: length, 31.3 mm.; maximum diameter, 15.0 mm.

This species, represented by Mabille's single shell, agrees well with *Bulimulus beldingi* Cooper, 1892. We consider it to be a synonym of this latter species. The illustration of the lectotype of *B. dismenicus* (fig. 3) compares well with the illustration in the Manual of Conchology of *B. beldingi* (Pilsbry, 1898, vol. 11, pl. 25, fig. 56).

The location of the Sierra de la Puna is not known to us; probably it is one of the subsidiary ranges of mountains either in the Sierra Laguna or the Sierra de la Victoria in the Cape Region of the Baja peninsula. *Bulimulus beldingi* belongs to the group of *B. inscendens* W. G. Binney. Cooper reported it as having been collected near San Jose del Cabo, in the Sierra Laguna, and at Punta Arenas, the latter stated to be on the east coast of the peninsula at about latitude 25°30' N., which is the present general location of Punta Marcial.

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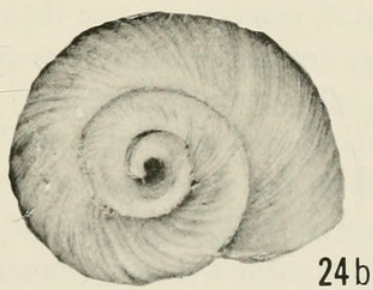
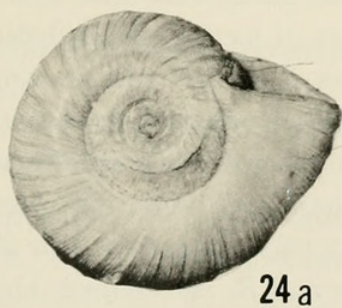
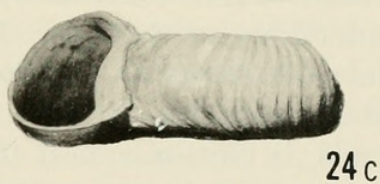
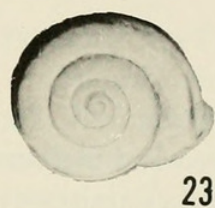
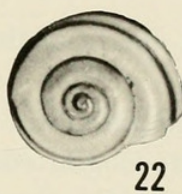
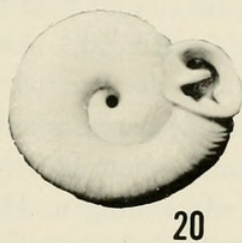
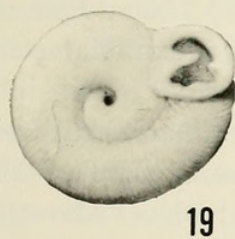
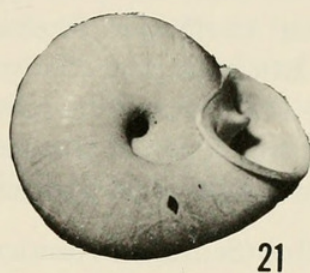
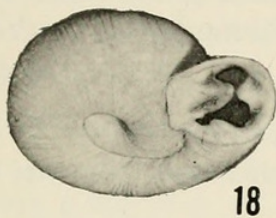
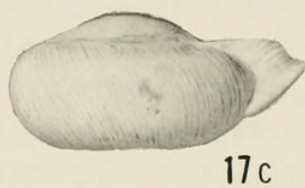
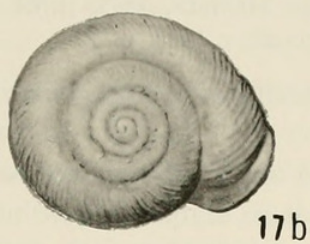
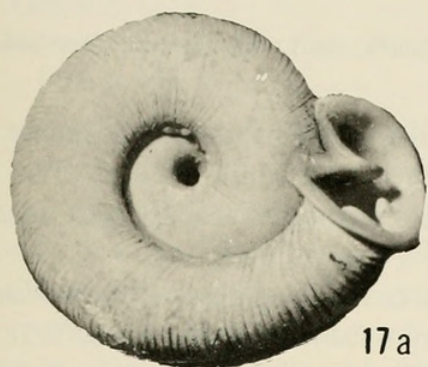
FIGURES 17a-c. *Helix (Polygyra) triangularis* Mabille. Lectotype (largest of 6 specimens). Maximum diameter, 17.5 mm.; minimum diameter, 14.9 mm.; height, 6.9 mm. Figure 17a, ventral; figure 17b, dorsal; figure 17c, side view.

FIGURES 18, 19, 20. *Helix (Polygyra) triangularis* var. *minor* Mabille. Figure 18, apertural view of lectotype. Maximum diameter, 14.2 mm.; minimum diameter, 11.9 mm.; height, 5.2 mm. Figures 19, 20, ventral views of two paralectotypes.

FIGURE 21. *Helix (Polygyra) solidens* Mabille. Lectotype. Maximum diameter, 14.0 mm.; height, 5.7 mm. Ventral view.

FIGURES 22, 23. *Helix indigena* Mabille. Dorsal views of two of nine shells. Figure 22, lectotype. Maximum diameter, 19.4 mm.; height, 10.2 mm. Figure 23, paralectotype. Maximum diameter, 16.8 mm.; height, 8.2 mm.

FIGURES 24a-c. *Planorbis tumidus* var. *major* Mabille. Largest shell of the series. Maximum diameter, 23.9 mm.; aperture height, 9.3 mm. Figure 24a, ventral; figure 24b, dorsal; figure 24c, apertural view.



***Bulimulus (Scutalus) acholus* Mabilles.**

(Figures 8a, 8b.)

Bulimulus (Scutalus) acholus MABILLE, 1895, p. 68. PILSBRY, 1897, vol. 11, pp. 143, 144. HANNA, 1923, p. 486. JACOBSON, 1958, p. 10.

TYPE LOCALITY. Mountains of Lower California, in company with *B. montezuma* (Diguets).

TYPE LOT. A single shell, which becomes the lectotype. Dimensions are: length, 45.1 mm.; maximum diameter, 25.0 mm.

The granular sculpture of this species places it in the group of *Bulimulus montezuma* Dall, 1893, the type species of subgenus *Puritanina* Jacobson, 1958. *Bulimulus harribaueri* Jacobson, 1958, has the finer sculpture of *B. acholus* but the latter is a somewhat more slender, smaller shell. On the basis of present evidence Mabilles's species may be accepted as valid until a sounder decision can be made from additional material showing the extent of individual variation of the three species so far assigned to the subgenus *Puritanina*.

***Bulimulus (Scutalus) cosmicus* Mabilles.**

(Figures 1, 2.)

Bulimulus (Scutalus) cosmicus MABILLE, 1895, p. 68. PILSBRY, 1897, vol. 11, p. 144. HANNA, 1923, p. 486. JACOBSON, 1958, p. 10.

TYPE LOCALITY. Sierra of the south [end] of the peninsula of Lower California (Diguets).

TYPE LOT. Three specimens. The selected lectotype (fig. 1) is the best preserved and measures: length, 46.7 mm.; maximum diameter, 25.7 mm. One of the two paralectotypes (fig. 2) measures: length, 50.3 mm.; maximum diameter, 29.7 mm.

Bulimulus cosmicus is closely related to *B. montezuma* Dall, a fact recognized by both Pilsbry and Jacobson. The sculpture is more finely granular than on this species or *B. harribauri* Jacobson, 1958. According to Mabilles, Diguets also collected *B. montezuma*, reporting it from "all of the southern sierra of the peninsula, and, in particular, near the Rancho San Bartolo." Thus Mabilles had at least three forms for comparison, including his *B. acholus*.

There is considerable variation in the shells of snails that have been identified as *B. montezuma*, and the possible occurrence of local races, including their ecology and the extent of their geographical ranges, is not yet well known. Much more collecting in the relatively inaccessible mountain areas of the Cape Region of Baja California needs to be done before the number of valid species and subspecies in the group can be determined with confidence. For this reason and because of the lack of a precise locality for *B. cosmicus*, together with Mabilles's failure to make a direct comparison between this and *B. montezuma*, his species may be allowed to stand until the availability of additional material dictates otherwise.

***Bulimulus (Scutalus) cacotycus* Mabilie.**

(Figures 5, 6, 7.)

Bulimulus (Scutalus) cacotycus MABILLE, 1895, p. 69. PILSBRY, 1898, vol. 11, p. 150. HANNA, 1923, p. 502.

TYPE LOCALITY. Sierras of the south[end] of the peninsula (Diguët).

TYPE LOT. Three specimens, labeled "Type." The one selected as the lectotype (fig. 5), is a full-grown shell measuring: length, 58.0 mm.; maximum diameter, 26.4 mm. A full-grown paralectotype, (fig. 6), measures: 53.0 mm. $\times$ 24.9 mm. and the second, which is subadult, 48.5 mm. $\times$ 23.8 mm.

The "anonymous worker" mentioned earlier has labeled these shells as *Bulimulus excelsus* (Gould, 1853), an identification that seems to be correct. Mabilie's shells show the characteristic waxen-white and brown streaks of Gould's species; and while they are all somewhat larger than Gould's type of *B. excelsus* they agree in size with specimens from the La Paz area in the Academy's collection. Pilsbry's inclusion of *B. cacotycus* in his "group of *B. inscendens*" now turns out to be incorrect.

***Bulimulus (Thaumastus) digueti* Mabilie.**

Bulimulus (Thaumastus) digueti MABILLE, 1895, p. 69. PILSBRY, 1898, vol. 11, pp. 148, 149. HANNA, 1923, p. 502.

TYPE LOCALITY. Sierra de la Victoria (Diguët).

TYPE LOT. Not found in the Paris Museum.

Measurements of this species, as given by Mabilie, are: length, 20 to 22 mm.; maximum diameter, 10 to 12 mm.; length of aperture (not including the peristome), 10 mm.; breadth, 7 mm. Inability to locate Mabilie's type shells leaves this species in the category of a *nomen inquirendum*. We suspect it was collected at a higher rather than lower elevation in the mountains. Several species of *Bulimulus* are found in these mountains, with which authentic specimens of *B. digueti*, if located, must be compared before its validity can be determined.

Pilsbry and Hanna both include *B. digueti* in the "group of *B. inscendens*," which comprises *B. inscendens* (W. G. Binney), *B. xantusi* (W. G. Binney), and *B. beldingi* Cooper, with some possible valid subspecies of *B. inscendens*. This is as far as one can probably go for the time being.

***Bulimulus (Globulus) recognitus* Mabilie.**

(Figure 9.)

Bulimulus (Globulus) recognitus MABILLE, 1895, pp. 69, 70. PILSBRY, 1897, vol. 11, p. 137. HANNA, 1923, pp. 485, 486.

TYPE LOCALITY. Lower California (Diguët).

TYPE LOT. A single specimen, the lectotype, measuring: length, 24.0 mm.; maximum diameter, 16.4 mm.

Authors who have commented on the taxonomic position of *B. recognitus* agreed that it was probably conspecific with *B. sufflatus* (Gould in Binney,

1859), which is common in the La Paz area and elsewhere and which has been collected also on some of the islands of the Gulf of California. This view is confirmed by inspection of the lectotype. *Bulimulus recognitus* Mabilie therefore becomes a synonym of *Rabdotus* (*Rabdotus*) *sufflatus* (Gould). Use of the genus *Rabdotus* to cover this and other Baja California *Bulimulidae* is covered by Emerson and Jacobson (1964, p. 317).

Family UROCOPTIDAE

Berendtia digueti Mabilie.

(Figures 10, 11.)

Berendtia digueti MABILLE, 1895, p. 70. MABILLE, 1897, p. 79.

Coelocentrum digueti (Mabilie, 1895). PILSBRY, 1900, pp. 550-552. PILSBRY, 1902, vol. 15, pp. 51, 56, 57. EMERSON AND JACOBSON, 1964, p. 328.

TYPE LOCALITY. San Xavier [Javier] plateau, about latitude 25° N.; collected among charcoal occurring in old Indian encampments (Diguët).

TYPE LOT. Two specimens on a small blue card indicated as "Types"; two additional specimens on another blue card (not illustrated). The selected lectotype (fig. 10) measures: length, 32.5 mm.; maximum diameter, 4.3 mm. A paralectotype (fig. 11) measures: length, 31.5 mm.; maximum diameter, 5.1 mm.

Coelocentrum digueti, and other species of the genus occurring in Baja California, belong to the subgenus *Spartocentrum* Dall, 1895, which takes precedence over the subgenus *Teneritia* Mabilie, 1897. It differs from all other described species in the occurrence of interstitial striae between the closely spaced riblets on all of the later whorls. This feature, unfortunately, does not show up in the illustrations of two of Mabilie's shells from the type lot (figs. 10, 11). According to Pilsbry, his *C. minorinum gabbi* has a shorter shell, fewer whorls, and scarcely any observable twist in the columella. Apparently no specimens referable to *C. digueti* have been collected since.

Coelocentrum digueti can be accepted as a valid member of the *Spartocentrum* group. The San Javier "plateau" on which the ruins of Mission San Javier are located, is nearer to 26° N. latitude than to 25° N., as given by Diguët. Some subsequent collector should be able to find the type locality without too much difficulty.

Berendtia minorina Mabilie.

(Figures 12-15.)

Berendtia minorina MABILLE, 1895, pp. 70, 71. MABILLE, 1897, p. 79.

Coelocentrum minorinum (Mabilie, 1895). PILSBRY, 1900, p. 551. PILSBRY, 1902, vol. 15, pp. 53, 54. EMERSON AND JACOBSON, 1964, p. 328.

TYPE LOCALITY. Plateaus above the Arroyo de la Purissima (Diguët).

TYPE LOT. Four specimens on a blue card labeled "Types." The best, a complete shell (fig. 12) is selected as the lectotype; it measures: length, 20.2 mm.;

maximum diameter, 3.9 mm. A complete paralectotype (fig. 13) measures 20.1 mm. $\times$ 3.9 mm. Both have about 17 whorls. The other two paralectotypes (figs. 14, 15) have lost their early whorls.

The main Baja California "highway" forks about 8 miles West by South of Canipolé, the upper fork going eastward across the narrow waist of the peninsula about latitude $26^{\circ}20'$ N. and follows the Arroyo de la Purisima for about 32.5 miles to the village of La Purisima. The type locality of *Coelocentrum minorinum* must be somewhere along this road on the western slope of the mountains. *Coelocentrum minorinum gabbi* Pilsbry, 1900 (p. 551) was collected by Gabb in the "high mountains back of Mulegé," which are on the eastern side of the peninsula approximately 40 miles to the north and east of the Arroyo de la Purisima. Until more is known about the variability of the various species of *Coelocentrum* in Baja California it will be possible only then to determine the status of *C. minorinum*. This also requires careful collecting at or near the type locality.

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