

CRITICAL OBSERVATIONS ON RECENT CONTRIBUTIONS TO OUR KNOWLEDGE OF THE FRESH WATER SHELLS OF TASMANIA.

PART I.

BY R. M. JOHNSTON, F.L.S.

In August, 1875, the Rev. J. E. Tenison-Woods contributed a paper to this Society on the fresh water shells of Tasmania. Prior to this date no systematic attempt had been made to arrange the fresh water shells of this island. It is true that five or six species were actually described in the scattered works of earlier writers, but these isolated observations in foreign works attracted little notice locally; indeed, without special research and access to a good library of reference it would be impossible for ordinary students to obtain certain guidance on the subject.

Mr. Woods fully described the shell characters of all the four forms known to him at this time, and from such characters, and from former references by other observers, he determined them to consist of 12 genera and 34 species, all of which, with the exception of five, he considered as new to science. The following is a complete list of the species described by him:—

UNIVALVES—

1. *Ancylus* *Cummingianus*, *Bourg.*
2. *Tasmanicus*, *Ten. Woods.*
3. *Limnæa* *Tasmanica*, *Ten. Woods.*
4. *Huonensis*, *Ten. Woods.*
5. *Hobartensis*, *Ten. Woods.*
6. *Launcestonensis*, *Ten. Woods.*
7. *Physa* *aperta*, *Ten. Woods.*
8. *eburnea*, *Ten. Woods.*
9. *mamillata*, *Ten. Woods.*
10. *nitida*, *Sowerby.*
11. *Bruniensis*, *Sowerby.*
12. *Vandiemensis*, *Sowerby.*
13. *Huonensis*, *Ten. Woods.*
14. *Legrandi*, *Ten. Woods.*
15. *Tasmanica*, *Ten. Woods.*
16. *ciliata*, *Ten. Woods.*
17. *Tasmanicola*, *Ten. Woods.*
18. *Huonicola*, *Ten. Woods.*
19. *Bythinia* *Legrandi*, *Ten. Woods.*
20. *Pontvillensis*, *Ten. Woods.*

UNIVALVES—

21. Dulvertonensis, *Ten. Woods.*
22. Huonensis, *Ten. Woods.*
23. unicarinata, *Ten. Woods.*
24. Dunrobinensis, *Ten. Woods.*
25. Tasmanica, *Ten. Woods.*
26. Pomatiopsis striatula, *Menke.*
27. Assiminea Tasmanica, *Ten. Woods.*
28. Planorbis Tasmanicus, *Ten. Woods.*
29. Paludestrina Legrandiana, *Brazier.*
30. Wisemaniana, *Brazier.*
31. Unio Moretonicus, *Sowerby.*
32. Pisidium Tasmanicum, *Ten. Woods.*
33. Dulvertonensis, *Ten. Woods.*
34. Cyclas Tasmanica, *Ten. Woods.*

In this first paper of Mr. Woods', he was only able to deal with the shell or exo-skeleton in this scheme of classification. That this was due to lack of materials at the time, however, rather than choice, is amply proved by his elaborate memoir "On some Tasmanian Patellidæ," contributed in the following year (May, 1876), where he minutely describes in an admirable manner the various species examined by him (eight); the malacological characters of each animal, including the odontophore, lingual plate, or radula, having received the greatest attention.

The appearance of Mr. Woods' paper, therefore, was hailed with much satisfaction by local naturalists, and it speedily had the effect of drawing the attention of other observers to this neglected branch of study. Among these, the writer was the first to follow up the work begun by Mr. Woods, and the results of many observations were communicated to this Society in the year 1877, in a paper entitled "Further Notes on the Fresh Water Shells of Tasmania."

My numerous explorations in nearly all parts of the island afforded me rare opportunities for collecting and for observing the varying character of the same species in different habitats. The extreme variability of the prevailing forms particularly arrested my attention, and a lengthened examination of some of them enabled me to draw particular attention to the unstable character of some of the distinctions which Mr. Woods deemed at first to be of specific value. Among these I specially drew attention to the influence of local environment, such as altitude, volume, and degree of brackishness of water, in modifying size, transparency, and colour; and in the genera *Physa*, *Lymnæa* and *Bithynella*, I pointed out the danger of depending upon the presence or absence of continuous or discontinuous ciliæ, spiniform ciliæ or ciliated membranous keel, as characters of specific value.

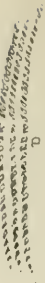
With respect to the genus *Bithynella*, I particularly noted that the species vary widely with the slightest difference in the conditions of their environment. In my notes I showed that the degree of brackishness had a very marked effect. The variety then known as *B. unicarinata*, T. Woods, in the drain near the Railway Station, Launceston, partly influenced by the tidal waters of the Tamar, has six whorls, shell moderately thick, coated with reddish decomposed confervæ. About a mile distant, where the water is still more brackish, the shell of the same species is of a very delicate pale horn colour, transparent, six whorls, and scarcely half the size of the individuals in the habitat previously mentioned. The carina of epidermal membrane, at that time deemed to be of specific value, was observed to be very inconstant, sometimes in awl-shaped spines, as in *B. Legrandiana*, Brazier; in interrupted lines, as in *Bithynella unicarinata*; in continuous lines simple; in continuous or interrupted lines fimbriated; and most frequently without any apparent carina, as in *Paludetrina Wisemaniana*, Brazier, or its synonym *Bithynella Tasmanica*, Ten. Woods. Nor was my attention confined to the exo-skeleton. The malacological character of the animals, including the odontophore, were frequently examined by me under the microscope, and careful drawings were made of the various parts. Descriptions of the animal and its dentition and external characters were given in my paper, together with similar descriptions of several interesting new forms not previously observed. Lithographs of these drawings were prepared at the same time, but these came to hand too late to be inserted in the proceedings along with the paper. These lithographic sheets, however, were preserved, and I now present them as an accompaniment to these notes. The following is a list of the species then described for the first time:—

- Gundlachia Petterdi, Mihi.
- Amnicola Launcestonensis, Mihi.
- Planorbis Atkinsoni, Mihi.
- Scottiana, Mihi.
- Pomatiopsis Badgerensis, Mihi. (fossil)
- Ancylus Woodsii, varieties A., B., Y., Mihi.
- Bithynella nitida, Mihi. (fossil)

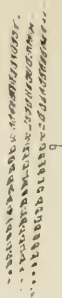
With the necessary exception of the fossil forms, the malacological characters of all these species were observed and described in addition to those of various forms of *Bithynella* and *Physa Tasmanica*, T. Woods.

So far as I am aware, these were the first descriptions published of the malacological characters of Tasmanian fresh water shells.

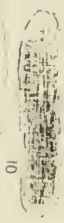
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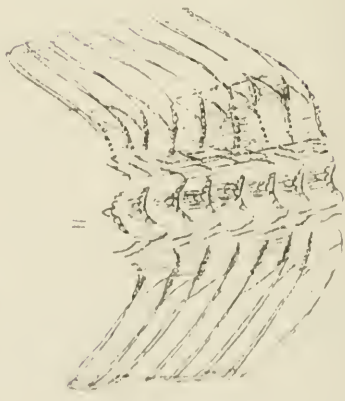
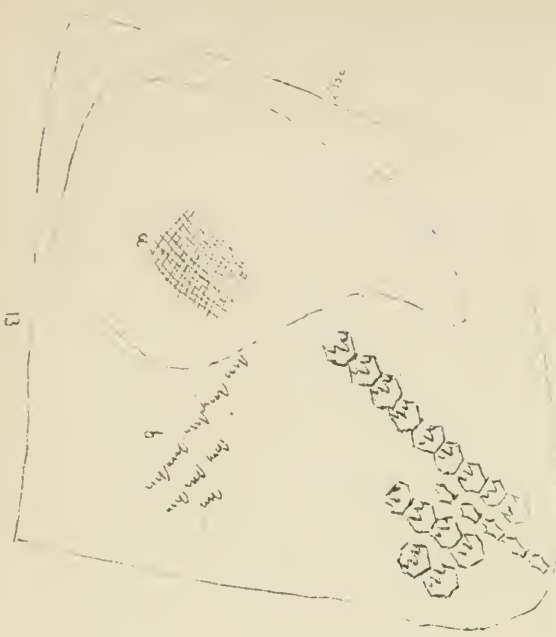
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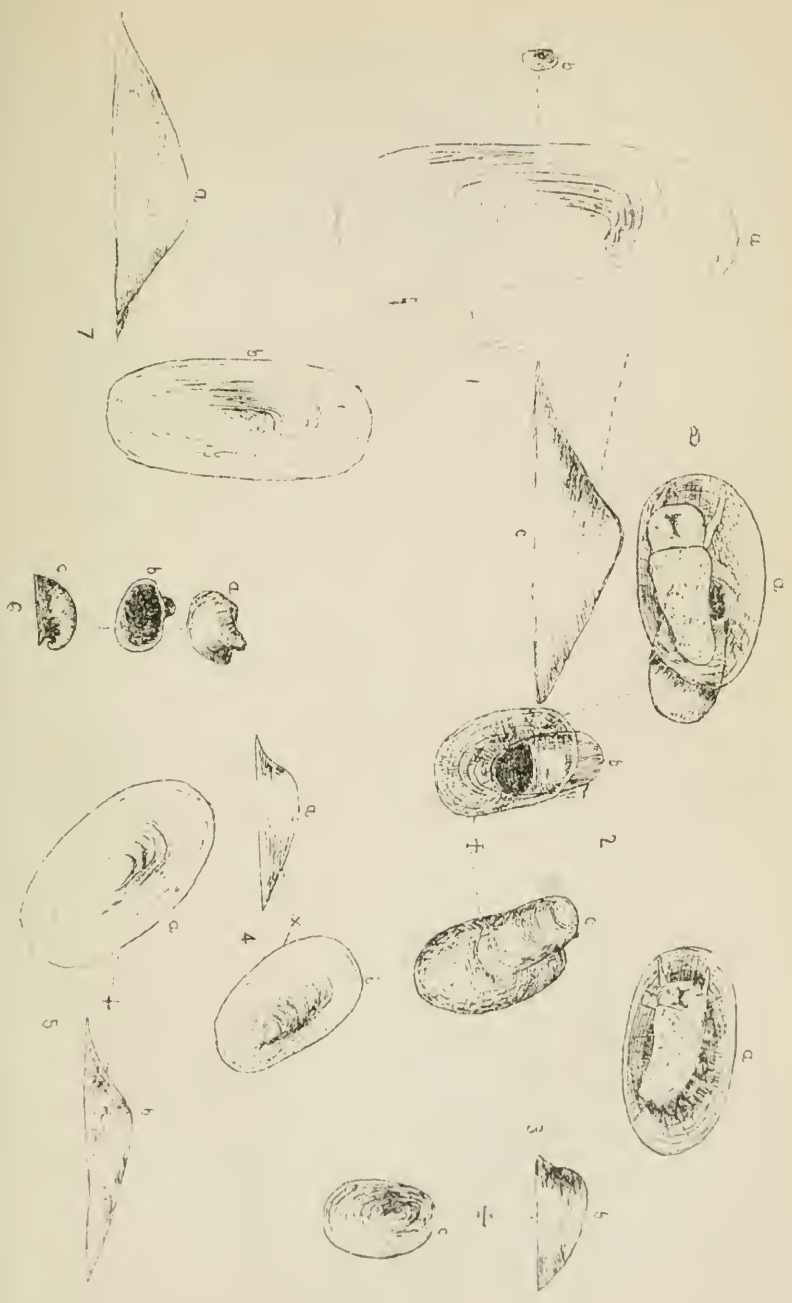


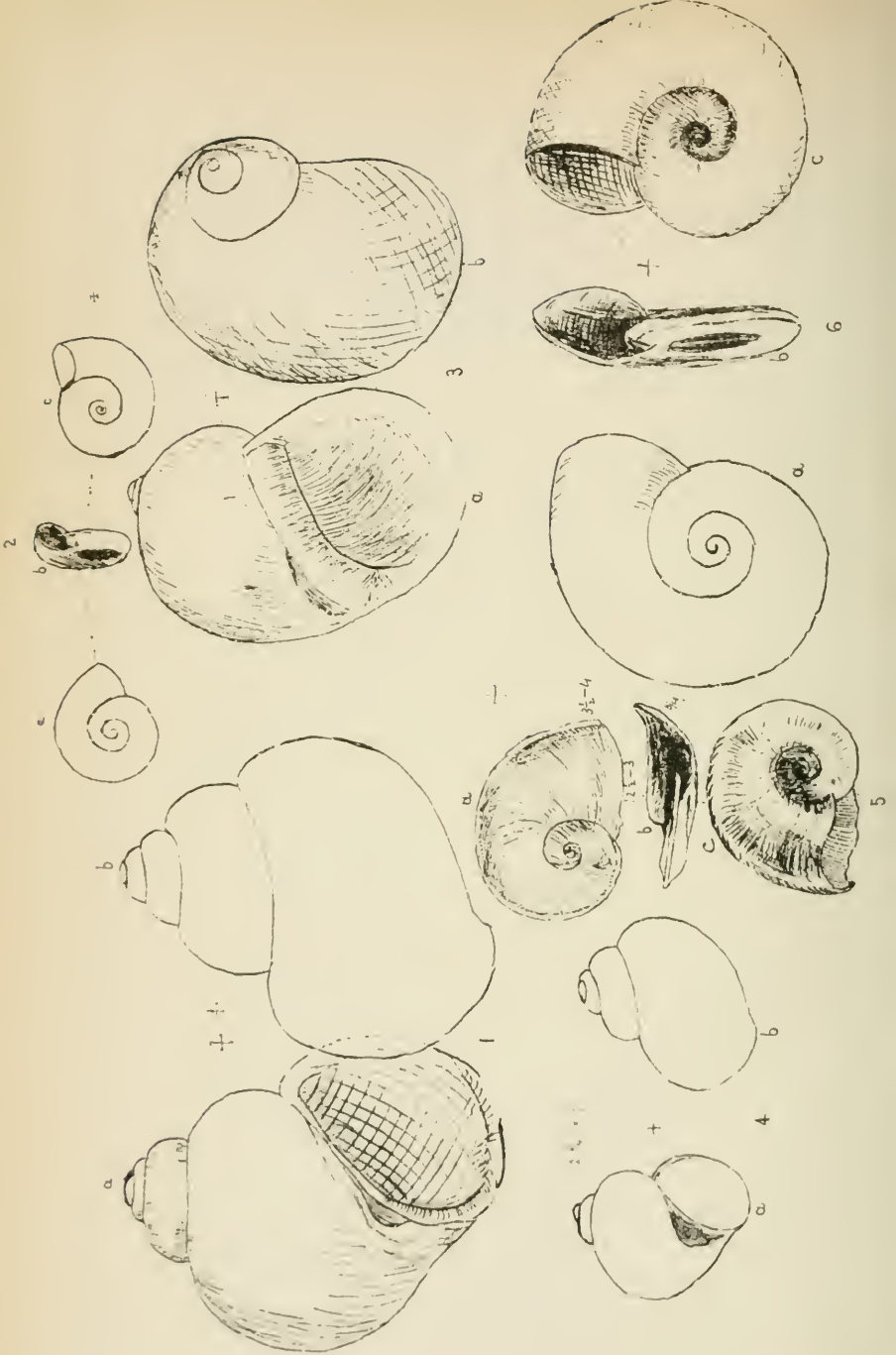
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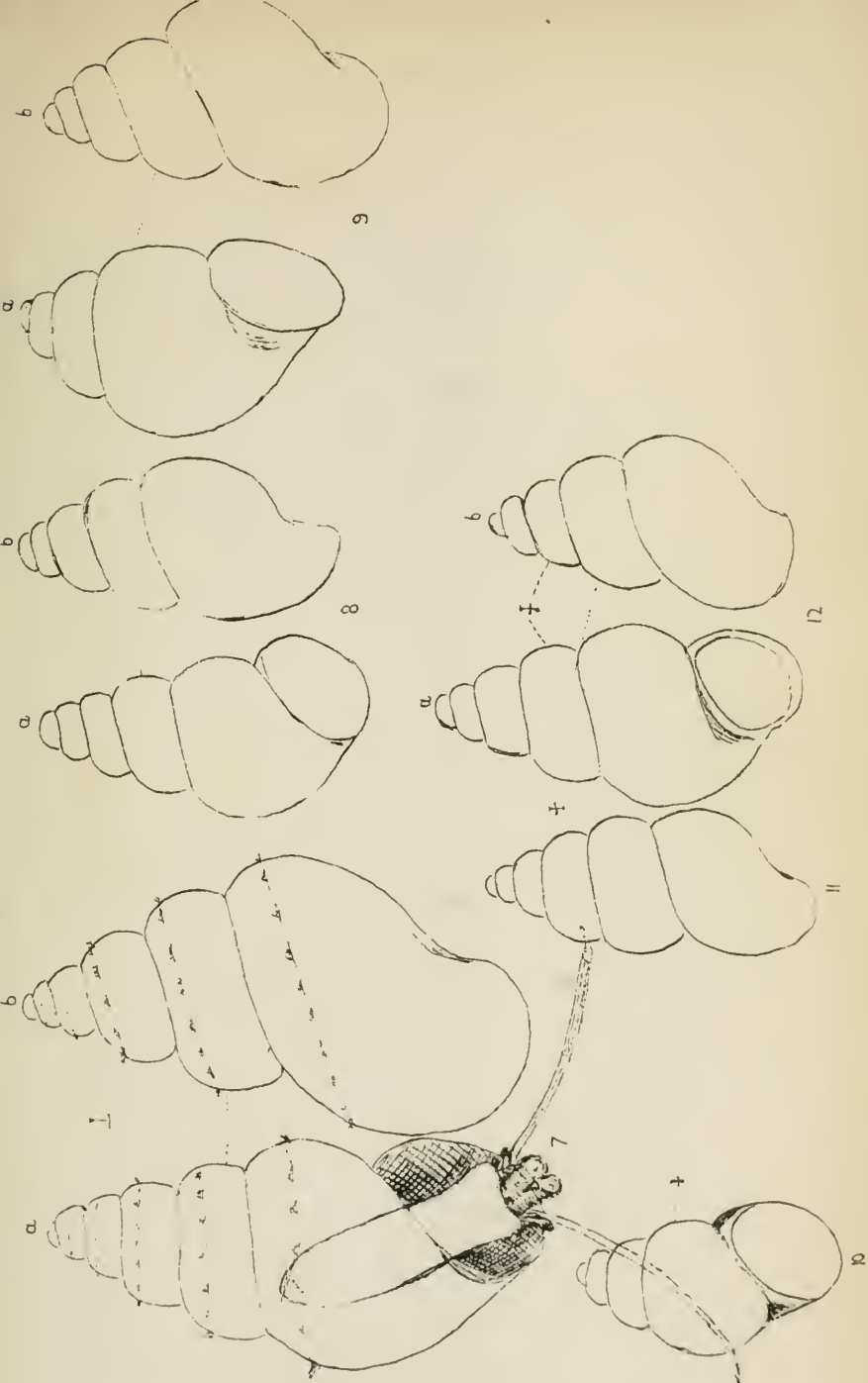


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TABULAR HISTORY OF THE CLASSIFICATION OF THE TASMANIAN FRESH WATER SHELLS.

Arranged approximately to Tate and Brazier's "Check List," Proc. Linn. Soc. N.S.W., 1881.	Tenison-Woods, August, 1875, Proc. Roy. Soc. Tas.	R. M. Johnston, March, 1877, Proc. Roy. Soc. Tas.	Tenison-Woods, October, 1878, Proc. Roy. Soc. Tas.	Tenison-Woods, 1878, Proc. Linn. Soc. N.S.W., p. 135.	R. M. Johnston, April, 1879, Proc. Roy. Soc. Tas.	Tenison-Woods, August, 1879, Proc. Roy. Soc. Tas.	Prof. F. W. Hutton, November, 1881, Trans. N. Z. Institute.	GENERAL REMARKS.
<p>LYMNÆIDÆ</p> <p><i>Lymnaea</i> (<i>amphipeplea</i>) <i>haonenis</i> T. Woods <i>sigilla</i> T. Woods</p> <p><i>Physa</i> Van <i>Diemenensis</i> ... Sowerby <i>aperta</i> " " <i>nitida</i> " " <i>haonenis</i> T. Woods (possibly var. <i>H. nitida</i>)</p> <p><i>Bruniense</i> T. Woods <i>Tasmanicola</i> " " <i>huonicola</i> " " <i>eburnea</i> Sowerby <i>atomata</i> " " <i>mamillata</i> " "</p> <p><i>Tasmanica</i>? T. Woods (doubtful species, <i>nitida</i>) <i>Legrandi</i>? T. Woods (doubtful species, <i>nitida</i>)</p>	<p><i>L. hobartensis</i> T. Woods <i>haonenis</i> " " <i>haonenis</i> " "</p> <p><i>P. Van Diemenensis</i> ... Sowerby <i>aperta</i> " " <i>nitida</i> " " <i>haonenis</i> T. Woods</p> <p><i>Bruniense</i> " " <i>Tasmanicola</i> " " <i>huonicola</i> " " <i>eburnea</i> Sowerby</p> <p><i>mamillata</i> " " <i>ciliata</i> " " <i>Tasmanicus</i> " " <i>Legrandi</i> " "</p>	<p><i>L. haonenis</i> T. Woods</p> <p><i>P. Van Diemenensis</i> ... Sowerby <i>aperta</i> " " <i>nitida</i> " " <i>haonenis</i> T. Woods</p> <p><i>Bruniense</i> " " <i>Tasmanicola</i> " " <i>huonicola</i> " " <i>eburnea</i> Sowerby</p> <p>United as <i>mamillata</i> " " <i>ciliata</i> " "</p> <p>United as one variable species.</p>	<p><i>L. hobartensis</i>, stated to be undistinguishable from <i>L. peregra</i>.</p> <p><i>P. Van Diemenensis</i> ... Sowerby <i>aperta</i> " " <i>nitida</i> " " <i>haonenis</i> T. Woods</p> <p><i>Bruniense</i> " " <i>Tasmanicola</i> " " <i>huonicola</i> " " <i>eburnea</i> " "</p> <p>United as <i>mamillata</i> Sowerby</p>					
<p><i>Ancylus cumingiannus</i> ... Bourg. <i>Tasmanicus</i> T. Woods Woodhill R. M. Johnston <i>Gamulachia petterdi</i> " " <i>Planorbis meridionalis</i> ... Brazier Atkinson R. M. Johnston Scottiana " "</p>	<p><i>Ancylus cumingiannus</i> ... Bourg. <i>Tasmanicus</i> T. Woods</p> <p><i>P. Tasmanicus</i> T. Woods</p>	<p><i>A. cumingiannus</i> ... Bourg. <i>Tasmanicus</i> T. Woods Woodhill R. M. Johnston G. Petterdi " " P. Tasmanicus T. Woods Atkinson B. M. Johnston Scottiana " "</p>	<p><i>P. meridionalis</i> ... Brazier</p>	<p>In this paper Mr. Woods, dealing with some "Fresh water shells from New Zealand," shows that <i>Bithynella cordata</i>, Gould, is of the same genus as the Tasmanian <i>B. wisemaniana</i>, and even considers the species as identical with some of the Tasmanian forms.</p>		<p>Notes on <i>Bithynella</i> states that Brazier's <i>Amplicolpa petterdi</i> is identical with <i>B. nigra</i>, Quoy and Gaim., and unites also under this species all the forms bracketed with the former in the first and second columns of this table.</p>	<p>In a paper on the New Zealand Hydrobiids, Prof. Hutton gives fresh reasons for transferring forms classed formerly by himself and Rev. Ten. Woods as <i>Bithynella</i> to Stimpson's genus <i>Potamopyrgus</i>, which has been slightly modified for this purpose.</p>	<p>Since 1881, Mr. Petterd has described two forms under the names <i>Gamulachia pedemonte</i> and <i>Ancylus pedemonte</i> (1887), but the author regrets that he is unable to distinguish these from forms already named and described; the former being undistinguishable from <i>Gamulachia petterdi</i> nubi, and the latter is simply an unusually large specimen of one of the more pronounced riyval forms of <i>Ancylus cumingiannus</i>, Bourg. The author received over 100 specimens of this splendid <i>Ancylus</i> about 14 years ago from the same locality as Mr. Petterd's specimens were obtained from. Careful examination proves that the species is of a profane character, no two are alike in sculpture or size; the radiating ribs are in some obsolete, in others fine and very numerous, while in the majority they are few and well pronounced. Mr. Petterd has overlooked the fact that in the original description of <i>A. cumingiannus</i>, the shell is stated to be smooth or striate about the aperture; the apical whorls very often rugosely radiate.</p>
<p>VALVATIDÆ</p> <p><i>Valvata tasmanica</i> ... T. Woods</p>	<p><i>Bythynia</i> <i>Legrandi</i> ... T. Woods " <i>micrariata</i> " " " <i>Tasmanica</i> " " <i>Paludestrina</i> <i>Legrandiana</i> ... Brazier Wisemaniana " "</p>	<p>United as one species under <i>Bithynella</i> <i>Legrandiana</i> ... Woods and Brazier <i>Legrandiana</i> ... Woods and Brazier <i>Legrandiana</i> ... Woods and Brazier " <i>Dulvertensis</i> ... T. Woods " <i>Dunrobinensis</i> " " " <i>Pontvillensis</i> " "</p>	<p><i>B. meridionalis</i> ... Brazier</p>	<p><i>B. dulvertensis</i> ... T. Woods <i>Dunrobinensis</i> " " <i>B. simoniana</i> Brazier</p>		<p>Also amends diagnosis of <i>Tate</i>, and gives a description of morphological characters.</p>		<p>Many years ago the author forwarded examples of our variable forms of <i>Lymnaea</i> to Prof. Tate, in the belief that he would recognise in them but one variable species. Prof. Tate at first thought they were identical with <i>L. peregra</i>, but a larger number submitted to him from specimens collected in different localities, principally from habitats near Launceston, enabled him to recognise two species, viz.:-</p>
<p>RISOIDÆ</p> <p><i>Bithynella</i> (<i>Potamopyrgus</i>?) <i>nigra</i> Quoy Gaim. <i>nitida</i> R. M. Johnston <i>Dulvertensis</i> ... T. Woods <i>Dunrobinensis</i> " " <i>Dyeriana</i> Petterd Simoniana Brazier</p> <p><i>Amplicola tasmanica</i> ... T. Woods Dionensis Frauenfeld Launcestonensis ... Johnston</p>	<p><i>Bythynia</i> <i>Legrandi</i> ... T. Woods " <i>micrariata</i> " " " <i>Tasmanica</i> " " <i>Paludestrina</i> <i>Legrandiana</i> ... Brazier Wisemaniana " "</p> <p><i>Bythynia</i> <i>Dulvertensis</i> ... T. Woods " <i>Dunrobinensis</i> " " " <i>Pontvillensis</i> " "</p> <p><i>Amplicola</i> <i>Tasmanica</i> " "</p>	<p>United as one species under <i>Bithynella</i> <i>Legrandiana</i> ... Woods and Brazier <i>Legrandiana</i> ... Woods and Brazier <i>Legrandiana</i> ... Woods and Brazier " <i>Dulvertensis</i> ... T. Woods " <i>Dunrobinensis</i> " " " <i>Pontvillensis</i> " "</p>	<p><i>B. meridionalis</i> ... Brazier</p>	<p>In this paper also we find the first suggestion of these Tasmanian and New Zealand forms under Stimpson's genus <i>Potamopyrgus</i>. Vog. Martens regards the <i>Bithynella cordata</i> as the type of Stimpson's genus <i>Potamopyrgus</i>, but P. Fischer does not share this opinion, and in this he is supported by Mr. Woods.</p>	<p>Announces the discovery of habitat of <i>Amplicola tasmanica</i>, T. Woods, and classifies it under <i>amnicola</i>.</p>			<p><i>L. haonenis</i>, Ten. Woods, <i>Amplicolella papayracae</i>, Tate.</p>
<p>HYDROBIIDÆ</p> <p><i>Sphaerium tasmanicum</i> ... T. Woods <i>Pisidium tasmanicum</i> " " Dulvertensis " "</p> <p><i>Corbicula</i> <i>Brunnæ</i> Prisms</p>	<p><i>Bythynia</i> <i>haonenis</i> ... T. Woods P. striatula Menke Badgerensis R. M. Johnston</p>	<p><i>Bithynella</i> <i>haonenis</i> ... T. Woods P. striatula Menke Badgerensis R. M. Johnston</p>	<p>Name of genus changed to <i>Tate</i>.</p>					<p>The author, however, is inclined to believe that a fuller examination will show that these run into each other. The young shells differ considerably from the mature specimens in form and in the columellar fold.</p>
<p>CYCLADIDÆ</p> <p><i>Sphaerium tasmanicum</i> ... T. Woods <i>Pisidium tasmanicum</i> " " Dulvertensis " "</p> <p><i>Corbicula</i> <i>Brunnæ</i> Prisms</p>	<p><i>Cyclas tasmanica</i> ... T. Woods P. tasmanicum " " " <i>Dulvertensis</i> " "</p>	<p><i>Cyclas tasmanica</i> ... T. Woods P. tasmanicum " " " <i>Dulvertensis</i> " "</p>						
<p>UNIONIDÆ</p> <p><i>Unio moretonicum</i> ... Sowerby</p>	<p><i>U. moretonicum</i> Sowerby</p>	<p><i>U. moretonicum</i> Sowerby</p>						
		<p>* This valuable paper also discusses the whole question concerning the true alliance of the various forms of antraxes, belonging to the sub-family Hydrobiina.</p>						

perhaps, of Mr. Woods and Mr. Petterd, the naturalists at a distance from Tasmania, who described the first four or five forms, had no other characters at their command than the shell afforded.

I merely make these observations in justice to myself, because Mr. Petterd in his otherwise excellent paper* read this evening, has remarked that hitherto "unfortunately almost all our writers have simply devoted their attention to the outline of the shell and structure of the operculum, few, if any, devoting the amount of attention to the malacological characters that the more modern and elaborate system of classification demands."

I think Mr. Petterd is somewhat unjust as well as inaccurate in making this statement without further qualification. So far as local observers are concerned, it is true, neither himself, in the description of the two fresh water forms, viz., *Gundalachia Beddomi* and *Ancylus Irvinæ*, published by him, nor Mr. Woods in the first and most important of all contributions to our knowledge of Tasmanian fresh water shells, give any description of the animals other than those relating to the exo-skeleton, and the operculum where present; but it is not true so far as I am concerned, as the statement I have already made proves.

As some confusion has already occurred, owing to the alterations in nomenclature more recently made, I have thought it desirable to draw up a tabular historical list showing the various modifications and additions which have been made in connection with Tasmanian fresh water shells since Mr. Woods' paper was published in 1875.

CLASSIFICATION.

The classification of the various forms of Lymnæidæ and Hydrobiinæ presents many difficulties, and these already have been the principal cause of the present overload of synonyms, which must be a fruitful source of error to many. The confusion now existing will not be dissipated by the mere creation of fresh names for genera. Already, owing to the various modes of classification adopted by independent authors, the sub-family *Hydrobiinæ* is broken up into an interminable number of genera, each with a host of synonyms, while the characters of many of them do not justify their separation from each other.

Certain genera are based upon the form and character of the shell and its operculum. Others are established upon the form of the muzzle and tentaculæ of the animal, while not a few are erected upon the character of the odontophore and its denticulæ. So long as there are different methods

* Contributions for a Systematic Catalogue of the Aquatic Shells of Tasmania.

employed—where in each the characters depended upon by all other authorities are reduced to play a subordinate part in determining the limits of a genus—so long will we be involved in contradiction and confusion. This must certainly be the case when we are assured that no single character can be made to harmonise with any other character in a common generic range.

But we have still another difficulty. The local worker may zealously, as in Mr. Petterd's case, work up the hidden characters of the denticulæ, and show clearly the differences: so far as local examples are concerned, but if he have no reliable knowledge that genera already established for similar forms of shell may or may not have corresponding dentition characters, what justification is there for creating a new genus for a local form of shell which in all respects corresponds with one already established for this particular form, irrespective of the character of its denticulæ?

Take, for example, Mr. Petterd's sub-genus *Beddomcia* proposed for globosely conical shells, spire short; body whorl inflated.

So far as apparent form of shell and animal is concerned, it answers exactly to *Lithoglyphus*, of Muhlfeldt, or with *Gillia*, of Stimpson. Why, therefore, create a new genus for a similar form in Tasmania. But it may be said that the denticulated teeth justifies the separation. To this I reply, Good. Show us proof that this is so. Have you examined the denticulæ of the various species of *Lithoglyphus* and of *Gillia*? If you have done so, why neglect to show the marked contrast of dentition in forms externally alike?

When genera are established after the fullest comparison in this way few will object, but I need hardly say that thrusting fresh generic names into our nomenclature is far from satisfactory when the dentition of allied forms of other countries have not been thoroughly examined and compared with the local types.

While it is admitted that all external and internal characters of the animals should be studied together, where possible, few will altogether agree with Mr. Petterd's observation "that in all cases the inhabitant of the shell requires thorough examination before the generical position can be with certainty decided."

For, we may exclaim with Binney, "Supposing the dentition of all living forms to be examined (an impossibility), we are still confronted by the fossil shells. What shall we do with them? Shall we use for these 30,000 species obvious external universal characters, yet discard these in the recent mollusea for the modifications of a partial character, the very slight observation of which has sufficed to show that it may

not be predicted with certainty from either the shell, operculum, external features, or anatomy of the animal." These are weighty considerations.

Mr. Petterd forgets that all systems of classification, ancient and modern, are more or less arbitrary and artificial, whether based upon the "infallible criterion" lingual dentition, respiratory organs, muscular impressions, or external form generally. Young observers, enthusiastic with a new idea, are apt to forget that all fresh discoveries, however valuable, only cover a small space of the whole field, and are usually accompanied by fresh germs of error which must also be reckoned with. Defective exo-skeleton is dead: long live defective endo-skeleton!

So far as true progress in the exact sciences is concerned, a celebrated writer has well said: "Assuredly he will not be most capable of discoveries who despises the theory of yesterday and swears by that of to-day; but he who sees in all theories but a means of approximating to the truth and of surveying and mastering the facts for our purposes."

The best systematists of the modern school do not share Mr. Petterd's distrust of our old valued friend, *the shell and its form*, and some of them are even bold enough to trust to its guidance in cases of conflicting evidences rather than to any other singular characteristic.

That this is the opinion of two of our best modern systematists (Tryon, unfortunate to science, recently deceased; and Mr. Wm. G. Binney, who has devoted a number of years to the study of the dentition and anatomy of terrestrial mollusks), is shown by the following utterances.

G. Tryon, who has a high opinion of lingual dentition as an auxiliary aid, in his recent work on "Structural and Systematic Conchology," concludes that there is "a growing conviction that there are no sharply defined groups in nature; that a generic character, for example, cannot be made to cover all its species; that upon its borders occur forms which partake of the characters of other so-called genera, and that families, orders, etc., similarly coalesce upon their confines. We may anticipate a period when our larger collections, together with our better knowledge of external influences and of the power of adaptation to them of these creatures, shall reveal to us a series of recent and fossil forms having relationship so intimate that our present system of classification, and resulting nomenclatures shall become utterly valueless.

"In this point of view classification is essentially arbitrary. The value of a classification founded on a single organ (the lingual ribbon), which does violence to other apparent affinities, whilst at the same time it fails of signification even in

one of the most important functions with which it is connected, in that it does not enable us to certainly separate the phytophagous from the zoophagous animals, may be seriously questioned.

"We have many most important characters of the mollusks which impress themselves upon their shells, so that they are in accord, and enable us to predicate reciprocally their relationships; and such characters appear to be much more useful for classification.' Binney expresses himself in a similar way, and states briefly: "If it be proposed that a single arbitrary standard shall be used because it *is* arbitrary then the standard selected should be the most universal and the most apparent, namely, *the shell*."

Binney, who has devoted many years to the special study of dentition, goes so far as to say, "Is it not impertinent to make use of a few hundred observations of an organ which only pervades a portion of the mollusca, to establish a classification which is frequently in violent contrast with natural affinities ascertained by long examination of all the species, recent and fossil?"

Enough has been stated to show that we have no new "divining rod" to help us in classification difficulties. Wide careful comparison of all characters are certainly necessary, but so long as local workers only trouble themselves to single out extremes of each type for the information of others, so long will a satisfactory classification of our shells be a thing of the future.

Local workers would better advance the cause of science if more regard were paid to the study of the variability of characters of the shell and of the animal. Little is known yet how far the denticulæ of the lingual ribbon varies in animals of the same genus, and this must be well studied in every group before we can depend upon their form and numbers for determining the limits of a genus.

Is our knowledge of the constancy of form and number of denticles on the median tooth of fresh water shells wide enough to enable us to rely upon its indications alone for marking the limits of a genus? This is a most pertinent question. Some of our best classifiers, who have tested this matter systematically, insist that reliance upon such characters are deceptive, and are not so reliable as the more obvious ones.