

THE APPLICATION OF THE NAMES *GOMPHINA*, *MARCIA*,
HEMITAPES, AND *KATELYSIA*.

By A. J. JUKES-BROWNE, B.A., F.G.S.

Read 11th December, 1908.

PLATE X.

THE shells which form the subject of the following study belong to the family Veneridæ, and have been separated from the older generic groups of *Venus*, *Chione*, and *Tapes*. There is, however, much confusion and difference of opinion with regard to the definition of the groups for which the names *Gomphina*, *Marcia*, and *Hemitapes* were proposed, and certain species have been placed by different authors under each of these heads. Having had occasion to investigate the history of the names, to consider the validity of the accredited type species, and to make a critical examination of the shells themselves, I propose to give some account of all these matters, with the view of arriving at a satisfactory settlement of the questions involved.

In order to state the facts as clearly as possible I shall first give the history of each name separately, and will subsequently define the shell-groups under the names which, as it seems to me, they ought to bear.

I. HISTORY OF NAMES AND DETERMINATION OF TYPES.

1. *GOMPHINA*, Mörch.

This name was proposed by Mörch in his catalogue of Count de Yoldi's Collection,¹ a work in which many new generic and subgeneric names were employed, and though in no case was any definition or description given, yet they may be regarded as sufficiently indicated by the species which are referred to them.

Under *Gomphina* (which Mörch placed in the Donacidæ) only two species are mentioned, these being *Venus undulosa*, Lam., and *Venus donacina*, Chem. They stand in the order above given, but as Mörch did not indicate types, it was open to any subsequent author to choose either as the type of *Gomphina*. The first authors to adopt the name were the Messrs. H. & A. Adams in 1857, who, curiously enough, placed *Gomphina* as a subgenus of *Meretrix*,² and gave *V. donacina*, Chem., as the only species referable to it, the reason of this being that in the arrangement of the Veneridæ they followed Deshayes' grouping (of 1853), and he had included *V. undulosa* under the genus *Chione*.

Now since the *Gomphina* of Mörch included only these two species, and since the Messrs. Adams expressly excluded the one and included the other, they practically made the group a monotypical one. Under

¹ Cat. Conch. Yoldi, 1852-3.

² Genera Recent Moll., 1857, vol. ii, p. 425.

the rules of the International Zoological Congress "a genus proposed with a single original species takes that species as its type"; it seems to follow that if a genus was proposed to include two species only, and if a subsequent author removes one of these species to another genus, he determines the type by elimination. In this view I am supported by the opinion of Dr. W. E. Hoyle.

In the same year (1857), but three months later than the issue of the part of the Messrs. Adams' work dealing with the Veneridæ, E. Römer published a critical review¹ of this family, and this is prefaced by a tabular view of the subdivisions of the Linnean genus '*Venus*' which he adopts. One of these is *Gomphina*, Mörch, of which he gives *V. undulosa* as his example, for the species mentioned in his scheme can only be regarded as examples, not as types.

In 1864-5 Römer published a more complete revision of the Veneridæ.² In this he regarded *Gomphina* as a distinct group equivalent in value to such genera as *Mercenaria* and *Tapes*, and he gave a detailed description of its characters in Latin. In this description the part relating to the hinge is specially good, complete, and diagnostic; thus he correctly describes the median tooth of the right valve as thick and triangular, but says nothing about the median of the left, though the anterior and posterior are described. The reason of this is that the left median is solid and entire in *G. undulosa*, but is bifid in *G. donacina*.

In this group Römer included four species, these being *donacina*, Chem.; *æquilatera*, Sow.; *melanægis*, Römer; and *undulosa*, Lam. It is doubtful, however, whether the second and third are more than varieties of *donacina*. No type was indicated by Römer, but his definition of the genus was so good that there ought not to have been any subsequent misunderstanding about it.

In 1884 Tryon regarded *Gomphina* as a subgenus, and made the following significant remark: "Römer describes four species and considers *V. undulosa*, Lam., as the type, while H. & A. Adams quote *V. donacina*, Chem., as the only species, and place it as a subgenus of *Cytherea*."³ Tryon evidently thought that the examples given by Römer in 1857 should be taken as types, but was in doubt about the action of Messrs. Adams.

In 1887 Fischer placed *Gomphina* as a subgenus of *Tapes*, and gave *V. undulosa* as an example, but this calls for no remark.

In 1902 Dr. W. H. Dall published a "Synopsis of the Family Veneridæ and of the North American recent species,"⁴ in which he made many modifications of nomenclature, and proposed several new names for what he regarded as sections or subgenera worthy of being so distinguished. He was also careful to indicate the type of every group, but did not enter into any discussion of these types, or of his

¹ "Kritische Untersuchung der Arten des Molluskengeschlechts *Venus* bei Linné und Gmelin," Cassel, 1857.

² Malak. Blätt., vols. xi and xii.

³ "Systematic Conchology," vol. iii, p. 177.

⁴ Proc. U.S. Nat. Mus., vol. xxvi, pp. 335-412.

nomenclature, reserving all explanations for his memoir on the Tertiary Fauna of Florida, which was published in the following year.¹

Both in his Synopsis and in the larger memoir Dr. Dall places *Gomphina* as a subgenus of *Chione*, in spite of many obvious differences. The type is given as *V. undulosa*, Lam., without comment. On p. 1289 of the later memoir he gives a brief diagnosis of *Gomphina*, which, however, is much less accurate than that given by Römer. The first sentence reads, "valves more or less extended behind and pointed"; he fails to notice the thick triangular tooth of the right valve, but says "the posterior right and two anterior left cardinals grooved."

He proceeds to divide the group into two sections, namely—

Section *Gomphina*, Mörch, s.s. Type, *V. undulosa*, Lam.

„ *Macridiscus*, Dall. „ *V. æquilatera*, Sow.²

The first is defined as having reciprocal rugosities on the right nymph and on the left posterior cardinal, and he then remarks: "*Tapes pinguis*, Sowerby, is really more typical of this group than the nominal type."

Macridiscus is thus defined: "Nymphs and teeth smooth, entire; valves in general more compressed, equilateral, and trigonal than in the preceding section; less heavy and sometimes with feeble striation distally. *V. faba*, Reeve, and *V. fumigata*, Sow., seem to belong to this section. It is *Gomphina*, H. & A. Adams, not Mörch."

Several of these statements are very far from being correct. In the first place, the first sentence about the shape of the valves is not true either of *V. undulosa* or of *V. æquilatera*, though it would apply to *Tapes pinguis* and its allies. *T. pinguis*, however, is so different from *Gomphina*, whether that is typified by *V. undulosa* or *V. donacina*, that no other conchologist has ever placed them in the same subgenus. It was included by Römer in his *Hemitapes*, and is certainly more closely allied to that group than to *Gomphina*. Dr. Dall, therefore, first assumed that certain species should be transferred from *Hemitapes* to *Gomphina*, and then tells us that one of them is more typical than the type!

Again, he asserts in his general description that three of the teeth are grooved, while under '*Macridiscus*' he says its teeth are entire and smooth. Both these statements are incorrect. In most specimens of *V. undulosa* the only grooved tooth is the right posterior, all the teeth in the left valve being entire, but there are occasional specimens in which the median tooth of each valve is grooved. In *V. donacina*, however (and its var. *æquilatera*), both the median teeth are distinctly grooved. As regards smoothness, I have observed that in *V. donacina* the left posterior cardinal always has one or two elongate grooves on its upper side, though it is not so rugose as in *V. undulosa*.

¹ Trans. Wagner Free Inst. Science, 1903, vol. iii, pt. vi.

² He does not explain why he gives *æquilatera* as his type instead of *donacina*, but probably he considered them as identical, and will not acknowledge Chemnitz as a binomial author.

Thirdly, it is absurd to say that *V. æquilatera* is "more compressed, equilateral, and trigonal" than *V. undulosa*. In making such a statement Dr. Dall must again have been thinking of the shells which he considered "more typical than the type."

Lastly, I cannot see that either *V. faba* or *V. fumigata*, which latter is identical with *V. levigata*, Sow., has any close resemblance to *V. æquilatera*, but both might be classed in the same group as *T. pinguis*.

I regret to find myself so much at variance with Dr. Dall both in regard to facts and in regard to the affinities of certain species, but the result of my investigation is a conviction that his description of the *Gomphina* group must be considerably modified. It is very probable that the effect of the Messrs. Adams' restriction of the name to a single species did not occur to him, or he would doubtless have retained that species as the type. The adoption of *V. donacina* as the type will of course nullify the section *Macridiscus*, and I do not propose to create a new one for *V. undulosa*, as, in spite of some small differences, I do not think there is sufficient reason for splitting *Gomphina* into two sections. The fact is that in all the species of this group there is great variability in the extent to which the teeth are grooved. In some specimens of *donacina* all the teeth but two are more or less grooved, while in *undulosa* the number of grooved teeth varies from one to three.

Finally, though, as above stated, I would exclude *T. pinguis* and its allies from close association with *Gomphina*, there is another small group of shells which should in my opinion be ranked as a section or subgenus of *Gomphina*. This is the group typified by *V. fluctuosa*, Gould, which Dr. Dall separated from *Tapes* in 1870,¹ and considered so distinct as to deserve generic rank, giving it the name of *Liocyma*. I quite agree that it should be separated from *Tapes*, but though the external form does not much resemble that of *Gomphina*, its hinge will be found to agree very closely with that of *G. donacina*.

Dr. Dall describes *L. fluctuosa* as having "three cardinals in each valve, the posterior left and anterior right entire, the others bifid or grooved." As my own three specimens of this species did not agree with this statement, having all the teeth entire except the right posterior, and in one specimen a grooved left median, I asked Mr. E. A. Smith if he would examine the specimens to see if any agreed with Dr. Dall's description. This he was kind enough to do, and wrote as follows: "In some specimens (not in all) I find the teeth as described by Dr. Dall; the grooving, however, is shallow and often so feeble as to be difficult of detection; moreover, it is not constant, for in some instances the posterior of the right and the anterior of the left may be ungrooved."

Here again, therefore, we find the same curious variability and the same tendency to solidity of the teeth which shows itself in *Gomphina*; but as in the latter, so also in *Liocyma*, the teeth which are most

¹ Proc. Bost. Soc. Nat. Hist., 1870, vol. xiii, p. 256; and Am. Journ. Conch., 1871, vol. vii, p. 145.

frequently grooved are the right posterior and the median of both right and left valves.

Gomphina is a Western Pacific group ranging from North Australia to Japan, but *Liocyma* is restricted to boreal seas, and may therefore be regarded as the boreal representative of the former.

2. MARCIA, H. & A. ADAMS.

This name was proposed by the Messrs. Adams in 1857¹ as a subgenus of the genus *Chione*, but the history of the group should begin with Deshayes' "Catalogue of the Veneridæ in the British Museum" (1853), because Deshayes' grouping of the subdivisions of this family was adopted by the Messrs. Adams, who only corrected and improved his nomenclature.

Deshayes had followed Gray and Megerle in recognizing *Chione* as a distinct genus, and he subdivided it into five sections, but did not give names to these, merely describing them as (1) species lamellosæ, (2) species cancellatæ, (3) species decussatæ, (4) species transversim striatæ, (5) species lævigatæ.

The Messrs. Adams not only adopted these sections without change, but furnished them with names, using such as were already in existence for the four first and proposing the name *Marcia* for the fifth section. They also gave lists of the species belonging to each of these groups, following Deshayes in the main, but arranging the names in alphabetical order, so that beyond the brief diagnosis at the head they give no idea of any special type.

It is evident, therefore, that no one could form a proper conception of the group for which the Messrs. Adams proposed the name *Marcia* without being aware of the facts above mentioned, and without referring to Deshayes' catalogue, where the species are not arranged alphabetically; for it is only reasonable to suppose that the first two or three species of Deshayes' list are those which he had more especially in view. Now the first four species in Deshayes' list are the following: (1) *Chione Kochii*, Phil.; (2) *C. fumigata*, Sow.; (3) *C. Ceylonensis*, Sow.; (4) *C. pinguis*, Chem. Here, therefore, we have what may be called the *pinguis* group, since that is the oldest species, of which *Ceylonensis*, Sow., is merely a variety, while *V. Kochii*, Phil., agrees with it in all essential characters, and *V. fumigata*, Sow. (= *lævigata*, Sow.), has much resemblance to the others though differing a little in the teeth. Clearly, therefore, any subsequent author who adopted the Messrs. Adams' name of *Marcia* should have taken care that it included the "*pinguis* group," and should have selected either *pinguis* or *Kochii* as its type.

The first person to adopt the name *Marcia* seems to have been Chenu,² and, curiously enough, the only species he gives as an example is *V. undulosa*, Lam., which was certainly, though erroneously, placed under it both by Deshayes and Messrs. Adams.

¹ Genera Recent Moll., vol. ii, p. 423.

² Man. Conchyl., 1862, vol. ii, p. 84.

Römer took no special notice of the "*pinguis* group" in 1857, but in 1864¹ he included the species above mentioned in a group for which he proposed the name *Hemitapes*, without referring to the Messrs. Adams, of whose publication he seems to have been ignorant, as he makes no mention of *Marcia*.

Tryon in 1884² seems to have been misled by Chenu, for he cites *V. undulosa* as his sole example of *Marcia* without giving any reason for the selection.

A new departure was made in 1887 by Paul Fischer,³ who placed *Marcia* under *Tapes*, and gave *V. exalbida*, Chem., as his example, at the same time very properly assigning *V. undulosa* to *Gomphina*. I have not been able to ascertain what led Fischer to select *V. exalbida* out of all the species mentioned by the Messrs. Adams, but anyone referring to his manual will see that it is given as an example only, and is not definitely stated to be the type.

No one else seems to have had occasion to notice or allocate species to the *Marcia* group until 1902, when Dr. W. H. Dall published his Synopsis already mentioned (*ante*, p. 234). In this, postponing discussion of his reasons, he formed a new generic group under the name of *Marcia*, taking *V. exalbida* as the type, but including as subgenera the *Katelysia* and *Hemitapes* of Römer, as well as some assemblages of small fossil shells, but excluding from it the *V. pinguis* and *V. paupercula* group, which was an essential part of the original *Marcia* of the Messrs. Adams.

The reason for this procedure is given by Dr. Dall in his later memoir, and is stated as follows: "Fischer in his Manuel de Conchyliologie cited *Venus exalbida*, Chemnitz (which was included by the Adams brothers in *Marcia*, though it does not agree with their diagnosis, the surface not being smooth), as the type of *Marcia*, and it is probably best to accept this rather than make another change on account of the discrepancy alluded to, which may have been due to the worn condition of their specimen."⁴

The surprising part of this statement is the assertion that Fischer cited *V. exalbida* as the 'type' of *Marcia*. Since this is incorrect, the question at once arises whether Dr. Dall can claim to have fixed the type of *Marcia* or not. If he had definitely selected *V. exalbida* as the type of his genus *Marcia*, with or without reference to Fischer, he would undoubtedly have had a strong claim, but in his own words "he thought it best to accept" Fischer's type, which, as a type, had no real existence.

Feeling, however, that the case was a peculiar one, I wished to obtain the opinion of a competent authority on nomenclature, and I naturally turned to Dr. W. E. Hoyle, who is a member of the Commission of Nomenclature appointed by the International Zoological Congress. He very kindly consented to consider the matter, and eventually sent me the following as his opinion: "It is quite certain

¹ Malak. Blätt., 1864, vol. xi, pp. 83, 94.

² "Structural and Systematic Conchology," vol. iii, p. 177.

³ Man. de Conchyl., p. 1086.

⁴ Trans. Wagner Free Inst. Sc., Philadelphia, 1903, vol. iii, p. 1319.

that Fischer did not fix the type of *Marcia* in the sense of the International rules, and therefore Dr. Dall could not adopt Fischer's type. Further, I think anyone fixing a type must use discretion, and if anyone fixes on a type which is inconsistent with the original definition his action is nullified. For instance, one could not fix a type by drawing lots. This seems to me another good reason for rejecting *exalbida* as type."

Believing, therefore, that I am free to choose another species as the type of *Marcia*, I have no hesitation in selecting *V. pinguis* of Chemnitz as that type, this being one of the small natural assemblages of species to which the majority of those in the Messrs. Adams' list belong. It is also the first species of Römer's second section of *Hemitapes*, that section (*testá lævi*) being in fact the very assemblage above mentioned, so that my action merely detaches certain species from *Hemitapes* and restores them to *Marcia*. At the same time I agree with Römer in considering the two assemblages to be closely allied, and to be referable to the same genus, but the generic name will be *Marcia*, with *Hemitapes* as a subgenus.

A further consequence of this alteration is that *V. exalbida* remains to be dealt with, but it will be more convenient to do so after giving an account of *Hemitapes* and *Katelysia*.

3. HEMITAPES, Römer.

As already mentioned, this name was proposed by Römer in 1864 for a group of shells, some of which had previously been referred to *Tapes* and some to *Chione*. He did not indicate any particular species as a type, but divided the group into two sections or series under the respective headings of (*a*) *Testa transversim sulcata*, (*b*) *Testa lævis*.

He then gave a list of the species referable to each subdivision, the first species of the (*a*) series being *T. virginea* (Linn., *non auct.*), with the synonyms *V. flammiculata*, Lam., *V. callipyga*, Lam. (*non* Born), and *V. rimularis*, Lam. From this and from his remarks under the head of *T. edulis* (Chem.) it is evident that he considered the *V. virginea* of Linnæus to be identical with *V. flammiculata*, Lam., and *V. rimularis* to be a variety of the latter.

The first species of his second series (*b*) is *V. pinguis*, Chem., and it is clear that Römer saw no essential difference between the two series, except that of the external surface, a smooth shell in the one and a grooved surface in the other.

A curious mistake was made by Stoliczka in 1871,¹ that of stating that Römer's type of *Hemitapes* was *T. pinguis*, a mistake in which he seems to have been followed by Tryon (1884) and by Fischer (1887), both of whom give *T. pinguis* as their example of *Hemitapes*.

No one seems to have discovered the mistake made by Stoliczka until Dr. Dall studied the Veneridæ in 1902, and then in rectifying the one he only fell into another. In his Synopsis of 1902 a wrong date is given for the establishment of *Hemitapes*, but in his monograph of 1903 the right date and reference are given, and the type is stated

¹ Cret. Fauna S. India, vol. iii, p. 144: Mem. Geol. Surv. India.

to be "*Venus rimularis*, Lam. (as *V. virginea*, L.)." Further, in the text he remarks that "Römer proposed *Hemitapes* for a group typified by *V. rimularis*, Lamarek."

I cannot understand why Dr. Dall made the positive statement that *V. rimularis* was the type of *Hemitapes*, for that name is merely given as a synonym of the first species on Römer's list, and nothing is said by Römer about a type. As already pointed out in the case of *Marcia*, it cannot be maintained that an author determines a type when he erroneously assumes or supposes a type to have been indicated by a previous author. Further, if an error of this kind could be accepted as determinative, then Stoliczka's mistaken belief that *V. pinguis* was the type would have priority of Dr. Dall's mistake.

At the same time, as there is no reason why *V. rimularis*, Lam., should not be taken as the type of *Hemitapes*, and as I do not desire to increase the confusion by selecting any other species, I prefer to take the species which Dr. Dall imagined to be the type, and in order to establish it I merely observe that in my judgment *V. rimularis* is now for the first time properly and definitely determined as the type of *Hemitapes*.

With regard to the second section of Römer's *Hemitapes* (the *pinguis* group), I have already shown that it should bear the name of *Marcia*. I think few conchologists will agree with Dr. Dall that this group should be placed in the genus *Gomphina*; at the same time, there are some other differences between it and the *rimularis* group besides the smoothness of the shell; these are the following:—

The escutcheon of *Marcia* is never defined. The lunule is impressed, but the lunular border of each valve has an outward bulge above the anterior tooth. The hinge-teeth are more widely divergent, the right anterior being parallel to the general trend of the lunular border, not oblique to it; the right posterior is broad and bifid. In the left valve the median and anterior teeth are of nearly the same thickness, and both are grooved.

These differences are hardly of more than sectional or subgeneric value, and *H. variabilis* (Phil.) (= *H. marmorata*, auctorum) seems to be a kind of connecting link between the two groups, so that, as already stated, I regard *Hemitapes* as merely a subdivision of *Marcia*, and am consequently in accord with Römer in this matter.

4. KATELYSIA, Römer, 1857.

This name was proposed and published in the same year as the *Marcia* of Messrs. Adams, but three months later.¹ Römer's ideas of nomenclature at this time were peculiar; he divided the Linnæan *Venus* into a number of 'subgenera,' which we should now rank as genera, and these subgenera he divided into 'families,' which we should now call sections. In this way he proposed a 'subgenus' *Murcia*, which he again divided into five families, the last of which he named *Katelysia*. The work consists of an introduction, a scheme or tabular view, and a list of species. No types are indicated for any

¹ Krit. Untersuchung der Arten des Moll. Venus, Cassel, 1857.

of his groups, and though in his tabular view he gives in most cases single examples, under *Katelsysia* he gives two species, *V. scalarina*, Lam., and *V. exalbida*, Chem., so that it is clear that he meant them all to be taken as examples, not types.

In his later revision of the family¹ he gives a full definition of the group characters in Latin, the part referring to the teeth reading thus: "dentes cardinales valde divergentes, triangulares, obliqui, in valva sinistra dens medianus crassus, bisulcatus, in dextra secundus tertiusque fissi." Moreover, he therein regards *Katelsysia* as a 'subgenus' and divides it into three sections, each of which is briefly defined; these sections include the following species:—

- § 1. *K. scalarina*, Lam.; *K. aphrodina*, Lam.; *K. regularis*, Desh.
 § 2. *K. exalbida*, Chem.; *K. lenticularis*, Sow.; *K. quadrangularis*,
 Ads. & Rve.; *K. tenuilamellata*, Sow.
 § 3. *K. astartoides*, Beck; *K. Creplini*, Dunker; *K. telliniformis*,
 Phil.

Römer, therefore, did not indicate a type either in 1857 or in 1864, and in this case Dr. Dall does not suppose that he did, but he says that "the first to accept the name was Tryon in 1884, who selected *V. scalarina*, Lam., as type of Römer's group, in which he was followed by Fischer, who changed the name to *Katelsysia*."

Whether Tryon can be said to have selected *V. scalarina* as the type or not, it is the species which should be so regarded; and as Dr. Dall accepted it in 1903, I definitely adopt it as the type of a restricted *Katelsysia* group, corresponding to the first section of Römer's *Katelsysia* of 1864.

It will be noticed that the second section of Römer's *Katelsysia* is what may be called the *exalbida* group, for everyone admits that the three species *exalbida*, *lenticularis*, and *quadrangularis* are closely allied. *V. tenuilamellata*, however, must be excluded, as it was based on a shell which is probably a young specimen of *V. Campechiensis*, Gmelin.

When Dr. Dall in 1902 created a genus *Marcia*, with *V. exalbida* as type, he made *Katelsysia* a subgenus of it, and placed the species *quadrangularis* and *lenticularis* under the latter as a separate section with the new name of *Samarangia*.² His reason for separating these species from *exalbida* seems to have been that he imagined the latter to have four cardinal teeth in the right valve, while he credited the others with the normal number of three.

I have only been able to examine one specimen of *V. exalbida*, which was kindly lent to me by Mr. J. J. MacAndrew, and in this there is nothing but a slight ridge at the base of the nymph, just as there is in *V. lenticularis* and in many other shells, such as *Gomphina donacina* and in several species of *Chione*, especially *Ch. Gnidia* and *Ch. amathusia*. Dr. Dall himself observes that "in a few of the larger species [of *Chione*] a feeble fourth cardinal is sometimes present below the ligament," but he does not for that reason propose to separate these species as a distinct section of *Chione*; why, therefore, should *V. exalbida*

¹ Malak. Blätt., 1864, p. 169.

² Proc. U.S. Nat. Mus., 1902, vol. xxvi, p. 361.

be separated from *lenticularis* and *quadrangularis* merely because there is sometimes a stronger ridge in this place than the other species exhibit?

In all the essential characters of sculpture, strength of hinge-plate, shape of teeth, and pallial sinus *V. exalbida* differs from *Katelsia* proper, and agrees with *V. lenticularis*. More particularly they agree in having only one grooved tooth in each valve, the posterior right and the median left, both the median right and the anterior left being narrow, entire, tall, and sharp, though at the same time slightly rugose.

There is nothing whatever in *V. exalbida* to afford any ground for separating it from *V. lenticularis*; consequently I place it in Dr. Dall's *Samarangia*, and adopt that name for a group which is practically the second section of Römer's *Katelsia*. The hinge of these shells is not that of *Marcia*, and I think they must be regarded as forming a distinct genus. With them, however, I am inclined to place the Eocene fossils which were first separated by M. Cossmann in 1886,¹ and now bear the name of *Mercimonia* (Dall, 1902). These shells also have two entire teeth in each valve, and the left median has a ledge on the anterior side which seems to correspond with the laterally grooved tooth in the left valve of *Samarangia*.

In his description of the American Veneridæ Dr. Dall places two other recent species in the restricted section of his genus '*Marcia*' along with *V. exalbida*.² These are *V. Kennerleyi*, Carpenter in Reeve, and *V. rufa*, Lam., better known as *V. opaca*, Sow. I have not been able to obtain or see a specimen of the former, so cannot discuss it, but I have examined *V. rufa*, which is a thick oval shell having many of the characteristics of *Samarangia*, but a somewhat different hinge. The posterior part of the hinge-plate is deeply excavated, so that in the right valve the posterior cardinal is very short, being abruptly truncated by the border of the plate; in the left valve also there is a similar abbreviation of the plate, so that both the posterior and median teeth are short, the latter being grooved in the middle, not at the side. These differences seem to be at least of sectional importance, but at present I refrain from proposing a new name for this single species.

Another shell which looks from Dr. Dall's figure as if it might belong to *Samarangia* is that described by him as *Clementia solida* (op. cit., p. 401). Its hinge differs considerably from that of *Clementia*, and seems to resemble that of *V. exalbida*.

II. SYSTEMATIC DEFINITION OF THE GROUPS.

Having completed the analytical part of my enquiry into the history and characters of these shell-groups, I come now to the synthetical part, i.e., that of estimating their relative taxonomic value, and of compiling descriptive definitions of the genera and their subdivisions.

In the first place, however, something should be said about the mollusca to which the shells serve as coverings, and it is to be regretted

¹ Ann. Soc. Roy. Malac. Belge, vol. xxi, p. 106.

² Proc. U.S. Nat. Mus., 1902, vol. xxvi, pp. 396, 397.

that so little is yet known about the animals of the numerous genera and subgenera of the Veneridæ. I cannot, indeed, find that anyone has described the animal of any single species belonging to the groups I have been dealing with. Under the head of '*Marcia*,' and consequently referring inclusively to *Samarangia*, *Katelysia*, and *Hemitapes*, Dr. Dall says "the soft parts appear to be unknown." It is therefore with much pleasure that I am able to record some notes on the animals of three different species belonging to the *Marcia* group. These are— a specimen of *Hemitapes variabilis* (Phil.) sent me by Lieut. H. S. Brown from the neighbourhood of Mangalore, south-west of India, and one each of *Katelysia scalarina* (Lam.) and *K. corrugata* (Lam.), sent by Dr. J. C. Verco, of Adelaide, South Australia.

Hemitapes variabilis (Phil.). Mantle widely open, with smooth thickened margins, the medial lamina of which is slightly undulating in the spirit-preserved specimen, but is not frilled, nor has it any filaments at the anterior end. The siphons are very short, but are entirely separate. The foot is deep and laterally compressed, but elongate from anterior to posterior end, so as to be hatchet-shaped.

The shell of this specimen belongs to the var. *orientalis*, Reeve. I regard *H. marmorata* (auctorum, but ? Lam.), *H. laterisulca* (Lam.), and *H. ustulata* (Desh.) as mere varieties of *H. variabilis* (Phil.).

Katelysia scalarina (Lam.). The mantle of this has smooth margins. The siphons are short, divergent, and separate, but united at the base; the lower one is thick, tough, and papillose at the end. The foot is large, thick above, but compressed below, and elongated anteriorly.

Katelysia corrugata (Lam.). The mantle and foot as in *K. scalarina*. The two siphons are better preserved in this specimen, are clearly quite separate, though very short, and both the orifices are papillose.

From the above descriptions it will be seen that all three species agree in having smooth mantle-margins, short, separate siphons, and a large compressed elongate foot. Consequently the inference drawn from a study of the shells that they should be placed in the same genus is confirmed by examination of the animals.

As already stated, however, I think that *Gomphina* and *Samarangia* are generically distinct from the *Marcia-Katelysia* group, and consequently believe that three genera must be recognized. The following are descriptive definitions of the genera and their subdivisions, so far as the shells are concerned.

Genus GOMPHINA, Mörch, 1853.

Generic characters.—Shell trigonal, rather thick, compressed, smooth, or concentrically striated. Lunule long, narrow, superficial, and feebly circumscribed; escutcheon not defined; ligament very short. Margins of valves smooth; dorsal margins of both valves grooved on both sides of the hinge-plate to receive the opposing edges. Pallial sinus small and rounded.

Hinge-plate short, broad from the umbo inwards, triangular. Teeth, three cardinals in each valve; rather long, straight, separate, widely and equally divergent. In the right valve the median is broad and

triangular, generally solid, the posterior narrow and feebly grooved. In the left valve the anterior is very long, the median thick and feebly grooved, the posterior very thin. The left anterior and the right median are sometimes feebly grooved.

GOMPHINA, s.s.

Type, *Venus donacina*, Chem.

Shell nearly equilateral, smooth or nearly so, right nymph and left posterior tooth bearing one or two ridges in *donacina*, and having a rugose surface in *G. undulosa*. Pedal scar separate from that of the anterior adductor.

Species.—*G. donacina*, Chem., with vars. *æquilatera*, *melanægis*; *G. undulosa*, Lam. (= *V. variabilis*, Sow., non Phil.).

LIOCYMA, Dall.

Subgenus. Type, *Venus fluctuosa*, Gould.

Shell ovate-trigonal, inequilateral, concentrically grooved, with a bright vernicose periostracum. Nymphs and teeth smooth. The grooving of the teeth very feeble and sometimes obsolete. Pedal scar not quite separated from the adductor.

Species.—*G. (Liocyma) fluctuosa*, Gould (= *V. astartooides*, Phil.); *G. (L.) Becki*, Dall (North Japan and Alaska); *G. (L.) viridis*, Dall (North Japan and Alaska); *G. (L.) Scammoni*, Dall (British Columbia).

Genus MARCIA, Adams, 1857.

Generic characters.—Shell oval, oblong or subtrigonal, inequilateral, smooth, or concentrically striated. Lunule defined and circumscribed, escutcheon not defined, except by absence of sculpture when that is present. Margins of valves smooth. Pallial sinus short or moderately deep, but always rounded. Anterior left and posterior right dorsal margins grooved to receive edge of opposite valve. Hinge-plate short and rather small. Teeth, three in each valve, fairly strong, divergent, and nearly equidistant. In right valve the posterior and median are both bifid or grooved; in the left only the median is bifid, but the anterior is sometimes feebly grooved. The posterior left cardinal and the right nymph bear fine linear riblets, and frequently all the teeth are more or less rugose. The pedal scar is always separate from the anterior adductor.

MARCIA, Adams, s.s.

Type, *Venus pinguis*, Chem.

Shell oval or oblong, tumid, sometimes attenuated posteriorly, always smooth with a vernicose periostracum. Lunule impressed, but convex above the anterior teeth. Escutcheon depressed, but not defined. Pallial sinus often extending to centre of valve. Teeth slender and widely divergent; the right median narrow, the left median thick, the one grooved, the other bifid.

Species.—*M. pinguis*, Chem. (including the vars. *Ceylonensis*, Sow., *triradiata*, Chem., and *nebulosa*, Chem.); *M. paupercula*, Chem. (with vars. *Kochi*, Phil., *ambigua*, Desh., and *Kraussi*, Desh.); ? *M. interrupta*, Koch (Indian Ocean); *M. fumigata*, Sow. (= *lavigata*, Sow.), Australia.

KATELYSIA, Römer, 1857.

Subgenus. Type, *Venus scalarina*, Lam.

Shell obliquely oval, rather compressed, anterior side short; sculpture consisting of strong concentric ridges or riblets, which are sometimes corrugated by radial striæ. Pallial sinus very small. Hinge-plate short, triangular; teeth nearly straight, upper surfaces of all more or less rugose, median in each valve stout and bifid.

Species.—*K. scalarina*, Lam.; *K. strigosa*, Lam. (= *K. corrugata*, Lam., ? non Gmel.); *K. Peronii*, Lam. (? = *aphrodina*, Lam.); *K. regularis*, Desh.

HEMITAPES, Römer, 1864.

Subgenus. Type, *V. rimularis*, Lam.

Shell oval or subtrigonal, tumid, with irregular concentric sculpture, or flat ribs and grooves. Escutcheon defined by absence of sculpture, and sometimes by a slight keel. Pallial sinus fairly deep. Hinge-plate small; teeth all short; in right valve the posterior is narrow, curved, and grooved; the median narrow, tall, and grooved; in the left valve the anterior is narrow, but the median is thick and bifid.

Species.—*H. rimularis*, Lam.; *H. flammiculata*, Lam. (= *hiantina*, Lam.); *H. tristis*, Lam.; *H. striata*, Chem. (= *vermiculosa*, Lam., *aurisiaca*, Gray, and *Labuana*, A. Ad. & Reeve); *H. Philippi*, Desh.; *H. cor*, Sow.; *H. variabilis*, Phil. (= *marmorata*, Lam.?, *laterisulea*, Lam., *orientalis*, Desh., *ustulata*, Desh., and *recens*, Sow. non Chem.); *H. flammea*, Gmel. (= *radiata*, Chem. and Desh.); *H. recens*, Chem. (and of Wood and Hanley, but not of Sow.).

Genus SAMARANGIA, Dall, 1902.

Generic characters.—Shell oval or subquadrate, inequilateral, with prominent curved umbones, solid, white with a dull surface, concentrically striate or lamellose. Lunule circumscribed, escutcheon not defined; ligament long and thick. Margins smooth. Pallial sinus moderate, angular. Hinge-plate deep and strong, with a flat or concave space in front of the anterior tooth in each valve. Teeth, 3-3, divergent, and unequal in size, only the right posterior and sometimes the left median being grooved. Pedal scar merging more or less into that of the adductor.

SAMARANGIA, S.S.

Type, *V. quadrangularis*, A. Ad. & Reeve.

Shell large, thick, subquadrate, rounded. Lunule flat, impressed, and clearly circumscribed. Nymphs deep, that of right valve sometimes having a ridge or riblet at the base. In right valve the posterior cardinal is strong and bifid, the median long, narrow, entire, and not reaching to top of hinge-plate, the anterior short and small. In the left valve the anterior and median are united at the top so as to fit over the right median. Pallial sinus fairly deep, horizontal.

Species.—*S. quadrangularis*, A. Ad. & Reeve; *S. exalbida*, Chem.; *S. lenticularis*, Sow.; ? *S. Kennerleyi*, Reeve; ? *S. rufa*, Lam. (= *V. opaca*, Sow.).

MERCIMONIA, Dall, 1902 (= *Mercenaria*, Cossmann, 1886).

Subgenus. Type, *V. Bernayi*, Cossm. Eocene of France.

Shell small, oval, tumid. Lunule superficial and feebly circumscribed. Teeth in right valve like those of *Samarangia*, but the median is stouter and semi-triangular; in left valve the teeth are all entire, the median being thick and having a narrow shelf on the anterior side. Pallial sinus rather short, angular; sometimes obsolete.

Species.—*M. Bernayi*, Cossm.; *M. cythereaformis*, Desh.; *M. inopinata*, Desh.; *M. delicatula*, Desh.; and possibly some other species.

In conclusion, I desire to thank many friends and correspondents for their kind assistance in various ways, especially Dr. W. E. Hoyle, Dr. J. C. Verco, Mr. E. A. Smith, Mr. J. J. MacAndrew, Dr. J. C. Melvill, and Mr. R. H. Burne.

EXPLANATION OF PLATE X.

FIG.

1. *Gomphina donacina* (Chem.).
2. *G. (Liozyma) fluctuosa* (Gould).
3. *Marcia pinguis* (Chem.).
4. *M. (Hemitapes) rimularis* (Lam.).
5. *M. (Katelaysia) corrugata* (Lam.).
6. *Samarangia lenticularis* (Sow.).

All the figures are reduced to about four-fifths of the natural size.