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THE SYSTEMATIC POSITION OF THE GENUS *FOSSARINA*,  
A. ADAMS AND ANGAS, AND OF *FOSSARINA VARIA*,  
HUTTON.

By H. LEIGHTON KESTEVEN.

PART I.—THE GENUS *FOSSARINA*.

SOME time ago I found that *Fossarina patula*, Adams and Angas, had a rhipidoglossate dentition and a multispiral operculum. I mentioned the discovery to Mr. Hedley, and he at once drew my attention to the genus *Minos*, Hutton, and gave me dried specimens of the type (*M. petterdi*, Crosse), and of *Fossarina varia*, Hutton. The examination of these has been productive of rather curious results.

The genus *Fossarina* was described by A. Adams and Angas in 1863,<sup>1</sup> their type being *F. patula*, from Sydney Harbour. A short description of the shell is followed by the statement, "Operculum corneum, subspirale," and "this genus constitutes a peculiar littoral form allied to *Fossar*, from which it differs in the curvature of the inner lip and circular aperture." It is also compared with *Conradia*, A. Ad., and *Isapis*, A. Ad., and here I might draw the attention of those more fortunately placed than myself, to the fact that none of the six species of the former of these two genera have been figured. When dealing with the Japanese species (*Fossarina picta*, A. Ad.),<sup>2</sup> Dunker questioned the correctness of the systematic assignment of the species.<sup>3</sup>

Stearns and Pilsbry, when recording the same species, placed it between *Littorina* and *Echinella*, removing it from the family Fossaridæ.<sup>4</sup>

The statement of Adams and Angas that the operculum was subspiral has proved disastrous. Hutton obtained specimens of *Fossarina petterdi*, Crosse,<sup>5</sup> to compare with his *F. varia*, and found that it had a multispiral operculum and a dentition like *Cantharidus*,<sup>6</sup> and in 1885 made the genus *Minos* for its reception.<sup>7</sup>

<sup>1</sup> A. Adams and Angas—Proc. Zool. Soc., 1863, p. 423, pl. xxxvii, f. 9, 10.

<sup>2</sup> A. Adams—Proc. Zool. Soc., 1867, p. 312, pl. xix, f. 26.

<sup>3</sup> Dunker—Mar. Moll. Jap., i., 1882, p. 113.

<sup>4</sup> Stearns and Pilsbry—Cat. Mar. Moll. Jap., 1895, p. 62.

<sup>5</sup> Crosse—Journ. de Conch., (3), x., 1870, p. 303; (3), xi., 1871, p. 323, pl. xii., f. 1.

<sup>6</sup> Hutton—Proc. Linn. Soc. N.S.W., vii., 1883, p. 66.

<sup>7</sup> Hutton—Loc. cit., ix., 1884 (1885), p. 369.

His description of the operculum and dentition was dismissed by Tryon with the remark that the species had not the pearly nacre of a *Trochus*.<sup>8</sup>

The dentition of *F. patula* is shown in Fig. 28 (a), as also the rachidian of *F. petterdi* (b), which seems to differ from that of the former in having an expanded root, but this difference probably does not really exist, for it was only seen with great difficulty, owing to its transparency, in a dismembered ribbon, and it is likely that it exists, unseen, in *F. patula* also; there is no other difference between the two ribbons. The opercula of both species are so typically trochoid, that it has not been thought necessary to figure them; the form also of the shells is congeneric, and it was on a supposed anatomical difference that Hutton separated

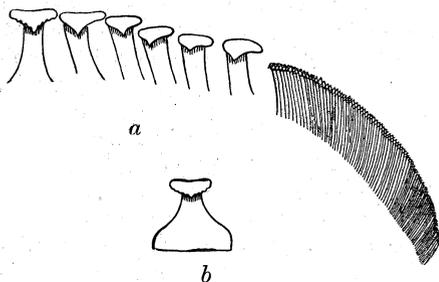


Fig. 28.

them. The carelessness of the authors of *Fossarina* has led to the making of the genus *Minos*. The necessity for Part II. of this paper is another result of that carelessness. That the shell which I have regarded as *F. patula*, is correctly identified there can be no doubt. It agrees perfectly with

the description and figures, with the exception of the operculum; moreover it is the shell which has been so identified by every local Conchologist, including Messrs. Hedley and Brazier.

Tate and May, in dealing with the genus *Minos*, remark:—“The author founded this genus on the Tasmanian shell *Fossarina petterdi*; he placed it in the family Stomatidæ, but the ‘horny multispiral operculum, the dentition resembling *Cantharidus*,’ and the porcellaneous, somewhat iridescent interior, induce us to place it in the vicinity of *Gibbula*.”<sup>9</sup> The complete closure of the aperture by the operculum strengthens this classification. Its right place seems to be between *Gibbula* and *Margarita*, with which the internally iridescent species *Fossarina legrandi*, Petterd,<sup>10</sup> seems to connect it, and with which it may even prove synonymous.

The result of these investigations, then, is that *Minos* is a synonym of *Fossarina*, and that the genus should be placed in the Trochidæ, between *Gibbula* and *Margarita*.

<sup>8</sup> Tryon—Man. Conch., ix., 1887, p. 275.

<sup>9</sup> Tate and May—Proc. Linn. Soc. N.S.W., (2), xxvi., 1901, p. 403.

<sup>10</sup> Petterd—Journ. Conch., 1879; Tate and May—*Loc. cit.*, p. 404, pl. xxiv., f. 21, 22.

A second species, *F. brazieri*,<sup>11</sup> was described by Angas from Sydney Harbour; the differences between the two are slight, and all the intermediate forms are obtainable; the name must therefore be regarded as a synonym of *F. patula*, though it may be retained by pedants as a cabinet variety.

PART II.—FOSSARINA VARIA.

Hutton's mistake in making the genus *Minos* was practically unavoidable, because his *F. varia* answered in every way to the description of *Fossarina*; it has a subspiral operculum, and the dentition shows it to be related to *Littorina*. His tentative reference of the species to *Risella*,<sup>12</sup> seems to show that he was well aware of these facts, consequently he had no reason to doubt the correctness of Adams and Angas' description; but in these points, as we have seen, it differs widely from that genus. It, therefore, devolves on me to make a genus for the reception of the species.

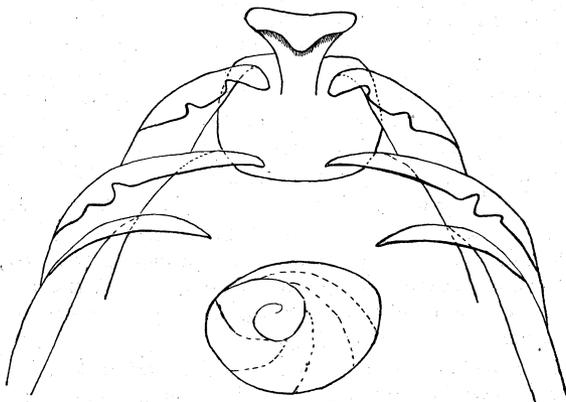


Fig. 29.

*RISELLOPSIS*, *gen. nov.*

A genus closely allied to *Risella*.<sup>13</sup>

*Shell*.—Comparatively small; stomatiform or depressed trochoid, perforate, rather solid, spirally ribbed or carinated transversely, growth striate; aperture oval (subject to modifications caused by sculpture), oblique, interior porcellaneous, outer lip sinuated according to sculpture, columella short, curved; operculum corneous subspiral (Fig. 29).

<sup>11</sup> Angas—Proc. Zool. Soc., 1871, p. 18, pl. i., f. 24.

<sup>12</sup> Hutton—Journ. de Conch., 1878, p. 27.

<sup>13</sup> Hence the name.

*Animal*.—As only dried material was obtainable, nothing but the radula could be deciphered.

*Dentition*.—Fig. 29. 3 + 1 + 3. The rachidian is bluntly unicusped, provided with a broad root; the first lateral has three blunt cusps, the centre one broadest; the second, has one cusp on the distal attached end, and a long scythe-like blade as the proximal end; the third lateral is a simple scythe-like blade; all three are provided with long narrow roots.

*Type*.—*Fossarina varia*, Hutton.<sup>14</sup>

The porcellaneous interior, and indeed the general texture of the shell, are strikingly like *Risella*, so much so that I was inclined to assign it subgeneric rank under that genus, but the contour of the shell, and the difference in dentition are, it seems, sufficient justification for giving it full generic value.

A comparison of my figure of the dentition with that of *Adeorbis*, by Fischer,<sup>15</sup> suggests that perhaps Hutton's reference of his species to that genus was much more correct than his reference of it to *Fossarina*; it may be that *Risellopsis* forms a connecting link between *Risella* and *Adeorbis*. The fact of the operculum being corneous in the one and calcareous in the other, need not be considered antagonistic to this, as evidenced by the close relationship of *Polinices* and *Natica*.

It is possible that *Risella* (*Peasiella*) *caledonica*, Crosse,<sup>16</sup> is referable to *Risellopsis*, but as I am unable to examine either the radula or the operculum, I refrain from saying definitely that it is.

To the more thoroughly appreciate the characters of *Risellopsis*, it was found necessary to obtain the radula of *Risella*; while doing so, anatomical differences between it and *Littorina* were observed. I hope shortly to describe these differences at length in a paper devoted to the subject.

As *Risellopsis varia* has been but briefly described, and never figured, I append the following descriptions and figures:—

RISELLOPSIS VARIA, Hutton.

(Figs. 30, 31, 32).

*Adeorbis varia*, Hutton, Cat. Marine Moll., Col. Mus. and Geol. Surv. N.Z., 1873, p. 35.

*Fossarina varia*, Hutton, Man. N.Z. Moll., Col. Mus. and Geol. Surv. N.Z., 1880, p. 79.

Shell rather solid, opaque with translucent spaces, turbinate, perforate, of three and a half whorls; whorls rounded.

<sup>14</sup> Hutton—Cat. Marine Moll., Col. Mus. and Geol. Surv. N.Z., 1873, p. 35, (as *Adeorbis*); Man. N.Z. Moll., 1880, p. 79, (as *Fossarina*).

<sup>15</sup> Fischer—Journ. de Conch., 1885, p. 166, pl. ix., f. 1-4.

<sup>16</sup> Crosse—Journ. de Conch., 1874, p. 206; 1875, p. 139, pl. vi., f. 6 (as *Fossarus*); Tryon—Man. Conch., ix., 1886, p. 263 (as *Peasiella*).

*Colour*.—Ground colour brown, with a few splashes of grey on the spire; on the body whorl the grey predominates; umbilical region white.

*Sculpture*.—Spirals: superiorly there are two riblets, the first (and smaller) close to the suture, the other median; there are two equal sized riblets on the periphery, the lower of which is seen

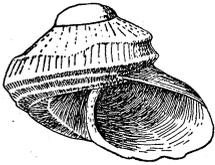


Fig. 30.

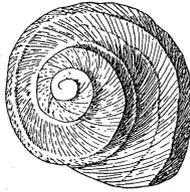


Fig. 31.

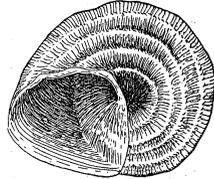


Fig. 32.

just above the suture on the whorls of the spire; this sculpture decreases in size till it is lost on the apical whorls. The base is sculptured with three equal ribs, and a smaller one defining the umbilical region. Longitudinally the shell is covered with oblique growth striae. Mouth oval, oblique, outer lip sharp, sinuated by the basal ribs; columella short, curved, and reflected over the perforation; inner lip defined by a thin transparent callous.

*Dimensions*.—Max. diam., 8·5; minim., 7; height, 4·66 mm.

*Epidermis*.—None.

For operculum and dentition see generic description.

*RISELLOPSIS VARIA, var. CARINATA, var. nov.*

(Figs. 33, 34, 35).

Shell rather solid, slightly translucent, depressed trochiform, perforate, of three and a half whorls.

*Colour*.—Ground colour pale yellow; viewed from above the yellow is, on the spire, splashed with brown; on the body whorl these splashes become confluent, the area between the carinae is marked like the top of the body whorl, on the base there are a few pale brown streaks at the circumference; the umbilical region is white.

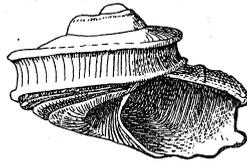


Fig. 33.

*Contour*.—Depressed trochiform, tabulate.

*Sculpture*.—Spirals: two prominent carinae divide the shell into a superior, a peripheral, and a basal area; there are on the superior area two small riblets, one, the smaller, at the suture, the other a little less than a third of the breadth of the area from the suture;

on the base there are three riblets of about equal size, and a smaller one defining the umbilical region. Longitudinally the shell is covered with oblique growth striæ. Mouth oval, oblique, outer lip sharp, sinuated by the carinæ and basal ribs; columella short, curved, and reflected over the perforation. Seen from below the mouth is somewhat rhomboidal, with one rounded side (the basal margin); the callus is projected on the body whorl.

*Epidermis*.—None.

*Dimensions*.—Max. diam., 5; minim., 4.3; height, 3 mm.

Operculum and dentition as in the type form.

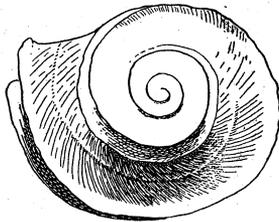


Fig. 34.

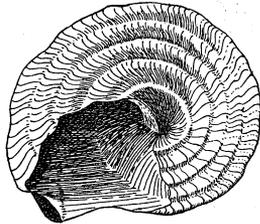


Fig. 35.

Differs from typical examples in the development of the two keels, to which is due the difference in contour.

To the kindness of Mr. H. Suter, I am indebted for spirit specimens of *Minos rimata*, Hutton.<sup>17</sup> The dentition I find to be that of a *Fossarina*.

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ADENDUM.—Since writing the above, Part 2 of Vol. xiv. of the Proceedings of the Royal Society of Victoria (1902), has come to hand. In it,<sup>18</sup> Pritchard and Gatliff recognise *Minos* as a synonym of *Fossarina*, and regard *F. funiculata*, Ten. Woods,<sup>19</sup> as a synonym of *F. brazieri*.

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<sup>17</sup> Hutton—Proc. Linn. Soc. N.S.W., ix., 1884 (1885), p. 369.

<sup>18</sup> Pritchard and Gatliff—Proc. Roy. Soc. Vict., xiv., 2, 1902, p. 24.

<sup>19</sup> Ten. Woods—Proc. Roy. Soc. Vict., xvii., 1881, p. 81, pl. i., f. 6, 7; Tate and May—Proc. Linn. Soc. N.S.W., (2), xxvi., 1901, pl. xxiii., f. 9.