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A REVIEW OF AUSTRALIAN HELMET SHELLS
(FAMILY CASSIDIDAE—PHYLUM MOLLUSCA)

BY

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(Plates xxxi-xxxii.)

No connected account of the shells known as Helmet Shells has yet appeared in Australian literature, though many species have been listed by Hedley, Verco, May, Pritchard, Gatliff and Gabriel. The majority of these occur in temperate Australian waters, and many different interpretations of the species exist. An attempt is here made to correlate the information available by means of the material gathered together in the Australian Museum, supplemented by loan of specimens from the workers above named, and to supply a criticism of literature. This review was begun some years ago and has proved of a very complex nature, both as regards the literary side and the conchological aspect.

True Helmet Shells are common to the tropics, one or two species reaching into northern Australia, but in Australia, more numerous in the southern parts, many species of what may be termed "False Helmet" shells occur. Hitherto these two main groups have been commonly recognized, but sometimes only subgeneric rank has been allowed the latter. Many sub-groups have been accepted, but generally authors have differed as to the extent and nomination of these groups. In the present essay the names proposed are detailed so that easy criticism may ensue; small groups are utilised, as, though fossil forms are known, only in few instances can lineage be traced, and in these cases the recent forms have been found to have persisted practically unchanged since the Eocene. Little has been done in connection with the comparative anatomy of the groups, but years ago Troschel recorded that the radula showed differences in the two main groups that were worthy of generic rank, and that differences were visible in other species to which he allotted subgeneric value. As Troschel's values were higher than those of present day usage further comparisons will undoubtedly emphasise the separative features and confirm the smaller groupings advocated. All the types and the specimens figured are in the Australian Museum. The beautiful figures provided are from the brush of Miss Joyce K. Allan, of this Museum, to whom my best thanks are here tendered, for the illustrations enhance the value of this paper two-fold. It should be recorded that the bulk of the paper deals with what has been known as the "*pyrum-achatina*" series, and the paintings refer more especially to this group.

As no list of Australian Cassids has previously been prepared, a summary of the conclusions here published will be acceptable.

Cassid cornuta (Linné 1758, *Buccinum*). North Queensland.

spinosa (Meuschen 1781, *Buccinum*). Australia.

[*flammea* (Linné 1758, *Buccinum*). Australia. Error.]

- Nannocassis nana* (Tenison-Woods 1879, *Cassis*). South Queensland, Northern New South Wales.
torva Iredale 1927. South Queensland.
- Hypocassis fimbriata* (Quoy and Gaimard 1833, *Cassis*). Western Australia.
bicarinata (Jonas 1839, *Cassis*). Western Australia, South Australia, Victoria.
- Cypræcassis rufa* (Linné 1758, *Buccinum*). North Queensland.
- Phalium glaucum* (Linné 1758, *Buccinum*). Queensland.
areola (Linné 1758, *Buccinum*). Queensland, northern New South Wales.
bandatum (Perry 1811, *Cassidea*). Queensland, northern New South Wales, North Western Australia.
agnitum Iredale 1927. Western Australia.
- Xenophalium hedleyi* Iredale 1927. New South Wales.
- Semicassis diuturna* Iredale 1927. Queensland, northern New South Wales, Northern Territory(?).
- Casmaria erinaceus* (Linné 1758, *Buccinum*). North Queensland.
vibex (Linné 1758, *Buccinum*). North Queensland.
ponderosa (Gmelin 1791, *Buccinum*). Queensland, northern New South Wales.
- Xenogalea pyrum* (Lamarck 1822, *Cassis*). Southern New South Wales, Victoria, Tasmania.
stadialis (Hedley 1914, *Cassidea*). New South Wales, Victoria, Tasmania (?).
thomsoni (Brazier 1875, *Cassis*). New South Wales.
sophia (Brazier 1872, *Cassis*). New South Wales, south Queensland (Kermadec Islands).
nivea (Brazier 1872, *Cassis*). West Coast of Tasmania, South Australia.
paucirugis (Menke 1843, *Cassis*). Western Australia.
lucrativa Iredale 1927. North Queensland.
labiata (Perry 1811, *Cassidea*). New South Wales, South Queensland, Victoria(?), Norfolk I.
insperata Iredale 1927. New South Wales, south Queensland.
angasi Iredale 1927. South Queensland, and northern New South Wales.
- Antephalium semigranosum* (Lamarck 1822, *Cassis*). Victoria, Tasmania, South Australia, south Western Australia.
adcocki (Sowerby III, 1896, *Cassis*). Victoria, South Australia, south Western Australia.
sinuosum (Verco 1904, *Cassidea*). South Australia, Victoria.

FOSSIL FORMS.

It is necessary to survey the known fossil forms of any group when dealing with deep water shells, but in the present instance very little information is available, so the little may be here incorporated.

Tate in 1889¹ catalogued the known fossil species as follows: *Semicassis transenna* Tate (p. 166, pl. viii, fig. 2) from Lower Beds, Muddy

¹Tate—Trans. Roy. Soc. S. Australia, xi, 1888 (April, 1889).

Creek, Victoria: "no analogue in living creation." *Semicassis subgranosa* Tate (p. 166, pl. vii, fig. 10), from raggy limestones, Edithburgh, South Australia: "shape of *semigranosa*." *Semicassis muelleri* Tate (p. 167, pl. vii, fig. 9), from Upper Beds, Muddy Creek: "resembles in miniature *S. nivea* Brazier, but with a different ornament." *Semicassis trinodosa* Tate (p. 167, pl. vii, fig. 12), from Bairnsdale, Gippsland, Victoria: "has the shape of *S. abbreviata* Lamarck, recent on the west coast of Tropical America." *Semicassis radiata* Tate (p. 168, pl. viii, fig. 3), from well sinking, Murray desert: "approaches the nodulate variety of *S. torquata* Reeve, recent in temperate waters of Australia." *Cassis sufflata* Tenison-Woods² was included as an unfigured species from Table Cape, Tasmania, without comment. Harris³ recorded *Semicassis sufflata* = *transenna* ex Pritchard, and *S. muelleri*, observing of the latter, "it is, apparently, the precursor of the living *S. nivea* Brazier, of the Australian Seas." Dennant and Kitson⁴ refer to the Eocene and Oligocene, *Semicassis sufflata* Tenison-Woods, *S. transenna* Tate, and *S. radiata* Tate.

To the Miocene were relegated *S. muelleri* Tate, *S. trinodosus* Tate, and *S. subgranosus* Tate, while from the Newer Pliocene of Limestone Creek, Glenelg River, Victoria, *S. semigranosus* Lamarck, was recorded. A note is added "Mr. Harris credits me with presenting this [*S. sufflata*] as a Muddy Creek species to the British Museum. I observe (1) that it does not occur at Muddy Creek, and (2) that the shell I sent was *S. transenna*, a distinct species. J.D."

European palaeoconchologists have usually endeavoured to associate Australian forms with their fossils, so that we find Sacco⁵ arranging under the subgenus *Semicassis* a sequence thus:

"Living: *saburon* and *undulata*.

Pliocene fossil: *laevigata*.

Miocene fossil: *miolaevigata*.

Eocene fossil: *muelleri* and *transenna*. Australia,"

and under subgenus *Echinophoria* Sacco (p. 39)

"No living representative of this group, but the Australian *E. (?) torquata* Reeve may be a probable ally, whose fossil ancestor may be the Eocene *S. radiata* Tate."

Cossmann⁶ disagrees almost entirely with Sacco's arrangement, placing *Echinophoria* Sacco as a synonym of *Semicassis* (p. 125), but admitting as a distinct subgenus (p. 127) *Casmaria* H. and A. Adams, with the living *C. pirum* Lamarck as type; he figures as plesiotype, *Semicassis muelleri* Tate, from the Muddy Creek, and names *transenna* Tate as the Oligocene representative.

These values and relationships cannot be accepted, as *transenna* and *muelleri* appear to belong to different stocks, and neither of them is referable to the *saburon* series, and probably none have any close alliance with the Palearctic fossils. Material is still insufficient to allow dogmatism, but *muelleri* really appears to be closely related to the living *nivea* and

²Tenison-Woods—Proc. Roy. Soc. Tasm., 1867, 21, 1879 (*vide* Tate, *recte* Pap. Proc. Roy. Soc. Tasm., 1876, (1877), p. 93).

³Harris—Cat. Tert. Moll. Brit. Mus., pt. i, 1897, p. 198.

⁴Dennant and Kitson—Rec. Geol. Surv. Vict., i, 2, 1903, p. 108.

⁵Sacco—Mem. del. Real. Accad. Sci. Torino, (2), xi, 1890.

⁶Cossmann—Essais de Paléconch. comp., livr., 5, 1903, p. 119, *et seq.*

to be strictly ancestral. The age of *muelleri*, however, cannot be regarded as Eocene, and scarcely Miocene. The species *transenna* is undoubtedly older than *muelleri*, but does not belong to the same group, being related to *sinuosa* and *adcocki*. These latter are living, but are restricted to the Adelaidean province and are rare deeper water species. These may be comparable with *Xenogalea labiata*, which now lives only on the East Coast, and which may be a distant relative of the western *paucirugis*. With regard to the fossil *sufflata* from Table Cape, it may be a little younger, but nearly allied to the Muddy Creek *transenna*.

SYSTEMATIC ACCOUNT.

Genus CASSIS Scopoli.

1772. *Cassida* Brunnich, Zool. Fund., p. 248; name and diagnosis only, exactly as *Tonna* and equally acceptable, were it not invalidated by *Cassida* Linné, Syst. Nat., 1758, ed. x.
1777. *Cassis* Scopoli, Introd. Hist. Nat., p. 393; first species, *Bucc. flammeum*, but includes *Bucc. cornutum*. Type by subsequent designation, Montfort, Conch., 1810, p. 559, *Bucc. cornutum*.
1789. *Cassidea* Bruguière, Ency. Meth. Vers., I, p. xv, diagnosis only.
1792. " " " " p. 414: new name instead of *Cassis* Klein, contents differing. Type by subsequent designation, Cossmann, Essais de Paléonconch. comp., livr. 5, 1903, p. 123, *Bucc. cornutum* Linné.
1797. *Cassida* "Humphrey," Museum Calonnianum (May 1), p. 19. Not *Cassida* Linné, Syst. Nat., 1758, ed. x.
1798. *Cassidea* Cuvier, Tabl. Elem. Hist. Nat., p. 406: includes *cornutum*.
1798. *Cassis* Bolten, Museum Boltenianum, p. 28.
1799. *Cassis* Lamarck, Mem. Soc. d'Hist. Nat. Paris, p. 72 (May). Type, by monotypy, *Buccinum cornutum* Linné.
1801. *Cassis* Lamarck, Syst. Anim. sans Verteb., p. 79 (Jan.). Type, by monotypy, *Buccinum cornutum* L.
1802. *Cassidea* Bosc, "Hist. Nat. Coquilles, v, ex Bruguière": 3rd edition, 1836, p. 1.
1804. *Cassis* Duvernoy, Dict. Sci. Nat., ed. I, v, p. 404.
1805. *Cassis* Roissy, Hist. Nat. Moll., vi, p. 98; for "Casque Bruguière."
1807. *Cassidea* Link, Besch. Nat. Samml., Rostock, pt. 3, p. 111; for part of Bruguière's genus: includes *cornuta*, etc.
1810. *Cassis* Montfort, Conch. Syst., 599. Type, by original designation, *Buccinum cornutum* Linné.
1815. *Cassinia* Rafinesque, Analyse de la Nature, p. 145 (Cf. Iredale, Proc. Malac. Soc. (Lond.), ix, 1911, pp. 261, 262): new name for "Cassis Brug."
1816. *Cassidea* Bosc, Nouv. Dict. d'Hist. Nat., nouv. ed., v, p. 347: for the genus "Casque Bruguière."
1817. *Cassidea* Schumacher, Essai nouv. Syst. Vers., test, pp. 75 and 247, as of Bruguière. Includes *B. rufum* Linné and *B. flammeum* Linné.

1817. *Cassis* Blainville, Dict. Sci. Nat. (Levrault), vii, p. 203, for the "genre Casque."
1817. *Cassidea* id. ib. p. 226; note of proposal for the same genus by Bruguière.
1822. *Cassis* Lamarck, Hist. Nat. Anim. sans Verteb., vii, p. 218, Aug.: for the genus "Casque": second species *C. cornuta* ex L.
1823. *Cassis* Bory de Saint Vincent, Dict. Class. d'Hist. Nat., iii, p. 245, as of Lamarek.
Cassidea id. ib. p. 255, as Bruguière's name for same group.
1838. *Cassidea* Schlüter, Kurz. Syst. Verz. Conch., p. 19, as of Bruguière, for *pennata* Brug., *testiculus* Brug., etc.
1838. *Cassis*. id. ib. for *tuberosa* Lamarck, *flammea* Lam., *rufa* Lamarck, etc.
1846. *Cassis* Hermannsen, Index Malac., p. 195, as of Swainson, 1840. Type, *Cassis cornuta* Linné.
1857. *Goniogalea* Mörch "Cat. Suenson." Not seen.
1877. id. ib. Malak. Blatt, xxiv, p. 37, ex "Cat Suenson" for *madagascariensis* Lam., *flammea* L., and *tuberosa* L.
1882. *Fimbriola* Scudder, Nomencl. Zool. ex Megerle MS.=*Cassis*. Cf. Iredale, Proc. Malac. Soc. (Lond.), xiv, 1921, p. 204.
1890. *Galeodocassis* Sacco, Mem. del. Real. Accad. Sci. Torino, (2), xi, (I. Moll. test. tert. Piemonte and Liguria, pt. vii), p. 18. Type, by virtual monotypy, *C. anceps* Sacco.
1890. *Cassis* Cossmann, Ann. Soc. Roy. Malac. Belg., xxiv, p. 107; as of "Klein 1753." Type, by original designation, *C. flammea* L.
1899. *Cassisoma* Rovereto, Atti. Soc. Ligustica, x, p. 107: new name for "*Cassis* Klein 1753, nec. Klein 1734."
1903. *Cassidea* Cossmann, Essais de Paleconch. comp., livr. 5, 123; as "of Bruguière 1789 = *Cassis* Lamarck, 1799 not Klein 1734 = *Casida* Humphrey 1797, error typogr., non *Cassida* Lang 1722, nec Linn. 1735, nec Gevers. 1787 = *Cassisoma* Rovereto 1899." Type, by original designation, *Buccinum cornutum* Lin.
1909. *Cassis* Dall, and most recent authors.

Huge massive shells with planate spire, regularly variced, mouth elongate, narrow, contracted, inner lip wrinkled, outer lip recurved, flattened, swollen medially with a dozen long denticles, minute umbilicus; canal recurved into an upturned snout. Sculpture punctate or smooth, more or less nodulose.

The somewhat complex synonymy here displayed needs a little explanation. Malacological systematists are indebted to Dr. W. H. Dall for the elucidation of the majority of problems, and as a general rule his results have been accepted without criticism. In the present case, though his conclusions are valid, some of the arguments presented need emendation, and the facts are here reviewed. Dall⁷ discussed the names proposed in this family and admitted two genera, *Cassis*, and *Phalium*. He referred *Cassis* to the authority of Scopoli, and noted that Scopoli's assemblage was very similar to that of Klein, whose introduction of the name *Cassis* was pre-Linnean. As a matter of fact, Scopoli

⁷Dall—U.S. Geol. Survey, Prof. Paper, 59, 1909, pp. 57-69.

acknowledges the genus as that of Klein. Dall then utilised *Phalium* Link for the shells typified by *Buccinum glaucum* Linné, but included as a subgenus, "*Cassidea* (Bruguière) Swainson" explaining "*Cassidea* Bruguière, *Encycl. Meth.*, I, pp. xv (1789), 414 (1792); new name for *Cassis* Klein (*cf.* p. 416, col. 1): first species, *Buccinum vibex* L. *Cassidea* Swainson, *Malac.*, p. 299, 1840; type, *Cassis vibex* L." For this conclusion details were furnished thus: "In the matter of names for the divisions of *Phalium* it may be noted that the *Cassidea* of Bruguière was proposed as a substitute for *Cassis* Klein 1753, not 1734, and *Cassis* Klein contained none of the typical genus *Cassis*, so *Cassidea* Bruguière cannot be used for the latter. *Cassidea* was a heterogeneous group until Swainson fixed on *C. vibex* to typify it in 1840. As the first section of *Bezoardica* Schumacher was already a synonym of *Phalium*, the name can be retained for the second section for which the much later name of *Semicassis* Mörch has been frequently used." If this were accepted as written, the Rules demand the usage of the earlier name *Cassidea* in place of *Phalium*, and I so used that name when introducing my species *C. royana*. Later, re-investigating the matter, I advised Hedley to use *Phalium*, which he did, but the reasons have not previously been published by either of us. The facts are as follows.

Bruguière introduced the genus name *Cassidea* for the genus *Casque*, but the diagnosis only was published in 1789. In 1792 on page 414, as cited by Dall, the genus was fully dealt with, and on page 416 Bruguière gave his reasons: "Bonanni est le premier qui aie trouvé quelque ressemblance à ces coquilles avec la forme d'un casque, & qui les aie nommées par cette raison *Cochleæ galeæformes*. Les autres Conchyliologistes adoptèrent dans la suite cette première idée de Bonanni, dont est venu le mot générique de *Cochleæ cassidiformis* de Gualtieri, celui de *Cassis* de Klein, & le casque des Auteurs François. En adoptant cette dénomination Française, parce qu'elle est généralement reçue, je ferai un léger changement au mot latin de Klein, parce que s'il est utile d'indiquer l'analogie qu'on trouve entre le forme de ces coquilles & celle des casques des anciens guerriers, on ne doit pas cependant confondre sous un même nom latin les casques des guerriers, & des coquilles qui, à tout prendre, n'ont avec eux qu'une ressemblance très-éloignée." Further Bruguière states that his genus *Cassidea* does not coincide with that of Klein, being more comprehensive. In Bruguière's genus are included *vibex*, *glaucæ*, *rufa*, *cornuta*, etc., *i.e.*, all the species mentioned by Scopoli in his *Cassis* so that they are practically co-equal. Dall's argument that, because Klein's group contained no true *Cassis*, Bruguière's genus could not be used, is not valid, as the usage of a pre-Linnean name by a post-Linnean worker does not bind the latter to accept the sense of the earlier writer. This is clearly seen in Linné's own work, as he utilized many generic names in anything but the previous understanding. Dall's claim that *Cassidea* Bruguière was fixed by Swainson in 1840 is misleading. Its acceptance would necessitate the usage of *Cassidea* in place of *Phalium*, but the history of *Cassidea* obviates that necessity. Probably the first definite reviser was Link, who restricted *Cassidea* Bruguière to *rufa*, *cornuta*, *flammea*, etc., providing *Phalium* for *glaucæ* and others, a perfectly legitimate action. Previously, Cuvier and Bosc had followed

Bruguière in using *Cassidea* for the whole series, whereas Bolten and Lamarck have revived *Cassis* and this name was accepted by Montfort. *Cassidea* was independently proposed by Perry for a conglomerate series. Rafinesque introduced a novel emendation, *Cassinia* for “*Cassis* Brug.,” while Schumacher divided the group exactly as Link, of whose work he was probably ignorant, but used *Cassidea* and *Bezoardica*, the latter exactly equivalent to Link’s *Phalium*. Swainson then independently introduced *Cassidea* for the open-mouthed series of Helmet Shells, for which *Phalium* and *Bezoardica* were already in literature, but did not cite a species. This was remedied by Sowerby, who figured a specimen under the name *C. erinaceus*, which name he later altered to *C. glauca*, but the figure seems referable to neither. Then Swainson utilized *Cassidea*, still claiming the genus as his own, and included a large number of species, figuring, probably inattentively, *vibex*, but this figure cannot be construed in any way as a type selection. As a matter of fact Hermannsen definitely designated, as type of *Cassidea* Swainson 1840, *Cassis areola* Lamarck. As this is one of the series allotted to his genus by Swainson, this type designation is valid, and consequently Dall’s suggestion as to the type of *Cassidea* (Bruguière) Swainson cannot be confirmed.

An innovation which does not seem to have received careful consideration in recent years was that made by Stutchbury when he introduced *Cypraeacassis*, designating *Cassis rufa* as type.

CASSIS CORNUTA (*Linné*).

1758. *Buccinum cornutum* Linné, Syst. Nat., Ed. x, p. 735, based on Bonan. recur. 3, t. 155. Rumph. mus., t. 23, f. 1. Gualt. test., t. 40, f. D. “*Habitat*” in America.
1876. *Cassis cornuta* Brazier, Proc. Linn. Soc. N.S.W., i, p. 234. “Quite common throughout Torres Straits.”
1910. *Cassis cornuta* Hedley, Rep. Austr. Ass. Adv. Sci., Brisbane, 1909, p. 361. Queensland.
- Distribution*.—North Queensland; extra-limital.

CASSIS SPINOSA (*Meuschen*).

1781. *Buccinum spinosum* Meuschen, Zoophyl. Gronov., fasc. iii, Expl. to plates, Tab. xix, (fasc. iii, tab. ii), fig. 9, p. 302, no. 1344, index. “*Habitat* in America.”
1789. *Buccinum fasciatum* Bruguière, Ency. Meth. Vers., i, p. 247; whilst cited as a synonym by Tryon, is a species of *Tonna*. Not of Müller, Vermes, ii, 1774, p. 145.
1791. *Buccinum tessellatum* Gmelin, Syst. Nat., pt. vi, p. 3476, based on “Seba, mus., 3, t. 73, f. 1, 12, 13; Martin. Conch., 2, t. 36, f. 369, and t. 37, f. 374. Oceano australi.” Not of Martyn, Univ. Conch., iii, 1786, pl. 85.
1791. *Buccinum maculosum* Gmelin, Syst. Nat., pt. vi, 3476, based on “List. Conch., t. 997, f. 62. Hab. ?” Not of Martyn, Univ. Conch., i, 1784, pl. 8.
1791. *Buccinum rumpfii* Gmelin, Syst. Nat., pt. vi, 3491, based on “Rumpf. mus., t. 25, f. 3. Hab. ?”

1798. *Cassis coronata* Bolten, Mus. Bolten, pt. ii, 29, based on "*tessellatum* Gmel. pars = Martini, 2, t. 36, f. 369 and t. 37, f. 374."
 1840. *Cassis fasciata* Swainson, Treat. Malac. 299 (May), based on "Mart., 37, f. 384" (*recte* 374).
 1923. *Cassis rumpfii* Hedley, Rec. Austr. Mus., xiv, p. 47.

Distribution.—North Australia; extra-limital.

Remarks.—Hedley at the place quoted included this species under the name *C. rumpfii* Gmelin, but noted that the earliest name was *Buccinum spinosum* Gronovius, 1781, which however had been rejected as non-binomial. Six months later there appeared an article by Dr. Dall⁸ entitled "F. C. Meuschen in the Zoophylacium Gronovianum" wherein the opinion, that this was not a binomial work, is retracted, and that therefore the names in Meuschen's index in this work are valid. Reference to the book itself confirms Dall's conclusions, as in the introduction it is definitely stated that the Linnean system was accepted, and consequently Meuschen's name is here used.

CASSIS FLAMMEA (*Linné*).

1758. *Buccinum flammeum* Linné, Syst. Nat., Ed. x, p. 736, based on "Bonan., recr. 3, t. 161, and Rumph. mus., t. 23, f. 2. Habitat?"
 1826. *Cassis flammea* J. E. Gray, Survey Intertrop. Coasts Austr. (King), ii, p. 485, "1827" = April 18, 1826.

This appears to be the only note of this well-known species in Australian literature, and as Tryon⁹ includes it from the West Indies only, citing East Indian localities as erroneous, it would appear to have no legitimate claim.

Genus NANNOCASSIS, *nov.*

The genotype, *Cassis nana* Tenison-Woods, is like a miniature *Cassis* but is much more solid, with the outer lip more closely and regularly denticulate, while the inner lip is finely wrinkled throughout its length, with no internal teeth, but a median groove on the anterior portion indicating the false umbilical canal.

NANNOCASSIS NANA (*Tenison-Woods*).

1879. *Cassis nana* Tenison-Woods, Proc. Linn. Soc. N.S.W., iv, p. 108. Moreton Island, Queensland.
 1899. *id.* Hedley, *ib.* xxiv, p. 434, fig. 6 in text. Ballina, N.S. Wales.
 1910. *id.* *id.* Rep. Austr. Ass. Adv. Sci., Brisbane, 1909, p. 361.
 1918. *id.* *id.* Check List, p. M. 67, in Journ. Proc. Roy. Soc. N.S. Wales, li (1918).

Distribution.—South Queensland; northern New South Wales.

⁸Dall—Nautilus, xxxvii, Oct., 1923, pp. 44, *et seq.*

⁹Tryon—Man. Conch., vii, 1885, p. 271.

NANNOCASSIS TORVA *Iredale* 1927.

A very distinct dead shell was collected at Caloundra, South Queensland, by Mr. Nicholson, which proved to be a new species closely related to *Nannocassis nana*. It differs in its larger size and persistent longitudinal and spiral sculpture, and will be figured in a later publication.

Genus HYPOCASSIS, *nov.*

As genotype of this group *Cassis bicarinata* var. *decrensis* Hedley is selected, the two species, *Cassis bicarinata* Jonas, and *Cassis fimbriata* Quoy and Gaimard, having been introduced without definite locality. While this group superficially resembles *Cassis*, the fact that it has a long lineage in the south of Australia deserves a peculiar nomination. Thus three fossils have been described, and, though these are of some age, they show little variation from the living species. Medium to large medium shells with many varices present, spine very short, whorls strongly shouldered and nodulose, additional nodular rows present, mouth narrow, outer lip thickened, folded back, internally faintly denticulate with few teeth, columella nearly straight, widely reflected over the body whorl, false umbilicus narrow but open, umbilical cavity present.

HYPOCASSIS FIMBRIATA (*Quoy and Gaimard*).

1833. *Cassis fimbriata* Quoy and Gaimard, Voy. Astrol., Zool., ii, p. 596, pl. xliii, figs. 7-8. Mariannes (error) = Western Australia.

1923. *Cassis fimbriata* Hedley, Rec. Austr. Mus., xiv, p. 46, pl. viii, fig. 2. North Western Australia.

Distribution.—Western Australia.

Remarks.—At the place cited Hedley has distinguished between the Western Australian shell and the South Australian one, regarding the former as the true *fimbriata*. His conclusions are here accepted with reserve, as the few additional specimens examined suggest intergradation, and that the differential values are less than specific.

Cassis exigua was described by Tenison-Woods¹⁰ from a juvenile shell, and refigured from adult specimens compared with type from the lower beds of Muddy Creek by Tate,¹¹ who declared: "Resembles *C. fimbriata*, recent in Southern Australia, from which it differs particularly by the spiral sculpture." West Australian shells of the recent *C. fimbriata* retain the spiral sculpture which characterizes the immature stages, but there are fifteen nodules on the angle of the body whorl whereas the fossil is described and figured with only twelve. Consequently, the fossil appears to be strictly related.

Cassis textilis was introduced by Tate¹² and later figured¹³ from the calciferous sandstones of the River Murray cliffs near Morgan, and sand-rock from Cheltenham, Port Phillip Bay. Tate observed "differs in shape from the recent *C. fimbriata*, and its fossil representative, *C. exigua*, by being more ventricose, and by its longer spire. Its spiral ornamentation and triple row of tubercles further distinguish it from *C. fimbriata*."

¹⁰Tenison-Woods—Proc. Linn. Soc. N.S.W., iv, 1879, p. 17, pl. ii, fig. 7.

¹¹Tate—Trans. Roy. Soc. S. Australia, xi, April, 1889, p. 164, pl. vii, fig. 13.

¹²Tate—Trans. Roy. Soc. S. Australia, v, 1882, p. 45.

¹³Tate—*Ibid.*, xi, Apl., 1889, p. 165, pl. xii, fig. 11.

The latter has spiral sculpture, and sometimes three rows of nodules so that this fossil would also appear closely related.

Semicassis trinodosa was contrasted by its describer Tate¹⁴ with a recent tropical West American shell, but as it was fossil at Bairnsdale, Gippsland, the figure suggests that comparison should have been with this kind of shell.

HYPOCASSIS BICARINATA (*Jonas*).

1839. *Cassis bicarinata* Jonas, Archiv. Naturg. (Wiegmann), Jahrg. v, Bd, i, p. 343, pl. x, f. 2. "China," error = South Australia.

1923. *Cassis bicarinata* Hedley, Rec. Austr. Mus., xiv, p. 46, pl. viii, fig. 1. S.A.

var. *decrensensis* id. ib., Kangaroo Island (refers to *Cassis fimbriata* Kiener, Coquilles Vivants, 1835, p. 12, pl. iv, fig. 6 for illustration).

Distribution.—South Australia, Victoria, south Western Australia.

Remarks.—Hedley regarded the large South Australian shell known as "*fimbriata*" as a distinct species for which he used the above name. More material is needed to determine the exact relationship, as there seems to be much variation in connection with the present form.

Genus CYPRAECASSIS *Stutchbury*.

1837. *Cypraecassis* Stutchbury, Mag. Nat. Hist. (Charlesworth), i, p. 214.

Type, by original designation, *Cassis rufa*.

This genus is non-varicose save for the outer lip, which is thick and reflected, swollen throughout its length, and posteriorly developed into a pronounced canal reaching above the planate spire; the inner lip is developed into a heavy flange, finely wrinkled throughout its length, wrinkles more prominent internally, but not forming strong teeth. The juvenile grows quite differently from that of typical *Cassis*, being more like a young *Cypraea*.

CYPRAECASSIS RUFa (*Linné*).

1758. *Buccinum rufum* Linné, Syst. Nat., Ed. x, p. 736, based on "Rumph. mus., t. 23, f. B; Barrel. rar. 1325, f. 29; Gualt. test., t. 40, f. E.; Kratzenst. Regenf., t. 12, f. 69." Habitat "in Oceano Americano."

1797. *Cassida os-tauri* "Humphrey," Museum Calomnianum (May 1), p. 19. New name for *Buccinum rufum* Linn.

1911. *Cassidea rufa* Shirley, Proc. Roy. Soc. Queensland, xxiii, p. 98 (Murray Island).

Distribution.—North Queensland: extra-limital.

Genus PHALIUM *Link*.

1807. *Phalium* Link, Besch. Nat. Samml., Rostock, pt. 3, p. 112: for part of "*Cassis* Brug., Bolt.," includes *glaucum*, *areola*, etc. Type, *B. glaucum*, Linn.

¹⁴Tate—Trans. Roy. Soc. S. Australia xi, April, 1889, p. 167, pl. vii, fig. 12.

1817. *Bezoardica* Schumacher, Essai nouv. Syst. Vers. test., pp. 75 and 248. Type, by virtual tautonymy, *B. vulgaris*=*B. glaucum* Linn.
1835. *Cassidea* Swainson, Elem. Mod. Conch., p. 18 : diagnosis only.
1839. *Cassidea* Sowerby, Manual Conch. 1st ed., p. 20, as of Swainson. Type, by monotypy, *C. erinaceus*, fig. 411.
1842. *id.* *ib.* 2nd ed., p. 99 : same figure used, but name changed to *C. glauca* in text, but not in Expl. plate, p. 307.
- 1840 *Cassidea* Swainson, Treat. Malac., pp. 66 and 299 ; many species including *areola* and *vibex*, the last named figured.
1846. *Cassidea* Hermannsen, Index Malac., p. 192, as of "Swainson, 1840." Type designated, *Cassis areola* Linn.=*Bezoardica* Schum.
1852. *Cassidea* Hermannsen, Index Malac. Suppl., p. 25, as of "Swains. 1835, Elem.=*Phalium* Link."

Medium sized shells, oval, spire about half length of aperture, acuminate, varices present, mouth rather narrow, outer lip folded back and internally denticulate generally, prickly anteriorly, false umbilicus open, umbilical chink or perforation present.

The species are very similar, yet easily differentiated by means of coloration, thus :

Dull bluish grey ; shoulder plicate ; anterior prickles on outer lip pronounced	<i>glaucum</i>
White with five bands of large red square spots ; shoulder not angulate nor plicate ; anterior prickles on outer lip obsolete.....	<i>areola</i>
Bluish with five indistinct reddish bands ; shoulder angled and coronate ; spire more elate ; anterior prickles on outer lip subdued	<i>bandatum</i>
White ; shoulder not angulate, closely plicate ; anterior prickles on outer lip obsolete	<i>agnitum</i>

PHALIUM GLAUCUM (Linne).

1758. *Buccinum glaucum* Linné, Syst. Nat., x, ed., p. 737, based on "Rumph. mus., t. 25, f. A. ; Gualt. test., t. 40, f. A." "Habitat in O. Asiatico."
1786. *Buccinum galea-ferrea* Martyn, Univ. Conch., pt. iii, 1786, pl. xci, right hand fig. China.
1797. *Cassida bezoar* "Humphrey," Museum Calonianum (May 1), p. 19. New name for *Buccinum glaucum* Linné.
1817. *Bezoardica vulgaris* Schumacher, Essai nouv. Syst. Vers. test., p. 248. New name for *Buccinum glaucum* Linné.
1910. *Cassidea glauca* Hedley, Rep. Austr. Ass. Adv. Sci., Brisbane, 1909, p. 361. Queensland.
1911. *Cassidea strigata* Shirley, Proc. Roy. Soc. Queensland, xxiii, p. 98 : juvenile.

Distribution.—North Queensland ; extra-limital.

PHALIMUM AREOLA (*Linné*).

1758. *Buccinum areola* Linné, Syst. Nat., x, ed., p. 736, based on "Bonan. recr. 3, t. 154. Rumph. mus., t. 25, f. 1, B. 2. Gualt. test., t. 39, f. H, G. Argenv. conch., t. 18, f. I." "Habitat in M. Mediterraneo."
1873. *Semicassis (Phalium) areola* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 837. N.S. Wales.
1910. *Cassidea areola* Hedley, Rep. Austr. Ass. Adv. Sci., Brisbane, 1909, p. 361. Queensland.
1918. *Phalium areola* Hedley, Check List, p. M. 67, in Journ. Proc. Roy. Soc. N.S. Wales, li (1917). N.S. Wales.

Distribution.—Queensland; New South Wales; extra-limital.

PHALIMUM BANDATUM (*Perry*).

1811. *Cassidea bandata* Perry, Conchology, pl. xxxiv, fig. 2. East Indies.
1825. *Cassis coronulata* Sowerby, Cat. Shells, Tankerville, app., p. xx; no locality cited.
1873. *Semicassis (Phalium) coronulata* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 838. N.S. Wales.
1910. *Cassidea coronulata* Hedley, Rep. Austr. Assoc. Adv. Sci., Brisbane, 1909, p. 361. Queensland.
1917. *Cassis coronulata* Odhner. K. Sv. Vet. Akad. Handl., lii, 16, p. 11; Broome, north-western Australia.
1918. *Phalium coronulatum* Hedley, Check List, p. M. 67, in Journ. Proc. Roy. Soc. N.S. Wales, li (1917). N.S. Wales.

Distribution.—Queensland; New South Wales; north-western Australia: extra-limital.

This well-known species was first figured and described by Perry. The illustration is easily recognisable, while the description gives the diagnostic features of the species.

PHALIMUM AGNITUM, *sp. nov.*

(Plate xxxii, fig. 10.)

Shell small, ovate, thin but strong, spire short, acute, about one third the length of the body whorl, heavily variced, a varix at two thirds the length of a whorl for the last three whorls, aperture narrowly ovate, attenuate posteriorly, sculpture on early whorls reticulate, body whorl spirally sulcate and longitudinally striate. Coloration white. Apical whorls worn down, six adult whorls remaining, earlier ones spirally ridged, slender threads longitudinally over-riding these with a slight slant backwards; the ridges strengthen into three prominent ones, but there is only a slight tendency to shoulder. In the antepenultimate the longitudinals become stronger and a spiral thread appears above the shoulder; on the penultimate two spiral threads are seen, and on the last whorl five or six similar threads occur above the shoulder, but below these are replaced by fine sulci, which number about thirty, the base of the whorl showing every alternate one much broader. These are over-ridden by about thirty, slanting, fine longitudinal lirae which form squarish nodules on the shoulder but fade away as they approach the base; half a dozen are crowded together just behind the varix. Canal very recurved and

preceded above by a deep gutter, running into the false umbilicus, which is choked by the preceding varix. Columella nearly straight, finely wrinkled throughout, wrinkles emphasized anteriorly, where they continue on to the much expanded inner lip; this reflection does not coalesce with the recurved canal, but is distinctly separated. Outer lip slightly sinuated medially, variced and heavily reflected, a deep ditch outside, internally twenty longitudinal ridges, sharp and separated, run into the mouth a little way; posteriorly a few dots are intercalated.

Dimensions.—Length 55 mm., breadth 35 mm.

Distribution.—Western Australia.

Remarks.—This species resembles *Cassis exarata* Reeve¹⁵ but differs in smaller size, less nodulation on early whorls and shoulder, and presence of longitudinal lirae, and lacks the color scheme of Reeve's species.

Genus XENOPHALIUM, *nov.*

This name is introduced with the species here described as *X. hedleyi* as type, a second member being the species described by me as *Cassidea royana*.¹⁶

The large size with the open unarmed mouth characterizes the group, which may include *Cassis (Bezoardica) wyvillei* Watson,¹⁷ which was described from the Philippine Islands, where it was dredged in 100-115 fathoms. The illustration is suggestive, and this alliance is reinforced by the fact that Brazier¹⁸ has recorded the species from Makeira Harbour, San Cristoval, Solomon Islands, an intermediate locality.

XENOPHALIUM HEDLEYI, *sp. nov.*

(Plate xxxi, figs. 4-5.)

Shell very large for the series of Helmet Shells with open mouths, thin, globose oval, spire exerted rather acutely, whorls shouldered, body whorl twice the length of the spire, aperture elongate oval, sculpture of nodules on the shoulder above concentrically striate. Coloration creamy white, longitudinally flamed with orange brown, irregularly arranged as bands, which appear with a purplish tinge on the varix of the outer lip.

Apical whorls slightly damaged, but apparently of the smooth normal Cassid type; succeeding whorls, seven in number, sculpture beginning as concentric striae, shoulder minutely nodulose, slanting growth lines over-riding the striae. This sculpture persists for two more whorls, then the striae fade away below the shoulder, on which the nodules become more prominent and more widely spaced, while the concentric striae broaden above the shoulder. On the last whorl the postsutural striations are obsolete, the body whorl practically smooth, only large peripheral nodules present. On the antepenultimate whorl fifteen closely packed striae can be counted above the shoulder, none below, but on the preceding whorl ten impressed striae can be counted below the shoulder,

¹⁵Reeve—Conch. Icon., v, 1848, pl. xii, sp. and f. 32, Sept. Locality unknown. Mus. Cuming.

¹⁶Iredale—Proc. Malac. Soc. (Lond.), xi, 1914, p. 179, fig. in text.

¹⁷Watson—Zool. Rep. Challenger, xv, 1885, p. 408, pl. xiv, f. 13.

¹⁸Brazier—Proc. Linn. Soc. N.S. Wales, (2), viii, 1893, p. 43.

which is ornamented with twenty nodular projections, this number being reduced to twelve on the body whorl, where they are bolder and continue downwards a little as distinct elevated ridges.

The outer lip is recurved but not strongly folded back, an open channel being present behind; this may be due to age. The columella is doubly twisted, a distinct gap being observed between the columellar curve and the reflected area, which is quite smooth. The columellar lobe proceeds backwards so that only a chink is left open, the inner lip continuing across the shell as a fine glaze only. At the tip of the canal there is a minute umbilical perforation. Canal short, recurved, a narrow ill-marked gutter dividing it from the body whorl, this gutter continuing into the false umbilicus.

Dimensions.—Length 151 mm., breadth 92 mm.

Distribution.—5 miles off Kiama, New South Wales, in 70 fathoms. (Captain J. W. Smith).

Remarks.—Separated from *C. royana* Ire. (*supra*) by its tenuity, its less exert spire, its more numerous and less bold nodulation, and less swollen body whorl.

Genus SEMICASSIS Mörch.

1852. *Semicassis* Mörch, Cat. conch. Yoldi, pt. i, p. 112, *ex* Klein, species included, *japonica* Reeve, *saburon* Ad., etc. Type, by subsequent designation, Harris, Cat. Tert. Moll. B.M., pt. i, 1897, p. 198, *Cassis japonica* Reeve; by Cossmann, *Essais de Paleconch. comp.*, livr. 5, 1903, p. 125, *Buccinum saburon* Linné.
1888. *Faurotis* Jousseau, Mem. Soc. Zool. France, i, p. 188. Type, by original designation, *F. faurotis*, id., Red Sea (and *F. bisulcata* Sow. (*Cassis*)); there is no such species, but there is a *bisulcata* Schubert and Wagner).
1890. *Echinophoria* Sacco, Mem. del. Real. Accad. Sci. Torino, (2), xi, (I. Moll. test. tert. Piemonte and Liguria, pt. vii), p. 39, for *E. isselii* Sacco, and *Bucc. intermedium* Brocchi. (Cf. Cossmann, *loc. cit.*, who cites as synonym of *Semicassis*.)
1909. *Bezoardica* Dall, U.S. Geol. Survey, Prof. Paper 59, p. 62. (Not of Schumacher.)

As already shown, *Bezoardica* Schumacher is an absolute synonym of *Phalium*, being coequal and having the same type by virtual tautonymy and also by designation. Dall suggested that as two sections had been provided at its introduction, and as the first section was typified by the type of *Phalium*, the name could be transferred to the second section, and thus displace *Semicassis*, a conclusion that does not need discussion.

Faurotis was introduced by Jousseau for a shell from the Red Sea, which he described under the name *F. faurotis*, but did not figure. The only clue he gave was that *F. bisulcata* (Sow.) (*Cassis*), was closely related. There is only one *bisulcata* in *Cassis*, that belonging to this series, and the authority is Schubert and Wagner.

Echinophoria of Sacco was synonymised by Cossmann with *Semicassis*, as he considered that the nodulose species intergraded with non-nodulose ones, but this is not found in connection with the recent species. The recent *Casmaria torquata* Reeve does not appear to be related.

SEMICASSIS DIUTURNA, *sp. nov.*

(Plate xxxii, fig. 9.)

1873. *Semicassis saburon* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 837. Northern New South Wales.
1876. *Semicassis pila* Brazier, Proc. Linn. Soc. N.S.W., i, p. 234. Darnley Island, Torres Strait, 20 fathoms.
1885. *Cassis saburon* var. *pila* Tryon, Man. Conch. (i), vii, p. 275. China; Philippines; Australia.
1885. *Cassis (Semicassis) pila* Watson, Zool. Rep. Challenger, xv, p. 407. Port Jackson, N.S. Wales, 2-10 fath.; West of Cape York, Station 188, 28 fathoms; Philippine Islands, 12-20 fathoms.
1910. *Cassidea pila* Hedley, Rep. Austr. Ass. Adv. Sci., Brisbane, 1909, p. 361. Queensland.
1918. *Phalium pila* Hedley, Check List, p. M. 67, in Journ. Proc. Roy. Soc. N. S. Wales, li (1917). N.S. Wales.

Shell medium for the group, ovate, thin, spire short, less than half the length of the body whorl, whorls not shouldered nor tabulate, sculpture consisting of closely packed, flattened, concentric ridges, aperture rather narrowly ovate.

Coloration dull white, four or five concentric rows of yellow squarish blotches may be seen indistinctly on the body whorl. Apical whorls worn, succeeding whorls five in number, the earliest one showing five flat-topped ridges with slanting longitudinal threads between, the succeeding whorls having more ridges and the threads becoming less distinct, so that on the body whorl the narrow intervals between the ridges appear to be punctate only. Ten ridges can be counted on the penultimate whorl, and thirty-five ridges on the body whorl. Canal short, recurved, a very narrow, deep, well-defined gutter behind it, travelling into the deep, narrow, false umbilicus, while the termination of the canal itself bears a rather wide perforation, the tongue-like process being sculptured as the main shell. Columella nearly straight but strongly wrinkled, wrinkles broken towards the edge of the columellar lobe, which is nearly straight and thickened. Inner lip extending on to the body whorl, and appearing as a thick glaze reaching across to the outer lip in senile examples. Outer lip descending rather steeply and meeting the canal directly below the columella, and bearing twenty to twenty-five prominent elongate teeth fairly evenly spaced, a little crowded anteriorly.

Dimensions.—Length 69 mm., breadth 47 mm.

Distribution.—Port Stephens (type), Nambucca Heads, New South Wales; Stradbroke Island, Caloundra, Forsyth Island, Cape Sidmouth, Queensland.

Remarks.—Specimens from Anson Bay, Northern Territory, and Cape Sidmouth, Queensland, differ in their smaller size, narrower build, and heavier varix on the outer lip, the lirae also being fewer in number and consequently broader. These may represent a distinct species. In the latter specimen the apex is preserved and is of the normal, many-whorled, smooth Cassid type. Specimens from Forsyth Island have slightly narrower mouths but similar narrow ribs, while from New Guinea two distinct forms have been sent, one like the present one, the other boldly

marked with yellow square blotches, the body whorl smoother, the mouth more cramped, the varix very heavy.

As the name *Phalium pila* Reeve has been used for this species the status of that name must be discussed. In August, 1848, Reeve¹⁹ included *Cassis saburon*, citing "Le Saburon Adanson. *Cassidea saburon* Brug., Lam., etc.," for a species from "Japan (on the sands) Dr. Siebold," commenting "Martini has a very excellent figure of this species (Conch. Cab., vol. 2, pl. 34, f. 350), referred to by Lamarck under the head of *C. granuloseum* (*C. inflatum*), and the figure in a vignette, f. 1, 2 at p. 10 of the same work, to which Mr. Deshayes refers for *C. saburon*, appears to correspond with one not hitherto described, which I propose to distinguish by the name *C. pila*." Martini (p. 30) noted that the largest specimens came from the West Indies, the most beautiful specimens from Ceylon, while some came from the Mediterranean. In the following month Reeve figured and described his new species *C. pila* from China, but the name must be considered in connection with the earlier usage, and West Indies being selected as the type locality, the name cannot possibly be used for the present species.

As an alternative name *C. bisulcata* Schubert and Wagner has been suggested, but this is also unacceptable. These authors²⁰ described their species as "laevi"; "anfractibus margine superiore bisulcata," quoting also "List. Tab. 1012, fig. 76," while their own figures show a more globose shell, differently coloured to the Australian species. No locality was known, and the citation of Lister again suggests the West Indian species. As a matter of fact, the figures of the succeeding species, *C. pomum*, f. 3084-3058, resemble more our species, but the words "crassa," "columella inferne interrupta rugosa," and the heavy columellar reflexion indicate the West Indian species.

Genus CASMARIA H. and A. Adams.

1853. *Casmaria* H. and A. Adams, Gen. Rec. Mollusca, i, p. 216, for, *achatina*, *pyrum*, *vibex*, etc. Type, by subsequent designation, Harris, Cat. Tert. Moll. Brit. Mus., pt. i, 1897, p. 200. *Buccinum vibex* Linn. (Type, by Cossmann, Essais de Paléonconch. livr. 5, 1903, p. 127: *pyrum* Lam.)
1888. *Casmeria* Jousseau, Mem. Soc. Zool. France, i, p. 190. Type, by monotypy, *Cassis torquata* Reeve.

Small, including the smallest shells for the group, with the mouth somewhat open, but, sometimes with the outer lip scarcely variced, or a very heavy varix is formed; in each case prickles are formed anteriorly, sometimes for the full length of the lip, rarely are they obsolete. Some forms are smooth, others are nodulose; the false umbilicus closed.

CASMARIA ERINACEUS (*Linné*).

1758. *Buccinum erinaceus* Linné, Syst. Nat., Ed. x, p. 736, based on "Rumph. mus., t. 25, f. 7. Gualt. test., t. 39, f. I. D. Argenv. conch., t. 17, f. G. Habitat in O. Americano."

¹⁹Reeve—Conch. Icon., v, 1848, pl. v, sp. and fig. 11.

²⁰Schubert and Wagner—Conch. Cab. (Martini and Chemnitz), xii, p. 68, pl. 223, fig. 3081-3082.

1798. *Cassis denticulata* Bolten, Mus. Bolten, pt. ii, p. 32, based on "Martini, 2, t. 35, f. 363."
 1817. *Buccinum meles* Dillwyn, Descr. Cat. Rec. Shells, ii, p. 599, ex Solander MS., based on "Martini ii, t. 35, fig. 363."
 1848. *Cassis vibex*, var. *B.*, Reeve, Conch. Icon., v, Cassis, pl. vii, figs. 15 a and d.

Distribution.—North Queensland; extra-limital.

Remarks.—The relationships of the species of *Casmaria*, as here restricted, are puzzling, and their nomination is entangled. Thus Linné published two species of *Buccinum* in the 10th edition of his "Systema Naturae," the first named *erinaceus*, being based on three references all referring to a nodulose shell, while succeeding was another species, *vibex*, in connection with which five figures were cited, the first, a somewhat indeterminate nodulose shell, the others all relating to a smooth one. For many years these have been regarded as being variations of one species, commonly known as *vibex*, and when the variety was named it was quoted as "*vibex* var. *erinaceus*." This was quite wrong, the legitimate form to be used being reversed, but here the forms are regarded as distinct species; if they are lumped the specific name must be *erinaceus*.²¹

When Hanley commented on the Linnean species he stated that the shells in the Linnean cabinet agreed with the conventional interpretation, but curiously enough he referred to this species as *Cassis vibex* var. *erinaceus*, and added "I do not consider the *Cassidea erinaceus* of Bruguière identical; it is the *B. biarmatum* of Dillwyn (Schröter, Einl. i, pl. 2, f. 9, Seba, pl. 53, f. 11, 29), and judging from the figure in the Conchologica Iconica (Cas. f. 1 c.) the plaited form of the *C. torquata* of Reeve." The larger smooth shell with a thin outer lip contrasts strangely with the smaller, more solid, nodulose, shell with a very crass outer lip, and the latter would be called *erinaceus*, which has priority, while the smooth shell, variety or species, would bear the name *vibex*. When Hedley included *vibex* in the Queensland list he regarded these as varieties only, and the specimens before him were of the *erinaceus* type, but this Museum has since received specimens from Darnley Island which are typical *vibex*, so that Brazier's record from that locality would be also of that type.

CASMARIA VIBEX (Linné).

1758. *Buccinum vibex* Linné, Syst. Nat., Ed. x, p. 737, based on "Bonan. recr. 3, t. 152 (seminodulose). Rumph. mus., t. 25, f. E, 8, 9 (smooth); Gualt., test., t. 39, f. L. F (smooth); Argenv. conch., t. 17, f. H (smooth); Kratzenst. Regenf., t. 10, f. 40 (smooth). Habitat ad Jamaicam."
 1797. *Buccinum panthera* Solander, Humphrey, Museum Calonianum (May 1), p. 19. ?New name for *Buccinum vibex* Linné.
 1798. *Cassis glabra* Bolten, Mus. Bolten, pt. ii, p. 32, based on "List. 1013, f. 77."
 1876. *Casmaria vibex* Brazier, Proc. Linn. Soc. N.S. Wales, i, p. 234. Darnley Island, Torres Strait, 5 fathoms, sandy mud.

²¹Linné—Syst. Nat. Ed., x, 1758, p. 736, based on "Rumph. mus., t. 25, f. 7. Gualt. test., t. 39, f. I. D. Argenv. Conch., t. 17, f. G. Habitat in O. Americano."

1910. *Cassidea vibex* Hedley, Rep. Austr. Ass. Adv. Sci., Brisbane, 1909 p. 361 (part). Queensland.

Distribution.—North Queensland; extra-limital.

CASMARIA PONDEROSA (*Gmelin*).

1791. *Buccinum ponderosum* Gmelin, Syst. Nat., pt. vi, 3477; based on "List. Conch., t. 1016, f. 74." Habitat ?
1791. *Buccinum nodulosum* Gmelin, Syst. Nat., pt. vi, p. 3479; based on "Schroet. Einl. in Conch., i, p. 383, t. 2, f. 9." Habitat ?
1807. *Phalium quadratum* Link, Besch. Nat. Samml. Rostock, iii, p. 113, based on "Conch. Cab., ii, pl. xxxviii, fig. 385-386."
1817. *Buccinum biarmatum* Dillwyn, Descr. Cat. Rec. Shells, ii, p. 599; new name for *B. nodulosum* Gmelin, supra.
1817. *Buccinum pantherina* id. ib. ex Solander MS., for Martini, Conch. Cab. iii, t. xxxviii, f. 383-386.
1848. *Cassis torquata* Reeve, Conch. Icon., v, sp. and fig. 1, pl. i, August, 1848. New Holland.
1873. *Semicassis (Casmaria) torquata* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 838, May, 1873. Macleay River, N.S. Wales.
1910. *Cassidea nodulosa* Gmelin, var. *torquata* Hedley, Rep. Austr. Ass. Adv. Sci., Brisbane, 1909, p. 361. Queensland.
1918. *Phalium torquatum* Hedley, Check List, p. M. 67, in Journ. Proc. Roy. Soc. N.S. Wales, li (1917). N.S. Wales.

Distribution.—Queensland; New South Wales; extra-limital.

Remarks.—Here again a smooth and a nodulose form are known, but in this case they seem to be inseparable and are commonly found together. They do not appear to be easily distinguished from *C. erinaceus* save by their smaller size and denticulate outer lip. Commonly known as *C. torquata* Reeve, that name seems to have little claim on the score of priority alone. It may be that geographical variation exists, but such has not yet been determined.

The name here utilized appears to have been neglected, but it is based on an easily recognizable figure showing the salient features of the species. Gmelin introduced the name, *B. nodulosum*, for Schroeter's figures, and Dillwyn altered the name to *biarmatum* as there were two species named *nodulosum* by Gmelin, but he preserved the wrong one. When Dillwyn made the emendation, he observed "it may be at once known by its having the inside as well as outside of the outer lip muricated." This is the very feature emphasized by Lister and recorded by Gmelin for his *ponderosum*, which Dillwyn allotted to *erinaceus*. In 1823 Dillwyn referred to this association with some doubt.

Hanley referred to Dillwyn's species as "the plaited form of the *C. torquata* Reeve," and Hedley catalogued the smooth form as *C. nodulosa* var. *torquata*. However, the smooth and nodulose forms were figured in Martini's "Conchylien Cabinet," Bd. ii, where on t. xxxviii, figs. 383-4, are nodulose, and figs. 385-386 are smooth. To the latter, Link assigned the name *quadratum* and Mörch²² made use of this citing *torquata* as a synonym. Consequently, if the variety be recognized by name it would be called *C. ponderosa* var. *quadrata*.

²²Mörch—Catalogus Conchyliorum Yoldi, 1852, p. 112.

Genus XENOGALEA, *nov.*

This name is introduced for the species associated with *pyrum* and *labiata* in Neozelanic and southern Australian waters. Many species appear to have evolved in comparatively recent times and no series of fossils is yet known. They are characterized by their small to medium size, open mouth, rarely denticulate within, and short spire. The ornament of the juvenile is more or less reticulate, the adult more or less smooth, with sometimes a nodulous, or even a keeled, shoulder. The variation is not yet well understood as there appears to be geographical variation in only a slight degree, while little bathymetrical variation can yet be determined. Moreover, while the species are easily distinguished, specimens are met with that would suggest intergradation, which, however, does not occur. The genotype will be *Cassis pyrum* Lamarck as here interpreted.

XENOGALEA PYRUM (*Lamarck*).

(Plate xxxii, figs. 14, 16.)

1822. *Cassis pyrum* Lamarck, Hist. Anim. sans Verteb., vii, p. 226 August, 1822. “. . . les mers de la Nouvelle Hollande”=south Tasmania.
1835. *id.* Kiener, Coquilles Vivants, Casque, p. 39, pl. xiii fig. 25; not fig. 30, var.
1867. *Cassis pyrum* Angas, Proc. Zool. Soc. (Lond.), 1867, p. 197. New South Wales, Tasmania, New Zealand.
1873. *Semicassis (Casmaria) paucirugis* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 838. Merimbula, N.S. Wales.
1877. *Semicassis paucirugis* Angas, Proc. Zool. Soc. (Lond.), 1877, p. 183. Twofold Bay, N.S. Wales.
1889. *Cassis pyrum* Brazier, Proc. Linn. Soc. N.S.W., (2), iv, p. 747. Merimbula, N.S. Wales.
1900. *id.* Pritchard and Gatliff, Proc. Roy. Soc. Vic. (n.s.), xii, 1899, p. 189. April, 1900. Victoria.
1901. *Semicassis pyrum* Tate and May, Proc. Linn. Soc. N.S. Wales, xxvi, p. 373. Tasmania.
1924. *Phalium pyrum* Iredale, Proc. Linn. Soc. N.S. Wales (includes *paucirugis*, *nivea* and *tumida*), xlix, p. 254. N.S. Wales.

Shell medium, thin, solid, globose, spire very short, not attenuate, much less than half the length of the body whorl, whorls semi-shouldered, the shoulder more or less nodulose, sculpture of earlier whorls reticulate, aperture broad, reverse, ear-shaped, outer lip variced, not folded back, internally smooth. Coloration yellowish or brownish white, irregularly banded with squarish blotches of pinkish red of various shades, sometimes unicolor. Apical whorls normal, generally worn but clearly seen in immature specimens; adult whorls five, the earlier ones tabulately shouldered, a nodulose keel being present, fine spiral lines above, almost smooth below the keel. Slanting longitudinal threads cross the spirals causing a faint reticulation; the post-sutural lines persist on to the body whorl, where three to five are fairly prominent; the shoulder bears about sixteen well marked nodules. The body whorl smooth save for a few

spiral grooves around the base, though longitudinal slanting growth lines may also be discerned.

Canal short, recurved, preceded by a narrow gutter running into the false umbilicus, which is wide and open. Columella with a deep notch, sinuated posteriorly but almost smooth, and reflected into a strong, flattened, smooth lobe, expanding across the body whorl to the posterior angle of the aperture as a plate, and leaving no umbilical perforation anteriorly. Outer lip variced, recurved but not flattened, internally smooth.

Dimensions.—Length 56 mm., breadth 39 mm.

Distribution.—Tasmania, Victoria, southern New South Wales, New Zealand.

Remarks.—The Tasmanian specimen figured and described agrees very closely with Kiener's figure of the Lamarckian shell, and differs from the Neozelanic form of the species. A normal Tasmanian shell is also figured, the Neozelanic form being dealt with in an essay by Mr. H. J. Finlay which will appear in the "Transactions of the New Zealand Institute" almost simultaneously.

A little variation may be noted, the nodulose shouldering becoming sub-obsolete or even emphasized, while in rare cases, probably through injury, the outer lip may show a denticulate inner edge. It is a dweller in the shallow water adjoining the littoral, and is generally found as a dead shell washed upon beaches; it is also rarely trawled, the deeper water providing a related species.

Reeve's²³ interpretation of *Cassis pyrum* Lamarck was a very wide one, including *C. zeylanica* Lam., which he figured. The latter species had been carefully discriminated by Lamarck himself. Matters were more complicated by Tryon, who placed everything at sight under *achatina*, allowing *pyrum* varietal rank with *paucirugis*, *zealanica*, *striata*, and *nivea* as synonyms. Such action misled local workers, and has been a source of error ever since.

The true *pyrum* appears to have been collected by Peron and Lesueur, probably in south Tasmania, along with *C. semigranosa*, which was described at the same time. The curious recurrence of the species in Neozelanic waters is worthy of note, as otherwise it appears to be restricted to the Maugean Region, appearing outside only as a straggler, or new resident. Though fossil relatives are known in connection with the Neozelanic form, so far little direct knowledge is known of its forbears on the Australian continent.

As regards the South African forms, Bartsch²⁴ included *Cassis achatina* Lamarck, *Cassis zealanica* Lamarck, and *Cassis pyrum* Lamarck, but many years before, Martens²⁵ had introduced a *Cassis pyrum* var. *intercedens* for a form from Algoa Bay, though he also allowed *C. pyrum* and *C. achatina*.

The South African forms, though superficially resembling the Australian shells, are easily separable, and it may be worth notice that the Western Australian shells are quite unlike.

²³Reeve—Conch. Icon., v, September, 1848, pl. x, fig. and sp. 29, a, b, c.

²⁴Bartsch—U.S. Nat. Mus. Bull., 91, 1915.

²⁵Martens—Wiss. Ergebn. Deutsch. Tiefsee Exped., vii, 1903, pp. 54-56.

CASSIS TUMIDA *Petterd.*

1886. *Cassis tumida* Petterd, Pap. Proc. Roy. Soc. Tasm., 1885, p. 321.

The description reads "Shell thick, white, dull, globose, marked with a few prominent lines of growth; whorls, 5; rounded, minutely, regularly, transversely lirate; spire, small, short, rather acute, apical whorls, smooth, suture emarginate, callus deposit, thin, striate, and shining; aperture ovate, inflated; outer lip, sub-reflexed, and slightly prominently thickened outside. Long.—30 mill. Lat.—18 mill. Habitat.—Near River Leven (Miss Lodder)."

There is a specimen from Frederick Henry Bay, south Tasmania, presented by Mr. W. L. May, who has studied Petterd's type, and this, while agreeing with the description, proves to be an immature specimen of one of the species.

Pritchard and Gatliff²⁶ definitely state that *C. tumida* Petterd is a young immature shell of *pyrum*.

XENOGALEA STADIALIS (*Hedley*).

(Plate xxxi, fig. 3.)

1914. *Cassidea stadialis* Hedley, Biol. Results, F.I.S. "Endeavour," ii, February 2, 1914, p. 72, pl. x, fig. 4. Between Green Cape and Gabo Island, 50-100 fathoms.

1902. *Cassidea turgida* Hedley, Mem. Austr. Mus., iv. July 29, 1902, p. 340, pl. xxxvi, fig. 1. Off Wollongong, 55-56 fathoms and off Botany Bay, 79-80 fathoms, New South Wales, 100 mm. long.

1902. *Cassidea recurvirostrum* id. , ib. , p. 341, Off Cape Three Points, 41-50 fathoms, New South Wales, 50 mm. long.

1916. *Cassis achatina* var. *stadialis* Gatliff and Gabriel, Proc. Roy. Soc. Vict., xxix, (n.s.) p. 108, October, 1916. Dredged in Bass Strait.

1918. *Phalium stadiale* Hedley, Check List, p. M. 67 in Journ. Roy. Soc. N.S. Wales, li (1917), N.S. Wales.

This species has been well described so that the essential characters are here simply noted in connection with the variation now known. The species is a deep water relative of *pyrum*, not of *labiata*, and typically is very large and globose, without shouldering or nodulation.

It is now a well known inhabitant of the continental shelf of New South Wales, living in the deeper waters from 50-100 fathoms. In the depths between 25-50 fathoms a smaller form occurs, which has the last whorl shouldered, the shoulder semi-nodulose. In series trawled these are often met with together, inhabited by hermit crabs, so that they may represent different forms, the smaller shell being a direct relation of *pyrum*, the larger a more differentiated relative. Both are relations of *pyrum* through the characters of the columella, which differs in that species from that of *labiata*, to which the present species has been referred through a deceptive resemblance.

Besides the New South Wales localities, this species has been recorded from Bass Straits by Gatliff and Gabriel; two specimens from deep water between Gabo and Flinders Island belonging to the small form; while

²⁶Pritchard and Gatliff—Proc. Roy. Soc., Vict., n.s., xii, 1899 (April, 1900), p. 189.

another from off Devonport, north Tasmania, which, whilst agreeing with *stadialis* in shape, is more solid, and seems a direct shallow water form of the true *pyrum*. Still another shell from Tasmania, apparently a beach specimen, is superficially a large, smooth, unicolor *stadialis*, though just as certainly a *pyrum* form.

Many years ago Reeve²⁷ described *Cassis turgida* as a new species which Cuming had collected at the Island of Zebu in the Philippines, but observed "belonging to the same group as *C. achatina*, *vibex*, *torquata*." The same shell seems to have been figured by Sowerby in his "Conchological Manual," first edition, figure 411. The association of the species with the name *achatina* was sufficient to induce Tryon to regard it as a synonym, an erroneous conclusion.

Watson²⁸ recorded *Cassis (Casmaria) turgida* from the Admiralty Islands, north east of Papua, 16-25 fathoms, and probably through this reference Hedley used the name for an Australian species which he subsequently named *stadialis*.

XENOGALEA FINLAYI, *sp. nov.*

1924. *Cassidea stadialis* Finlay, Trans. New Zeal. Inst., iv, p. 525, pl. lii, figs. 3, a, b, c. Off Otago, New Zealand, 20 fathoms.

The shell figured and described by Finlay under the above name is easily separable from the Australian species by its more globose form, and is here named as a new species. The Neozelanic forms that have been confused under the names *pyrum*, *labiata*, *achatina*, etc., will be dealt with in a paper by Finlay to be published subsequently. I am anticipating this account only for the purpose of allotting the name of my friend and collaborator to this beautiful species as a mark of distinction and respect. The revolution in Neozelanic systematic conchology, now in progress, is mainly due to his enthusiasm and careful study of the recent and fossil forms in conjunction.

XENOGALEA THOMSONI (*Brazier*).

(Plate xxxii, figs. 6, 7.)

1875. *Cassis (Casmaria) thomsoni* Brazier, Proc. Linn. Soc. N.S. Wales, i, p. 8 (May, 1875). On sandy bottom, 45 fathoms, five miles due east of Sydney Heads ("Challenger.")

1889. *Cassis thomsoni* Whitelegge Journ. Proc. Roy. Soc. N.S. ., xxiii, p. 257. Off Port Jackson.

1902. *Cassidea pyrum* var. *thomsoni* Hedley, Mem. Austr. Mus., iv, July 29, p. 341, pl. xxxv, figs. (type) 2, 3. Off Cape Three Points, 41-50 fathoms. N.S. Wales.

1914. *Cassidea thomsoni* Hedley, Biol. Results, F.I.S. "Endeavour," ii, p. 73, February 2. Between Green Cape and Gabo Island, 50-100 fathoms. N.S. Wales.

1918. *Phalium thomsoni* Hedley, Check List, p. M. 67 in Journ. Roy. Soc. N.S. Wales, li, 1917. N.S. Wales.

Shell medium, thin, fragile, globose, spire short, attenuate, less than

²⁷Reeve—Conch. Icon., v, September, 1848, pl. x, sp. and fig. 25, a, b, c.

²⁸Watson—Zool. Rep. Challenger, xv, 1885, p. 409.

half the length of the body whorl ; whorls angulately shouldered, sculpture on early whorls finely reticulate, body whorl smooth, aperture large, broadly reverse ear-shaped, outer lip variced, varix recurved, internally with only faint indications of teeth.

Coloration pinkish fawn with spiral bands of square red brown blotches, darker colored on the shoulder.

Apical whorls smooth, first two almost planate, succeeding two rapidly increasing, globose and a little tilted ; succeeding whorls five, first adult whorl with half a dozen spiral ridges crossed by about fifty longitudinal slanting threads ; on third adult whorl a shoulder develops which on the next is crenulated by the threads, becoming obsolete on the last whorl. Above the shoulder the threads increase in number and the median ones in strength ; below the shoulder they become more distant and weaker, disappearing on the middle of the body whorl but remaining as ridges on the base. Generally on the last whorl below the shoulder a depression occurs and a second angulate ridge appears.

Canal short recurved, preceded by a rather broad gutter running into a fairly deep false umbilicus. Snout turned back but short, an umbilical chink present ; columella wrinkled, wrinkles more pronounced internally, eight notable ones being counted, continued on reflected expanded inner lip, which is sinuate and seen as a white glaze on body whorl. Aperture comparatively wide, anteriorly the outer lip is produced below the columella and with a full sweep joins the body whorl just below the angulate shoulder, internally the outer lip is smooth, a few denticles appearing with age.

Dimensions.—Length 49 mm., breadth 34 mm. Type. Length 56 mm., breadth 39 mm.

Distribution.—New South Wales : off Cape Three Points, off Sydney, off Botany Heads, off Montague Island, off Twofold Bay, off Green Cape, in water from 30 to 70 fathoms deep : on beaches at Broken Bay and Port Stephens.

Remarks.—Generally distributed on the continental shelf of New South Wales, this species occurs with *stadialis* but is a thinner shell. The type, here figured, is a small, strongly sculptured shell, so a normal adult specimen is also depicted.

XENOGALEA SOPHIA (*Brazier*).

(Plate xxxii, fig. 12.)

1872. *Cassis sophia* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 617, pl. xlv, f. 2, November 3. Near Grassy Head, mouth of Macleay River, New South Wales.

1873. *Semicassis (Casmaria) sophiae* Brazier, *ib.*, p. 838.

1910. *Cassidea pyrum sophiae* Iredale, Proc. Malac. Soc. (Lond.), ix, p. 71. Kermadec Islands.

1915. *Cassidea pyrum* Oliver, Trans. New Zeal. Inst., xlvii, 1914 (1915), p. 529. Kermadec Islands.

1918. *Phalium sophia* Hedley, Check List, p. M. 67 in Journ. Roy. Soc. N.S. Wales, li (1917). N.S. Wales.

Shell large for this genus, globose, thin, spire short, whorls tabulate, spire less than half the length of the body whorl, aperture oval, reverse

earshaped, sculpture of impressed lines only, the body whorl tending to smoothness. Coloration almost ivory white, ornamented with spiral rows of large square orange blotches, ten blotches to a row, five rows on body whorl, the lower two appearing only near varix where they are seen as bands on edge. Apical whorls worn down, five adult whorls present, the earlier sculpture being flattened ridges, two on the flattened shoulder, three below, these becoming more obscurely marked on the latter whorls. On the penultimate whorl one obsolete ridge is noticed below and there are two distinct ridges on the shoulder; the body whorl shows the continuation of these two, with the suggestion of a third, on the flattened shoulder. Below the shoulder half a dozen ridges are obscurely imaged through a smoothened surface, and basally another half dozen are seen well impressed.

Canal short recurved, the anterior gutter well defined and bounded by a raised edge as it enters the narrow false umbilicus; there is an open umbilical perforation.

Columella folded and irregularly wrinkled, the folds with a prominent ridge, eight wrinkles being counted on this area; columellar lobe very large, strongly reflected ending in a curve, and continuing as a thin glaze across the body whorl, the colour blotches showing through.

Outer lip anteriorly narrowed, then sweeping widely, almost joining the body whorl posteriorly at a right angle; varix reflected, but not folded over, and bearing internally eighteen elongate, somewhat distantly placed ridges, crowded a little anteriorly and becoming obsolete posteriorly.

Dimensions.—Length 79 mm., breadth 65 mm.

Distribution.—New South Wales, south Queensland, Kermadec Islands.

The type, here described and figured, came from the north coast of New South Wales, but there is in this Museum two specimens collected by Mr. G. Gross at Peel Island, Moreton Bay, south Queensland, which agree accurately. There is also a beautiful specimen trawled in 40-80 fathoms off Green Cape, New South Wales, by Captain J. W. Smith which agrees very closely, the mouth armature not being so pronounced, but this is a variable feature. I have recorded this species from the Kermadec Islands, and the worn specimen agrees very well, but shows no color blotches.

XENOGALEA NIVEA (*Brazier*).

(Plate xxxii, fig. 13.)

1872. *Cassis nivea* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 616, pl. lxiv, fig. 1, November 3, 1872. Macquarie Harbour, west coast of Tasmania.

Shell small, thin, globose, spire very short, whorls shouldered, aperture wide, earlier sculpture of spiral lines which disappear on the body whorl, where a double row of tubercles adorn the shoulder, outer lip recurved, but varix not well formed.

Coloration pure white, rather waxy, outer lip edged with yellow as is columella and part of body whorl in front of aperture.

Apical whorls worn, succeeded by four adult whorls, which show half a dozen spiral ridges on first two, longitudinals obsolete; on third whorl these are more distant and uneven, and obscure radials may be seen. The

body whorl has a flattened shoulder showing two elevated, round, spiral ridges, a third forming an angulate shoulder sharply cut by a dozen elongated, conical nodules, which do not appear until past the aperture and die away before they reach the outer lip. Below this appears a shallow excavation succeeded by a similar row of nodules; otherwise the body whorl is smooth and only obscure lines are seen basally.

Canal short, rather open, recurved, a broad gutter running into the deep open false umbilicus, but no umbilical chink is retained.

Columella wrinkled a little internally, two major folds present, inner lip expanded but quite smooth.

Outer lip effuse and rounded, thin, recurved but not variced.

Dimensions.—Length 51 mm., breadth 44 mm.

Distribution.—West coast of Tasmania, South Australia.

The type, which is somewhat immature, is described above, but adult shells are present in the Museum from Encounter Bay, McDonnell Bay, and Port Lincoln, South Australia, and these appear to be the species known as "*paucirugis*" from that State; there is also a fine adult shell from Tasmania. All these agree in that they are more solid, with longer spire, outer lip strongly variced, internally strongly lirated, the lirae more pronounced anteriorly, columella strongly wrinkled and wrinkles continuing on the inner lip expansion and moreover strongly marked on the body whorl towards the posterior angle of the aperture. The varix bears the red brown blotches of allied colored species.

XENOGALEA PAUCIRUGIS (*Menke*).

(Plate xxxi, fig. 2.)

1843. *Cassis paucirugis* Menke, Moll. Nov. Holl. Spec., p. 23: western shores of New Holland, but also including *C. pyrum* Lamarck, citing Kiener, fig. 30.
1844. *id.*, Zeitschr. Malak. (*Menke*), p. 60 (April 10)
 ". . . known for many years previously in Germany," and
 rejecting *C. pyrum* Lamarck.
1848. *Cassis paucirugis* Reeve, Conch. Icon. v, sp. and fig. 19, pl. viii,
 September. From specimen in Cumings' collection compared
 with type sent by Menke.
1857. *Cassis paucirugis* Kuster, Conch. Cab. (*Martini and Chemnitz*),
 iii, Abth. i, Th. 2, p. 45, pl. liii, f. 6.
1865. *Semicassis (Casmaria) paucirugis* Angas, Proc. Zool. Soc. (*London*),
 1865, p. 168. "From Swan River to Tasmania."
1912. *Cassidea pyrum* Verco, Trans. Roy. Soc. South Australia, xxxvi,
 1912, p. 217. Great Australian Bight, 90-120 miles west of
 Eucla, 75-120 fathoms.
1916. *Cassidea paucirugis* Hedley, Journ. Roy. Soc. Western Australia,
 i, 1916, p. 47. W. Australia.

Shell medium, solid, ovate; spire short, somewhat attenuate, less than one half the length of the body whorl; whorls rather acutely shouldered, shoulder less marked on the body whorl; sculpture on the earlier whorls consists of spiral lirae crossed by distant slanting threads, body whorl smooth; aperture reverse ear shaped, ovate; heavy external varix, lirated within. Coloration shining porcelain white, sometimes

with four obscure spiral bands of orange blotches, the varix marked with red to correspond with these rows. Apical whorls worn, succeeding whorls with spiral lirae and slanting longitudinal threads, each growing weaker until they disappear on the body whorl; on the penultimate a few concentric lines may be seen above the shoulder, none below, the shoulder marked by sharp close nodulations, twenty on the penultimate vanishing on the last half of the body whorl. Canal recurved; a short, narrow, deep gutter running into the false umbilicus; this is almost hidden by the reflected columellar lobe, which is very pronounced and passes across the body whorl to the outer lip, showing a prominent little elevation before reaching the posterior angle. Columella wrinkled, and with a noticeable narrow groove anteriorly, wrinkles scarcely extending on to the reflected lobe; an umbilical perforation is present. Outer lip strongly variced, varix folded back, internally markedly lirated, the lirae, about twenty-five in number, being more crowded anteriorly.

Dimensions.—Length 56 mm., breadth 38 mm.

Distribution.—Western Australia.

Remarks.—As far as yet known, this species is restricted to Western Australia, typical dead specimens having been dredged in King George's Sound by Professor W. J. Dakin, while Captain W. Burrows has presented dead shells from Vansittart Bay, north Western Australia, which differ only in the more pronounced denticulation of the outer lip. In the Helms collection in this Museum is a shell with pale square blotches as noted by Reeve. Verco has recorded specimens from 75-120 fathoms in the Great Australian Eight, 90-120 miles west of Eucla under the name *C. pyrum* with the remarks "All were well coronated, with moderately exerted spires and with more or less marked axial plicae on the inflation of the body whorl, a little below the coronation. Some have two spiral bands of orange blotches on the body whorl." This form is apparently related to *paucirugis*, differing in the thinner shell, less exert spire, more open umbilicus, and larger size, the outer lip showing only few denticulations. A very similar shell has been found washed up on the Ninety Mile Beach, Victoria, sent to me by Mr. C. J. Gabriel, and a specimen has recently been trawled off Montague Island, South New South Wales, and secured by Mr. W. Boardman of this Museum.

This species would appear to have been first introduced into literature by J. E. Gray²⁹ under the name *Cassis achatina* var.

When Menke commented upon the species included in his "Specimen" he observed that, though his *paucirugis* had been known for some years, it had not been previously named. Since then the name has been misapplied to southern and even eastern forms, though these do not resemble the typical shell to any extent.

The name *paucirugis* was used by Bednall for shells I regard as *nivea*, and by Brazier for the true *pyrum*, while by Tasmanian conchologists it was used for both of these species.

Pritchard and Gatliff³⁰ pointed out that this species was quite distinct, drawing attention to the denticulate outer lip.

²⁹Gray—Survey Intertrop. Coasts Austr. (King), ii, "1827," p. 485, [April 18, 1826].

³⁰Pritchard and Gatliff—Proc. Roy. Soc. Vic., (n.s.), xii, 1899, p. 189, April, 1900.

XENOGALEA LUCRATIVA, *sp. nov.*

(Plate xxxii, fig. 11.)

1848. *Cassis recurvirostrum* Reeve, Conch. Icon., v, sp. and fig. 16, a, b, pl. vii (Sept.). Raines Island, Torres Strait, Capt. Ince, R.N.1857. *Cassis recurvirostrum* Kuster, Conch. Cab. (Martini and Chemnitz), Bd. iii, Abth. i, Th. 2, p. 22. "New Holland: My Coll."

Shell medium, thin, ovate, spire a little exsert, about half the length of the body whorl, aperture narrowly ovate, sculpture of the earlier whorls reticulate, body whorl smooth, external varix not recurved back into a fold. Coloration creamy white, banded with orange, the bands irregular, being composed of squarish orange blotches which finally run together. Apical whorls worn, the succeeding ones with spiral lirae, four or five in number, crossed by slanting longitudinal threads, which at first predominate but weaken quickly and disappear on the antepenultimate, while the spirals persist as threads to the penultimate whorl, but also disappear on the body whorl; this is smooth, save for rather prominent growth lines, but under the glass an obscure matt of spirals and longitudinalinals can be traced.

Columella nearly straight, finely wrinkled, expanded into a lobe which bears separated pimples.

Canal short, recurved, a very narrow deep gutter running into the rather wide false umbilicus, while an open perforation is apparent at the tip of the canal.

The outer lip is a little expanded, the varix recurved but not folded, and the internal teething consists of about twenty separately spaced lirae.

Dimensions.—Length 63 mm., breadth 40 mm.

Distribution.—North Australia, Raines Island, Torres Strait.

Remarks.—Reeve did not propose his name for a new species, but simply used *Buccinum recurvirostrum* as of Wood,³¹ whose name was given to "List. Conch., t. 1016, f. 75," from Barbadoes.

Kuster³² quoted the species as of Wood, and cited "Lister, fig. 74," but that figure refers to a small shell "crassum et ponderosum" which is quite unlike; fig. 75, described as "ventricosum tenue Barbad.," is the one which should have been named, and is the one named by Wood, agreeing with the basis of Gmelin's³³ species.

Again, even Gmelin's name is unstable, as Mörch³⁴ preferred *cicatricosa* Meusch., 1871, 303, pl. xix, f. 1, 2. Reference to the "Zoophylacium Gronovianum" shows an excellent figure of this species, and the "Iconographia sive Tabularum Explicatio," of that work, including 'Tabula xviii, seu Fascic. iii. Tab. i,' 'Tabula xix, s. Tab. ii,' and 'Tabula xx, s. Tab. iii,' in which the names are given binomially, and also in the Index as noted under *C. spinosa* (*ante*, p. 327) the name *cicatricosa* occurs.

XENOGALEA LABIATA (*Perry*).

(Plate xxxi, fig. 1.)

1811. *Cassidea labiata* Perry, Conchology, pl. xxxiv, fig. 1 (April 1). "South Seas," probably Sydney, N.S. Wales.

³¹Wood—Index Test., 2nd ed., 1828, p. 105, pl. xxii, f. 30.

³²Kuster—Conch. Cab. (Martini and Chemnitz), Bd., iii, Abth., i, Th. 2, p. 22.

³³Gmelin—Syst. Nat., pt. vi, p. 3477, 1791.

³⁴Mörch—Catalogus Conchyliorum Yoldi, 1852, p. 113.

1816. *Cassia achatina* Lamarck, Tabl. Ency. Meth. Vers, vol. i, Liste, p. 3, pl. 407, f. 1, a, b.
1822. id., Hist. Anim. sans Verteb., vii, p. 226 (August).
"les mers de la Nouvelle Hollande."
1828. *Buccinum achatinum* Wood, Index Testac., 2nd ed., p. 105, pl. xxii, fig. 22. New Holland.
1835. *Cassia achatina* Kiener, Coquilles Vivants, Casque, p. 37, pl. xiii, fig. 24.
1867. *Cassia achatina* Angas, Proc. Zool. Soc. (Lond.), 1867, p. 196. N.S. Wales, S. Africa.
1873. *Semicassia (Casmaria) achatina* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 838.
1902. *Cassidea labiata* Hedley, Proc. Linn. Soc. N.S. Wales, xxvii (Aug. 22), p. 27.
1911. *Cassidea achatina* Shirley, Proc. Roy. Soc. Queensland, xiii, p. 98. Caloundra, Queensland.
1918. *Phalium labiatum* Hedley, Check List, p. M. 67 in Journ. Roy. Soc. N.S. Wales, li (1917). N.S. Wales.

Shell glossy, small, medium, thin but strong, oval, spire short and less than half the length of the body whorl, which is not at all shouldered, aperture narrowly ovate, external varix heavy, folded back, denticulate within, teeth more pronounced anteriorly. Coloration distinctive, earlier whorls bluish lilac, a few subsutural square spots of reddish brown, irregular longitudinal flames of a similar shade developing, interrupted by a median spiral band of the same colour, the last whorl showing as many as seven of these bands, the intervening markings varying from pale lilac to chocolate, appearing as pale scalloping. The coloration is interrupted by a cream elevated blotch in front of the posterior angle of the aperture, the columellar reflection being also cream. The inside of the mouth is deep lilac, the external margin marked with chocolate bands.

Apical whorls normal, succeeding whorls five, earlier ones with fine spiral threads, later ones becoming smooth, shining, and showing faint growth lines only.

The columella is internally plicate, a deeper sulcation anteriorly, the columellar expansion smooth and abruptly incurved, almost covering the false umbilicus, leaving only a small umbilical chink. Aperture narrowly ovate, reverse ear-shaped, outer lip strongly denticulate, but through fracture sometimes appearing nearly smooth. Canal short, strongly recurved, an indistinct gutter preceding and running into the false umbilicus.

Dimensions.—Length 62 mm., breadth 39 mm. (figured specimen).

Distribution.—New South Wales from Richmond River to Twofold Bay (Bungaree Norah, Broken Bay, Narrabeen, Port Jackson, Bulli, Shell Harbour); South Queensland and Norfolk Island.

Remarks.—Pritchard and Gatliff³⁵ have recorded *Cassia achatina* from San Remo, Bass Strait, Waratah Bay (Miss Stirling), but I have seen no specimens of the distinctive shell from Victoria. I secured a shell at Port Fairy, Victoria, in 1923 which may be the Victorian representative, but it is larger, less brightly colored, and lacks the distinctive colour

³⁵Pritchard and Gatliff—Proc. Roy. Soc. Vict., n.s., xii, 1899, p. 189 (April, 1900).

scheme of the typical form. On the other hand the shell from Norfolk Island agrees very closely in detail with the typical series.

When Reeve³⁶ included *Cassia achatina* as of Lamarck he observed "Lamarck cites New Holland, but Cuming's specimens (which were figured) were collected at Algoa Bay, South Africa." This error has been perpetuated down to date, though comparison shows the South African shell to differ appreciably, while the Australian species has a very restricted habitat. As related, Tryon's idea of *achatina*, of which he made *turgida* Reeve a synonym, was a very strange one, for he included *pyrum* and others, with a range from the Cape of Good Hope to the Philippine Islands, with outliers at Natal and Cape Verde Islands.

Cassia achatina, or *labiata*, has been commonly ascribed to New Zealand, but always as a rare shell. Apparently to include it in collections, specimens have been secured from Sydney, and one of these appears to be figured by Suter. The true Neozelanic shell is very close to the species here named *insperata*, and will be dealt with in an essay prepared by Finlay and myself, to which reference has previously been made.

XENOGEALIA INSPERATA, *sp. nov.*

(Plate xxxi, fig. 8.)

1873. *Semicassia (Casmaria) pyrum* Brazier, Proc. Zool. Soc. (Lond.), 1872, p. 838, May 1873. New South Wales.

1889. *Cassia pyrum* Whitelegge, Proc. Roy. Soc. N.S. Wales, xxiii, p. 257. Port Jackson.

Shell small, medium, thin but strong, globose oval, spire short, much less than half the length of the body whorl, aperture rather narrowly ovate, external varix not folded back, but lirate within, lirae more crowded anteriorly

Coloration pale pinkish white with interrupted lines of elongate white spots, sometimes accompanied by a few larger reddish ones, a sub-sutural row of reddish brown blotches being present; sometimes the body whorl may show an additional few blotches while the outer lip shows seven to nine dark purplish brown patches which coincide with the spaces between the white lines.

Apical whorls normal, generally worn in adults, five adult whorls, the earlier ones faintly reticulate but becoming smooth on the third; there is no shoulder present until the last whorl, which presents a few coarse nodules towards the outer lip, as many as eight being counted; on the base a few obsolete ridges are faintly discernible.

Canal short, recurved, preceded by a narrow gutter which enters a small false umbilical perforation; columella nearly straight, notched anteriorly and weakly lirate, expanded into a smooth lobe which flattens over the false umbilicus nearly closing it, at the tip a scarcely noticeable umbilical chink, inner lip only seen as a faint glaze over body whorl. Outer lip variced.

Dimensions.—Length 56 mm., breadth 41 mm.

Distribution.—New South Wales (Ballina, Stockton, Port Stephens, Port Jackson, Port Hacking, and Bulli), south Queensland (Caloundra), New Zealand.

³⁶Reeve—Conch. Icon., v, 1848, pl. x, sp. and fig. 28, a, b (September, 1848).

Remarks.—This species has been recorded as *pyrum* but it is more closely related to *labiata*, appearing to be a shallow water relative of that species. The Neozelanic shell, usually referred to as *C. achatina* or *labiata*, is very like this, and not much like the true *labiata*. It will be dealt with subsequently by Finlay.

XENOGALEA ANGASI, *sp. nov.*

(Plate xxxii, fig. 15.)

1911. *Cassidea angasi* Brazier, Shirley Proc. Roy. Soc. Queensland, xxiii, 1911, p. 98 : Caloundra, Queensland (*nomen nudum*).

Shell small, ovate, thin, spire acuminate, more than half the length of the body whorl, aperture narrowly ovate, sculpture of earlier whorls reticulate, body whorl smooth, external varix thick and folded.

Coloration ivory white.

Apical whorls worn, succeeding whorls six, earlier ones shallowly shouldered, the sculpture consisting of lirae overridden by slanting radials, which become less marked until they disappear on the body whorl, the penultimate whorl shows one crenulate and three fine lirae above the slightly sloping shoulder, and two obscurely below.

Canal short, very recurved, preceded above by a deep, narrow, gutter proceeding into the false umbilicus, which is indicated by a deep hollow; three or four lines can be seen above this on the basal part of the body whorl. Columella with a double twist finely wrinkled throughout, reflected into a lobe which does not expand on to the body whorl and which leaves a noticeable opening (the umbilicus) at the termination of the canal. The edge of this opening is reflected, and the columellar snout so formed is striated and callused, behind which an additional perforation is formed. This columellar twisting and reflection is a characteristic feature. The outer lip is variced and heavily reflected; internally there appear sixteen to eighteen distant lirae evenly separated, but posteriorly smaller teeth intercalate.

Dimensions.—Length 55 mm., breadth 36 mm. Type (Moreton Bay, Queensland).

Distribution.—New South Wales, south Queensland.

Remarks.—A broken specimen from the Richmond River, New South Wales, presented by Mr. A. W. O'Sullivan, obviously represented an unknown species, but in the collection was found the fine specimen here figured, bearing the name "*angasi* Brazier," from Moreton Bay, Queensland. Though the species has not hitherto been described the name has been recorded by Shirley as above, with the locality, Caloundra, Queensland.

Genus ANTEPHALIUM, *nov.*

This genus is provided for the species *Cassis semigranosa* Lamarck, with which is associated *Cassis adcocki* Sowerby and *Cassidea sinuosa* Verco.

All the species are small, ovate, comparatively strongly sculptured, mouth narrow, outer lip recurved, not strongly variced as a rule, columella reflected so as to leave only a minute false umbilicus. All live in southern Australia, and have their closest relations in the fossil forms of Tasmania, Victoria, and South Australia.

ANTEPHALIUM SEMIGRANOSUM (*Lamarck*).

1822. *Cassis semigranosa* Lamarck, Hist. Anim. sans Verteb., vii, p. 228 (August, 1822). "les mers de la Nouvelle Hollande" = South Tasmania."
1828. *Buccinum semigranosum* Wood, Index Test., Suppl., ii, pl. iv, fig. 2. No locality.
1835. *Cassis semigranosa* Kiener, Coquilles Vivants, Purpurifères, pt. i, 36, pl. 14, f. 29. Seas of New Holland. Lamarck's type figured.
1848. *Cassis semigranosa* Reeve, Conch. Icon., v, pl. ii, sp. and fig. 3 (August, 1848). Van Diemen's Land.
1857. *Cassis semigranosa* Kuster, Conch. Cab. (Martini and Chemnitz), iii, Abt. i, Th. 2, p. 24, pl. xlv. figs. 6-7. New Holland.
1865. *Semicassis semigranosa* Angas, Proc. Zool. Soc. (Lond.), 1865, p. 168. South Australia.
1877. *Cassis semigranosa* Tenison-Woods, Papers. Proc. Roy. Soc. Tasm., 1876, p. 33. Tasmania.
1885. *Cassis semigranosa* Tryon, Manual Conch., vii, p. 275, pl. iii, fig. 60. South Australia and Tasmania.
1887. *id.* Brazier, Trans. Roy. Soc. S. Australia, ix, 1885-86, p. 123.
1900. *id.* Pritchard and Gatliff, Proc. Roy. Soc. Vict., n.s., xii, 1899, p. 190. Victoria.
1901. *Semicassis semigranosa* Tate and May, Proc. Linn. Soc. N.S. Wales, xxvi, p. 373. Tasmania.
1912. *Cassidea semigranosa* Verco, Trans. Roy. Soc. South Australia, xxxvi, p. 217. Western Bight, 100 fathoms.
1916. *id.* Hedley, Journ. Roy. Soc. W. Australia, i, p. 47. W. Australia.
1921. *Phalium semigranosum* May, Check List Mollusca Tasmania, p. 65. Tasmania.
1923. *id.* Illus. Index Tasmanian Shells, pl. xxx, fig. 2. Tasmania.

Shell small, thin but solid, regularly oval, spire acuminate, more than half the length of the body whorl, aperture narrowly reverse ear-shaped; sculpture of earlier whorls finely semigranose, middle of body whorl smooth, outer lip a little sinuate, varix recurved but not folded back, internally smooth.

Coloration dull brownish white.

Apical whorls three, a little elevated, smooth; adult whorls five, first adult whorl with about eight square-topped spiral lirae over-ridden by very closely packed slanting, radial, threads which strengthen on the next whorl forming square nodules, the antepenultimate whorl

showing five spiral rows of small separated nodules with a depression between the sutural row and the shoulder, which is not very pronounced; the penultimate whorl shows this depression a little more marked, while it is well defined on the body whorl. On this whorl the five rows become ill-defined and the median portion of the whorl smooth save for growth lines, the lirae reappearing on the base but in that place not nodulose. Canal short, much recurved, anterior gutter well marked, the false umbilical opening nearly closed by the columellar expansion. There is no umbilical perforation. Columella with half a dozen strong wrinkles and two major grooves, only expanded a little and closely appressed to the body whorl, where a very thin glaze persists across to the anterior edge of aperture, inside which there is a small white callus lump. Outer lip sinuate medially, advancing posteriorly, thickened and recurved as a varix but not folded back.

Dimensions.—Length 54 mm., breadth 32 mm.

Distribution.—Victoria, Tasmania, South and south Western Australia.

Remarks.—The fossil *S. subgranosa* Tate³⁷ from the raggy-limestones of Edithburgh, South Australia, is closely allied to the recent shell, as, though the sculpture is at first sight so much bolder, there is great variability in this respect in the recent species. South Australian shells may have short spires and the post-sutural beading obsolete, the nodulose sculpture weak and fading on the body whorl, which is mostly smooth. South Tasmanian shells may have the spire produced, the sculpture bold, a well-developed post-sutural bead row present and a strong nodulose pre-peripheral sculpture on the body whorl, base of which is also spirally lirate. The fossil is comparable with a juvenile of the latter form, the body whorl of which shows spiral lirae throughout.

When Angas recorded the species from South Australia he observed "Specimens from Tasmania, where it is not uncommon, are of a larger size than those found in South Australia."

ANTEPHALIUM ADCOCKI (*Sowerby III.*)

1896. *Cassia adcocki* Sowerby III., Proc. Malac. Soc. (Lond.), ii, p. 14, fig. in text. Yankalilla Bay, South Australia.
 1912. *id.* Gatliff and Gabriel, Proc. Roy. Soc. Vict., n.s., xxv, p. 170. Bass Strait.
 1912. *Cassidea adcocki* Verco, Trans. Roy. Soc. South Austr., xxxvi, p. 217. 90 miles west of Eucla, Great Australian Bight, 100 fathoms.
 1916. *id.* Hedley, Journ. Roy. Soc. Western Australia, i, p. 47. W. Australia.

Shell very small, solid, regularly oval, spire elate, about half the length of the body whorl, aperture narrow, slightly reverse ear-shaped, sculpture of impressed lines overridden by strong radials on shoulder, outer lip heavily variced and internally denticulate.

³⁷Tate—Trans. Roy. Soc. S. Australia, xi, Apl., 1889, p. 166, pl. vii, fig. 10.

Coloration pure white, marked with spiral rows of small bright red-brown square spots, six rows on the body whorl, twenty spots to a row. Apical whorls rubbed down, probably normal; adult whorls three in number, the earlier ones spirally lirate, the lirae crossed by strong slanting longitudinal threads forming a reticulation, the spirals predominating; on the last whorl a sloping shoulder is seen a little excavate, and below it the longitudinals are still strong, forming about twenty short radial ridges, the spirals continuing and still well pronounced on the base.

Canal short, much recurved, preceded by a very narrow deep gutter running into a minute false umbilicus, which is almost hidden by the columellar expansion, though there is a faint umbilical chink. Columella nearly straight, very little wrinkled, though a little expanded. Outer lip heavily variced and folded back, internally toothed, teeth more pronounced posteriorly.

Dimensions.—Length 28 mm., breadth 17 mm.

Distribution.—South Australia, Victoria, south Western Australia.

Remarks.—The exact relationships of this rare little shell are not known, but they may be with the fossil *S. transenna* Tate.³⁸

ANTEPHALIUM SINUOSUM (*Verco*).

1904. *Cassidea sinuosa* Verco, Trans. Roy. Soc. S. Australia, xxviii, p. 141, pl. xxvi, figs. 7-10, a-c. Backstairs Passage, South Australia.

1921. *Phalium sinuosum* Gatliff and Gabriel, Proc. Roy. Soc. Vict., n.s., xxxiv, p. 143 (May 31, 1921).

Shell very small, regularly ovoid, spire elate, about half the length of the body whorl, aperture rather narrow, elongately reverse ear-shaped, sculpture of spiral lines only, with no external varix.

Coloration white, with about five spiral rows of square faint yellowish red spots.

Apical whorls, three, globose, smooth; adult whorls three, spirally closely grooved, the ridges a little broader than the interstices, ten lirae on first whorl, where obscure radials can be detected just below the suture, twelve lirae on second, radials even more obscure, whorl evenly rounded, no shoulder; on the body whorl just below suture half a dozen broader lirae with deeper grooves can be seen; radial growth lines with little sinuation crossing them. On the middle of the body whorl the lirae broaden and the grooves tend to disappear, but at the base the lirae become more crowded and stronger again.

Canal short recurved, a depression, scarcely an obscure gutter, preceding it into the false umbilicus, which is almost entirely closed by the columellar reflexion; an open umbilical aperture is noticeable.

Columella arcuate, finely wrinkled, the wrinkles continuing on the expansion, which is narrow and well marked anteriorly and continues as a

³⁸Tate—Trans. Roy. Soc. S. Australia, xi, April, 1889, p. 166, pl. viii, fig. 2.

thin glaze across the body whorl to the posterior angle of the aperture, outer lip posteriorly receding and then sinuate anteriorly, bearing no varix but a little thickened internally (Verco wrote "faintly toothed").

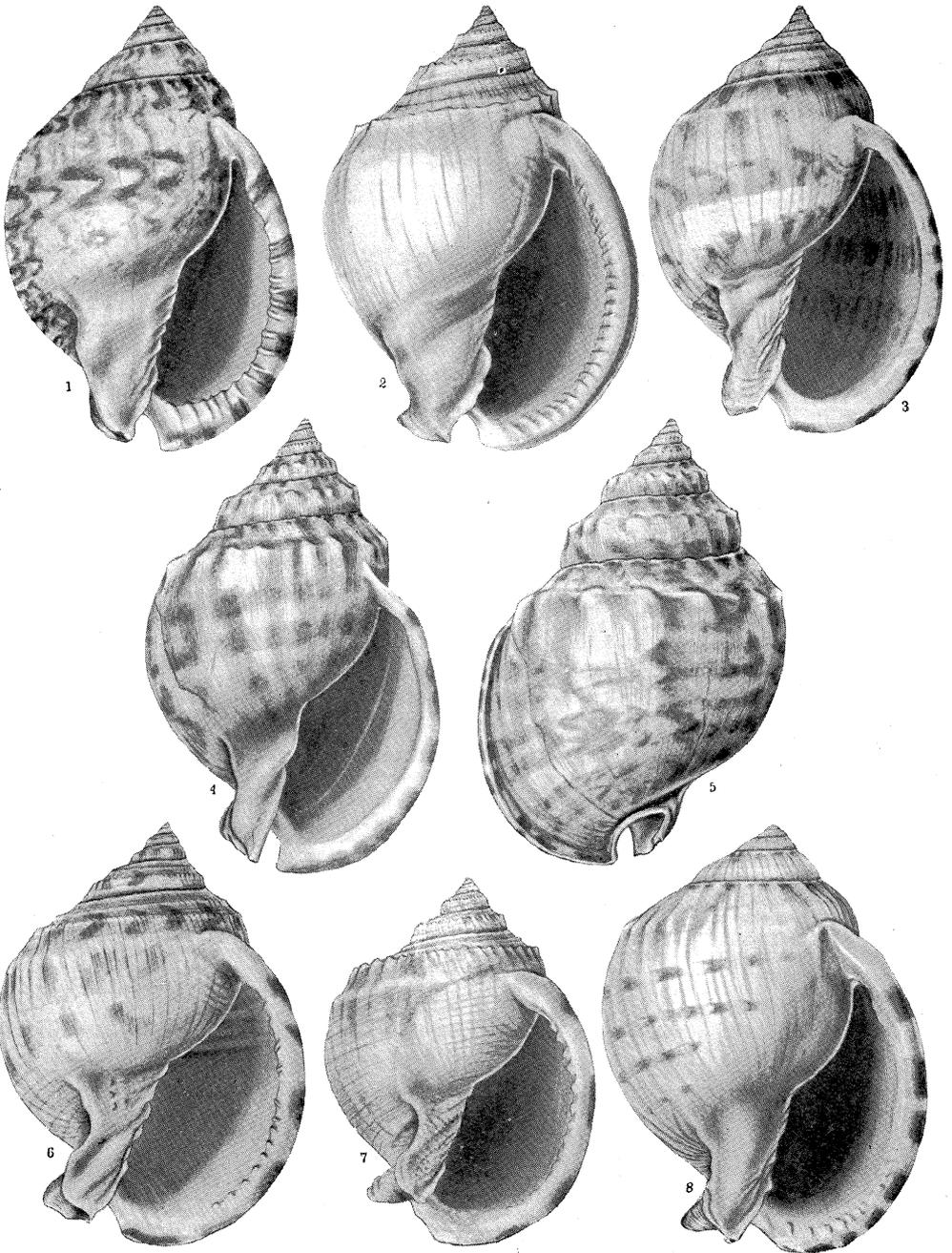
Dimensions.—Length 24 mm., breadth 15 mm. (type).

Distribution.—South Australia, Victoria.

Remarks.—This rare little species appears to be related to the fossil *C. sufflata* Tenison-Woods, judging from the columellar features. The sinuate outer lip is also seen in *A. semigranosum* Lamarck, though in the latter case an external varix is achieved.

EXPLANATION OF PLATE XXXI.

- Fig. 1. *Xenogalea labiata* (Perry).
,, 2. *paucirugis* (Menke).
,, 3. *stadialis* (Hedley).
,, 4, 5. *Xenophalium hedleyi* Iredale, front and back views of type.
,, 6, 7. *Xenogalea thomsoni* (Brazier), normal form and type.
,, 8. *Xenogalea insperata* Iredale, type.



JOYCE K. ALLAN, del.

EXPLANATION OF PLATE XXXII.

- Fig. 9. *Semicassis diuturna* Iredale, type.
,, 10. *Phalium agnitum* Iredale, type.
,, 11. *Xenogalea lucrativa* Iredale, type.
,, 12. *sophia* (Brazier), type.
,, 13. *nivea* (Brazier), type.
,, 14, 16 *pyrum* (Lamarck), typical specimen and normal
Tasmanian shell.
,, 15. *angasi* Iredale, type.

