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## AQUATIC PULMONATES FROM LAKE TAHOE

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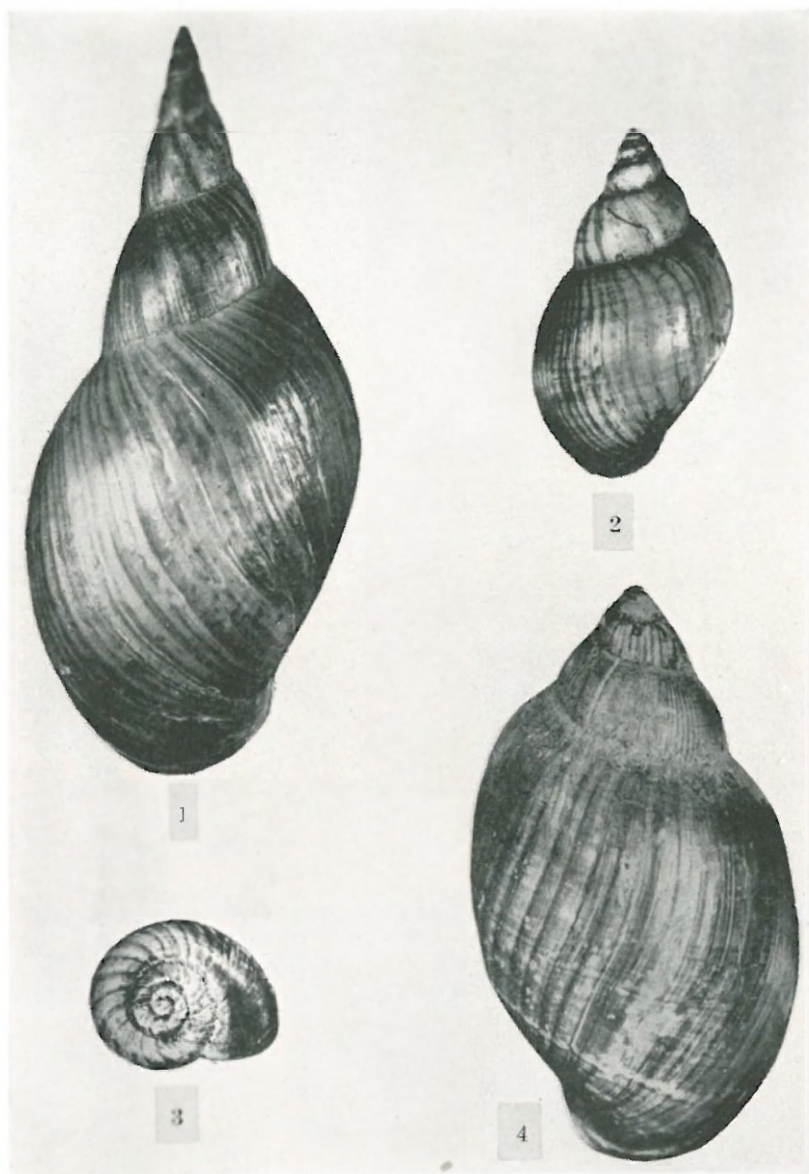
In 1937, G. D. Hanna and A. G. Smith (Calif. Fish and Game, 23: 244) published an interesting article, in which they called attention to the absence of records of mollusks from Lake Tahoe, California. They indicated that: "This seems strange in view of the size of the lake, the purity of its waters and the number of conchologists who have visited it." Their article was later reprinted in this journal (Nautilus, 52: 34-36, 1938). By deep water dredging in October, 1933, and again in August, 1936, at depths beyond 20 fathoms and as deep as 50 fathoms, they were able to collect the following species: *Pompholyx effusa* (Lea), *Carinifex newberryi* (Lea), *Valvata humeralis californica* Pilsbry, *Lymnaea* sp., and *Pisidium* sp.

Recently, while working with some unaccessed material, we found a small collection of shells taken from the shore of Lake Tahoe, on June 23, 1934. These specimens were collected along the west side of the lake at the town of Tahoe, while we were enroute to the American Malacological Union meetings at Stanford University. This collection is of special interest because it consists almost entirely of littoral pulmonates and in that way supplements the profundal records reported earlier. We found the following species living in abundance on a small rocky shoal: *Lymnaea stagnalis wasatchensis* (Hemphill), *Lymnaea bulimoides* Lea, *Gyraulus vermicularis* (Gould), and *Physa virgata* Gould. Only two dead and badly weathered specimens of *Carinifex newberryi* (Lea) and a similar dead, immature specimen of *Pompholyx effusa* were found; an observation which tends to support the habitat preference of these species as shown by Hanna and Smith.

A peculiarity of a majority of the specimens from this locality is the typical costate sculpture common to most specimens.

This peculiar appearance is indicated graphically by the accompanying figures (Pl. 11, figs. 1-4). The same phenomenon is described in the literature as characteristic of several species. For example, F. C. Baker (Lymnaeidae of North America, 1911: 460) in discussing the peculiar sculpture of *Galba utahensis* stated: "This curious form, dwarfed and peculiarly sculptured by its unfavorable environment, seems a representative of *Polyrrhytis* Meek. . . . The costae are not always developed, some specimens (pl. XXIV, fig. 23) being almost smooth. The costae, however, may be detected in all specimens, though the development is but slight in some individuals." Junius Henderson (Nautilus, 49: 86), in discussing *Physa columbiana*, stated: "Most of the latter are of a rich chestnut color, the surface very finely rippled with minute, rather regular, somewhat rounded striae, instead of fine, sharp growth lines." There are perhaps many similar references to this unique sculpture. The Lake Tahoe specimens are striking in that this condition is not limited to a single group but is shown on both the species of *Lymnaea* found there, as well as among the *Physa* and *Gyraulus*.

What causes the development of this striate or costate sculpture? In the above quotation, F. C. Baker suggests it is brought about by an "unfavorable environment." Is it due to some chemical factor in the water, or is it a physical characteristic such as the sudden and extreme diurnal and nocturnal fluctuations in temperature which are reflected on the shell during the growing season? Seemingly, a locality like the one cited here for Lake Tahoe would be an ideal place for an inquiry into the factors causing this development in practically all the specimens regardless of genus or species.



1, *Lymnaea stagnalis wasatchensis* (35 mm. long). 2, *L. bulimoides* (8 mm. long). 3, *Gyraulus vermicularis* (max. diam. 4 mm.). 4, *Physa virgata* (13 mm. long).

