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A NEW HELICID SNAIL FROM MÉXICO

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WHILE conducting herpetological investigations in the Sierra de los Tuxtlas of southeastern Veracruz, México, in January, 1958, William E. Duellman and Richard E. Etheridge gathered a miscellaneous assortment of snails. Among this material are three specimens of an undescribed helicid. Fortunately, one of the specimens was alive when the collectors returned home. It was relaxed in the laboratory with a 10 per cent solution of sodium nembutal, fixed with Lavdovsky's mixture (alcohol-formalin-acetic acid) and preserved in 70 per cent alcohol.

Characters of the shell suggest that this snail belongs in the subgenus *Miraverellia* of the genus *Averellia*. The new name refers to the inflated nature of the whorls.

***Averellia* (*Miraverellia*) *inflata*, new species**

(Figs. 1-2; Pl. I)

HOLOTYPE.—UMMZ 196002: El Fuente, south slope of Volcán San Martín, Sierra de los Tuxtlas, Veracruz; 1170 meters; collected by William E. Duellman, January 22, 1958.

PARATYPES.—UMMZ 196001 (2 specimens): same data as the holotype.

DESCRIPTION.—Shell depressed-helicoid, with low conoidal spire, chocolate in color (Ridgway, 1912: Pl. XXVIII); umbilicus open, deep, about one-fifth the diameter of the shell; whorls $4\frac{3}{4}$ – $5\frac{3}{8}$, slowly increasing in size; last whorl bluntly subangulate, inflated, descending near the aperture; embryonic whorls $1\frac{1}{4}$, crossed with finely rugose, irregular, vertical threads; the rugosities on these threads appear as fine, conical tubercles; initial part of embryonic whorl sunken; remaining whorls crossed by numerous, irregular, obscure growth wrinkles which are most distinct near the suture; the whole surface

of the shell is covered with very fine, thin, arcuate, cuticular threads which run parallel to the growth lines, and aid to obscure them; occasionally the cuticular threads are enlarged and crescentic so that the shell surface appears rough; suture deeply impressed; lip reflected (partly broken in type), lying at an angle of about 15 degrees to the axis of the shell, bordered behind by a shallow, impressed groove; aperture ovate, shallowly incised by preceding whorl; peristome thin, slightly concave; inside of aperture, peristome, columella, and lip dull white.

Measurements of holotype (mm.): height of shell, 11.9; width of shell, 21.0; diameter of umbilicus, 4.4; height of aperture, 8.2; width of aperture, 10.2; $5\frac{1}{4}$ whorls.

Measurements of two paratypes (mm.) respectively: height of shell, 10.8, 12.0; width of shell, 19.1, 21.5; diameter of umbilicus, 3.2, 4.2; height of aperture, 7.7, 8.1; width of aperture, 9.5, 10.1; 5 and $5\frac{3}{8}$ whorls.

RADULA.—(Fig. 1, D) The radular formula is $C\frac{1}{3}-L + M\frac{30}{2-3}$. The central is relatively long, narrower at top than at base. The two sides converge, and then rapidly diverge so that the shaft is constricted near the top. The two ectocones are much smaller than the mesocone, and on some teeth the ectocones are hardly discernible.

No distinction can be made between lateral and marginal teeth. The transition in shape from tooth number one through thirty is gradual, and no structures appear or drop out. The first lateral is almost tricuspid. A small bulge occurs on the lateral side of the mesocone to suggest the appearance of an ectocone, but a point is not formed. The remaining teeth are tricuspid. None of the individual cones are in themselves polycuspid. Progressively toward the margin of the ribbon the cusps become longer, and are deflected toward the center. No small, irregular marginal teeth occur beside the thirtieth lateral-marginal tooth. This strongly suggests that additional rows were lost in the dissection. Repeated searches through the remains of the buccal mass failed to provide additional fragments of the radula.

JAW.—(Fig. 1, B and C). The jaw is solid, moderately arched, and of amber coloration. It is crossed by about twelve strong, irregularly spaced grooves (Fig. 1, B). In cross section the face is flat, and the back is reinforced by two crests (Fig. 1, C). One crest is small, and extends the length of the jaw near the cutting edge. The second crest

is much heavier, about one-third the length of the jaw, and is medially located along the dorsal edge. Length of jaw, 1.6 mm.

FOOT.—The light colored sole is tripartite, having the usual three zones; holopod, slender, elongate, and bluntly pointed posteriorly. The sides of the foot are marked by a row of high pillasters which are terminated above by the suprapedal groove. The dark dorsal surface of the foot is heavily pebbled. The tail is round and impressed with a dorsal median groove. The tentacles are black.

RETRACTOR MUSCLES.—The free retractor muscles extend into the shell for a distance of $1\frac{1}{2}$ whorls. Shortly below this point the muscles divide into a right and a left band. On its ventral side, the right

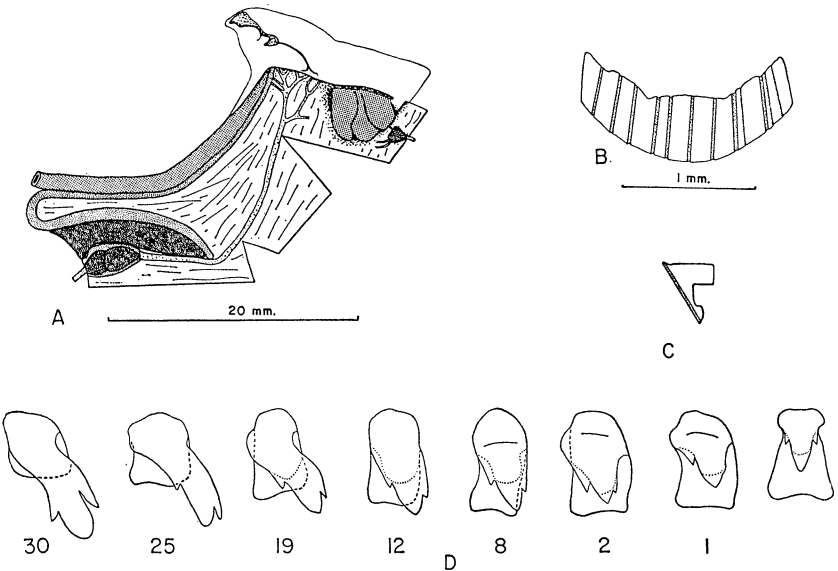


FIG. 1. Pallial organs and dentition of *Averellia (Miraverellia) inflata*, new species. A, pallial organs; B, jaw; C, section through middle of jaw; D, radula, including the central tooth and assorted lateral teeth.

band gives off the columellar retractor, and continues as the right pedal retractor. The left band divides shortly below its point of origin to form the pharyngeal retractor above and the left pedal retractor below. The right and left ocular retractors attach to their corresponding pedal retractors. The right ocular retractor passes through the angle between the penis and the vagina.

PALLIAL ORGANS.—(Fig. 1, A). The lung is nearly $3\frac{1}{2}$ times the length of its base, and about $2\frac{1}{2}$ times that of the kidney. The aerated surface is reticulated with a heavy network of fine veins (not shown in illustration), and is heavily pigmented with black. The left ring vein is enlarged to form a bulbous chamber from which several small veins radiate. The kidney is long (12.6 mm.) and slender, being bluntly pointed anteriorly, and concave posteriorly. The primary ureter is stout; the secondary ureter is more slender, but complete to the external ureteric orifice, which drains into a groove that is continuous with the pneumostome. The anus and the pneumostome are bridged by a flap of tissue that is attached on both sides. Behind the mantle collar and narrowly attached to it near the left ring vein sinus is a large glandular structure. Along its post-dorsal surface it is attached to the outer lung wall. A tripartite lobe is folded back over the attached section. Whether this structure is pathologic or not I do not know.

GENITALIA.—(Fig. 2). The penis and the vagina come together close above a common opening. The penis is moderately long (6 mm.), cylindrical, and is terminated by a long epiphallus (14mm.). The internal structure of the epiphallus consists of a hollow, irregularly compressed tube surrounded by glandular tissue (Fig. 2, *d*). The tube is heavily folded, and its lumen is compressed into seven to eight irregular grooves. This tube and its surrounding glandular tissue are continuous into the verge within the penial cavity (Fig. 2, *c*, *e-g*). The verge is about one-half the length of the penis and is bifurcate, one appendage being shorter and more compressed than the other. The tubular center of the epiphallus continues into the proximal half of the verge and then protrudes through the side of that structure as the shorter appendage of the bifurcated tip. The lumen of the tube opens on the side of this appendage. On the side of the verge opposite the extrusion of the epiphallic tube lies another lumen which is continuous with the length of the verge, extends from the point of origin of the verge to the tip of the larger terminal appendage, and separates one side of the verge from its internal pillar of glandular tissue. A short heavy penial retractor muscle, 3 mm. long, originates on the epiphallus half way between the penis and the vas deferens, and attaches to the diaphragm. The epiphallus proper is terminated by the vas deferens, and has a long, slender flagellum (18 mm.) which almost equals the combined length of the penis and the epiphallus. The vas deferens is 19 mm. long, and reversed; it passes down the side of the penis and continues along the side of the vagina to the prostate.

The vas deferens is attached to the base of the vagina by a narrow sheet of muscular tissue. Opposite the point of juncture with the penis, the vagina bears a large bulbous vestibule which is terminated by two elongate, club-shaped mucous glands that open into the vagina by separate ducts (Fig. 2, A). Each of the mucous glands bears in turn a very long tubular diverticulum. These tubes are completely hollow throughout their length, and show no signs of glands. They are highly convoluted and interwoven to form a jumbled mass on top of the vaginal vestibule (Fig. 2, B). The diverticula to the mucous glands are so fragile that when I attempted to separate them they fragmented into numerous small segments so that their exact size could not be determined. The vagina is 14 mm. long and moderately slender; surrounded by a muscular wall, it possesses a highly folded lumen (Fig 2, *b-c*). Nowhere on the vagina or its vestibule is there an indication of a dart sac or darts. The spermatheca lies against the base of the albumen gland. Its duct is 26 mm. long and enters the vagina half way between the uterus and the penis. Shortly above this juncture, the spermathecal duct bears a short diverticulum 6 mm. long, which in its natural position is attached to the opposite side of the uterus from the spermathecal duct. The uterus has large bulges. The albumen gland is long and compressed. The hermaphroditic duct enters below its middle. The talon is small, ovoid, and exposed. The ovotestes were lost during the dissection.

DISCUSSION.—The shell characters of *A. inflata* are most similar to those of *A. sargi* (Crosse and Fischer, 1872). These species agree in characteristics of the sculpture, and in having subangulate whorls. *A. inflata* differs from *A. sargi* in the following respects: (1) it is smaller, (2) it is lighter in color, (3) the growth lines are weaker, and (4) the angulation of the shell lies above the center of the whorls, whereas in *A. sargi* the angulation of the shell is medially located on the whorls. The dorsal location of the angulation gives the whorls of *A. inflata* the appearance of being flattened above and swollen below, thus the connotation of the specific name.

A. inflata apparently is also related to *A. sumichrasti* (Crosse and Fischer, 1872), but is larger and has a chocolate colored shell instead of a sayal brown one. The shell of *A. inflata* is thicker than that of *A. sumichrasti*, and the aperture does not lie at as great an angle to the axis of the shell as in the latter species. It differs further from *A. sumichrasti* in that the whorls are not as strongly angulate, they are more inflated, and the spire is higher. Crosse and Fischer (1873, Pl. 9, Fig. 4) illustrate the type (?) of *A. sumichrasti* as having a low, conical

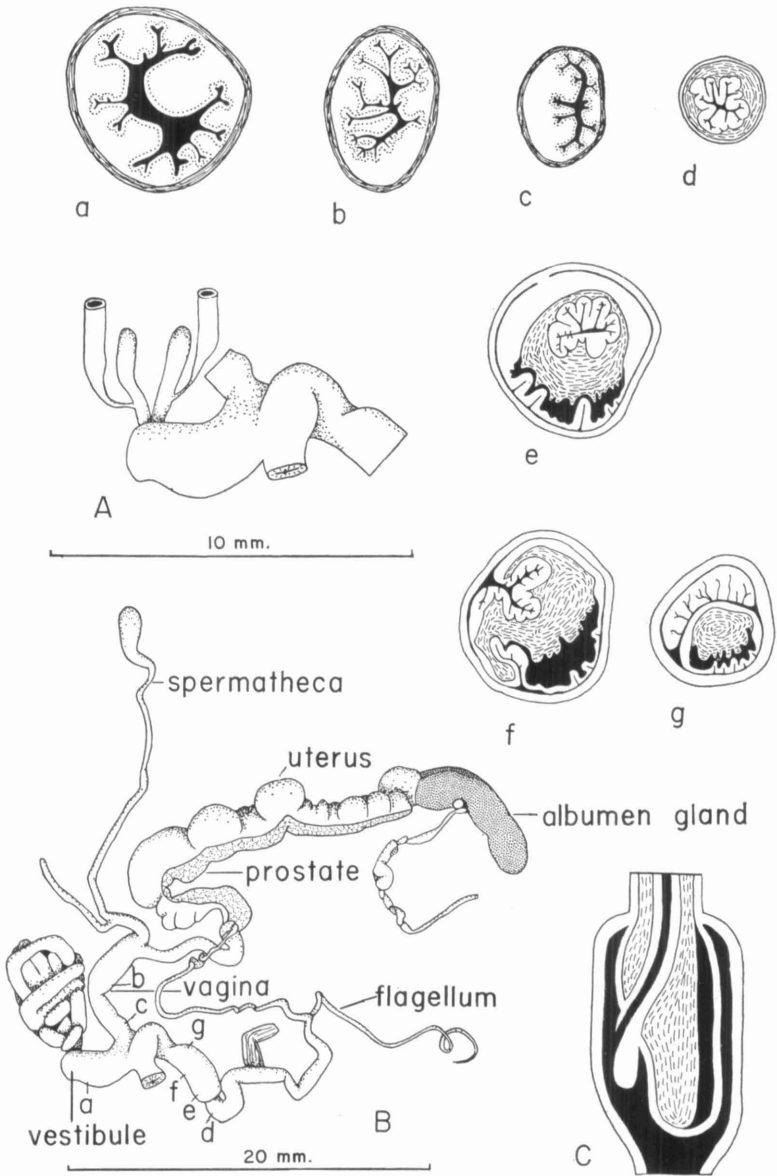


Fig. 2. Reproductive system of *Averellia* (*Miraverellia*) *inflata*, new species. A, enlarged drawing of penial-vaginal complex showing vestibule and arrangement of mucous glands; B, reproductive system; C; diagrammatic reconstruction of penis; a, section through vestibule; b-c., sections through vagina; d, section through epiphallus; e-g, sections through penis.

spire. Specimens collected by Dr. H. B. Baker at Hacienda Coatotolapam, Veracruz (UMMZ 31857) have nearly flat spires.

Only one other species referred to *Averellia* has been dissected and recorded in the literature. The anatomy of *A. (Trichodiscina) cordovana* (Pfeiffer) was described by Baker (1927, 242-43). It is apparent on the basis of the anatomy that *A. inflata* is not congeneric with *A. cordovana*. The vaginal vestibule with its associated mucous glands and their diverticula are in striking contrast to the simple vagina of *A. cordovana* with its associated dart sacs and mucous glands. There was no indication of darts or dart sacs in *A. inflata*. H. B. Baker pointed out to me that darts are easily decalcified in the process of buffering the acidity of the snail's body while in aestivation. It is also possible that the dart sacs were atrophied in this particular individual.

The anatomy of the genotypes of *Averellia*, *Trichodiscina*, *Miraverellia*, and *Discolepis* still remain unknown. In view of the meager knowledge about the classification of many Middle American helicids, it seems best to be conservative in evaluating the apparent differences between *Trichodiscina* and *Miraverellia*, and to continue to associate them both with *Averellia*.

REMARKS.—El Fuente, the type locality of *A. inflata*, lies on the steep slope of a dormant volcano. The collectors arrived at this locality after leaving the town of San Andres Tuxtla, traveling north-northwest by mule for five hours and climbing by foot for two more hours. *A. inflata* was found under logs and debris in a tropical rain forest. The ground in the immediate vicinity was covered with a thick growth of herbaceous plants and ferns.

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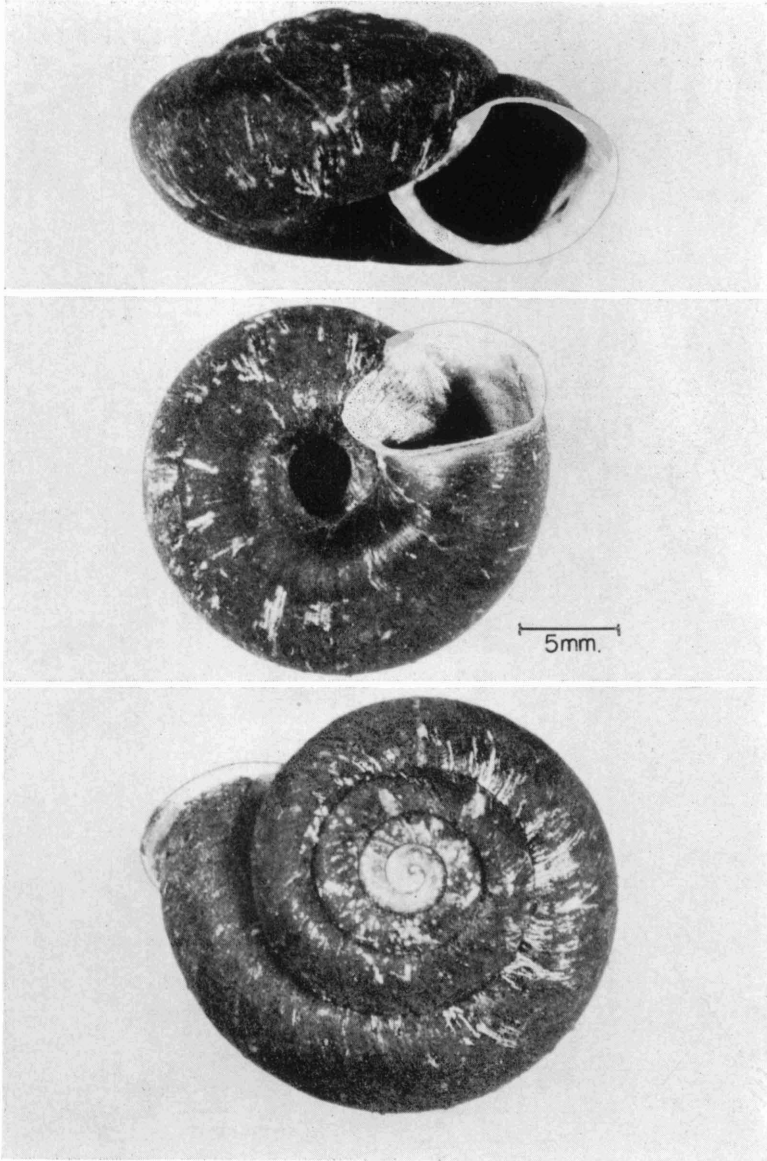


PLATE I

Shell of *Averellia inflata*, new species. Edge of lip reconstructed.
(Holotype: UMMZ 196002)

