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(The pages of the publication follow this cover sheet)

Succinea archeyi Powell

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Abstract.

The anatomy of *Succinea (Austrosuccinea) archeyi* Powell is described and compared with some of the features of other members of the group. The geographical range of *Succinea* s.s., *Oxyloma*, *Quickella*, and *Austrosuccinea* is discussed.

I am indebted to Capt. F. W. Short for recent shells and alcohol specimens of *Succinea archeyi* from the sand dunes at Taipa, Doubtless Bay, Northland, New Zealand, and to Mr. L. W. Stratton for subfossil shells from Tokerau sand-dunes, Northland. For the original description and figure of the shell see Powell, 1933. As only subfossil shells were known then, it may be added that recent shells are pale amber coloured with a waxy lustre. Powell, 1950, gives an excellent account of the ecology, and a figure of the mantle pattern and the radula.

Description: Alcohol specimens show the usual external and internal features of the family. The pigmented bands on the mantle and body whorl are placed one at the posterior border of the kidney, one at its anterior border, and one, sometimes broken up into spots, near the mantle margin (pigment pattern is often characteristic of species). The genital orifice is an oblique groove terminating at the labial palp (fig. 5). The only difference between Powell's radulae and mine is the possession in mine of a small endocone at the base of the mesocone in most or all of the marginal teeth.

The ovo-testis is of the usual somewhat flattened raspberry shape with a pigmented covering and numerous bifid white follicles. The hermaphrodite duct is pale proximally, densely pigmented in the middle dilated and convoluted middle part and pale distally. At its entry towards the base of the tongue shaped albumen gland are the two pigmented seminal vesicles, united almost to their apices, with one slightly longer than the other and sometimes again minutely bifid. The small fertilisation pouch is as usual unpigmented, figure 1. The folded gelatinous oviduct narrows in its distal half, and the slender pigmented duct of the small globular spermatheca dilates very slightly as it enters the free oviduct so low down that the vagina is exceedingly short.

The compact prostate, also somewhat pigmented, is of the usual bean shape characteristic of Succineidae, and the vas deferens runs forwards under the right tentacular retractor muscle, and back along the penis sheath to enter the epiphallus at its apex. The penis sheath, about 3 mm. long, is a little dilated at the apex and sharply bent over and bound down by the retractor muscle of the penis which splits to enclose the termination of the vas deferens. A narrow neck joins this apical portion to the rest of the sheath. On opening the sheath, figure 2, the penis is seen to have a slight spiral twist. The epiphallus when opened, figure 3, shows three or four circular rows of papillae in its proximal part, and a series of alternating circular folds distally, while the penis has

feeble longitudinal folds. In *S. australis* the penis sheath is not bent over at the apex nor dilated, and the epiphallus is relatively shorter and lacks the circular folds, figure 4. *S. striata* Krauss from S. Africa, and *S. andecola* Crawford, from Peru have essentially the same type of penis and epiphallus.

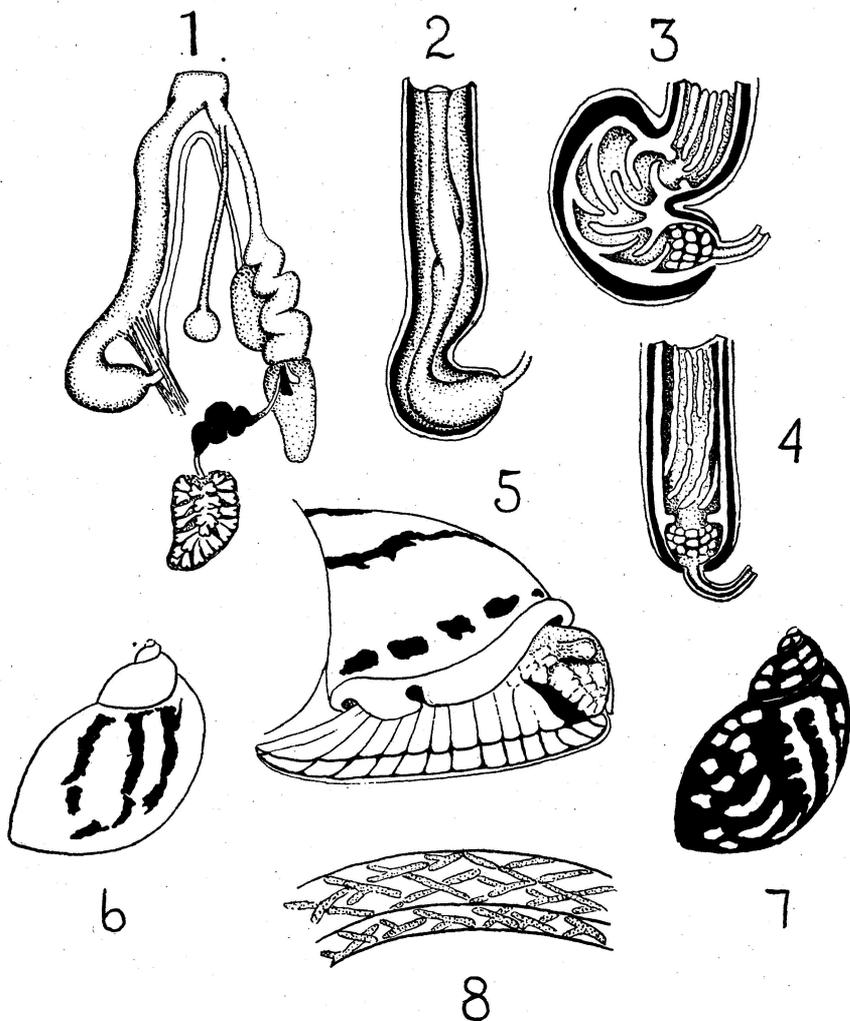
In *S. australis*, figure 7, the pigment pattern of mantle and body almost reverses that of *archeyi*, figure 6, leaving white streaks outlining the kidney, and white spots elsewhere, while *striata* has a dark streak over the centre of the kidney and a different pattern less pigmented over the centre of the mantle, and a dark band near its margin (Quick, 1936), (Powell, 1950). The mantle pattern of *S. andecola* (see Quick, 1939) recalls that of *Limnaea peregra*.

The shells of *S. australis*, *striata*, *andecola*, *caduca*, *norfolkensis*, and of *solitaria* and *aperta* from Western Australia, all show a curious feather stitch or trellis-like structure, apparently in the substance of the shell, between the lines of growth, figure 8. It is best seen under a 2-3rds. inch objective by transmitted light, looking down on the last whorl through the mouth of the shell. This is not present in *Succinea* s.s., *Oxyloma*, or in *Quickella arenaria*. Seeing that *archeyi* agrees so closely with, at any rate, the first three of the above species it was unexpected to find that this trellis structure was not apparent in its shell. Fresh translucent shells must be used, as the structure is obscured in weathered and sub-fossil specimens.

Discussion: Iredale (1937) proposed a new genus *Austrosuccinea*, type *Succinea australis* Férussac for a group of nine or ten Australian and Tasmanian Succineids as follows: "The Australian specimens dissected by Quick proved unlike the typical *Succinea*, but were nearer a form that is conchologically dissimilar. There may be three or four groups in the Australian fauna and it will be necessary to examine them anatomically. *Austrosuccinea* nov. Type *Austrosuccinea australis* Fér. According to Quick, Victorian specimens resemble *arenaria* in jaw, radula and genitalia, and of *arenaria* he wrote that it differs so much from other British species that it will not fit into either of their sections, and from its jaw it cannot be placed in *Oxyloma*, so another name is required for the type. The Australian type differs entirely from *arenaria*, being more like *elegans* as figured by Quick."

A few paragraphs before the one Iredale quotes (Quick, 1933), Quick showed that in proposing *Oxyloma*, type *Succinea hungarica* Hazay, Hazay was mistaken in supposing that the jaw had no median projection, but as a matter of fact it has a well marked one except perhaps in old worn jaws. *Succinea hungarica* belongs to the same group as *pfeifferi*, *elegans* and many exotic species forming the section *Oxyloma*. This paragraph was interpolated after the main part of Quick's paper was written and seems to have escaped Iredale's notice, as it makes his reference to the jaw irrelevant. There is no suggestion in the main part of the paper that the genitalia of *arenaria* resemble *australis*, and indeed the absence of penis sheath and epiphallus is described, so the statement towards the end of the paper that *arenaria* resembles *australis* in its genitalia is a regrettable oversight by Quick that escaped correction on proof-reading.

It is generally agreed that the shells of *Succinea* of differing groups are often so much alike, and sometimes so variable in the same



1. *Succinea (Austrosuccinea) archeyi* Powell. Genitalia x 14 circa.
2. *Succinea (Austrosuccinea) archeyi* Powell. Penis sheath opened, showing the penis and epiphallus within, x 14 circa.
3. *Succinea (Austrosuccinea) archeyi* Powell. Epiphallus and proximal portion of penis opened and lying within the sheath, x 16 circa.
4. *Succinea (Austrosuccinea) australis* Fér. Penis and epiphallus opened and lying within the sheath, x 10 circa.
5. *Succinea (Austrosuccinea) archeyi*. Part of alcohol specimen showing the reproductive orifice and other features, x 8 circa.
6. *Succinea (Austrosuccinea) archeyi*. Showing the mantle pattern, x 2.6 circa.
7. *Succinea (Austrosuccinea) australis*. To show how the mantle pattern almost reverses that of *archeyi*, x 2.6 circa.
8. *Succinea (Austrosuccinea) australis*. The "feather-stitch" or decussate shell structure between the striae, x 75.

species, e.g., *pfeifferi*, that they do not form a reliable basis for classification. Iredale, 1937, agrees that dissection is necessary to determine the group to which a species belongs, so it is difficult to see why so many Australian succineids of which the anatomy is unknown are assigned to definite groups. Again, he says (Iredale, 1939) that the Succineidae are at present allowed a world-wide range, but that this is questionable, and that recent researches into British forms show distinct groups in that small compact area. He therefore proposes the genus *Austrosuccinea*, southern or Australian type, and for a second peculiar group, the generic name *Arborcinea*. It is, however, surely wrong to question the world-wide range of the family Succineidae, for snails with the very characteristic assemblage of external and internal features in tentacles, foot, jaw, stomach and genitalia occur all over the world. Probably Succineidae is a misprint for *Succinea* s.s. Succineidae cannot be divided into southern and northern groups, for to take an instance, *Oxyloma* ranges from Greenland to South Africa, and *Succinea* s.s. from the northern hemisphere to S. Africa, and a European species, *arenaria*, which Boettger, 1939, has raised to generic rank *Quickella*, is more nearly related to the Pacific genus *Ca'inella* than, as far as is known at present to any other European species, though members of this group occur in North America also. *Succinea australis* is nearly related to *striata* Krauss, South Africa, and to *andecola* Crawford, Peru.

I have only been able to examine dried up bodies of *S. norfolkensis* Sykes, after soaking, but it appears to belong to the same group as *australis*, *striata* and *andecola*. If future dissection of *norfolkensis* confirms this, Iredale's proposal of *Spirancinea* Iredale, 1945, as a new genus will become unnecessary. Sykes, 1900, proposed *Tapada* for *norfolkensis*, but Studer in 1820 named *putris* as his type, so the name is not appropriate for *norfolkensis*.

The group *Austrosuccinea* is characterised by the presence of a penis sheath, absence of a penial appendix, a very short epiphallus, low entry of the spermatheca duct into the oviduct, genital orifice an open groove, and microscopic feather-stitch shell structure, but the latter feature is absent in *archeyi*.

As *S. archeyi* differs from the other members of this group mainly in its relatively somewhat larger epiphallus, and absence of feather-stitch shell structure, it may also well be included in *Austrosuccinea*.

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