

Clark and Mr. E. V. Edmonds each have three additional specimens from the type locality, and the Los Angeles Museum has two from the Timms Point formation.

The species is named for Mrs. Effie M. Clark, who brought in the first specimens, and whose diligent and careful work in the fossil deposits of the San Pedro area has resulted in many interesting additions to our knowledge of the shells of that region.



## A PROPOSED DICHOTOMY OF THE SNAIL-GENUS MONADENIA

By S. STILLMAN BERRY  
Redlands, California

In the course of my studies on the anatomy of certain of our western land-snails it early became evident that the species of the splendid genus *Monadenia* (Pilsbry) so far as investigated align themselves in two very distinct and apparently natural groups. These groups find their strongest characterization in the genitalia, but it has likewise been possible to discover support for them in certain features of the shell. For several years I have been putting off publication of my conclusions in the hope of fortifying them by an investigation of the animals of all or nearly all of the known species. This has as yet been only possible of attainment in part, but since no conflicting evidence has come to light in any of the species studied, and as I wish the privilege of reference to the situation in a taxonomic and distributional paper shortly to appear, it seems desirable to publish this preliminary synopsis.

Genus *MONADENIA* (Pilsbry, 1895:199)  
(Type: *Helix fidelis* Gray, 1834:67)

♂ apparatus with large sacculate dart-sac opening into an enormous complex atrium, the single large elongate mucus-gland entering asymmetrically in the angle proximad to the dart-sac; penis very short and stout, containing a verge; epiphallus stout, terminating posteriorly in a very conspicuous "flagellum"<sup>1</sup>; penial retractor entering on the epiphallus.

Adult shell rounded-helicoid to carinate, with varying spiral sculpture and rounded or hyphen-shaped granulation. Embryonic shell always carinate, its surface very closely and finely granulate.

<sup>1</sup>The use of the term "flagellum" for the free appendix of the epiphallus is supported by weighty authority; yet it is open to the serious objection that there exists in biology a very different, much more strongly established, and very much more appropriate morphological meaning to the word. For this reason and because the organ in many of its manifestations is far from flagelliform, some such term as, e.g., epiphallic caecum, would be altogether preferable.



1. Subgenus MONADENIA s. s.

(Type. same as for genus)

♂ apparatus with short pouch-shaped dart-sac, and very large narrowly elongate mucus-gland many times longer than the sac, its terminal portion somewhat more slender and set off by a less thickened and usually more or less constricted intermediate region; epiphallus short and relatively sturdy, with a very thick and stout "flagellum" often terminating in a short, slender, abruptly constricted appendicular process.

Embryonic granulation of shell closely crowded, more or less confluent, and geometrically aligned to give a file-like or cloth-like surface.

2. Subgenus CORYNADENIA nov.

(Type: *Helix Hillebrandi* Newcomb, 1864:115)

♂ apparatus with very large elongate dart-sac, and a relatively short club-shaped mucus-gland, showing no evident external division into regions, its stalk rather narrow; epiphallus slender, with a very long and slender, pointed "flagellum".

Embryonic sculpture copious, but composed of separate rounded<sup>2</sup> granules.

"The new subgeneric name proposed is derived from the Gr. κορῶνη, club, + ἄδην, gland, and has reference to the shape of the mucus-gland as above described."

Further interesting and perhaps significant differences exist, but those cited are the more conspicuous and suffice for my present purpose.

These snails, in our current knowledge of them at least, are the answer to a zoo-geographer's prayer in that they exhibit in their distribution a dichotomy precisely corresponding to their major taxonomy as outlined above. The typical subgenus is recorded in a nearly continuous sweep in the western coastal region, extending from extreme southern Alaska to Alameda County, California, and as far inland as The Dalles, Oregon, and Trinity and western Siskiyou Counties, California. The *Corynadenia* group, omitting the doubtful *churchi* from consideration, occurs as a scattering of more or less isolated colonies from Shasta County, California, south on the western slopes of the Sierra Nevada at least as far as Fresno County. Both groups thus occur in the Shastan area, but sharply divaricate there.

LITERATURE

Gray, J. E. 1834. ....land and fresh-water shells...regarded as hitherto undescribed. Proceedings Zoological Society, London, 2:63-68, 1834.

<sup>2</sup> An exception is the somewhat anomalous *M. churchi* Hanna & Smith (1933:79) where the granules are relatively few, large, and hyphen-shaped. It is also quite possible that the anatomy of this form may show significant peculiarities, but I have not yet had an opportunity to examine it, and the original account and figure are deficient in important particulars.



1940. "A proposed dichotomy of the snail genus *Monadenia*." *Bulletin of the Southern California Academy of Sciences* 38, 203–204.

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