THREE NEW MEXICAN LAND SNAILS
OF THE GENUS HUMBOLDTIANA

By John B. Burch and Fred G. Thompson

Humboldtiana is an anatomically isolated genus belonging to the family Helminthoglyptidae, the American dart-bearing helices. It is confined to the mountains bordering the Mexican Plateau, the mountains of the Big Bend region of Texas, and southeastern New Mexico (Map 1). The genus is unique in the structure of the dart apparatus and the mucous glands, characters that mainly distinguish it from other helminthoglyptoids. The genotype of Humboldtiana was given by von Ihering (1892) as Helix humboldtiana Val. (= Helix humboldtiana Pfeiffer, 1841, cf. Pilsbry, 1927, 1948), although his knowledge of the anatomy was from Binney's (1879) account of the species now known as Humboldtiana potosiana Pilsbry. Pilsbry (loc. cit.) has further defined the genus and, as presently understood, it comprises the 24 species and two subspecies listed below (numbers refer to localities on Map 1).

1. Humboldtiana buffoniana (= Helix buffoniana Pfeiffer, 1845)
2. H. cheatumii Pilsbry, 1935
3. H. chiosensis Pilsbry, 1927
4. H. chrysogona Pilsbry, 1948
5. H. durangoensis Solem, 1954
7. H. fasciata new species
8. H. ferrissiana Pilsbry, 1928
9. H. fortis Pilsbry, 1940
10. H. globosa new species
11. H. hög3ana hög3ana (= Helix humboldtiana hög3ana von Martens, 1890)
12. H. hög3ana praesidii Pilsbry, 1939
13. H. humboldtiana (= Helix humboldtiana Pfeiffer, 1845)
14. H. montezuma montezuma Pilsbry, 1940
15. H. montezuma inferior Pilsbry, 1948
16. H. nuevoleonis (= H. humboldtiana nuevoleonis Pilsbry, 1927)
17. H. palmeri Clench and Rehder, 1930
18. H. pergranulosa Solem, 1955
20. H. potosiana Pilsbry, 1927
21. H. queretaroana (= Helix queretaroana Dall, 1897)
22. *H. striata* new species  
23. *H. taylori* Drake, 1951  
24. *H. texana* Pilsbry, 1927  
26. *H. ultima* Pilsbry, 1927

*Humboldtiana tuckerae* Mansfield, 1937, from the Lower Miocene Tampa limestone of Florida is not listed above. According to all characters given in the description it appears that this species should be placed in the genus *Cepolis*.

Nine of the presently recognized species have been previously investigated anatomically (Pilsbry, 1927, 1939, 1948). (This does not include the "*Helix humboldtiana*" dissected by Fischer (1899), the identity of which is uncertain.) The genus may be divided into two groups (which should perhaps be designated as subgenera) on the basis of the relationship of the mucous glands and the dart sacs. The mucous glands are situated closely above the summit of the dart sacs in *H. buffoniana*, *H. chrysogona*, *H. fortis*, *H. montezuma*, *H. potosiana*, and *H. ultima*, whereas they are separated in *H. chisosensis* and *H. texana* by a distance often equal to or greater than the length of the dart sacs. Of the three new species described in this paper *H. striata* belongs to the first group and *H. fasciata* and *H. globosa* to the second. These groups appear to be further characterized by the length of the verge and the presence or absence of a conspicuous upper chamber in the penial structure (Plate V, Figs. e and f). *H. chrysogona*, *H. fortis*, *H. nuevoleonis*, and *H. striata* have the chamber and a short verge, and a long verge and only a trace of the chamber is evidenced by *H. fasciata* and *H. globosa*.

*Humboldtiana fasciata*, new species  
(Pl. I, Figs. A, D; Pl. II; Pl. III, Figs. A, a, c, d, e; Pl. V, Figs. A, B, a, b, f)

**Holotype.**—UMMZ 191473; Hidalgo, Mineral del Monte, 9,300 feet altitude; collected by William E. Duellman, July 14, 1956.  
**Paratypes.**—UMMZ 191472 and 191474; same data as holotype.  
**Description of the Holotype.**—Shell ovate-globose, moderately heavy; spire raised, obtuse, forming an angle of about 107°; whorls 4 1/4, strongly convex, heavily, irregularly, and closely wrinkled, sculptured with numerous fine, evenly distributed granules that run parallel to or on the growth wrinkles, disappearing near the umbilicus; embryonic whorls 1 1/4, raised, relatively small, slightly pitted; suture impressed, descending rather deeply to the aperture; aperture oblong-ovate, lying at an angle of about 45° to the axis of the shell, upper lip
Map. 1. Distribution of species of *Humboldtiana*. For explanation of locality numbers, see list page 1. Locality for *H. humboldtiana* (No. 13) is unknown.
lying below lower band of shell; lip thin, sharp, slightly reflected; columellar margin reflected, half concealing the umbilicus; peristome slightly expanded, little thickened.

The shell is isabella-colored with three unevenly spaced black bands, which are frequently interrupted and stop short of the lip. The upper band is widest, but only slightly wider than the lower band. The middle band is about \( \frac{2}{5} \) as wide as the upper band. The upper three whorls are slightly tinged with red. The inside of the aperture is pinkish white, with the bands of the shell distinctly showing through. The columella and lip are dull white.

Height of shell, 36.5 mm.; diameter, 40.4 mm.; height of aperture, 28.0 mm.; width of aperture, 26.0 mm.

The genitalia of the type are drawn in Fig. A, Pl. II. The somewhat cylindric penis contains a relatively long verge, which, when contracted, extends almost \( \frac{2}{3} \) of the length of the penis. The end of the verge is divided into four fingerlike processes. Below the verge the penial wall has seven lengthwise ridges. These ridges are joined distally, almost separating the penis cavity into two compartments. The verge is marked with numerous transverse folds and contains only a trace of an upper cavity where the verge connects with the wall of the penis cavity. The flagellum is almost as long as the combined length of the penis and epiphallus. The long, narrow vagina bears four dart sacs of approximately equal size, which are separated from the mucous glands by a distance of 11 mm. The spermathecal duct, at about three-fourths of its length, bears a moderately long diverticulum. Measurements of the various structures are listed in Table I.

**Variation.**—The thickness and length of the vagina and the length ratios of the verge, penis and flagellum, and penis and epiphallus show slight variation. The only shell variation shown by the paratypes is in size and in the descent of the suture to the aperture. In both paratypes the upper lip originates on the lower band of the shell.

Shell measurements of the paratypes are as follow: height, 30.8 and 33.8 mm.; diameter, 39.2 and 39.8 mm.; height of aperture, 27.0 and 25.0 mm.; width of aperture, 24.2 and 24.6 mm.

**Relationships.**—This species belongs to the group characterized by the relatively great distance between the mucous glands and the dart sacs and appears to be most closely related to *H. texana*. It differs from *H. texana* in that all of the dart sacs are equal, or nearly so, in size, and in having a much larger penis, verge, and epiphallus.

The combination of the shell's color, size, shape, granulation, and raised spire with small nuclear whorls make it distinctive within the
genus. Conchologically, this snail is similar to *H. potosiana* but differs in being larger, decidedly wider than high, having a more obtuse spire with smaller, more protruding nuclear whorls, and having larger, unevenly spaced bands. The only other species with which *H. fasciata* may be confused is *H. nueveleonis*. *H. nueveleonis*, however, has more compressed whorls, a more obtuse spire with less protruding embryonic whorls, larger and stronger granulation, and a better developed middle band on the shell. It differs further from *H. fasciata* in that the angle the aperture makes with the main axis of the shell is about 15° greater.

**Remarks.**—The type lot was collected on a cold, misty day in an oak-fir forest where the specimens were found crawling on moss- and lichen-covered tree trunks and stumps. The ground supported an undergrowth of small herbaceous plants and was covered with a thick mulch of oak leaves and fir needles.

*Humboldtiana globosa*, new species

(Pl. I, Figs. C, F; Pl. III, Figs. B, b, f; Pl. V, Figs. C, c, f)

**Holotype.**—UMMZ 191476; Veracruz, 3 miles east of Perote, La Molina, 8,000 feet altitude; collected July 30, 1955, on a lone fir tree by a mill by Emmet T. Hooper. It was found associated with *Helix aspersa* Muller.

**Description of the Holotype.**—Shell globose, moderately light, wider than high; spire raised, obtuse, forming an angle of about 118°; whorls 4¼, strongly shouldered, globose, irregularly and moderately wrinkled, with many fine, oblong granules arranged diagonally to the wrinkles, disappearing at the edge of the umbilicus; embryonic whorls 1½, raised, moderate in size, smooth; suture deeply impressed, descending to the aperture; aperture subovate, lying at an angle of about 38° to the axis of the shell; upper lip originating on lower band, approaching the columella; lip thin, sharp, slightly reflected; columella slightly reflected, partly covering the umbilicus; peristome distinct, thin, hardly concealing the granules of the preceding whorl.

The ground color of the shell is horn yellow, with three chocolate-brown to black bands stopping short of the lip. The bands are unequally spaced, the middle one lying slightly closer to the upper than to the lower band. The upper band is the widest, the lower band the narrowest, being about half as wide as the upper band. The middle band is about ¼ as wide as the upper band. The embryonic whorls are pinkish buff (may be partly due to peeling of the periostracum). The
inside of the aperture is glossy white, with slight indications of color bands showing through. The aperture, peristome, and columella are also glossy white.

Height of shell, 28.0 mm.; diameter, 33.0 mm.; height of aperture, 20.5 mm.; width of aperture, 20.7 mm.

The genitalia of the type are shown in Pl. III, Fig. B. The bulbous penis contains a quadripartite-ending verge which, when contracted, extends about $\frac{1}{2}$ the length of the penis. The four processes at the end of the verge are strikingly dissimilar in appearance, two being shorter and thinner. The verge is marked with numerous transverse folds and contains a very small upper cavity. The lower half of the penial wall has seven heavy, longitudinal ridges. The flagellum is nearly as long as the length of the penis and epiphallus. The vagina bears four long, thin dart sacs, three of approximately equal size, the other much smaller. The outer wall of the upper half of the spermathecal duct contains a conspicuous flange. Measurements are listed in Table I.

Relationships.—*H. globosa* belongs to the group characterized by a relatively great distance between the mucous glands and dart sacs. Although the distance is less in this species than in others of the group, the close similarity in structure to *H. fasciata* may readily be seen. *H. globosa* is distinguished from other species of the genus by its flattened dart sacs and spermathecal duct.

The shell may be distinguished from that of other species by the combination of the following characters: the globose, shouldered whorls, raised spire, moderate nuclear whorls, pattern of granulation, and moderate growth wrinkles. The glossy white aperture is a further aid in identifying the shell.

*Humboldtiana striata*, new species

(Pl. I, Figs. B, E; Pl. IV; Pl. V, Figs. D, d, e)

**Holotype.**—UMMZ 192247: Distrito Federal, Paso Cortez, 10,500 feet altitude; collected by Emmet T. Hooper, August 26, 1955.

**Paratypes.**—UMMZ 191475 (six specimens); same data as the holotype.

**Description of the Holotype.**—Shell subglobose, heavy, wider than high; spire raised, obtuse, forming an angle of about $114^\circ$; whorls $4\frac{1}{4}$, strongly convex, irregularly and heavily wrinkled, periostracum mostly worn off, sculptured with few small granules that are confined mostly to zones between growth wrinkles; embryonic whorls $1\frac{3}{4}$, raised, relatively
large, lightly but regularly wrinkled; shell sculptured with numerous fine, incised striae which are heaviest and most distinct near the suture; where granules occur they are separated by the striae; suture deeply impressed, descending deeply to the aperture; aperture oblong-ovate, lying at an angle of about 40° to the axis of the shell; upper lip somewhat thickened, blunt, not reflected, slightly approaching the columella; columellar margin reflected, nearly closing the umbilicus; peristome little thickened, slightly expanded.

The body whorl is pinkish cinnamon; the remaining whorls are a little darker. There is a faint indication of two dark color bands on the spire. These fade out on the body whorl. The interior of the aperture is pale lavender-violet. The peristome is white along its outer border and horn yellow farther in the shell. The columella and the lip are also white. The color abruptly fades into the pale lavender-violet of the interior of the aperture. When the shell is placed in front of a light the bands may be discerned from the inside, but over an opaque surface there is an indication of them only deep within the aperture.

Height of shell, 34.5 mm.; diameter, 38.0 mm.; height of aperture, 26.3 mm.; width of aperture, 25.5 mm.

The genitalia of two paratypes are shown in Pl. IV. The short, bulbous penis contains a short, contracted verge extending about ⅓ its length. The verge ends in three large flaplike and two small narrower processes. Projecting from the wall of the penis cavity are four massive, more or less transverse folds almost completely filling the cavity and crowding the verge to one side. The flagellum is longer than the combined length of the penis and epiphallus. The vagina bears four almost equal dart sacs, closely appressed to the mucous gland ring. The spermatic duct, at about ¾ of its length, bears a diverticulum which may be either rather short or long. Measurements of paratypes are listed in Table I.

Variation.—In half of the paratypes the spire is raised a little higher than in the holotype, so that the spire has a slightly concave outline. The angle of the spire varies from 102° to 118°, averaging 104°. The number of whorls varies from ¾ to 4½, the latter extreme appearing to be usual for mature shells. The embryonic whorls of all of the paratypes agree with the holotype in number and texture. In juvenile shells the periostracum is moderately granulated, the granules small and lying parallel to the growth wrinkles. All of the shells have the fine incised striae that are peculiar to this species. In younger specimens the striae are confined to the upper third of the whorls, parallel to the suture, but in older ones the striations extend over the entire whorl to the
The angle of the aperture to the axis of the shell varies from 39° to 47°, averaging 44°.

In juvenile shells the periostracum is burnt umber, the color bands dark maroon. In mature shells the periostracum peels off, leaving the shell bare and colored like the holotype.

Measurements of the shells of the paratypes are as follow: height, 27.6–33.2 mm. (av. 30.2 mm.); diameter, 28.1–36.8 mm. (av. 33.5 mm.); height of aperture, 21.0–25.0 mm. (av. 22.7 mm.); width of aperture, 18.7–23.8 mm. (av. 21.1 mm.).

There appears to be considerable variation in the length of the diverticulum of the spermathecal duct (9–28 mm. in the two specimens measured) and also in the height from the spermatheca. Other structures of the genitalia appear constant.

Relationships.—This species belongs to the group in which the mucous glands are situated closely above the summit of the dart sacs. The arrangement and structure of the female genitalia are very similar to *H. montezuma*; the penis and verge approach that of *H. nuevoleonis*.

The shell of this species is unique within the genus *Humboldtiana* in having fine, incised striae running parallel to the suture of the whorls.

Remarks.—These specimens were found at the base of a limestone cliff in a fir forest. Live snails were crawling on debris on the forest floor. Dead shells were found in caves where they had apparently been dragged by pack rats.

Acknowledgments.—Grateful acknowledgment is made to Emmet T. Hooper and William E. Duellman for the privilege of examining the material on which this paper is based, to Alan Solem for many helpful suggestions and the loan of comparative material from the Chicago Museum of Natural History, and to William L. Bruton for advice on the presentation of illustrations. We wish to thank Henry van der Schalie for criticism and advice during the course of this work.

References

**Anaconda, H. I.**


**Binney, Amos**


**Binney, W. G.**


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\(^1\)From Pilsbry, 1948.
\(^2\)From Pilsbry, 1927.
\(^3\)First column based on UMMZ 191472; second on 191473 (Holotype); and third on 191474.
CHEATUM, ELMER P.

CLENCH, W. J., AND H. A. REHDER

DALL, W. H.

DRAICE, JOHN

DALL, W. H.

FISCHER, H.

FISCHER, P., AND H. CROSS

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MANSFIELD, W. C.

PARODIZ, JUAN José

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von Hering, Hermann
von Martens, Eduard


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PLATE I


A,D. *H. fasciata*, Holotype UMMZ 191473.
B,E. *H. striata*, B1–4, E, Holotype UMMZ 192247; B5–8, young paratype UMMZ 191475.
C,F. *H. globosa*, Holotype UMMZ 191476.
Figs. A,B,C reduced ca. ½.
Figs. D,E,F show minute sculpture. Slightly enlarged.
PLATE II

Reproductive system of *Humboldtiana fasciata*, new species.

A. Holotype UMMZ 191473. $\times 1\frac{1}{2}$. Arrow indicates position of cross section of vagina figured in Plate III, Fig. c.

B. Paratype UMMZ 191472. $\times 1\frac{1}{4}$. Arrow indicates position of cross section of vagina figured in Plate III, Fig. d.

a,b,c,d,e,f,g are cross sections of the epiphallus and penis at corresponding letters in Fig. A. $\times 5$. 
Reproductive system of *Humboldtiana fasciata*, new species, and *H. globosa*, new species.

A. *Humboldtiana fasciata*, Paratype UMMZ 191474. $\times 1\frac{1}{2}$.

B. *H. globosa*, Holotype UMMZ 191476. $\times 1\frac{3}{4}$.

a.e. Cross sections of the spermathecal duct and the vagina at the positions indicated in Fig. A. $\times 5$.

b.f. Cross sections of the spermathecal duct and the vagina at the positions indicated in Fig. B. $\times 5$.

c. Cross section of the vagina of *H. fasciata* (Holotype UMMZ 191473) at the position indicated by the arrow in Plate II, Fig. A. $\times 5$.

d. Cross section of the vagina of *H. fasciata* (Paratype UMMZ 191472) at the position indicated by the arrow in Plate II, Fig. B. $\times 2\frac{1}{2}$.
Reproductive system of *Humboldtiana striata*, new species.

A,B. Paratypes UMMZ 191475. × ca.1½.
a,b,c,d,e,f. Cross sections of the epiphallus and penis at corresponding letters in Fig A. × 5. Figs. c,d,f show complementary proximal and distal sections.
g. Cross section of the spermathecal duct. × 5.
h,i. Cross sections of the vagina at arrows h and i in Figs. A and B. × 5.
PLATE IV

Lumen of verge
Verge
Lumen of epiphallus
Fold of penial wall
Lumen of penis
Spermatheca
Diverticulum
Septum of upper chamber
Flagellum
Spermathecal duct
Epiphallus
Penis
A
Dart sacs
Lumen of vagina
Dart sac
Vas deferens
Spermathecal duct
Prostate
Penis
Epiphallus
Uterus
Mucous gland
Dart sacs
Atrium
PLATE V


A. Penis and verge of *Humboldtiana fasciata*, Paratype UMMZ 191472. The penis has been cut longitudinally and the walls pinned back to expose the penial cavity and the verge.

B. Penis and verge of *H. fasciata*, Paratype UMMZ 191474.

C. Penis and verge of *H. globosa*, Holotype UMMZ 191476.

D. Penis and verge of *H. striata*, Paratype UMMZ 191475.
   a. Extended verge of *H. fasciata*, Paratype UMMZ 191472.
   b. Extended verge of *H. fasciata*, Paratype UMMZ 191474.
   c. Extended verge of *H. globosa*, Holotype UMMZ 191476.
   d. Extended verge of *H. striata*, Paratype UMMZ 191475.
   e. Diagrammatic longitudinal section of the penis and verge of *H. striata*.
   f. Diagrammatic longitudinal section of the penis and verge of *H. fasciata* and *H. globosa*.

All figures except e and f × 4.