

ANATOMICAL STUDIES ON SOME MIDWESTERN SUCCINIDAE AND TWO NEW SPECIES

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Recent workers (Pilsbry, 1948; Lee, 1951) have adequately shown the necessity for studying the anatomy of succineid land-snails. From my brief experience with midwestern species, I would consider it a less unscientific procedure to save the animal and to reject the shell if both cannot be studied. Fortunately succineids are less difficult to dissect than most of the larger land-snails, and permanent slides can be made of each dissection.

It has been said that the only malacological sin worse than describing a new *Succinea* would be naming a new *Physa*. Because of the many named succineids and the lack of anatomical data on topotypes (old type material invariably lacking the animal), the current synonymy often may be wrong. Also the distribution of only a few species has been mapped of which the identifications were confirmed anatomically. On the basis of the current anatomical knowledge of North American Succineidae, the kinds herein described are new, but if the types of described species were anatomically known, some of these new names might be unnecessary. Clarification of the taxonomy seems better aided by the creation of new names than to try to discuss the anatomy and relations of nameless entities. It would take a large part of a human lifetime and great expense to assemble an anatomical topotype-collection of known North American Succineidae.

I am indebted to Robert W. Reese for abetting the anatomical study of these succineids, to Austin B. Williams for helping collect the type lot of *Quickella (M.) oklahomarum* n. sp., and to the University of Kansas for the use of photographic facilities.

Localities other than type-localities are listed below; the numbers will be cited again in text or figures in parentheses. The types and paratypes are in the author's collection.

KANSAS

1. Unlocalized, E. Kansas.
2. Anderson Co., high on the bank of Pottawatomie Cr., 5 miles N. of Garnett, on U. S. rt. 59.
3. Dickinson Co., 3-4 miles N. of Herrington.
4. Douglas Co., meadow between 19th St. and Snow Hall, University of Kansas, S. edge of Lawrence.
5. Douglas Co., about 3 miles NW. of Lawrence.
6. Leavenworth Co., 3 miles W., ¼ mile S. of Tonganoxie.
7. Lyon Co., Elm Cr., slightly less than 1 mile S. of Miller.
8. Meade Co., roadside 6 miles N. of Meade (Coll. A. B. Leonard).
9. Douglas Co., University of Kansas Natural History Reserve, near Lawrence.
10. Wabunsee Co., 2 miles E. of Paxico, ½ mile S. on rt. 10.
11. Wabunsee Co., stream near Volland.

NORTH CAROLINA

12. Beaufort, North Carolina (Coll. Dee Saunders Dundee).

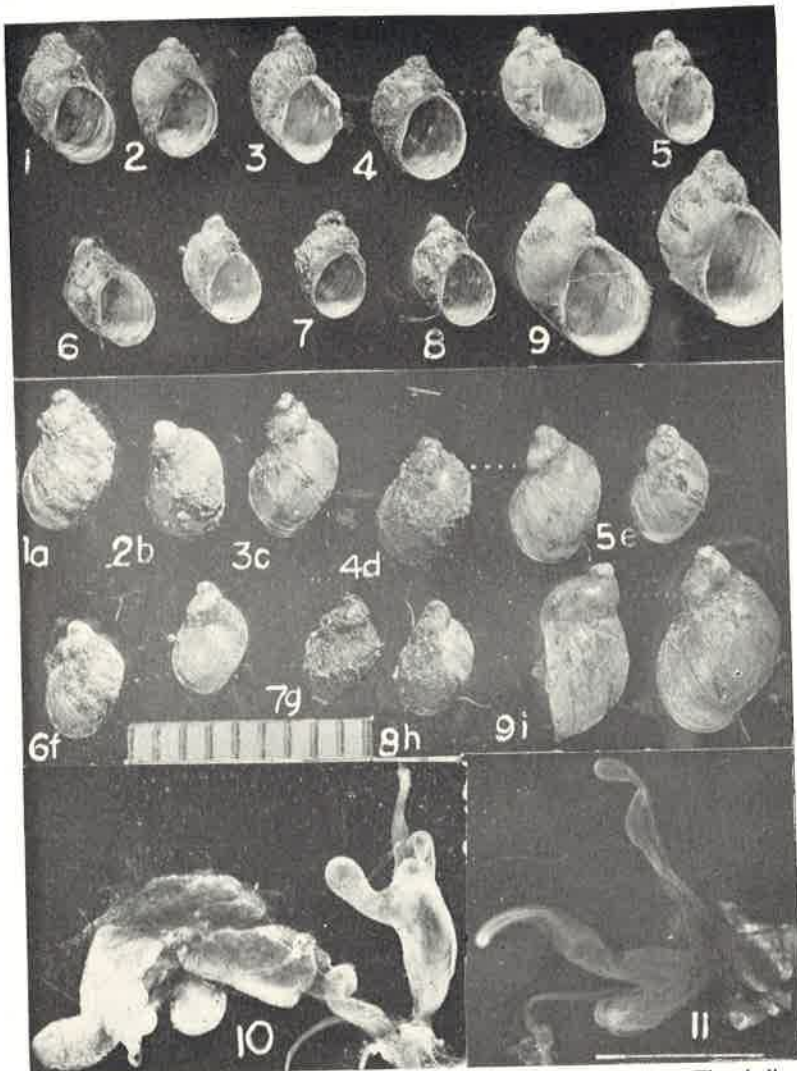
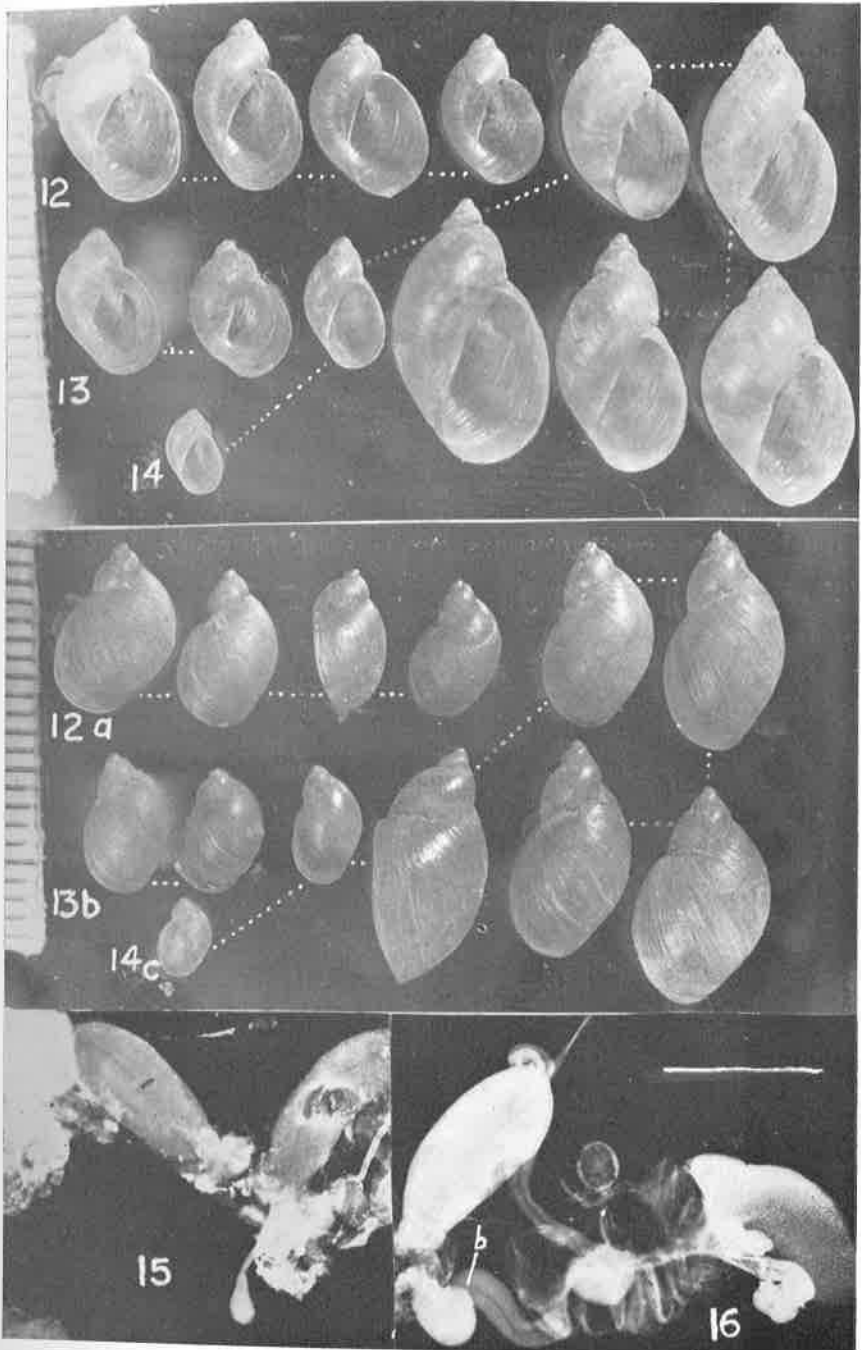


Plate 1. Figs. 1-8; 1a-8h; 11. *Quickella (Mediappendix) wandae* n. sp. The shells of various localities: Fig. 1, (5); Figs. 2 (TYPE); 5, and 6 (PARATYPES); Fig. 3, (6); Fig. 4, (10); Fig. 7, (2); Fig. 8, (9); Fig. 11, genitalia of TYPE. Figs. 9-9i, *Q. (M.) oklahomarum* n. sp. Left shell, TYPE; right shell, PARATYPE. Fig. 10, genitalia of TYPE. Figs. 1-9, 1a-9i are of like scale; Figs. 10-11 are to the same scale which represents 2 mm, equally enlarged (as do the other drawn-in scales; Figs. 15-16 are of like scale; Figs. 17, 20, and 21 are without scales; Figs. 18, 19, 22, and 23 are of like scale; Figs. 24-31 are of like scale; Figs. 32-33 are of like scale.

Plate 2. (Opposite page.) Figs. 12, 12a; 13, 13b, 15-16, *Succinea (Heysuccinea) vaginacontorta* Lee, from (4). Figs. 12, 12a, shells; Fig. 15, dissected-out penis of a mating-anatomy; Figs. 13, 13b, shells of a mated pair; Fig. 16, resting anatomy. Fig. 14, *Quickella vagans* Pilsbry. The shells of the midwestern strain, coll. Sept. 9, 1950, (7).



The anatomical figures of the genitalia are negative prints made directly from permanent slides by an enlarger—an adaptation from the method of R. H. Beamer, University of Kansas. The remaining figures are from photographs.

Succinea (**Heysuccinea**, n. sect.) *vaginacontorta* Lee

While this paper was in press, Lee's description and data appeared so that it seems useful to retain only the sexological data and my initial treatment of referring it to a new section. However, my material from eastern Kansas (4) is more intensely pigmented on the mantle than the type form, and differs slightly in body coloration. The two common mantle-patterns shown in my material are illustrated in figures 32-33. *Heysuccinea*, genotype *S. vaginacontorta* Lee, 1951, differs from *Calcisuccinea* Pilsbry, 1948, in having a prominent, dense, muscular basal twist of the vagina above the atrium, and with the vas-deferens free of the penis-vaginal crotch. The new section is named in honor of my mother, Wanda Hey Webb, who early may have found malacology an antidote for incipient ophiology.

The species was first noted mating on May 19, 1951, (4) and then on June 16, 1951, south of Kingman, Kansas. The mating consists of one snail simply mounting the shell of another, moving about the aperture-rim so that the genital pore is above that of the mate, and of effecting coitus. The initial sex-organ engagement was not observed. In all of the mating-anatomies studied the penis of each snail, both upper and lower snail, engages the vagina and free-oviduct of the other. The inserted penis tip is indicated by the lower arrow in figure 30, in which the absence of a free apical loop at the point of insertion of the penis-retractor demonstrates the descent of the free-loop with the exertion of the penis during copulation. The vaginal lumen passes excentrically to the basal twist, which is thus more of an exaggerated growth of one side of the vaginal wall than the thickened convolution of the entire vagina at this point. In mating the inserted penis-tip extends beyond the twist into the lower one-fourth of the free-oviduct. The smooth, pear-shaped, exerted penis-tip is borne on a very narrow stalk. Insemination is by a fluid semen rather than by capsular spermatophores.

Quickella (*Mediappendix*) **wandae** n. sp.

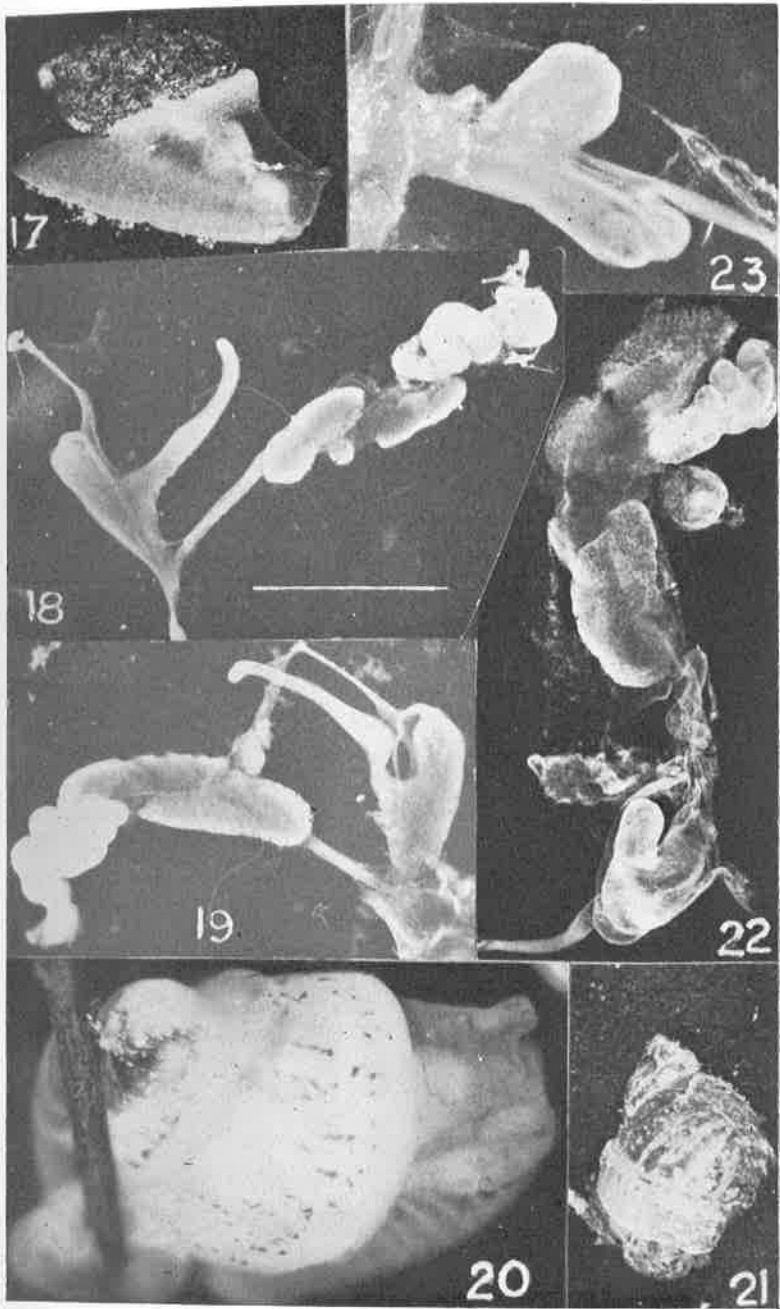
(TYPE: Figs. 2, 2b, 11. PARATYPES: Figs. 5, 5e, 6, 6f, 17-20. Other specimens: Figs. 1, 1a, 3, 3c, 4, 4d, 7, 7g, 8, 8h, 26.)

Shell very similar to that of *Q. vagans* (Pilsbry), greenish yellow, epidermis brownish where thick, apex less obtuse than in *Q. vagans*, size less. Umbilicus closed on the lower half of the columella, rarely partly unsealed. Differs conchologically from the next species in being less greenish, smaller, and slightly less acute. It may prove conchologically impossible to separate *Q. vagans*, *Q. wandae*, and the next species, but anatomically they are distinct. The species is named for Wanda Hey Webb.

Drowned animal: Rim of the mantle at aperture and exsertile body flecked with brown; liver very light brown; grooves of the foot whitish; regions between the grooves blackish, fading posteriorly on the foot. Body anterior to the visceral pillar grayish, marked dorso-laterally on each side by an unpigmented line. Sole whitish, densely orange-flecked. Mantle of the lung whitish with about 9 interrupted streaks of dash-like markings.

Genitalia: The sex-organs alone seem conspicuously unlike those of *Q. vagans*, however, the prostate gland is larger, more elongate, and the spermatheca is proportionately smaller. The penis is strongly bifurcate, having a

Plate 3. (Opposite page.) Figs. 17-20, *Q. wandae*, PARATYPES. Fig. 17, lateral view of a drowned specimen; Figs. 18-19, genitalia; Fig. 20, view of mantle and foreparts. Fig. 21, *Succinea concordialis* Gould, Coll. 1950, (11). Compare with Fig. 17, note hypertrophy of mantle-rim. Fig. 22, *Q. oklahomarum*, PARATYPE. Genitalia, note the reflexure of "appendix" toward the base of the penis. Fig. 23, *Q. vagans*, penis, (7).



digitiform glandular organ inserting on the "appendix" and being strongly muscular at this point and bearing the pore of the gland. This region, by reason of its greater solidity, in some anatomies is thrust papilla-like into the lumen of the thin-walled "appendix." The other penis-lobe is similar to that of *Q. vagans* but an epiphaller vestige or swelling is present, and no terminal

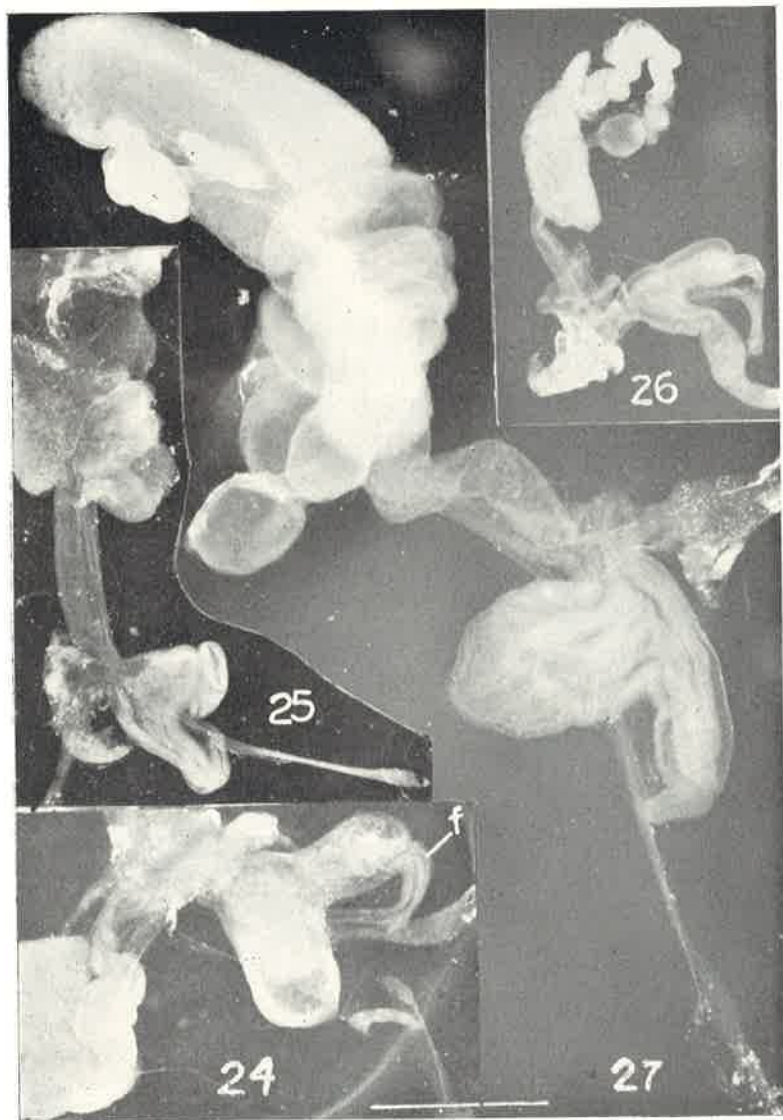


Plate 4. Figs. 24-25, 27. *Q. vagans*. Fig. 24, the sex-organs: note micro-flagellum by the seeming epiphaller remnant (7). Fig. 25, an anatomy with more acuminate penis-lobe, and more convoluted "appendix" (1). Fig. 27, the entire genitalia except ovitestis (1). Fig. 26, *Q. wandae*, the genitalia (10), compare with Fig. 24.

caecum seems formed—the penis merely bulging out at the insertion point of the epiphallus—and contains a small, distal, nearly round pilaster.

Habitat: All of the specimens seen have been taken in rather shady, deciduous woods on well-drained, damp, terraces. TYPE-LOCALITY: Kansas, Wabaunsee Co., banks of a small stream 8½ miles S., ½ mile E. of Alma.

Habits: The species seems normally to cover its shell with long parallel rows of material, presumably excreta. Living snails were often taken in litter samples sealed by a thick, sub-transparent epiphragm to brown leaves. Collecting litter was a means of taking the species during the winter. Specimens were usually numerous but when sealed to leaves are easily overlooked.

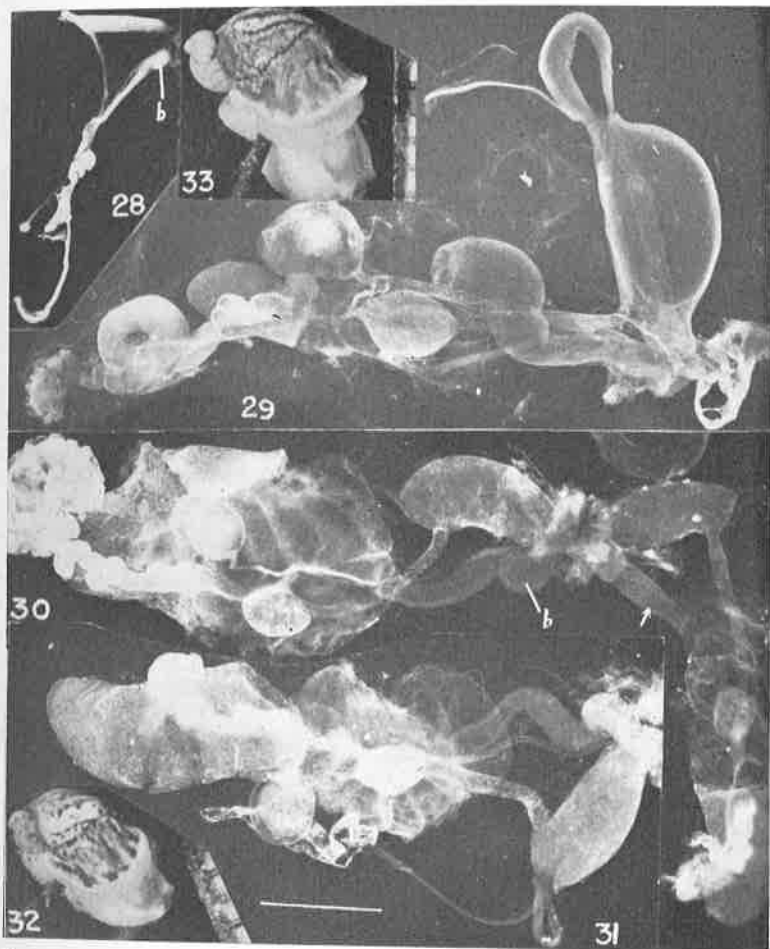


Plate 5. Figs. 28, 30-33, *S. vaginacontorta*. Fig. 28, the immature genitalia (specimen from A. B. Leonard, coll. (8), Aug. 26, 1950); note vaginal twist (b). Fig. 30, a pair of mating-anatomies; arrows shows site of inserted penis-tip (3). Fig. 31 (4), Figs. 32-33, two diverse types of mantle-patterns (4). Fig. 29, *Succinea* (*Calcisuccinea*) *campestris* Say. Note the absence of a vaginal twist. (coll. 1950, (12) by Dee Saunders Dundee).

Quickella (*M.*) *oklahomarum* n. sp.

(TYPE: left Fig. 9-9i; Fig. 10. PARATYPES: right Fig. 9-9i; Fig. 22.)

Shell intense greenish yellow; apex less obtuse than in *Q. wandae*, umbilical chink sealed on the upper third of the columella. Size similar to *Q. vagans* Pilsbry.

Animal: Mantle of the lung pale with about 7 smoky, linear, markings which reticulate at the kidney. Sides of the foot smoky. Lung with united black markings at the outer edge.

Genitalia: The genitalia differ most conspicuously from those of *Q. vagans* and *Q. wandae* in the form of the sex-organs. Prostate oval-elongate as in *Q. wandae*, spermatheca proportionately large. Penis distally trilobed, having an apparently compact ovaline glandular organ inserting on the appendix, which lacks internal folds. The epiphallar lobe is moderately well developed, more so than in *Q. wandae*, less than in the midwestern strain of *Q. vagans*; the new species, *Q. oklahomarum*, is distinctive in having the main part of the penis fusiform and bearing the other parts distally, including a third lobe or "caecum", and containing a large, longitudinal pilaster.

Habitat: An abandoned homestead at the edge of forested hills. The snails were taken at the margin of a streamlet at this site. TYPE-LOCALITY: 6 miles W. of Sardis, Pushmataha Co., Oklahoma, very near the Latimer County line. The species is named for its native state.

The two new relatives of Pilsbry's *Quickella* (*Mediappendix*) *vagans* and *Q. (M.) rehderi* seem especially interesting if not spectacular. In this regard, it is noteworthy that the midwestern strain of what I believe is *Q. vagans* Pilsbry may prove to be a subspecies somewhat intermediate between it and *Q. rehderi* Pilsbry. The shells seem more like those of *Q. rehderi*, but the anatomies seem similar in genitalia to *Q. vagans* except that the main lobe of the penis is slightly more acuminate (with the vas-deferens either becoming thickened, or a slight epiphallus remnant being present). In at least some anatomies (Fig. 24) an adnate, micro-flagellum (f) with an accessory lumen is present at this point. The epiphallus remnant and the micro-flagellum have seemingly not yet been noted in typical *Q. vagans*, and may prove absent in typical stocks.

It would seemingly be possible to evolve the type of penis shown by *Q. vagans* from *Q. wandae* by merely the degeneration of the tubular glandular part, leaving only a somewhat enlarged, evolution-modified "appendix". In *Q. oklahomarum* the glandular part seems to have become somewhat reduced, and the entire "appendix" and other limb of the penis are situated more distally due to a seeming lengthening of the basal penis, which possibly functions differently than in *Q. vagans* and *Q. wandae*. The western *Q. rehderi* could be evolved from *Q. vagans* by a further reduction in the size of the "appendix". The question now arises: May not some species of *Quickella* exist which have lost the "appendix" entirely? The form figured by Pilsbry (1948, fig. 442A, B) as *Succinea avara* may be such a species. Before dissecting these midwestern species of *Quickella*, I thought them *S. avara* Say.

PAPERS CITED

- Pilsbry, H. A. 1948. Land Mollusca of North America (North of Mexico). *Acad. Nat. Sci. Phila. Mon.* No. 3, vol. 2, pt. 2., pp. 521-1113 (see 771-847).
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