

3. On a Collection of Marine Shells from Aden, with some Remarks upon the Relationship of the Molluscan Fauna of the Red Sea and the Mediterranean. By EDGAR A. SMITH, F.Z.S.

[Received June 10, 1891.]

(Plate XXXIII.)

The specimens hereafter catalogued were collected at Aden between tide-marks or at low water by Major J. W. Yerbury, R.A., and the Rev. A. W. Baynham. To the former the British Museum is indebted for a very valuable series of 555 specimens, and from the latter it received 160 specimens. Nearly all are in excellent condition, and much praise is due to these gentlemen for devoting so much time and trouble to their cleaning and preservation. No complete list of the Mollusca of this particular spot has yet appeared, and it is as a contribution to such a Catalogue that I venture to publish the following. Many species have already been quoted from Aden, but to have searched through the vast mass of Conchological literature which exists, in order to get together a complete list of the fauna, would have occupied more time than could at present be spared.

Dr. F. Jousseaume, in the 'Mémoires de la Société Zoologique de France' for 1888, has enumerated the species collected in the Red Sea and Gulf of Aden by Dr. Faurot in 1885, and among the species quoted are a number (about 26) from Aden itself. Another list of 106 species from this locality was given by G. Caramagna in the 'Bollettino della Società Malacologica Italiana,' vol. xiii. 1888.

Some of the species mentioned in these Catalogues were not met with by Major Yerbury or Mr. Baynham, and these I have given in a supplemental list at the end of this paper. The species quoted from the present collection which also appear in the works of Jousseaume and Caramagna are indicated by the locality Aden being inserted in the distribution, with the names of one or both of these writers appended.

The fauna of the Red Sea is essentially tropical, and forms the north-west limit of the Indo-Pacific fauna. The great mass of the species found at Aden have been met with at various places further up the Red Sea, and many of them occur even at the northern end, in the Gulfs of Suez and Akaba; the majority also have a wide distribution over the Indian and Pacific Region.

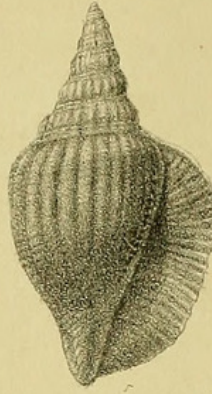
I have not thought it necessary to give references to all the species, most of which are well known; but it is to be understood that they are recognized as determined in the Monographic works of Reeve, Sowerby, and Küster, viz. the 'Conchologia Iconica,' the 'Thesaurus Conchyliorum,' and the 'Conchylien-Cabinet,' ed. 2.

Notes respecting the identification of certain species have been inserted when any doubt has existed, and it is trusted some of these observations may be useful, as, in many cases, they are based upon comparison of the types. The present paper may also be of some





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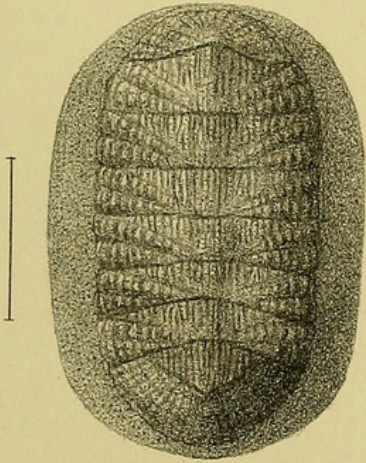
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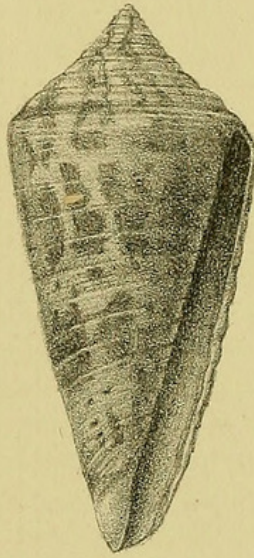
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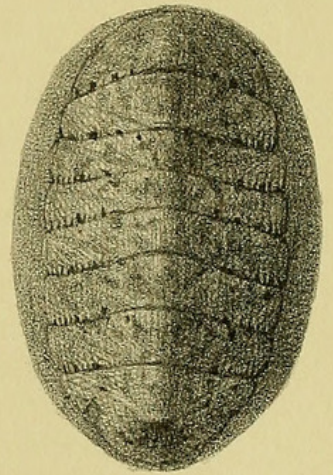
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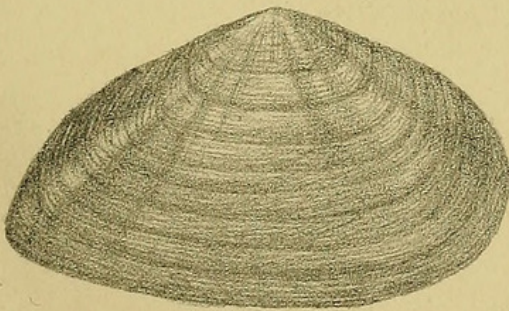
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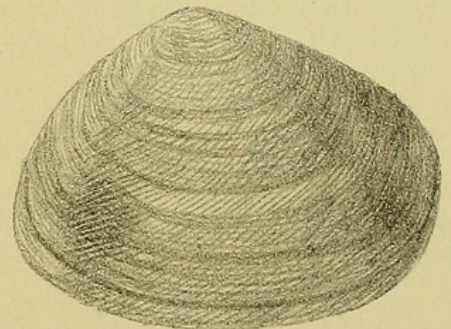
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NEW SPECIES OF SHELLS FROM ADEN.







use to those who possess shells from this locality and are desirous of identifying them.

Before concluding these prefatory remarks I have some observations to make respecting the list of species which, according to Mr. Cooke, are "common to the Mediterranean and the Red Sea"<sup>1</sup>. Examples of the seventeen species he enumerates were collected in the Gulf of Suez by the late Robert MacAndrew in the early part of the year 1869, some months before the opening of the Canal. It is important to note this as showing that their establishment in the Red Sea was not of recent date. Before expressing any opinion with regard to the accuracy of some of Mr. Cooke's identifications, it was necessary for me to study the specimens themselves, and consequently I applied to Dr. Sharp of the Cambridge Museum, where the MacAndrew collection is preserved, and I have to acknowledge his kindness in forwarding all the specimens I required, and I have also to thank Mr. Cooke for kindly looking them out for transmission.

The following is the result of my examination :—

1. *CERITHIUM* (*PIRENELLA*) *MAMMILLATUM*, Risso.  
(= *caillaudi*, Pot. & Mich.)

Nearly all the Suez specimens, which may be referred to a strongly marked variety of this species, have a peculiar facies. They have two distinct rows of granules on the upper whorls, whereas in Mediterranean specimens there are mostly three or more, and in these the granules are smaller than in the Red-Sea specimens. In the Museum we have three specimens from Bombay<sup>2</sup> which are more like the Mediterranean form than that from Suez.

In discussing the marine fauna of any particular sea, it is hardly correct to include the genera *Cerithidea* and *Leuconia*, the former an estuarine form and the latter an amphibious Pulmonate. Now the distribution of some of these estuarine species is most remarkable, and so unaccountable, that I think the occurrence of two forms in some parts of the Mediterranean and the Red Sea hardly bears upon the subject of distribution in question. An instance of this unaccountable distribution has lately come to my notice which may fittingly be recorded here: I refer to *Neritina crepidularia*. This unmistakable species is known from the mouth of the Ganges, from Pondicherry, Tranquebar, Ceylon, Mergui, Singapore, the Dutch Indian Islands, Philippines, Japan, Persian Gulf, and lastly from the Gold Coast, West Africa, where living specimens were collected by Mr. R. Austen Freeman and presented to the British Museum.

2. *EMARGINULA ELONGATA*, Costa.

The specimen kindly sent me for inspection I certainly consider distinct from the above species. It bears a close resemblance to it in general appearance, and without close examination one would not

<sup>1</sup> Ann. Mag. Nat. Hist. 1836, vol. xviii. p. 394.

<sup>2</sup> *Cerithidea bombayana*, Sowerby, Con. Icon. sp. 24. Badly described and figured.



recognize the differences which distinguish it. It is a trifle shorter and higher than the Mediterranean form, but chiefly differs in the sculpture. The cancellation is coarser, the radiating ribs are peculiarly and closely imbricately squamate and thicker, and the filled-up portion of the slit is less prominent. These may be regarded by some people as varietal characters, but in answer to this I would remark that if we unite as one species forms from different seas as distinct as those from the Mediterranean and Red Sea, we should be compelled to include others also, such as *E. micans*, A. Ad., from Torres Straits, and *E. candida*, A. Ad., from Adelaide, both of which have certain points of resemblance to *E. elongata* and to each other, but which still are fairly recognizable as distinct species.

3. *CHITON SICULUS*, Gray.  
(= *C. affinis*, Issel.)

*C. affinis*, Issel, may be regarded as a strongly marked form of the Mediterranean species. There is also a species found in New Zealand, *C. siculoides*, Cpr. MSS. = *C. æreus*, Reeve, which is also inseparable. *C. muricatus*, A. Adams, from Sydney, and *C. stangeri*, Reeve, = *C. insculptus*, A. Ad., from New Zealand, are likewise very similar.

4. *CHITON (ACANTHOCHITES) DISCREPANS*, Brown.

I cannot separate *C. scutiger*, Ad. & Reeve, Corean Archipelago, and *C. carinatus*, A. Ad. & Angas, from Port Jackson, from this species.

5. *VOLVULA ACUMINATA* (Brug.).

The two specimens obtained by Mr. MacAndrew are more slender than this species and agree in form with *V. angustata*, A. Adams, from the Philippine Islands, and *V. cylindrica*, Smith, from Whydah, West Africa, which apparently is the same species.

6. *PHILINE APERTA* (L.).

*P. orientalis*, A. Adams, and *P. angasi*, Crosse, both Australian, are inseparable from this species, which also occurs at Natal (Cooke).

7. (*LEUCONIA DENTICULATA*, Mont.)

Not considered.

8. *PECTEN VARIUS*, Linn.

Mr. MacAndrew collected three specimens which he considered belonged to this species. Of these Mr. Cooke<sup>1</sup> informs us that one is undoubtedly a worn shell of *P. senatorius*, Gmel. This I fully

<sup>1</sup> Ann. Mag. Nat. Hist. 1886, vol. xvii. p. 134.



admit. With regard to the two others he observes :—" I quite agree that they are undistinguishable from the common *varius* of our coasts. Even M. Fischer, who only finds three species common to the Mediterranean and Red Sea, admits as much (Journ. de Conch. 1871, p. 225)."

Having most carefully studied the two shells referred to (only 13 millims. in length!), I have no hesitation in pronouncing them young examples of *P. senatorius*. One of them distinctly exhibits the red curved lines upon the ribs which are so characteristic of typical specimens of this species, and which are chiefly visible upon the pale blotches which variegate the surface. The second specimen agrees with the others in all respects excepting colour. It is of an orange tint, varied with obscure pale markings.

With regard to the latter portion of Mr. Cooke's comment I may point out that M. Fischer should not be accredited with the view that "only three species are common to the Mediterranean and the Red Sea." He is only reviewing a paper by MacAndrew and states "*il n'en a trouvé que 3 identiques.*"

#### 9. LIMA INFLATA, Chemn.

Only a few valves have as yet been quoted from Suez. This species also occurs at the Philippines, for specimens from this locality exist in the British Museum. Another Mediterranean species, *L. squamosa*, has been shown<sup>1</sup> to have a world-wide range. *L. rotundata*, Sowerby, from South Africa may be regarded as a variety of the present species.

#### 10. SPONDYLUS GÆDEROPUS, Linn.

Mr. Cooke considers this species synonymous with *S. aculeatus*, Chemn.! He remarks :—" It is perhaps from want of critical power that I am quite unable to separate these specimens [correctly identified by MacAndrew with *S. aculeatus*, Chemn.] from the well-known Mediterranean *gæderopus*, Lam."<sup>2</sup> This sentence is hardly comprehensible, for if there is one species in the genus *Spondylus* more easy of recognition than any other, it is *S. gæderopus*. This is not the place to discuss the differences which separate this species and *S. aculeatus*, but I would remark they are so obvious that I cannot imagine any conchologist failing to perceive them.

*S. aculeatus* is quoted from the Red Sea by Chemnitz; it is common in the Gulf of Suez (Vaillant) and it is also known from the Gulf of Akaba (Arconati) and Mauritius (MacAndrew).

#### 11. MODIOLARIA MARMORATA, Forbes.

(=*cœnobita*, Vaill.)

The shells from Suez, specimens of which are before me, presented

<sup>1</sup> Lischke, Japan. Meer. Conch. vol. i. p. 162; Smith, 'Challenger' Lamelli-branchiata, p. 287.

<sup>2</sup> Ann. Mag. Nat. Hist. 1886, vol. xvii. p. 136.



to the British Museum by Mr. MacAndrew, certainly are like *M. marmorata*, but more profusely ornamented with colour-markings than the Mediterranean form.

If we unite these two so-called species, we must also include *M. cuneata*, Gould, from the Cape of Good Hope<sup>1</sup>, and *M. cumingiana*, Dunker, from Australia and the Red Sea; the former "differing chiefly [from *marmorata*] in being of a brownish or rosy colour instead of pale green" (Gould)<sup>2</sup>, and the latter being of larger dimensions and somewhat more coarsely sculptured than normal specimens of *marmorata*.

However, I believe those forms, at all events three of them (*M. cuneata* I am doubtful about), are quite recognizable and may therefore be left separate.

## 12. ARCA LACTEA, Linn.

This species ranges as far north as Great Britain; it occurs in the Mediterranean and along the West Coast of Africa; it is recorded from Port Elizabeth by Sowerby, and from the Natal Coast by Krauss (specimens from the latter locality are in the British Museum); and, finally, Mr. Cooke remarks that it "occurs in the Philippines in a form precisely identical with that found at Suez."

## 13. VENERUPIS IRUS, Linn. (=*macrophylla*, Desh. &c.)

*V. macrophylla* and *V. irus* are certainly identical. The former was originally described from the Philippine Islands, and has since been quoted from the Persian Gulf (MacAndrew) and Aden (Jousseume, and Yerbury Coll.).

## 14. PETRICOLA LITHOPHAGA, Retzius. (=*hemprichii*, Issel.)

Doubtless Mr. Cooke is right in considering these two names as belonging to one and the same species, and I fully admit the correctness of his supposition that *P. chinensis*, Deshayes, and *P. bipartita* of the same author, respectively from the China Sea and the Philippine Islands, are merely slight variations also. They had previously been considered synonymous with *P. lithophaga* by Tryon (Amer. J. Conch. vii. p. 257), who also, rightly I think, includes *P. typica*, Jonas, which has been recorded from South Africa by Sowerby (Journ. of Conch. vol. vi. p. 157).

The MacAndrew specimens are exactly like the form *bipartita*. Jousseume quotes this species, as *P. hemprichi*, from Aden.

<sup>1</sup> A specimen obtained by the 'Challenger' at Port Jackson more resembles *M. marmorata* than *M. cænobita*.

<sup>2</sup> Gould states that his species, like *P. marmorata* and *P. cænobita*, occurs "imbedded in the test of a large Ascidian," a fact of which Mr. Cooke seems to have been unaware.



15. *TELLINA BALAUSTINA*, Poli.(=*isseli*, H. Ad.)

"Quite undistinguishable from *balaustina*, Poli. I have examined large series of each without detecting any difference" (Cooke). On the contrary, H. Adams (P. Z. S. 1870, p. 790), who had ample or the same material before him, observes of his *T. isseli*:—"This species very much resembles *T. balaustina*, Linn., but the posterior side is somewhat more angulated, and the concentric striæ, which are less numerous, are much stronger." These points of difference certainly do exist in the specimens from Suez, and I also notice that the form is rounder and the hinge-teeth proportionally stronger. I am therefore at present inclined to regard these two forms sufficiently specifically distinct.

16. *GASTROCHÆNA DUBIA*, Penn.(=*rüppellii*, Desh.)

This species undoubtedly occurs in the Red Sea (*rüppellii*), at Singapore (*indistincta*, Desh.), and the Philippines (*lamellosa*, Desh.). On comparing the types of the three Deshayesian species with specimens of *G. dubia*, I fail to discover any essential differences.

17. ? *PHOLAS DACTYLUS*, L.(=*erythræa*, Gray.)

Of this species (*erythræa*) Mr. Cooke writes—"It seems very doubtful whether the type shell at the Brit. Mus., from which this<sup>1</sup> has been named, is anything more than *dactylus*, L." Now Gray correctly described his species as a *Barnea*, and this alone should have been sufficient to indicate its distinctness from *P. dactylus*. I have examined the types (two valves) of *erythræa* and find that they are identical with *B. manillensis* of Philippi from the Philippine Islands. We may therefore dismiss from our minds the notion that *P. dactylus* occurs in the Red Sea.

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A perusal of the above observations shows that three of Mr. Cooke's identifications I regard as entirely erroneous, namely:—

- |                               |           |                             |
|-------------------------------|-----------|-----------------------------|
| 1. <i>Pecten varius</i>       | should be | <i>P. senatorius</i> .      |
| 2. <i>Spondylus gæderopus</i> | „         | <i>S. aculeatus</i> .       |
| 3. <i>Pholas dactylus</i>     | „         | <i>Barnea manillensis</i> . |

Four species, although closely resembling Mediterranean forms, I regard as sufficiently distinct for specific separation, viz.—

- |                                |           |                       |
|--------------------------------|-----------|-----------------------|
| 1. <i>Emarginula elongata</i>  | should be | <i>E. sp. nov.</i>    |
| 2. <i>Volvula acuminata</i>    | „         | <i>V. angustata</i> . |
| 3. <i>Modiolaria marmorata</i> | „         | <i>M. cænobita</i> .  |
| 4. <i>Tellina balaustina</i>   | „         | <i>T. isseli</i> .    |

<sup>1</sup> MacAndrew's one valve.



The remaining eight species<sup>1</sup> are evidently correctly assigned :—

1. *Chiton siculus*.
2. „ *discrepans*.
3. *Philine aperta*.
4. *Lima inflata*.
5. *Arca lactea*.
6. *Venerupis irus*.
7. *Petricola lithophaga*.
8. *Gastrochæna dubia*.

The subject of the relationship of the Faunas of the Mediterranean and Red Seas is most attractive, and has been more or less fully discussed by R. A. Philippi, Paul Fischer, R. MacAndrew, A. Issel, and A. H. Cooke.

Certain species have been regarded by some of these authors as common to the two seas, and it has been conjectured by them that an intermingling of the faunas of these seas has occurred in past ages when a junction of their waters apparently existed. Species which are commonly regarded as Mediterranean, and which occur in the Gulf of Suez, are supposed to have gradually migrated southward, and, when the two seas became separated, to have established themselves as permanent inhabitants of the warmer waters.

Now, after a careful study of the geographical distribution of these species, finding that all exist also far east in the Indian Ocean, having a much greater range in this direction than through the Mediterranean and some distance into the Atlantic, and considering the Indo-Pacific character of the Red-Sea fauna, it seems to me equally or more reasonable to suppose that the Mediterranean specimens were derived from a Red-Sea source than *vice versâ*. It may be urged in opposition to this theory, how is it that such and such species have been found at Suez only, and at no other part of the Red Sea? The answer to this is simply, that the shores of the Red Sea have only been cursorily examined in a few places, and I fully anticipate that, whenever other more southern parts have been as well investigated as the Gulf of Suez, most of these species will be met with. Already two out of the eight have been recorded as far south as Assab.

Geographical distribution of species is such an enigma in many cases that one feels reluctance in launching forth any theory whatever. Some species, as far as our present knowledge of them extends, appear to have an almost unlimited range; whilst, on the contrary, other allied forms seem to be equally restricted. As examples, I may instance *Arca lactea* and *A. olivacea*. The former little species ranges through the Mediterranean into the Atlantic as far north as this country, southward along the West Coast of Africa past the Atlantic Islands to Ascension Island, on to the Cape of

<sup>1</sup> The estuarine forms *Cerithium mammillatum* and *Leuconia denticulata* are not taken into account, as the subject under consideration is the relationship of the Marine faunas of the two seas. *Vide* remarks upon the former previously given.



Good Hope and Natal, and finally it is known from the Red Sea and Philippine Islands. The other species, *A. olivacea*, the distribution of which, as far as we know, is as limited as that of *A. lactea* is extensive, has at present only been recorded from the Philippines. I could multiply cases of this kind, but the one mentioned is sufficient to demonstrate the unaccountable difference in the distribution of allied forms. There seems to be an unfathomable something in their nature which permits the one to live under very varied conditions, in temperatures greatly differing, and in waters of which the chemical composition is dissimilar, and on the other hand which does not allow the other to exist excepting under special and limited conditions. It is so in the vegetable kingdom. Do we not find some plants which will grow almost anywhere, in all kinds of soil, whereas to others existence appears to be possible only amid very special surroundings? Being cognisant of such facts as these, it is with much diffidence that I have suggested the migration, so to speak, of the species in question, or some of them at least, from the Red Sea into the Mediterranean. However, taking all points into consideration, I think this supposition is likely to be as correct as the view usually entertained.

Some support to this theory is derived from a study of the emigration of species from the Red Sea to the Mediterranean and *vice versâ* since the opening of the Suez Canal. From the reports upon this subject by Fuchs<sup>1</sup>, Keller<sup>2</sup>, Krukenberg<sup>3</sup>, and others, it is evident that there is a greater pilgrimage taking place northward than towards the south, and this, to some extent, is possibly attributable to the movement of the current from the Red Sea to the Bitter Lakes being faster than that from the Mediterranean southward, for there is a flow in both directions, owing to the great evaporation in the Bitter Lakes. At present two Red Sea forms, *Mytilus variabilis* and *Macra olorina*, have been taken living at or near Port Said; on the contrary, no Mediterranean species has as yet got through to Suez, but *Cardium edule* (if correctly identified) is said to have almost reached there. Although certain species may extend northward and to the south, it yet remains to be seen if they become modified to any extent, supposing the altered temperature and chemical composition of the water into which they may have migrated permit their race to be perpetuated.

I can well imagine that eventually it will be found that all the rest of the species have as wide and very nearly the same distribution as *Arca lactea*, and therefore the possibility is suggested that their presence in the Mediterranean may have originated from the Atlantic end and not from the eastern or Red Sea extremity. Suggestive of this is the fact that specimens of the same species from the Atlantic Islands (Madeira, Canaries &c.) and the Mediterranean are absolutely identical, whereas, in some instances at all events, in the Red Sea equivalents some slight modifications are noticeable.

<sup>1</sup> Die geologische Beschaffenheit der Landenge von Suez. Wien, 1877.

<sup>2</sup> Neue Denkschrift. allgem. Schweiz. Gesellsch. 1883, vol. xxviii. pt. 3.

<sup>3</sup> Vergl.-physiolog. Studien, 1888, 2nd ser., 5th part, 1st half.



The following table also lends some support to this proposition. It will be noticed that, starting from Australia<sup>1</sup> and the Philippine Islands, all are found in the Red Sea, four at the Cape, one has been recorded from St Helena, one from Ascension, six from the Atlantic Islands, and all in the Mediterranean.

Name of species.	Australian region.	Philippines.	Red Sea.	S. Africa.	St. Helena.	Ascension.	Atlantic Is.	Mediterranean.
<i>Chiton siculus</i> .....	*	...	*	...	...	...	...	*
„ <i>discrepans</i> .....	*	...	*	...	...	...	...	*
<i>Philine aperta</i> .....	*	...	*	*	...	...	*	*
<i>Lima inflata</i> .....	...	*	*	*	...	...	*	*
<i>Arca lactea</i> .....	...	*	*	*	...	*	*	*
<i>Venerupis irus</i> .....	...	*	*	...	...	...	*	*
<i>Petricola lithophaga</i> .....	...	*	*	*	...	...	*	*
<i>Gastrochæna dubia</i> .....	...	*	*	...	*	...	*	*

It is quite possible that most of these species may have been carried across the Indian Ocean<sup>2</sup> to the Cape in various states of development, for we know that a very large quantity of pumice thrown into the sea during the eruption of Krakatoa in 1883 was drifted in that direction, indicating the course likely to be taken by larval and pelagic forms or even by adult organisms (like the last five of the above species) if attached by a byssus to, or burrowing into, floating substances like pumice. Passing the Cape they may have extended up the West-African side of the Atlantic past the Atlantic Islands<sup>3</sup>, and so on into the Mediterranean, at the entrance of which at Gibraltar, the main strong *surface* current is from the Atlantic eastward, which would of course be favourable to the influx of species from that sea.

As I have before stated, this is all mere conjecture, and we have to assume a starting-point somewhere in the East, for which we have no grounds. The proposition that species common to the Red Sea and the Mediterranean may have originated in the East, holds good also in regard to three of the four species which I consider sufficiently different from the Mediterranean species to be regarded as distinct. Even if we consider them practically identical, as Mr. Cooke does,

<sup>1</sup> *Euthria cornea* was recorded from New Caledonia by Brazier in 1889, and the 'Challenger' dredged off Sydney about 10 species of Mollusca which are inseparable from N. Atlantic forms.

<sup>2</sup> We conjecture that the ocean-currents took the same direction in bygone days: what grounds have we for this?

<sup>3</sup> Vide my reports on the Mollusca of St. Helena and Ascension Island (P. Z. S. 1890, pp. 247, 317).



we find that they have as near representatives in the Indo-Pacific. In the case of the fourth species, *Tellina isseli*, I am not aware that it has been found anywhere except in the Gulf of Suez, a fact which to some extent confirms its distinctness from the Mediterranean *T. balaustina*, considering that all the other species common to the two seas have an enormous distribution.

In the foregoing observations no reference has been made to the light which Palæontology may throw upon the subject of distribution of the species in question. It is true that most of them are found fossil in the Miocene, Pliocene, and other Tertiary rocks of Italy, Sicily, &c., a fact which would seem to indicate a long establishment in the northern hemisphere. On the other hand, a number of recent Mediterranean and Atlantic forms have already been recorded from the Tertiary deposits of Australia<sup>1</sup>; and we may therefore conjecture that when the Palæontology of Australia and other eastern countries has been more fully worked out, many more so-called European species will be discovered. Such being the case, I fail to perceive that the evidence afforded by Palæontology lends more support to any one of the theories of distribution set forth than to another. Probably all are wrong.

*List of the Yerbury and Baynham Collections of Shells  
from Aden.*

I. GASTROPODA.

1. *CONUS SUMATRENSIS*, Hwass.

*Hab.* Red Sea (*Reeve & others*). Gulf of Akaba (*Brit. Mus.*); Aden (*Caramagna*).

2. *CONUS CAPITANEUS*, Linn.

*Hab.* Ceylon, Philippines, Australia, New Caledonia, Polynesia, Mauritius. Andaman Is. (*Brit. Mus.*).

3. *CONUS RATTUS*, Hwass.

*Hab.* Red Sea, Ceylon, New Caledonia, Tahiti, &c. Islands of Rodriguez and Annaa (*Brit. Mus.*).

4. *CONUS TESSELLATUS*, Born.

*Hab.* Red Sea, Persian Gulf, Ceylon, Mozambique, Mauritius, Philippines, New Caledonia, Polynesia. Island of Rodriguez, Torres Straits, Fiji Islands (*Brit. Mus.*); Aden (*Caramagna*).

5. *CONUS QUERCINUS*, Hwass.

*Hab.* Red Sea, E. Africa, Mauritius, Ceylon, Philippines, Viti Islands, Sandwich Islands, New Caledonia, Friendly Islands.

Some adult specimens 80 millimetres long, obtained by Major Yerbury, are entirely without the spiral thread-like lines which occur in young shells. They are covered with a very thick fibrous or spongy epidermis.

<sup>1</sup> R. Etheridge, jun., Cat. Australian Fossils, 1878.



6. *CONUS BETULINUS*, Linn.

*Hab.* E. Africa, Isle of Bourbon, Ceylon, Java, China, Philippines. Aden (*Caramagna*).

I do not agree with Tryon<sup>1</sup> in considering *C. suratensis* a variety of this species.

7. *CONUS STRIATUS*, Linn.

*Hab.* Red Sea, E. Africa, Ceylon, Cochin China, Philippines, Australia, New Caledonia, Viti Islands. Amirantes, Solomon Islands, Island of Annaa (*Brit. Mus.*).

8. *CONUS GENERALIS*, var.

*Hab.* Red Sea, Ceylon, E. Africa, Philippines, New Caledonia, &c. *C. maldivus*, Hwass, *C. monile*, Hwass, and *C. bayani*, Jousseaume, should, I think, be considered varieties of this species, and *C. spirogloxus*, Deshayes, appears to be the young of it. One of the specimens from Aden is like Reeve's figure of *C. monile* (Con. Icon. f. 61), but the transverse lines are not interrupted and very much finer and thread-like. A second young example has equally fine lines, but they are interrupted and consequently form series of dots.

9. *CONUS ACUMINATUS*, Hwass.

*Hab.* Red Sea.

*C. insignis* and *C. multitenatus*, Sowerby, belong to this species. The latter is placed by Tryon among the synonyms of *C. aplustre*, Reeve. Having Sowerby's type in the Museum, I am able to state that it bears no relationship to that species.

10. *CONUS VIRGO*, var. *THOMASI*, Sow.

*Hab.* Red Sea, E. Africa, Ceylon, Amboina, Java, Philippines, New Caledonia, Polynesia. Fiji, Tongatabu (*Brit. Mus.*); Aden (*Caramagna*). Only the variety (*thomasi*) is among the Aden shells.

11. *CONUS FLAVIDUS*, Lamarck.

*Hab.* Red Sea, Persian Gulf, E. Africa, Ceylon, Java, Australia, New Caledonia, Polynesia. Mozambique, Island of Rodriguez, Torres Straits, Solomon Islands, Fiji and Tonga Islands (*Brit. Mus.*).

12. *CONUS INSCRIPTUS*, Reeve.

*Hab.* Red Sea.

*C. keatii*, Sowerby, from the Seychelles Islands, which apparently is only a variety of this species, has the spire slightly tabulated and the tops of the whorls have more numerous spiral striæ. One of the six specimens from Aden possesses these characteristics.

13. *CONUS LINEATUS*, Chemnitz.

*Hab.* Red Sea, East Africa, Ceylon, Philippines, Australia, New Caledonia. Andaman Is. (*Brit. Mus.*).

<sup>1</sup> Man. Conch. vol. vi. p. 16.



The shell described by Crosse under the name of *C. mirmillo* is not allied to this species, with which it is united by Tryon (Man. Con. vi. 44), but should be regarded as a form of *C. vulpinus*.

#### 14. CONUS CATUS, var.

*Conus coffea*, Gmelin, is probably the same as this species. *C. discrepans*, Sowerby, also appears to be a variety; and *C. adansonii*, Reeve, and *C. nigropunctatus*, Sowerby, may be regarded in the same light.

The specimens from Aden belong to the var. *adansonii*.

*Hab.* Red Sea, Mauritius, Java, China, New Caledonia, Polynesia. Gulf of Akaba (*Brit. Mus.*).

#### 15. CONUS ERYTHRÆENSIS, Beck.

*Hab.* Red Sea.

With this species may be united *C. piperatus*, Reeve (non Dillwyn), *C. hamilli*, Crosse, *C. dillwynii*, Reeve, *C. induratus*, Reeve, *C. adustus*, Sowerby, and *C. quadratomaculatus*, Sowerby.

#### 16. CONUS TRAVERSIANUS, Smith.

*Conus traversianus*, Smith, Quarterly Journ. Conch. vol. i. p. 107, woodcut; Sowerby, Thes. Conch. vol. v. p. 263, pl. 511. f. 719.

The locality of this species has hitherto remained unknown. The two specimens from Aden answer in every respect my original description. The spire, as conjectured, consists of ten whorls, which are slightly turreted. Mr. Sowerby's figure gives but a poor idea of the beauty of this shell, the form being not sufficiently tapering anteriorly, the aperture too narrow, the transverse articulated lines are not indicated, and the blotched bands are not correctly placed.

The figure in the 'Quarterly Journal of Conchology' represents the bands more accurately as regards position, but apparently they are generally more blotchy and broken up. The whorls of the spire also are slightly elevated one above the other, producing a turreted appearance.

A specimen from Amboina has recently been presented to the Museum by Mrs. Parkinson.

#### 17. CONUS ADENENSIS. (Plate XXXIII. fig. 1.)

*Testa elongato-turbinata, alba, seriebus macularum subquadratarum transversis, et zonis duabus aurantio-fuscis (altera supra altera medium infra) cincta, transversim sulcata; interstitia plus minus tuberculata; spira breviter conica, leviter concava, aurantio-fusca maculata; anfractus 12-13, levissime turriti, infra suturam marginati, declives, lirulis tenuibus spiralibus ornati; apertura angusta, intus alba.*

*Longit* 48 millim., *diam. maj.* 21½.

The colour and disposition of the markings are similar to those of *C. planiliratus*, Sowerby, from the China Sea, but the form is different, especially as regards the spire. It is a little more elevated



and not nearly so concave. The upper normal whorls in the Chinese species are turreted and prettily coronated or tuberculated at the angle, and the revolving sculpture of the spire is rather stronger than in the present species, which does not exhibit any coronation above. The tuberculation upon the transverse ridges of the lower two-thirds of the body-whorl is also a good distinguishing feature.

Kiener's figure of *C. recurvus* (Coq. Viv. pl. 97. f. 4), if the outlines of the spire were the slightest less concave, would exactly represent the form of this species.

18. *CONUS ARMATUS*, Hwass.

*Hab.* Red Sea, East Africa, Ceylon, Philippines, New Caledonia, Viti Islands, Samoa Islands. Amiranter (Brit. Mus.); Aden (*Caramagna*).

19. *CONUS TÆNIATUS*, Hwass.

*Hab.* Red Sea, Ceylon, China, Singapore.

20. *CONUS MINIMUS* (auct.).

*Hab.* Natal, Andaman Islands, China, Philippines, Port Essington, New Caledonia (Brit. Mus.); Aden (*Caramagna*).

21. *CONUS CEYLANENSIS*, Hwass.

*Hab.* Red Sea, Ceylon, Mauritius, Andaman Islands, Island of Rodriguez.

These are localities for the typical form of this species.

22. *CONUS CUVIERI*, Crosse.

*Hab.* Red Sea (Brit. Mus.).

Tryon<sup>1</sup> could never have seen this species or he would not have placed it as a variety of *C. cervus*, with which it has no relationship. Weinkauff<sup>2</sup>, in comparing it with *C. tulipa* and *C. geographus*, has indicated its true affinity.

The locality "Swan River," which has been quoted for this species, requires confirmation.

23. *CONUS TEXTILE*, Linn.

*Hab.* Red Sea, Indian Ocean, Philippines, Polynesia. Aden (*Caramagna*).

With this species I am inclined to unite the following as varieties:—*C. vicarius*, Lamarck, *C. verriculum*, Reeve, *C. textilina*, Kiener, *C. tigrinus*, Sowerby, *C. corbula*, Sowerby, *C. scriptus*, Sowerby, *C. panniculus*, Lamarck, *C. canonicus*, Hwass, *C. rubescens*, Bonnet, *C. legatus*, Lamarck, *C. musivum*, Broderip, *C. paulucciae*, Sowerby, *C. condensus*, Sowerby, *C. archiepiscopus*, Hwass, *C. abbas*, Hwass.

Great as is the difference in many respects between the extreme forms, still I find it impossible to discover any permanent distinctions,

<sup>1</sup> Man. Conch. vi. p. 87.

<sup>2</sup> Conch.-Cab., Monogr. *Conus*, p. 321.



when a very large series of specimens is examined, which will separate any of these so-called species from the rest.

Sowerby (Proc. Zool. Soc. 1882, p. 120), on the other hand, observes "having had exceptional opportunities, from time to time, of examining large numbers of specimens of all the varieties, I continue to regard these last (*C. abbas*, *C. panniculus*, *C. legatus*, &c.) as species."

24. *CONUS NUSSATELLA*, Linn.

*Hab.* Red Sea, East Africa, Ceylon, Java, Philippines, N. Australia, New Caledonia, Polynesia.

25. *TEREBRA TESSELLATA*, Gray.

*Hab.* Pidang, Sumatra.

This species is quite distinct from *T. ligata*, Hinds, with which it is united by Tryon<sup>1</sup>. It is, however, identical with *T. decorata*, Deshayes. Having the *types* of the three so-called species in the Museum, I can speak with certainty upon the subject.

The specimens from Aden show that this species attains to much larger dimensions than those already quoted, the largest example having a length of 55 millimetres.

26. *TEREBRA LAMARCKII*, Kiener.

*Hab.* Zanzibar; Aden? (Jousseaume as *duplicata*).

This species is considered by Tryon and Reeve a variety of *T. duplicata*, Linné. The style of coloration, however, is very peculiar, and the longitudinal striæ are farther apart. I prefer therefore, not having as yet met with intermediate forms, to regard them as distinct species.

27. *TEREBRA (IMPAGES) CÆRULESCENS*, Lamarck.

*Hab.* Red Sea, Mauritius, Philippines, Australia, Polynesia.

28. *PLEUROTOMA VIOLACEA*, Hinds, var.

*Hab.* Red Sea, Persian Gulf, Japan, Philippines, New Guinea, New Zealand, Australia.

The specimens from Aden are unusually large, measuring as much as 27 millimetres in length and 9 in diameter. They do not belong to the typical lilac form, but are of a very light brownish tint with white spiral ridges, one of which is more conspicuous than the rest.

29. *PLEUROTOMA (SURCULA) CATENA*, Reeve.

This species, the habitat of which was hitherto unknown, is well distinguished by the oblique white tubercles on the middle of the whorls with brownish spots between them. They become obsolete on the body-whorl, which is ornamented with oblique streaks and

<sup>1</sup> Man. Conch. vol. vii. p. 26.



spots of a brownish tint. The extremity of the canal is stained with a darker tint. The upper part of the whorl is divided off by an impressed line forming an infra-sutural convex band which is more or less nodose.

This is an extremely rare species, the type in the British Museum being the only specimen previously recorded, and a single example only was obtained by Major Yerbury.

### 30. PLEUROTOMA (DRILLIA?) VIRGINIA, Beck.

*Hab.* Mouth of the Gambia (Reeve).

In the British Museum are four specimens from Bombay, presented by W. T. Blanford, Esq., which agree precisely with Reeve's figure and description.

*Pl. tuberculata*, Gray, very closely resembles this species, but the canal appears slightly longer. Tryon<sup>1</sup>, in carrying out his system of "lumping," unites with *Clavatula muricata* this and several other species, which in my opinion should be kept separate.

### 31. PLEUROTOMA (DRILLIA) BAYNHAMI. (Plate XXXIII. fig. 2.)

*Testa fusiformis, turrita, dilute flavo-fuscescens, pone costas fusco tincta; anfractus 12, primi duo læves, globosi, subpellucidi, cæteri supra medium concavi, inferne convexi, infra suturam marginati, costis longitudinalibus supra medium evanidis (in anfract. penultimo 9-10) instructi, lirisque spiralibus tenuibus albis ornati; anfr. ultimus inferne angustatus, pone labrum varice magno convexo instructus, costis inferne attenuatis et flexuosis ornatus; apertura longit. totius  $\frac{2}{5}$  fere æquans, intus livida; columella vix arcuata, callo tenui superne tuberculo parvo munito induta; sinus haud profundus, mediocriter latus. Longit. 29 millim., diam. 9; apertura  $11\frac{1}{2}$  longa,  $3\frac{1}{2}$  lata.*

Like *Drillia suturalis*, Gray, this species has a raised fillet at the suture; but it may be distinguished by its shorter body-whorl, its more pronounced costæ, and the difference of colour. The costæ become obsolete a little above the middle of the whorls where the concavity commences, and, being traversed by a distinct white spiral thread, have a somewhat angulated appearance.

### 32. MUREX SCOLOPAX, Dillwyn.

*Hab.* Red Sea, Persian Gulf; Aden (*Caramagna*).

Tryon has united with this species *M. occa*, Sowerby, and *M. macgillivrayi*, Dohrn, two forms which in my opinion are very different.

### 33. MUREX TERNISPINA, Lamarck.

*Hab.* Red Sea, Indian Ocean, China, Philippines, Japan.

I am inclined to believe with Tryon that *M. aduncospinosus* is the same as this species, but I think *M. martinianus* and *M. troscheli* should be kept distinct.

<sup>1</sup> Man. Conch. vol. vi. p. 229.



## 34. MUREX HAUSTELLUM, Linn.

*Hab.* Red Sea, Ceylon, Mauritius, China, Philippines. Aden (*Caramagna*).

## 35. MUREX (CHICOREUS) ANGULIFERUS, Lamarck.

*Hab.* Aden (*Jousseume*), Red Sea, Persian Gulf, Indian Ocean, Seychelles, Bourbon, Ceylon.

In Cuming's collection is a shell, named *M. lycacantha*, Jonas (not *cyacantha* as given by Sowerby and copied by Tryon), which appears to be only a manuscript name. It evidently is the same as *M. anguliferus*.

## 36. MUREX (CHICOREUS) RAMOSUS, Linn.

*Hab.* Red Sea, Indian Ocean, Polynesia, &c.

## 37. MELONGENA PARADISIACA (MARTINI), Reeve.

*Hab.* Red Sea, Mozambique, Natal, Ceylon, Bourbon.

The epidermis of this species is quite velvety to the touch and is covered with innumerable very short glossy hairs, disposed in longitudinal series upon the lines of growth; they are invisible to the naked eye. The operculum is unguiculate, more than twice as long as broad, strong, thickened underneath along the outer margin, and has the nucleus terminal.

## 38. PISANIA TRITONOIDES (Reeve).

*Buccinum tritonoides*, Reeve, Conch. Icon. vol. iii. pl. x. f. 77.

*Hab.* Philippine Islands.

I cannot agree with Tryon in considering this species a variety of *P. ignea*, Gmelin. The differences of form, colour, and sculpture are, I think, sufficient to separate them.

## 39. TRITONIDEA UNDOSA (Linné), var.

*Hab.* Malacca, Australia, Philippines, Viti, Paumotus, Society Islands.

This species varies considerably in size. The specimens from Aden are very small in comparison with the shell figured by Reeve<sup>1</sup> from the Philippines, being only 22 millimetres in length. They differ also in the absence of the yellow margin to the aperture.

## 40. COLUMBELLA PROPINQUA. (Plate XXXIII. fig. 3.)

*Testa acuminata, ovata, solida, olivacea, interdum aurantia, guttis et maculis albis fusco marginatis variegata; anfractus 8, convexiusculi, læves vel obsolete spiraliter striati, ultimus basim versus distinctius transversim striatus; spira brevis, leviter concave acuminata; apertura albida vel pallide cærulea, angusta, longitudinis totius  $\frac{1}{2}$  adæquans; labrum extus paulo incrassatum, intus denticulatum, denticulis medianis paucis cæteris majoribus; columella callo tenui induta.*

*Longit.*  $16\frac{1}{2}$  millim., *diam.* 9.

This species is very like *C. vulpecula*, Sowerby, but differs in

<sup>1</sup> Con. Icon. vol. iii. *Buccinum*, pl. viii. fig. 55.



colour and slightly in form. The labrum in that species is white within and without, and much more strongly transversely striated externally than in the present species. The latter also is a stouter shell, broader across the body-whorl at the shoulder, and consequently the spire is much more acuminate. *C. fabula*, Sowerby, and *C. pardalina*, Lamarck, are also allied species.

41. *COLUMBELLA* (*ANACHIS*) *MISERA*, Sowerby.

*Hab.* Andaman Islands, Japan, Sandwich Islands.

With this species Tryon (perhaps rightly) unites *C. zebra*, Gray, and *C. pacifica*, Gaskoin. A shell from the Andaman Islands which I described (P. Z. S. 1878, pl. 50. f. 6) under the name *C. nigriricosta*, I now believe to be the same as *C. misera*.

42. *COLUMBELLA* (*CONIDEA*) *FLAVA* (Bruguère).

*Hab.* Indian Ocean, Mauritius, Réunion, Seychelles, Singapore, Japan, &c.

The Aden shells are of a purplish-brown colour variegated with whitish dots and wavy streaks. The inner dentate portion of the labrum and the columella, with the exception of the upper part which is white, are rose-purple. The epidermis has a somewhat silky appearance and is disposed in longitudinal close-set shreds.

43. *ENGINA* (*PUSIOSTOMA*) *MENDICARIA* (Linné).

*Hab.* Red Sea, Zanzibar, Mauritius, Madagascar, Amirantes, Philippines, Australia, Polynesia. Gulf of Akaba, Christmas Island, Mergui Archipelago, Solomon Islands (*Brit. Mus.*).

44. *EBURNA VALENTIANA*, Swainson.

*Hab.* Red Sea and Persian Gulf. Aden (*Jousseume*).

This is not the *Nassa molliana* of Chemnitz as supposed by Sowerby<sup>1</sup> and Tryon<sup>2</sup>. Chemnitz describes his species in the fourth volume of the 'Conchylien-Cabinet,' pp. 15-18, and figures it on pl. 122. fig. 1119. The shell there depicted is the well-known *E. zeylanica*. Sowerby evidently never read Chemnitz's text, but appears to have been led into the error through Chemnitz having inadvertently put the name *Nassa molliana* (p. 13) to figure 1118. On page 6 it is referred correctly to figure 1119.

45. *BULLIA MAURITIANA*, Gray.

*Hab.* Madagascar (*Gray*); Aden (*Caramagna*).

I quite agree with Tryon in uniting *B. grayi*, Reeve, with this species. The beautiful specimens collected at Aden by Major Yerbury are of a livid colour, glossy, with the basal carina and the aperture of a dark rich brown, and the spot at the termination of the sutural callus is also deep brown. The largest specimen is 52 millim. long, whilst the gigantic example referred to by Reeve under *B. grayi*, which has been in the Museum fifty years, is 64 millim. in length.

<sup>1</sup> Thesaurus Conch. vol. iii. p. 69.

<sup>2</sup> Man. Conch. vol. iii. p. 213.



46. *BULLIA* (*LEIODOMUS*) *LINEOLATA* (Wood).

1828. *Buccinum lineolatum*, Wood, Index Test. Suppl. p. 12, pl. 4. f. 22.

1834. *Buccinum politum* (Deshayes from Lamarck), Bélanger's Voy. Indes Orientales, Zool. p. 431, pl. iii. ff. 1, 2.

1840-1850. *Buccinum bellangeri*, Kiener, Coq. Viv. p. 34, pl. 14. f. 48.

1846. *Bullia belangeri*, Kiener, Reeve, Con. Icon. pl. ii. f. 8 a-b.

*Hab.* Aracan, Ceylon.

I do not know the exact date of Kiener's publication, but there is no doubt that it appeared some years after Wood's Index. Wood's type is in the British Museum.

47. *BULLIA* (*LEIODOMUS*) *TAHITENSIS* (Gmelin).

*Buccinum australe*, Chemnitz, Conch.-Cab. vol. x. p. 178.

*Buccinum australe otaheitensi*, id. l. c. p. 202, pl. 154. f. 1477.

*Buccinum tahitense*, Gmelin, Syst. Nat. p. 3498; Wood, Index Test. p. 111, pl. 23. f. 109.

*Bullia takeitensis* (Gray, MSS.), Reeve, Conch. Icon. f. 11.

This species has not, I believe, been recorded from any special locality of recent years, and the original habitat, "Otaheite (*Chemnitz*)," has not been confirmed. The figure of this shell in Tryon's 'Manual' is not worth quoting, the drawing being very bad and the colour simply disgraceful; in fact the colouring of the figures in the whole of this volume (vol. iv.) is so utterly ridiculous that not the slightest attention should be paid to it. Dabs of blue, smears of pink, washes of green, &c., &c. seem to have been applied haphazard; indeed the production of a nursery would be as near reality.

48. *BULLIA* (*LEIODOMUS*) *KURACHENSIS*, Angas.

*Bulla* (*Leiodomus*) *kurrachensis*, Angas, Proc. Zool. Soc. 1877, p. 229, pl. 54. f. 6.

*Bullia* (*Pseudostrombus*) *kurrachensis*, Tryon, Man. Conch. vol. iv. pl. 6. f. 90.

*Hab.* Kurrachee, N.W. coast of India.

Besides the type presented to the Museum by the late G. F. Angas, Esq., there are three specimens also from Kurrachee in the Cumingian Collection. The specimens from Aden are very pale brown.

49. *NASSA PULLUS* (Linné).

*Hab.* Red Sea, Java, Philippines, Aden (*Caramagna*).

50. *NASSA LENTIGINOSA*, A. Adams.

*Hab.* Philippines.

With this species I would unite *N. punctata*, A. Adams, and *N. velata*, Gould. It is considered by Tryon<sup>1</sup> a form of *N. grandiosa*,

<sup>1</sup> Man. Conch. vol. iv. pp. 34-5.



Hinds, with which species he unites a considerable number of what, to my mind, are quite distinct species.

51. *NASSA ALBESCENS*, Dunker (var. *FENESTRATA*, Marrat).

*Hab.* Red Sea, India, Ceylon, Seychelles, Singapore (*Brit. Mus.*); Mozambique, Philippines, Moreton Bay, Australia (*Marrat*).

The above are the localities for the variety *fenestrata*. I am not sure that the shell figured by Reeve (*Con. Icon. f. 100*) is the same species as that described by Dunker under the name *albescens*. The latter is stated to be West-Indian, and although Reeve also quotes West Indies, the specimen he figures was probably Australian, as it agrees precisely with specimens in the Museum from that region.

52. *NASSA CORONATA* (Linn.).

*Hab.* Natal, E. Africa, Seychelles, Andaman Islands, Darnley Island (*Brit. Mus.*). Other localities are Madagascar, Java, Philippines, &c.

53. *NASSA GEMMULATA*, Lamarck, var.

*Hab.* Red Sea, Muscat, Japan, Philippines, Cape York, New Guinea, Queensland. Aden (*Caramagna*).

The shells from Aden belong to the variety described by A. Adams under the name of *N. verrucosa*. They are considerably larger than Adams's type as figured by Reeve (*Conch. Icon. f. 36*).

54. *NASSA FISSILABRIS*, A. Adams.

*Hab.* Philippines.

This species is peculiar on account of the unusually distinct sinus at the upper end of the labrum and for the development of the callosity above it. It is perfectly distinct from *N. nodicostata* and *crenolirata* of A. Adams and *albipunctata*, Reeve, which are all united by Tryon<sup>1</sup>, but which I consider separate well-defined species.

55. *PHOS ROSEATUS*, Hinds.

*Hab.* Philippines.

Only a single specimen was found by Major Yerbury.

56. *RAPANA BULBOSA*, Solander.

*Hab.* China, Japan, Philippines. Red Sea, Kurachee, Singapore (*Brit. Mus.*).

57. *PURPURA RUDOLPHI*, Lamarck.

*Hab.* Philippines, Natal.

58. *PURPURA HIPPOCASTANUM*, Lamarck.

*Hab.* Red Sea, Seychelles, Amirantes, Mergui, Japan, Philippines, N.E. Australia, Fiji, and New Zealand (*Brit. Mus.*).

Many other localities have been quoted for this species. The synonymy given by Tryon (*Man. Conch. vol. ii. p. 162*) is so ridiculous that it is beneath criticism.

<sup>1</sup> *Man. Conch. vol. iv. p. 40.*



59. *PURPURA MANCINELLA* (Linn.).

*Hab.* Philippines, Ceylon, Mergui, Amboina, Bay of Muscat.

*P. echinata*, Blainville, and *P. ægrota*, Reeve, united by Tryon (Man. Conch. vol. ii. p. 164) with this species are certainly distinct.

60. *PURPURA TISSOTI*, Petit.

*Purpura tissoti*, Petit, Journ. de Conch. 1852, p. 163, pl. vii. ff. 4 a-b.

*Cantharus tissoti*, Tryon, Man. Conch. iii. p. 164.

*Pisania tissoti*, id. op. cit. vol. ii. p. 258.

*Hab.* Bombay (*Petit & Brit. Mus.*).

This species is a true *Purpura*, having the typical operculum of the genus. It is most surprising that Tryon could see in it any relation-ship to the genus *Cantharus*.

61. *SISTRUM TUBERCULATUM* (Blainville).

*Hab.* Red Sea, Indian Ocean, Mozambique, Japan, N.E. Australia, Solomon Islands, &c. (*Brit. Mus.*).

Other localities in the Indian and Pacific Oceans have been recorded (*vide* Smith, Voy 'Alert,' p. 52).

62. *SISTRUM UNDATUM* (Chemnitz).

*Hab.* Andaman Islands, Tranquebar, Singapore, West & N.W. Australia, Louisiade Archipelago, China, Japan, New Caledonia, &c.

63. *SISTRUM FISCELLUM* (Chemnitz).

*Hab.* Red Sea, Philippines. Natal and Polynesia (*Cooke*).

64. *SISTRUM CHRYSOSTOMA* (Deshayes).

*Ricinula chrysostoma*, Deshayes, Mag. de Zool. 1844, pl. 86.

*Ricinula chrysostoma* (part.), Tryon, Man. Conch. vol. ii. p. 191, pl. 59. f. 283.

*Hab.* Red Sea (*Deshayes*). Indian Ocean, Philippines, Polynesia (*Cooke*).

The Aden shells agree precisely with the Red Sea forms as described by Deshayes.

65. *SISTRUM ELATUM* (Blainville).

*Purpura elata*, Blainville, Nouv. Ann. Mus. 1832, p. 207, pl. 11. f. 1.

*Ricinula elata*, Reeve, Con. Icon. fig. 27 (is a small variety).

*Ricinula spectrum*, Reeve, l. c. fig. 19.

*Hab.* New Holland (*Blainville*). Philippines (*Reeve*). Red Sea (*Brit. Mus.*).

The aperture of this species is described as white by Blainville and Reeve. In several specimens in the Museum it is pale or deep yellow.



## 66. CANCELLARIA MELANOSTOMA, Sowerby.

*Hab.* — ?

The locality of this species has not been recorded in any of the monographs.

## 67. CANCELLARIA HYSTRIX, Reeve.

*Hab.* Mauritius.

Two specimens collected by Mr. Baynham have the two purplish bands on the body-whorl much darker than Reeve's type.

## 68. CANCELLARIA SCALARINA, Lamarck.

*Hab.* Isle de France (*Kiener*).

The specimen from Aden agrees very fairly with *Kiener's* figure<sup>1</sup> of this species. I am inclined to think that the shell identified by Sowerby<sup>2</sup> as this species is correctly determined, although Crosse<sup>3</sup> has held a different opinion.

## 69. MITRA GRANATINA, Lamarck.

*Mitra granatina*, *Kiener*, *Coq. Viv.* p. 16, pl. 4. f. 10.

*Mitra scabriuscula*, *Reeve* (? *Voluta scabricula* of *Linn.*), *Con. Icon.* pl. 2. f. 35.

*Hab.* Philippines (*Reeve*); Viti Islands (*Tryon*).

## 70. MITRA FERRUGINEA, Lamarck.

*Hab.* Islands of Annaa and Taheite (*Reeve*).

The specimen from Aden has the form and sculpture of this species as depicted by *Reeve*, but the brown colour is replaced with bright red, like that of *M. rubritincta*, which, as suggested by *Tryon*, is probably only a variety of this species.

## 71. MITRA SCUTULATA, Lamarck.

*Hab.* Philippines, Mergui.

Two specimens from Aden are connecting-links between this species and *M. amphorella*, Lamarck. They have the white zone at the upper part of the whorls like the latter and variegated markings like the former; the impressed transverse fine lines are of a red tint, and the whole surface is covered with a thin olivaceous epidermis.

## 72. MITRA LITERATA, Lamarck.

*Hab.* "Red Sea, Java, Mauritius, S. Africa, Philippines, Polynesia" (*Tryon*).

In the two specimens from Aden the rich brown colour predominates over the white.

73. TURRIS INTERMEDIA (*Kiener*).

*Hab.* Moluccas (*Reeve*); Madagascar (*Kiener*); East Coast of Africa, Nicobar Islands, Ceylon, Malay Archipelago (*Martens*).

<sup>1</sup> *Icon. Coq. Viv.* pl. 5. f. 3.

<sup>2</sup> *Thes. Con.* vol. ii. pl. 96. f. 88.

<sup>3</sup> *Journ. de Conch.* 1861, vol. ix. p. 231.



74. *FASCIOLARIA TRAPEZIUM* (Linné).

*Hab.* Mauritius, East Africa, Madagascar, Red Sea, Seychelles, &c.; also Philippines, Java, China.

Common at Assab and Karaman, and eaten by the natives (*Caramagna*).

75. *LATIRUS POLYGONUS* (Gmelin).

*Hab.* Massaua, Dahlak Island, and Suez in the Red Sea, Seychelles, Mauritius, Philippines, Tonga Island, &c., and many parts of the Indian and Pacific Ocean.

76. *LATIRUS* (*PERISTERIA*) *PAULUCCIÆ*, Canefri.

*Hab.* Red Sea, Mauritius.

77. *LATIRUS* (*PERISTERIA*) *FORSKALII*, Canefri.

*Hab.* Red Sea and Mauritius; Mozambique (*B.M.*).

78. *HARPA VENTRICOSA*, Lamarck.

*Hab.* Many parts of the Indian Ocean, Philippine Islands; Port Curtis (*Mus. Cuming*).

79. *OLIVA INFLATA*, Lamarck.

*Hab.* Red Sea, Persian Gulf, Madagascar, Zanzibar, Mauritius, Réunion, Seychelles, Ceylon.

80. *ANCILLARIA ALBISULCATA*, Sowerby.

*Hab.* Red Sea (*Sowerby*); Indian Ocean (*Weinkauff*); Aden (*Caramagna*).

81. *ANCILLARIA FULVA*, Swainson.

*Hab.* Red Sea.

82. *ANCILLARIA ACUMINATA*, Sowerby.

*Hab.* Red Sea, Zanzibar, Seychelles, S. Africa.

83. *ANCILLARIA AMPLA* (Gmelin).

*Hab.* Red Sea, Ceylon, Mauritius, Philippines.

84. *ANCILLARIA MAURITIANA*, Sowerby.

*Hab.* Mauritius, Madagascar, New Holland.

85. *MARGINELLA OBSCURA*, Reeve.

*Hab.* — ? (*Reeve*).

The type of this species, presented to the Museum by Mrs. T. Lombe Taylor, is smaller than the specimen from Aden, which is  $10\frac{1}{2}$  millim. in length and more conspicuously banded, agreeing very fairly with Reeve's figure.

86. *CASSIS GLAUCA* (Linn.).

*Hab.* Andaman Islands, Singapore, Philippines, Moluccas.



87. *CASSIS PILA*, Reeve.

*Hab.* Mergui, China, Philippines, Australia.

88. *CASSIS NODULOSA* (Gmelin).

*Buccinum* no. 107, Schröter, *Einleitung*, vol. i. p. 383, pl. 2. ff. 9 *a-b*.

*Buccinum nodulosum*, Gmelin, *Syst. Nat.* p. 3479.

*Buccinum biarmatum*, Dillwyn, *Cat.* p. 599.

*Vars.* = *Cassis torquata*, Reeve, *Con. Icon.* ff. 1 *a-1 c*; Tryon, *Conch. Man.* vol. vii. pl. 7. ff. 92-3.

*Cassis vibex*, var., Küster, *Conch.-Cab.* pl. 49. ff. 5, 6.

*Var.* = *Cassis erinaceus*, Bruguière, Kiener, *Coq. Viv.* pl. 11. ff. 21-21 *a*.

*Var.* = *Cassis turgida*, Reeve, *Con. Icon.* ff. 25 *a-c*.

*Hab.* Samoa or Navigators' Islands (typical form in *B.M.*); Mozambique, Red Sea, Andaman Islands (*vars. torquata* in *B.M.*); New Holland (*Reeve*); Zanzibar (*Kirk*).

The *Buccinum nodulosum* of Gmelin was founded on Schröter's figure referred to above. The shell there represented is the counterpart of the three specimens in the Museum from the Navigators' Islands, presented by Her Majesty the Queen in the year 1841. They correspond with the figure in every particular—the form, the nodose whorls, the greatly thickened lip with the tubercles along the margin, and the crenulations within are precisely similar.

The nodose variety of *C. torquata* has the outer lip rather less thickened and the crenulations or liræ within it less developed.

The stunted form of *C. vibex* (Küster, *Conch.-Cab.* pl. 51. ff. 5, 6) differs in having tubercles only at the anterior part of the labrum which is not lirate within; it also appears to have no dark spots around the base of the body-whorl.

89. *DOLIUM CUMINGII*, Hanley.

*Hab.* Philippine Islands, Wide Bay.

90. *DOLIUM MACULATUM*, Lamarck.

*Hab.* Ceylon, Andaman Islands, &c.

91. *DOLIUM OLEARIUM*, Bruguière.

*Hab.* Ceylon, Mauritius, and other parts of the Indian Ocean; Red Sea (*Dunker*).

92. *DOLIUM LUTEOSTOMUM*, Küster.

*Hab.* Japan (*Dunker, Schrenck, Lischke, Brit. Mus.*).

This species has been shown by Lischke to be the same as *D. japonicum* of Dunker. *D. favannii*, Hanley, is also the young state of this species, which, however, I am rather inclined to think has not been satisfactorily shown to be distinct from *D. variegatum*.



93. *DOLIUM PERDIX* (Linn.).

*Hab.* W. Indies, W. Africa, Indian and Pacific Oceans.

The single specimen from Aden, about an inch in length, has very fine spiral ribs, and is rather thick and strong for its size.

94. *TRITON RANZANII*, Bianconi.

*Triton ranzanii*, Bianconi, Rendiconti Accad. Sci. Istit. Bologna, 1849-50, p. 43; id. Mem. Accad. 1851, vol. iii. p. 17, pl. 3. ff. 1, 2; Kobelt, Conch.-Cab. ed. 2, p. 273.

*Triton tigrinus* (part.), Tryon, Man. Conch. vol. iii. p. 18, pl. 10. f. 71 (copy of Bianconi).

*Hab.* Mozambique (*Bianconi*); Aden (*Baynham*).

This appears to be a rare species, and has not been recorded since its original discovery by Bianconi. It is quite distinct from *T. tigrinus*, with which Tryon associated it.

95. *TRITON PILEARIS* (Linn.).

*Hab.* Red Sea, Indian and Pacific Oceans, West Indies.

96. *TRITON CHLOROSTOMA*, Lamarck.

*Hab.* Indian Ocean, Philippines.

97. *TRITON LABIOSUS*, Wood.

*Hab.* Indian Ocean, Philippines, Queensland.

98. *TRITON TRILINEATUS*, Reeve.

*Hab.* Red Sea, Persian Gulf, Indian Ocean, Philippines.

This is probably merely a variety of *T. gallinago*.

99. *TRITON VESPACEUS*, Lamarck.

*Hab.* Indian Ocean, W. Australia.

100. *TRITON CINGULATUS*, Lamarck.

*Hab.* Swatow, China (*Brit. Mus.*): Philippines, Gulf of Suez.

101. *RANELLA SPINOSA*, Lamarck.

*Hab.* Red Sea, Mauritius, Ceylon, &c.; Aden (*Caramagna*).

102. *RANELLA GRANIFERA*, Lamarck.

*Hab.* Aden (*Jousseume*), Red Sea, Indian Ocean, Sir C. Hardy's Island.

103. *PIRULA FICUS* (Linn.).

*Hab.* Indian Ocean.

A small specimen from Aden is almost entirely white, only a few very pale yellowish spots, indicating the position of the transverse pale zones, being noticeable.

104. *NATICA PULICARIS*, Philippi.

*Hab.* Tuticorin, S. India (*Brit. Mus.*); Mergui (*Martens*).

The locality of this species has not been recorded in any of the  
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monographs of this genus. The series from Aden includes small specimens, such as figured by Philippi, and others as large as that figured by Reeve in the 'Conchologia Iconica' (fig. 63). The minute dotting varies in depth of colour and size, but all examples exhibit the characteristic brown mark below the umbilicus.

105. *NATICA TÆNIATA*, Menke.

*Hab.* Philippines, Japan, China, Java; Assab (*Caramagna*).

The operculum of this species has only recently been described<sup>1</sup>. It is strong and shelly, spirally grooved and ridged, the central portion being more elevated than the rest of the surface, and the inner edge, or that which applies to the columella of the shell, is not straight but excurved at the middle.

106. *NATICA RUFA*, var.

*Hab.* Type from Mauritius; Madagascar, Singapore; Borneo (*Brit. Mus.*).

The Aden specimens belong to the variety (*N. forskalii*, Chemnitz) which has been quoted from Mauritius (*Tryon*) and the Red Sea (*Issel*).

107. *NATICA MAROCCANA* (Chemnitz).

*Hab.* W. Indies, W. and E. Africa, Red Sea, Indian Ocean, West coast of America, &c.

108. *NATICA* (*NEVERITA*) *DIDYMA* (Bolten<sup>2</sup>).

*Hab.* Indian Ocean, N. Australia to Japan, E. Australia. Aden (*Caramagna* as *N. chemnitzi*).

109. *NATICA* (*MAMILLA*) *MELANOSTOMA*, Lamarck.

*Hab.* Red Sea, Indian Ocean, some parts of the Pacific. Aden (*Caramagna*).

110. *NATICA* (*POLINICES*) *MAMILLA* (Linn.).

*Hab.* Same as *N. melanostoma*; Aden (*Caramagna*).

111. *NATICA* (*NATICINA*) *PAPILLA* (Gmelin).

*Hab.* Red Sea, Indian Ocean, Moluccas.

112. *SIGARETUS PLANULATUS*, Récluz.

*Hab.* E. Africa, Indian Ocean.

113. *IANTHINA TROCHOIDEA*, Reeve.

The specimens from Aden correspond exactly in form with Reeve's figure.

114. *RECLUZIA ROLLANDIANA*, Petit.

The two specimens from Aden, and one in the Museum from

<sup>1</sup> P. Z. S. 1890, p. 270, pl. xxi. f. 15.

<sup>2</sup> *Vide* Watson, 'Report Challenger Gasteropoda,' p. 450.



S. Africa, apparently belong to this species, agreeing very fairly with the figure in the 'Journal de Conchyliologie,' vol. iv. pl. 5. f. 12. The type was obtained on the Californian coast.

115. *EULIMA CUMINGII*, A. Adams.

*Hab.* Sandwich, Lord Hood's and Viti Islands (*Tryon*).

116. *SOLARIUM PERSPECTIVUM* (Linn.).

*Hab.* Indian Ocean, Amboyna, China Sea, &c.

117. *SOLARIUM LÆVIGATUM*, Lamarck.

*Hab.* Kurrachee, Madagascar and other parts of the Indian Ocean.

118. *SOLARIUM (PHILIPPIA) HYBRIDUM*, Lamarck.

*Hab.* Philippines, China Sea. Mauritius and E. Australia (*Brit. Mus.*).

119. *TORINIA PERSPECTIVIUNCULA* (Chemnitz).

*Hab.* Indian and Pacific Oceans: Suez (*Cooke*).

The single specimen from Aden belongs to the depressed form figured by Hanley in Sowerby's 'Thesaurus,' vol. iii. pl. 254. f. 63.

#### CYPRÆA.

The following species of this genus were obtained at Aden by Major Yerbury:—

120. *CYPRÆA PANTHERINA*, Solander.

121. *CYPRÆA VITELLUS*, Linn.

122. *CYPRÆA CAURICA*, Linn.

123. *CYPRÆA PULCHRA*, Gray.

124. *CYPRÆA HELVOLA*, Linn.

125. *CYPRÆA UNDATA*, Lamarck.

126. *CYPRÆA TURDUS*, Lamarck.

127. *CYPRÆA ARABICA*, Linn.

128. *CYPRÆA TALPA*, Linn.

129. *CYPRÆA FELINA*, Gmelin.

130. *CYPRÆA FIMBRIATA*, Gmelin.

131. *CYPRÆA CRUENTA*, Gmelin.

132. *CYPRÆA ISABELLA*, Linn.

133. *CYPRÆA CARNEOLA*, Linn.

134. *CYPRÆA EROSA*, Linn.



135. *CYPRÆA ERYTHRÆENSIS*, Beck.136. *CYPRÆA ANNULUS*, Linn.

These are all well-known species, of which the distribution has been given in various monographs. More than half of them have been recorded from the Red Sea, and all are known inhabitants of the Indian Ocean. *C. cruenta* and *C. undata* are quoted from Aden by Caramagna.

137. *LITTORINA GLABRATA*, Philippi.

*Hab.* Natal and Amirantes Islands (*Brit. Mus.*).

"Payta, Peru," one of the original habitats quoted for this species, is probably one of the numerous errors of locality which occur in Cuming's collection. So far as I am aware it has never been confirmed.

138. *LITTORINA NATALENSIS*, Krauss.

*Hab.* Natal and Algoa Bay (*Krauss*). Ceylon (*Brit. Mus.*).

Some specimens from Mergui received from Dr. Anderson and determined by Martens as *L. pyramidalis*, Quoy & Gaim., also belong to this species.

139. *LITTORINA GRANO-COSTATA*, Reeve.

*Hab.* Brisbane, Queensland.

The shells described from Christmas Island under the name of *L. granicostata*, which I subsequently changed to *L. insularis*, should, I now believe, be associated with this species.

The examples from Aden are more finely granose than the typical form.

140. *PLANAXIS BREVICULUS*, Deshayes.

*Hab.* Gulf of Akaba and Persian Gulf (*Brit. Mus.*). Gulf of Suez.

141. *CERITHIUM (VERTAGUS) OBELISCUS*, Bruguière.

*Hab.* Red Sea, Indian Ocean; China and Tonga Islands (*Brit. Mus.*). S. Africa and many parts of Indian and Pacific Oceans.

142. *CERITHIUM (VERTAGUS) KOCHI*, Philippi.

*Hab.* Red Sea, Indian Ocean, Japan.

Is this the *C. subulatum* of Lamarck?

143. *CERITHIUM RÜPPELLI*, Philippi.

*Hab.* Red Sea. Seychelles (*Brit. Mus.*).

144. *CERITHIUM CÆRULEUM*, Sowerby.

*Hab.* Red Sea, Indian Ocean; China and Tonga Islands; Aden (*Cooke*).



## 145. CERITHIUM COLUMNA, Sowerby.

*Hab.* Red Sea, Indian Ocean, Philippines, Australia, Samoa, Fiji, &c.

## 146. CERITHIUM TUBERCULATUM (Linn.).

*Hab.* Red Sea, Indian Ocean, Philippines, Polynesia.

For remarks on this and allied species see Report on the 'Alert' Collections, pp. 63, 64.

## 147. CERITHIUM YERBURYI. (Plate XXXIII. fig. 4.)

*Testa elongata, acuminata, alba, lineis transversis nigris interruptis ornata; anfract. 10, convexiusculi, costis longitudinalibus (in anfr. penult. 9, in ultimo tenuioribus circiter 12) lirisque spiralis (anfr. superioribus 3, in ult. 7-8 aliisque minoribus intercalentibus) instructi; apertura obliqua, longit. totius  $\frac{1}{3}$  superans; labrum extus incrassatum, intus album, leviter liratum; columella oblique arcuata; canalis brevis, obliquus.*

*Longit.* 19, *diam.* 7 millim.

In this species a few of the costæ (about two on each whorl) are more conspicuous than the rest, and one on the left side of the body-whorl which inferiorly runs into the cauda forms a boundary to it. Between this and the labrum the costæ are finer than upon the preceding whorl. The interrupted black lines fall upon the spiral ridges, which on crossing the ribs form more or less acute tubercles. In the interstices between them there are fine parallel striæ. *C. torresi*, Smith, is closely allied to this species, but more slender, and differs in detail of sculpture.

## 148. TURRITELLA MACULATA, Reeve.

*Hab.* China Sea.

The brown thread-like lines which cover the surface are more distinct in the specimens from Aden than in those from the China Sea.

## 149. TURRITELLA COLUMNARIS, Kiener.

*Hab.* Ceylon (Reeve); Mergui (Martens).

The whorls in the specimen figured by Reeve (Conch. Icon. f. 14) are unusually flat. Most examples more nearly resemble Kiener's figure of this species. The granulation of the transverse striæ mentioned by Kiener is very feeble, and can hardly be said to exist in the specimens I have examined. Two specimens from Aden are remarkably short and broad in proportion, so that at first I was inclined to regard them as a distinct species. Their colour and sculpture being the same as the typical form, I now regard them merely as a different growth of the same species.

## 150. MITRULARIA CICATRICOSA (Reeve).

*Calyptræa cicatricosa*, Reeve, Con. Icon. f. 3 a-b.

*Hab.* Philippine Islands (Cuming).



## 151. CREPIDULA (ERGÆA) WALSHI, Hermannsen.

*Hab.* Ceylon and Singapore (Reeve); Assab (Caramagna).

## 152. CALYPTRÆA (GALERUS), sp. inc.

A single specimen is all I have seen of this apparently new species. It is much elevated, cap-shaped, dirty whitish externally and tinted with purple inside, especially towards the apex. It is radiately ridged and concentrically striated with wavy lines of growth. The internal process is small, slender, compressed, and placed on the side towards which the apex inclines.

## 153. AMALTHEA ACUTA (Quoy &amp; Gaimard).

*Hab.* Indian and Pacific Oceans.

## 154. STROMBUS TRICORNIS, Lamarck.

*Hab.* Red Sea, Bourbon, Seychelles, Philippines.

## 155. STROMBUS GIBBERULUS, Linn.

*Hab.* Aden (Caramagna); Red Sea, Assab, Indian Ocean, Philippines, Polynesia.

## 156. STROMBUS LUHUANUS, Linn.

*Hab.* Red Sea, Assab, &c. as for *S. gibberulus*.

## 157. STROMBUS FLORIDUS, Lamarck.

*Hab.* Same as preceding species.

## 158. STROMBUS DENTATUS, Linn., var.

*Hab.* Red Sea, Indian Ocean, &c.

The specimen from Aden belongs to the variety named *S. elegans* by Sowerby. *S. ruppellii*, Reeve, is another variety.

## 159. STROMBUS YERBURYI. (Plate XXXIII. fig. 5.)

*Testa parva, subfusiformis, alba, plus minus lutescenti balteata; spira gracilis, producta, longit. totius  $\frac{2}{5}$  subæquans; anfractus normales circiter 9, superne concavi et marginati, supra medium rotunde angulati, infra angulum fere recti, longitudinaliter plicati, transversimque sulcati; plicæ vel costæ numerosæ (in anfr. penult. ad 24, in ultimo 16-17, inferne sensim evanescentibus paucis labrum versus, cæteris majoribus et magis distantibus, superneque subnodosis), paucæ supra spiram variciformes; sulci regulares, supra et inter costas continui, interstitia vix æquantes; anfr. ultimus brevis, basim versus paulo constrictus; labrum dilatatum, ad marginem anfractus superiorem productum, intus et extus incrassatum, sulcatum, ad marginem acutum; apertura angusta, alba; columella callo crenulato tenui rufo notato induta.*

*Longit.* 35 millim., *diam. maj.* 19.

This species recalls to mind *S. cancellatus* of Pease, a Sandwich-Island form. It differs in colour, in the greater length of the spire, its



larger size, and the different tint of the columellar callus. There are three specimens of this very interesting species in the Museum, two presented by Mr. Baynham and one by Major Yerbury. The specimen in best condition exhibits a faint pinkish tint upon the upper part of the spire. Most of the pale brownish or luteous colour is upon the back of the shell, and seems to be divided up into zones by a submedian white band and a narrower one upon the angle above. The constriction of the whorls at the upper part forms a very distinct sutural margination.

160. *STROMBUS FUSIFORMIS*, Sowerby.

*Hab.* Aden (*Caramagna*); N. Australia (*Reeve*); Red Sea and Indian Ocean.

161. *PTEROCERA BRYONIA* (Gmelin).

*Hab.* Red Sea, Aden (*Caramagna*); Seychelles, Amirantes, Madagascar, Mauritius, Bourbon, East Africa, Ceylon, Japan, &c.

162. *ROSTELLARIA CURVIROSTRIS*, Lamarck.

*Hab.* Red Sea, Persian Gulf; Aden (*Caramagna*); Moluccas.

163. *NERITA POLITA*, Linn.

*Hab.* Berbera and Assab (*Caramagna*); Indian and Pacific Oceans; Aden (*Cooke*).

164. *NERITA ALBICILLA*, Linn.

*Hab.* Aden (*Caramagna*); Red Sea, Indian and Pacific Oceans.

165. *NERITA QUADRICOLOR*, Gmelin.

*Hab.* Red Sea, Mozambique, Natal, Bombay, Java.

166. *NERITA LONGII*, Récluz.

*Hab.* Aden, Socotra, Bombay.

*N. arabica*, *Reeve*, is, as stated by *Martens*, a synonym of this species and not related to *N. chamæleon*, *Linn.*, as supposed by *Tryon*.

167. *TURBO RADIATUS*, Gmelin.

*Hab.* Red Sea and Persian Gulf; Madagascar.

*T. radiatus*, *Reeve* (non *Gmelin*), = *T. elegans*, *Philippi*, is altogether a very distinct species.

168. *TURBO (MARMOROSTOMA) CORONATUS*, Gmelin.

*Hab.* Aden, Red Sea, Natal, Zanzibar, Cochin China, Moluccas, Japan, &c.

*T. granulatus*, *Gmel.*, should, I think, be considered a variety of this species. The umbilication of some specimens and the imperforate columella in others has yet to be accounted for. This difference occurs in specimens otherwise precisely similar.



169. *TROCHUS* (*TECTUM*) *DENTATUS*, Forskål.*Hab.* Red Sea, Persian Gulf.

Both the typical form and the variety (*T. noduliferus*, Lamk.) occur at Aden. Of the latter some specimens are very large, being 69 millim. in height and 100 across the base. In these very fine examples the nodules at the periphery become somewhat obsolete upon the last third of the whorl towards the outer lip. Their opercula are 37 millim. in diameter, thin, yellowish brown, and consist of 12 whorls which enlarge somewhat rapidly.

170. *TROCHUS* (*INFUNDIBULOPS*) *ERYTHRÆUS*, Brocchi.*Hab.* Red Sea, Gulf of Suez.171. *TROCHUS* (*INFUNDIBULOPS*) *FIRMUS*, Philippi.*Hab.* Persian Gulf.172. *TROCHUS* (*EUCHELUS*) *ATRATUS*, Gmelin.*Hab.* Widely distributed. Many parts of the Indian and Pacific Oceans.173. *TROCHUS* (*CLANCULUS*) *PHARAONIS*, Linn.*Hab.* Red Sea, Gulfs of Suez and Akaba.174. *TROCHUS* (*MONODONTA*) *AUSTRALIS*, Lamarck.*Hab.* Natal, Seychelles, Madagascar; Gulf of Suez.

All the specimens from South Africa which I have seen have stronger spiral sulci and ridges than the examples from Aden. These are nearly smooth, but precisely similar in style of colouring.

175. *FISSURELLA* *RUPPELLII*, Sowerby.*Hab.* Mauritius, Red Sea, East Africa, Mergui.176. *PATELLA* *CHITONOIDES*, Reeve.*Hab.* Madagascar, Mauritius, Réunion.177. *CHITON* (*ACANTHOPLEURA*) *SPINIGER*, Sowerby.*Hab.* Suez (*Issel*); Aden (*Haddon*); also widely distributed in the Pacific and Indian Oceans.178. *CHITON* (*ISCHNOCHITON*) *YERBURYI*. (Plate XXXIII. fig. 6.)

*Testa parva, depressa, in medio leviter carinata, pallide grisea, sordido-viride maculata; areæ laterales, centrales et valva antica undique subæqualiter reticulatæ; apex valvæ posticæ subcentralis, mediocriter acutus; ligamentum squamis minutissimis indutum, roseo-griseum, sordido-viride maculatum.*

*Longit.* 15 millim., *diam.* 8.

Only a single specimen of this species was found by Major Yerbury. The sculpture recalls that of a thimble. It is a trifle coarser on the lateral, especially along their posterior margins, than on the



central areas. The dirty green spotting is also more noticeable on the hinder edges of the valves than elsewhere.

179. CHITON (CALLISTOCHITON) ADENENSIS. (Plate XXXIII. fig. 7.)

*Testa parva, depressa, haud carinata, concolor, pallide fuscescens; valva antica costis radiantibus circiter 22 granulatis instructa; areæ laterales e radiis duobus forte granulatis constitæ, centrales longitudinaliter granulose liratae, liris in medio tenuioribus quam lateralibus, postica liris tenuibus ad 25 granulatis instructa; ligamentum pallide fuscescens, minutissime squamulatum.*

*Longit.* 14 millim., *diam.*  $9\frac{1}{2}$ .

The sculpture of this species is of the same character as that of *C. antiquus*, Reeve, but not quite so pronounced, and the rays of both the terminal valves are more numerous.

180. BULLA AMPULLA, Linn.

*Hab.* Indian and Pacific Oceans, Red Sea; Aden (*Caramagna* & *Jousseume*).

181. HAMINEA CONSTRICTA, A. Adams.

*H. constricta*, A. Adams in Sowerby's Thesaur. vol. ii. p. 581, pl. cxxiv. f. 95.

*Hab.* Luzon, Philippines.

The Aden shells agree exactly with the above-quoted figure and with the types in the Museum. Sowerby's figure in the *Conch. Icon.* f. 16 *a-b* is not so good as his earlier illustration in the 'Thesaurus.'

182. HYDATINA PHYSIS (Linn.).

*Hab.* Indian and Pacific Oceans, Red Sea; also West Indies and Brazil.

Remarkable as it may appear, this species undoubtedly occurs in the West Indies. In the British Museum are specimens from Jamaica received from Mr. E. Chitty and others from St. Vincent's, and recently a specimen was obtained at Pernambuco by Mr. Ramage when investigating the fauna of Fernando Noronha.

183. HYDATINA CIRCULATA (Martyn).

*Hab.* Mauritius, Ceylon, &c. Not yet noticed from the Red Sea.

184. UMBRELLA INDICA, Lamarck.

*Hab.* Aden (*Caramagna*); Indian and Pacific Oceans.

## II. PELECYPODA.

185. DOSINIA PUBESCENS, Philippi.

*D. pubescens*, Phil., Römer, Mon. Dosinia, p. 79, pl. 15. f. 1.

*Hab.* Philippines, New Holland, and Madagascar (*Römer*).

With this species I unite *Artemis scabriuscula*, Reeve (? of



Philippi), *D. ovalis*, Römer, *D. eunice*, A. Adams, and perhaps *D. bisecta*, Reeve. The first three species were described from specimens from unknown localities and the last was said to be Japanese.

*Artemis cælata*, Reeve, considered by Römer to be synonymous with *D. pubescens*, is distinct. The lunule is longer and not so deep; the posterior dorsal area is seen to be different on comparison, and the concentric ridges are more conspicuously elevated at the extremities, forming a sort of crest circumscribing not only the posterior area, but also the lunule in front. The anterior muscular impression is narrower and the hinge-plate not quite so strong as in *D. pubescens*.

*D. erythræa*, Römer, was described from a specimen said to have come from Aden. It certainly is the same species as *D. radiata*, Reeve, and *D. amphidesmoides*, Reeve, and the shell identified by Deshayes<sup>1</sup> as *D. dilatata* of Philippi also belongs to the same form. Reeve quotes "Mouth of the Gambia" as the locality for *D. radiata*, and it has been suggested by Menke and Römer that this species is the "Colan" of Adanson. I am much inclined to doubt the accuracy of this identification and also of Reeve's habitat<sup>2</sup>. *D. amphidesmoides* is a Philippine shell; *D. erythræa*, as stated above, is from Aden, and Deshayes's specimen of *D. dilatata* in the Museum also came from the Red Sea.

#### 186. DOSINIA ALTA, Dunker.

*Hab.* Red Sea.

#### 187. SUNETTA CONTEMPTA, nom. nov.

*Meroë menstrualis*, Reeve (non Menke), Conch. Icon. vol. xiv. fig. 9.

This species is not the young of the Japanese *S. menstrualis* as supposed by Römer (Monog. *Sunetta*, p. 14). It is more convex, its shape is different, the ends being more equal than in Menke's species, and the valves are seen to be thicker and stronger when shells of equal size are compared. The interior is more or less purplish or purplish brown. In *S. menstrualis* the pallial sinus terminates in an *acute point*, whereas in the present species it is *rounded*.

I would here point out the shells figured both by Sowerby<sup>3</sup> and Reeve<sup>4</sup> as *S. excavata* are rather young specimens of *S. menstrualis*. Sowerby, however (pl. clxiii. fig. 17, not 16 as in text p. 742), has correctly depicted *S. excavata* by copying Philippi's figure<sup>5</sup> of *S. vaginalis*, which is a synonym of that species. In my opinion *S. aliciae*, Adams and Angas, is also synonymous. *S. subquadrata* (Sowerby, pl. 129. f. 9, and Reeve, f. 7, as *vaginalis*), as suggested by Römer, may be the young of *excavata*, but it seems to be rather more oblong.

<sup>1</sup> Cat. Conch. Biv. Mus. Brit. part i. p. 12.

<sup>2</sup> Issel quotes *D. radiata* from Suez (Mal. Mar. Ross. p. 72).

<sup>3</sup> Thes. Conch. vol. ii. pl. 126. ff. 13, 14.

<sup>4</sup> Conch. Icon. *Meroë*, pl. iii. ff. 11 a-b.

<sup>5</sup> Abbild. vol. ii. *Cytherea*, pl. iii. f. 2.



Römer's figures 2 *c*, 2 *d*, and 2 *e* do not, I think, represent young specimens of *S. menstrualis*, but in my opinion, at all events fig. 2 *e*, illustrate the adult state of a distinct species, specimens of which in the British Museum from the island of Formosa bear the name of *S. cumingii*, Hanley. This species has not been described, but appears in a list of Formosan shells published by Mr. Cuming in the Proc. Zool. Soc. 1865, p. 196. It is remarkable for the radiating character of its markings, its *radiating striæ*, and concentric periodic bluish zones. The interior may be more or less violet, or white, or flesh-tint, and the pallial sinus is something like that of *S. menstrualis*, but does not converge to so sharp a point.

188. CYTHEREA (TIVELA) PONDEROSA, Koch.

*Hab.* Zanzibar; Aden (*Caramagna*).

189. CYTHEREA (CALLISTA) UMBONELLA, Lamarck.

*Hab.* Brazil; Red Sea (*Lamarck*).

A single valve was all that was obtained by Major Yerbury. It is in perfectly fresh condition and of the same violet colour as the specimen figured by Reeve (Conch. Icon. *Dione*, fig. 27). I have never seen specimens from Brazil, but according to Römer it is plentiful on the coast of that country.

190. CYTHEREA (CALLISTA) FLORIDA, Lamarck.

*Hab.* Red Sea, Persian Gulf, Mozambique, Madagascar, Seychelles; Aden (*Caramagna*).

191. CYTHEREA (CARYATIS) HEBRÆA, Lamarck.

*Hab.* Philippine Islands and New South Wales.

For remarks upon this species see the Report upon the Lamelli-branchiata of the 'Challenger' Expedition, pp. 138-9.

192. CYTHEREA (CARYATIS) YERBURYI, nom. nov.

*Dione erubescens*, Reeve (*non* Dunker), Conch. Icon. pl. xi. fig. 54.

*Hab.* Ceylon (*Reeve*); Queensland (*Mr. Brazier's Coll.*); Japan (*MS. note in B.M.*)

I agree with Reeve in considering this species distinct from *C. crocea*, Desh. (= *C. deshayesii*, Pfr.), the differences in shape and sculpture, and colour also, being quite sufficient, in my opinion, to warrant its specific separation. The name *erubescens* being pre-occupied by Dunker for a species from West Africa, I have substituted that of *yerburyi*.

193. CIRCE CORRUGATA (Chemnitz).

*Hab.* Red Sea, Persian Gulf, Madagascar, New Holland; Aden (*Caramagna*).

194. CIRCE INTERMEDIA, Reeve.

*Hab.* Not previously recorded.

Several specimens from Aden prove the validity of this fine



species. It is fairly constant in colour and markings, but varies somewhat in form, some specimens being rather narrower and more produced posteriorly than others. As is usual, young shells are more compressed than adult specimens.

195. *CIRCE SCRIPTA* (Linn.).

*Hab.* Red Sea, Indian Ocean, Moluccas, &c.

196. *CIRCE (CRISTA) PECTINATA* (Linn.).

*Hab.* Same as preceding species. Aden (*Caramagna*).

197. *CIRCE (LIOCONCHA) CALLIPYGA* (Born).

*Hab.* Red Sea ; Aden (*Caramagna*).

All kinds of colouring exist among the specimens from Aden.

198. *VENUS RETICULATA*, Linn.

*Hab.* Red Sea, Persian Gulf, Indian Ocean, Philippines, New Caledonia, Society and Fiji Islands.

The Aden specimens are peculiar in having the hinge-teeth white instead of red as usual. In other respects they correspond exactly with the usual type of the species.

199. *TAPES SULCARIUS*, Lamarck.

*Hab.* Moluccas, Indian Ocean.

200. *TAPES DESHAYESII*, Hanley.

*Hab.* Philippine Islands ; Mauritius ; Red Sea (*Issel* and *Brit. Mus.*).

The single specimen from Aden is marked very similarly to that figured by Reeve (Con. Icon. f. 4 a).

201. *TAPES MALABARICUS* (Chemnitz).

*Hab.* Malabar, Ceylon, Mergui, Moluccas, Philippines, China.

The specimens from Aden agree precisely with Reeve's *T. lentiginosa* (Con. Icon. f. 25), which I consider a form of this species. They are large strong shells with coarse concentric ridges and a well-sinuuated posterior margin. The finest specimen is 72 millim. long, 57 high, and 29 in diameter. Römer<sup>1</sup> has considered Reeve's *T. turgidula* (Con. Icon. f. 32) a "var. monstrosa" of *T. malabaricus*; but I may point out that the shell figured by Reeve is a specimen of *T. inflata* of Deshayes, which is figured in the Proc. Zool. Soc. 1853, pl. 19. ff. 3 a-3 b. *T. inflata*, as determined by Römer, appears to be a large coarsely ribbed *T. malabaricus*. *T. inflatus* proper is perfectly smooth at the umbones and has less sinuation in the posterior ventral margin; in other respects it agrees with *T. malabaricus*.

202. *TAPES OBSCURATUS*, Deshayes, var.

*Hab.* Philippines.

Three specimens from Aden may belong to this species. They

<sup>1</sup> Monogr. *Tapes*, p. 34.



are, however, larger and narrower and much more finely and closely sculptured than the normal form. They do not seem to belong to *T. araneosus*, Philippi, which is quoted by Caramagna from Aden. *T. gratus*, Desh., and *T. quadriradiatus*, Desh., should, I think, be regarded as varieties of *T. obscurata*.

203. *TAPES VIRGINEUS*, Linn.

*Hab.* "In Indiis" (Linn.); New Holland (Römer); China Sea (Philippi).

Römer's figure 3 *d* on plate xxxiii. of his monograph of *Tapes* represents the form of the specimen from Aden, but the colouring is not quite the same.

204. *VENERUPIS MACROPHYLLA*, Deshayes.

*Hab.* Philippine Islands; Aden (Jousseume).

A few specimens from Aden apparently belong to this species, which A. H. Cooke unites (and probably correctly) with *V. irus*, Linn. This may be the same species as that quoted by Caramagna<sup>1</sup> from Assab, at the southern end of the Red Sea, under the name *Venerupis cordieri*, Desh., originally described from Californian specimens.

205. *PSAMMOTÆA OBLONGA*, Deshayes.

*Psammotella oblonga*, Reeve, Con. Icon. f. 7.

*Hab.* —?

The finest example from Aden is considerably larger and of thicker substance than the shell figured by Reeve. It is 83 millim. long and 41 high. The valves towards the umbones are purplish, the rest of the surface being dirty whitish. The purple tint behind the apices is much darker than in front.

206. *PSAMMOBIA (HETEROGLYPTA) CORRUGATA*, Deshayes.

*Hab.* Zebu, Philippines.

207. *PSAMMOBIA PALLIDA*, Deshayes.

*P. pallida*, Desh. Proc. Zool. Soc. 1854, p. 323.

*Hab.* Red Sea; Malacca (*malaccana* and *suffusa*).

*P. malaccana*, Reeve, is a synonym of this species, and *P. suffusa*, Reeve, a variety.

208. *ASAPHIS DEFLORATA* (Linn.).

*Hab.* Red Sea, Indian and Pacific Oceans; also West Indies; Aden (Caramagna).

209. *TELLINA (TELLINELLA) SULCATA*, Wood.

*Hab.* Philippine Islands, Red Sea; Aden (Cooke).

The figures in Römer's monograph of *Tellina* (Conch.-Cab. pl. 13. ff. 4, 5, 6) give a good idea of the Aden specimens. This species in Cuming's collection bears the name of *T. woodii*, Deshayes, but I do not think that this has been published.

<sup>1</sup> Bull. Soc. Mal. Ital. 1888, vol. xiii. p. 139.



210. *TELLINA* (*TELLINELLA*) *MADAGASCARIENSIS*, Gmelin.*Hab.* Madagascar.211. *TELLINA* (*TELLINELLA*) *INFLATA*, Chemnitz.*Hab.* Philippine Islands, China Sea, Mauritius, Red Sea, east coast of Africa, Nicobars, Ceylon, &c.; Port Curtis (*Brit. Mus.*).212. *TELLINA* (*ANGULUS*?) *ADENENSIS*. (Plate XXXIII. fig. 8.)

*Testa planissima, oblonga, antice rotundata, postice acuminata, fere æquilateralis, roseo-albida, umbones versus plus minus aurantio tincta, postice radio albo angusto ornata; valvæ nitidæ, lineis incrementi concentricis tenuiter striatæ (striis prope marginem posticum validioribus, aliisque ad medium obliquis), intus et extus radiatim substriatæ; margo dorsi anticus leviter declivis, vix excurvatus, posticus oblique descendens, rectus, cum margine posteriore angulum obtusum formans, ventralis parum arcuatus, postice vix sinuatus; pagina interna alba, superne ante apices aurantio tincta, lira postice radiante instructa; dentes cardinales valvæ dextræ tres divergentes, in sinistra duo, laterales nulli; sinus pallii maximus, usque ad cicatricem anticam productus, supra medium valvæ angulatus.*

*Longit.* 45 millim., *alt.*  $26\frac{1}{2}$ , *diam.* 7.

*T. armata*, Sowerby (*Conch. Icon.* fig. 264), the type of which is in the British Museum, is somewhat like the present species, especially in colour, but is less acuminate posteriorly and its hinder dorsal margin is not so sloping.

Besides the fine concentric lines of growth, *T. adenensis* exhibits oblique striæ upon the front half of the shell, which terminate about the middle of the valves. The striæ on the posterior dorsal slope are considerably stronger than any on the rest of the surface. The raised ridge on the inner surface of the valves, which extends obliquely from the umbones towards the posterior end of the ventral margin, forms the white ray which is so conspicuous on the outer surface. Of the three teeth in the right valve, the front one is the longest, the central smallest, and the hindmost bifid. In the left valve the posterior tooth is very thin, whilst the other, which falls perpendicular under the apex, is much stronger.

213. *TELLINA* (*ANGULUS*?) *SUBPALLIDA*. (Plate XXXIII. fig. 9.)

*Testa inæquilateralis, oblonga, antice rotundata, postice angustata, albida, versus apices interdum pallide flavescens, zonis et lineis concentricis griseo-hyalinis picta, mediocriter compressa; margo dorsi anticus leviter obliquus, subrectilinearis, posticus valde declivis, ventralis late arcuatus, postice vix sinuatus; valvæ lineis incrementi tenuibus concentricis striatæ, striisque aliis conspicue obliquis confertis fere undique sculptæ; dentes cardinales valvæ dextræ duo divergentes, in valva sinistra unicus,*



*subvalidus, centralis; pagina interna nitida, radiatim obsolete striata; sinus pallii profundus, superne subangulatus.*

*Longit.*  $18\frac{1}{2}$  millim., *alt.* 14, *diam.* 6.

This species has oblique sculpture similar to that in *T. rhomboides*, Quoy and Gaimard. It is, however, not nearly so narrow as that species, but agrees with it in dentition. Only the posterior slope is free from oblique striæ, but it has more distinct concentric lines. In certain lights the whole surface exhibits faint or subobsolete striation. When the valves are closed, the anterior dorsal slope exhibits a lanceolate lunular depression.

214. *TELLINA (PHYLLODA) FOLIACEA*, Linn.

*Hab.* Red Sea, Indian Ocean, Moluccas, Philippines: Aden (*Caramagna*).

215. *TELLINA (MACOMA) DUBIA*, Deshayes.

*Tellina dubia*, Deshayes, Proc. Zool. Soc. 1854, p. 371; Sowerby, Conch. Icon. pl. xlvii. p. 279.

*Hab.* — ?

Sowerby's figure does not represent the posterior end of this species sufficiently truncate.

216. *TELLINA (METIS) EDENTULA*, Spengler.

*Hab.* Philippines, Ceylon; China and Kurrachee (*Brit. Mus.*).

This species is *T. angulata*, Chemnitz, not of Linné.

217. *SEMELE CHINENSIS*, A. Adams.

*Hab.* Indian Ocean, Mergui Archipelago, China.

*Amphidesma cordiformis* (Reeve, Conch. Icon. fig. 30) is the same as this species. It is uncertain whether he has correctly identified that species of Chemnitz, who gives the West Indies as the locality of his shell.

218. *SEMELE (IACRA) SEYCHELLARUM* (A. Adams).

*Scrobicularia seychellarum*, A. Ad. Proc. Zool. Soc. 1856, p. 53.

*Hab.* Seychelles.

This interesting species, originally located in the genus *Scrobicularia*, was subsequently placed in a subgenus of that group named *Iacra* by H. & A. Adams. Fischer in his 'Manual' considered it a subgenus of *Syndesmya* or *Abra*. This location is, in my opinion, correct, for the dentition of the hinge and the ligament agree in detail with that group, which, however, I regard only as a subgenus of *Semele*.

219. *DONAX (MACHÆRODONAX) SCALPELLUM*, Gray.

*Hab.* Gulf of California.

The above-named locality, given by Reeve (Conch. Icon. sp. 39), has never been confirmed, and I think there is little doubt that it is incorrect. The specimens from Aden agree in form, colour, sculpture, and every other respect with that figured by Reeve. One example, however, has the ground-colour yellowish instead of bluish white.



220. *MACTRA DECORA*, Deshayes.

*Hab.* — ? (*Deshayes* and *Reeve*); New South Wales (*Weinkauff*); Assab and Berbera (*Caramagna*); Mergui (*Martens*).

With this species I have no hesitation in uniting *M. jickelii* of Weinkauff from Massowa on the coast of Abyssinia.

221. *MACTRA FAUROT*, Jousseaume.

*M. fauroti*, Jousseaume, *Mém. Soc. Zool. France*, 1888, vol. i. p. 200.

*Hab.* Aden (*Jousseaume*).

The shell figured by Weinkauff (*Conch.-Cab. Mactra*, pl. 19. figs. 5, 6, 7) as *M. pulchra*, Gray, evidently belongs to the present species.

222. *MACTRA (MEROPE) ÆGYPTIACA*, Chemnitz.

*Hab.* Red Sea (*Chemnitz*); Ceylon (*Reeve*).

223. *CARDIUM RUGOSUM*, Lamarck.

*Hab.* Madagascar, Red Sea, East Africa, Ceylon, North Australia, Philippines, &c.

224. *CARDIUM RUBICUNDUM*, Reeve.

*Hab.* Zanzibar.

225. *CARDIUM SETOSUM*, Redfield.

*Hab.* China, Philippines.

226. *CARDIUM AUSTRALIS*, Sowerby.

*Hab.* South Africa, Mauritius, China, Australia; Assab? (*Caramagna*).

227. *SOLEN TRUNCATUS*, Wood.

*Hab.* Ceylon: Aden (*Jousseaume*).

Both in the 'Conchologia Iconica' and in the 'Conchylien-Cabinet,' Sowerby is given as the author of this species. This is incorrect, as part 32 of Sowerby's 'Genera of Recent and Fossil Shells,' which contained the account of *Solen*, did not appear until 1829, whereas this species had already (1825) been figured by Wood under the name of *Solen truncatus*. Sowerby's 'Genera' was not published in 1820-25 as appears on the titlepage, for reviews of Numbers 29, 30, and 31 appeared in the 'Zoological Journal,' 1828, vol. iii. p. 284, and in Loudon's 'Magazine of Natural History,' vol. i. (1828) p. 56, vol. ii. (1829) p. 50. I am not aware when the work was completed, but I dare say it could be ascertained by searching for reviews of it. Unfortunately, the original covers of the Numbers were only dated in a few instances; for example, Number xxxiii. is dated 1st March, 1831, Number xxxv. 30th April, 1831. In the text relating to *Purpura*, published in Part 42, reference is made to Gray's genus *Polia*, described in the 'Zoology of Beechey's



Voyage,' 1839. This seems, therefore, to prove that the work in question was not completed until after that date.

228. *SILQUA JAPONICA*, Dunker.

*Aulus japonicus*, Dunker, Proc. Zool. Soc. 1861, p. 426.

*Cultellus* —, Sowerby, Conch. Icon. pl. v. f. 15 *b* (non 15 *a*).

*Machæra japonica*, Clessin, Conch.-Cab. p. 63, pl. 18. f. 5.

*Hab.* Japan.

The shell figured by Sowerby (fig. 15 *a*) is in the Cumingian collection labelled "*pulchra*, Gould," and not "*pulchra*, Dunker," as stated in his synonymy. It seems to me different from *S. japonica*, for although the colouring is very similar in both species, *S. pulchra* has the umbones more excentric and has not the keel-like ridge which defines the dorsal area in *S. japonica*. "*S. pulchra*, Gould," is given in Conrad's Catalogue of Solenidæ<sup>1</sup> without any reference, nor have I been able to discover where it was described.

229. *TUGONIA NOBILIS*, A. Adams.

*Hab.* Assab, Kamaran (*Caramagna*).

This species is very like the West-African *T. anatina*, and seems distinguished merely by the absence of radiating striæ anteriorly. It is very variable in form, some specimens being much more globular than others. "West Africa," assigned to this species in the 'Conchologia Iconica,' may not be incorrect, although we scarcely expect to find the same species at Senegal and Aden.

*T. semisulcata*, A. Ad., I regard as the young of this species, and *T. siphonata*, Reeve, and *T. compressa*, Reeve, are likewise young specimens of *T. anatina*, Gmelin.

230. *VENERICORDIA ANTIQUATA* (Linn.).

*Hab.* Ceylon.

231. *VENERICORDIA CUMINGII*, Deshayes.

*Hab.* Borneo.

This species, described in the Proc. Zool. Soc. 1852 (p. 102, pl. 17. f. 15), is not so pointed posteriorly as the preceding. In other respects it is very similar, and it is probable that the two forms pass one into the other. *V. canaliculata*, Reeve, appears to be another form of the same species.

232. *CARDITA (BEGUINA) GUBERNACULUM*, Reeve.

*Hab.* Zanzibar, Madagascar.

233. *LUCINA (CODAKIA) EXASPERATA*, Reeve.

*Hab.* Honduras (Reeve). New Caledonia, N. Australia, Amiantes Islands, and Red Sea (*Brit. Mus.*).

The Caribbean locality has not yet been confirmed, but it is quite possible it may be correct, for another well-known species of this

<sup>1</sup> Amer. Journ. Conch. vol. iii., Appendix, p. 23.



genus, *L. tigrina*, as pointed out by Cooke<sup>1</sup>, is also found both in the West Indies and in the Indian Ocean.

234. *CORBULA TAHEITENSIS*, Lamarck.

*Hab.* Tahiti; New Guinea (*Brit. Mus.*); Philippine Islands (Reeve, *Conch. Icon.* sp. 15).

235. *GALEOMMA*, sp.

A single valve obtained by Major Yerbury is very like *G. formosa*, Deshayes, but rather more glossy and of a bright yellow colour.

236. *DIPLODONTA ROTUNDATA*, Turton.

The three specimens from Aden appear to me inseparable from this European species. It is quoted by Caramagna from Zeila and Berbera.

237. *MARTESIA STRIATA* (Linn.).

*Hab.* "England, West Indies, Philippines" (*Tryon*); Arafura Sea ('*Challenger*').

238. *MYTILUS PICTUS*, Born.

*Hab.* N.W. Africa to the Cape of Good Hope. Aden (*Caramagna*).

The range of this species (= *M. afer*, Gmelin) is about the same as that of *M. perna*, Linn., and I am inclined to believe that both forms belong to one and the same species. The three specimens from Aden, although not typical examples, evidently belong to this species. Three shells in the Cumington collection labelled "*taprobanensis*, Blanf. MSS., Galle, Ceylon," apparently belong to this species also.

239. *MYTILUS SENEGALENSIS*, Lamarck.

*Hab.* Senegal (*Lamarck*); S. Africa (*Krauss*); Red Sea (*Brit. Mus.*); Aden (*Caramagna* under *M. variabilis*, *Krauss*).

240. *MODIOLA AURICULATA*, *Krauss*, var.?

*Hab.* S. and E. Africa; Gulf of Suez.

Two specimens, one of a bright red or almost scarlet colour, the other of the normal tint, are probably half-grown specimens of this species, differing from the typical form in having the dorsal angle more central and no emargination or sinus in front of it.

241. *SEPTIFER EXCISUS*, Wiegmann.

*Hab.* Madagascar, Mauritius, Mozambique, Mergui.

242. *ARCA NAVICULARIS*, Bruguière.

*Hab.* Suez, China, Amboina, N. and N.E. Australia, Solomon Is. Two dead valves are all that were obtained.

<sup>1</sup> Ann. & Mag. N. H. 1886, vol. xviii. p. 99.



243. *ARCA IMBRICATA*, Bruguière.

*Hab.* West Indies, Fernando Noronha, S. Africa, Indian Ocean, N.E. and N. Australia.

With this species I unite *A. umbonata*, Lamk., *A. cunealis*, Reeve, *A. kraussi*, Philippi, and *A. americana*, d'Orbigny.

244. *ARCA (BARBATIA) OBLIQUATA*, Wood.

*Hab.* South Africa.

Reeve's *A. obliquata* has been shown by Philippi and Lischke to be distinct from Wood's species, and it has been renamed *A. decurvata* by the latter author. I am of opinion that it is the same as *A. sinensis* of Philippi.

245. *ARCA (BARBATIA) LIMA*, Reeve.

*Hab.* Philippine Islands, Cape York.

*A. trapezina*, Lamarck, as determined by Reeve, is probably a form of this species, which is extremely variable in outline, no two specimens being quite alike.

246. *ARCA (ACAR) DOMINGENSIS*, Lamarck.

This species, as shown by Lischke, has a world-wide distribution. In addition to the synonymy quoted by that author (Jap. Meer. Conch. ii. p. 142), I may mention that *A. dubia* of Baird also belongs to this species.

247. *ARCA (ANADARA) SCAPHA*, Chemnitz.

*Hab.* Philippines, Indian Ocean, Natal, Suez.

248. *ARCA (ANADARA) ANTIQUATA*, Linn.

*Hab.* Australia, Indian Ocean, Mozambique.

This species was described by Reeve under the name of *A. maculosa*, under the impression that the "spots" on the posterior side constituted a good specific character. On carefully examining his type I find that the so-called "spots" are merely pieces of epidermis left upon the ribs, all of which might be removed with the point of a knife. The name *maculosa* therefore being unsuitable, had better be cast aside; and as Hanley (*Ipsa* Linn. Conch. p. 93) declares that the *A. antiquata* of Linn. is the same as Reeve's species, we can apply that designation instead. It seems to me very probable that an extended series of specimens would show that this species and *A. scapha* should be united.

249. *ARCA (ANADARA) ERYTHRÆENSIS*, Jonas.

*Hab.* Red Sea; Zanzibar (*Mus. Cuming*).

250. *ARCA (ANADARA) HOLOSERICA*, Reeve.

*Hab.* Philippines, Madagascar, Mauritius, East Africa.

According to Mörch, whose opinion has been followed by von Martens and Kobelt, this species is synonymous with *A. uropygome-lana* of Bory de St. Vincent. All we know about that species is its



name, printed *A. uropigimelana* in Encyclop. Méthod. Vers, plates vol. i. p. 156, and the figures on pl. 307. No description or locality is given in the work. As the identification of the species from the figure only is uncertain, I prefer to retain Reeve's name *holoserica*, the type of which is before me.

Young specimens are not nearly so much produced posteriorly as the adult form represented by Reeve's figure.

251. *ARCA* (*ANADARA*) *CLATHRATA*, Reeve.

*Hab.* Philippine Islands ; Gulf of Suez (*Cooke*).

A single specimen from Aden, 43 millim. in length and 34 high, has three more ribs than the type figured by Reeve, and is not quite so long in proportion. Reeve describes the epidermis as "very finely bristly between the ribs." The shell figured, as is evident from the illustration, is entirely devoid of periostracum, and neither in two other specimens in Cuming's collection, nor in that from Aden, is it "bristly," but roughly laminated between the costæ.

252. *ARCA* (*SCAPHARCA*) *RUFESCENS*, Reeve.

*Hab.* — ?

With this species I unite *A. disparilis*, Reeve, which, according to Kobelt, occurs in China. The species is variable in form and the number of ribs. The type specimen, although not a very large shell, is evidently old and much thickened.

253. *ARCA* (*TRISIS*) *SEMITORTA*, Lamarck.

*Hab.* Philippines, N. Australia ; Tasmania (*Lamk.*).

254. *CUCULLÆA* *CONCAMERATA* (Martini).

*Hab.* Indian Ocean (various parts), China.

255. *PECTUNCULUS* *PECTUNCULUS* (Linn.).

*Arca pectunculus*, Linn., part., Syst. Nat. ed. 10, p. 695 ; Lister, Hist. Conch. pl. 239. f. 73 ; Savigny, Descrip. Egypte, Atlas, pl. x. f. 2.

*Pectunculus subauritus*, Lamarck, part., Syst. Anim. p. 115.

*Pectunculus pectiniformis*, Lamk. part., Hist. Anim. s. Vert. ed. 2, vol. vi. p. 494.

*Hab.* Bengal (*Lister*). Suez Bay, Gulf of Akaba, Persian Gulf, and Madagascar (*Brit. Mus.*).

What I believe to be two distinct species of *Pectunculus* have been confused by Linné, Lamarck, and others. The figures cited above depict a form with the radiating costæ separated by grooves, well-defined and about half as broad as the ribs themselves. On the other hand, the rest of the figures quoted by Linné as illustrative of his *Arca pectunculus* (Gualtier, Test. pl. 72. f. H, and ? Argenville, Conch. t. 27. f. B) represent a species the ribs of which are separated by very narrow sulci. This same form is figured by Reeve (Conch. Icon. ff. 11 a, 11 b), Chemnitz (Conch.-Cab. vii. ff. 568-9), Crouch (Conch. pl. 8. f. 12), Knorr (Vergnügen, v. pl. xii. f. 4),



Bruguère (Encycl. Méth. pl. 311. f. 5), and Bonanni (Mus. Kirch. ii. pl. xvii. f. 129). The last-mentioned figure was described by Gmelin under the name of *Cardium amboinense* (Syst. Nat. p. 3255). The specific name I propose to retain for this form, as it is older than either *P. subauritus* or *P. pectiniformis* of Lamarck. Martens quotes it from Mergui.

The external colouring of these two species is very similar, but there is a feature within the valves which, in addition to the broader sulci, seems to indicate that the species are distinct. I refer to the colouring of the margin of the hinge-plate below the teeth. This is almost invariably of a rich brown or reddish-brown colour. On the other hand, in *P. amboinensis*, the species with broad ribs and narrow sulci, this part apparently is never entirely coloured, but occasionally a small brown mark is observable at one or both sides.

In the series of specimens in the British Museum, the differences are quite noticeable and the two forms are readily separable.

256. *LIMOPSIS FORSKALII*, A. Adams.

*Hab.* Japan.

The single valve described by Adams is small in comparison with some of the specimens obtained at Aden by Major Yerbury. The largest is 25 millim. long,  $25\frac{1}{2}$  from the umbones to the ventral margin, and  $13\frac{1}{2}$  through the valves. The epidermis which remains towards the outer margin is closely pilose and yellowish. The interior of the *dead* valve from Japan was described as pale red; in the Aden specimens it is rich brown, paler or even whitish at the circumference, and in the middle of the valves the rich brown colour is more or less clouded with a thin whitish callus, which, however, does not cover the muscular scars or the pallial line. Hinge-teeth about 28 in number.

257. *PINNA BICOLOR*, Chemnitz.

*Hab.* Red Sea (*Chemnitz*); Malacca (*Reeve*); Mergui (*Martens*).

Two valves from Aden exhibit the coloration described by Chemnitz; one specimen agrees with Reeve's figure (Conch. Icon. f. 17), and another example is almost entirely of a uniform whity-brown colour, with the elevated ridges towards the apex obscurely tinted olive-brown. The elevated scales upon the feeble ridges are few and far apart.

258. *PINNA SERRA*, Reeve.

*Hab.* Queensland.

259. *PINNA RIGIDA*, Dillwyn?

*Hab.* West Indies. One valve only.

260. *MALLEUS ALBUS*, Lamarck.

*Hab.* Philippine Islands.



261. *MALLEUS* (*MALVUFUNDUS*) *REGULA*, Forskål.

*Hab.* Red Sea; Aden (*Caramagna*); Philippine Islands and South Australia.

262. *CRENATULA* *PICTA* (Gmelin).

*Hab.* Red Sea.

Two small specimens from Aden, as regards colour, seem to connect this species and *C. mytiloides*, Lamk. It is not at all improbable that *C. viridis*, Lamk., is merely another colour-variety.

263. *MELEAGRINA* *MARGARITIFERA* (Linn.).

*Hab.* Red Sea, Persian Gulf, Indian Ocean, Philippines, N.W. Australia. Aden (*Caramagna*).

264. *MELEAGRINA* *FUCATA*, Gould.

*Hab.* Ceylon, Japan; Gulf of Suez (*Cooke*).

265. *VULSELLA* *VULSELLA* (Linn.).

*Hab.* Red Sea; Aden (*Caramagna*).

For remarks and synonymy, see A. H. Cooke (Ann. Mag. Nat. Hist. 1886, vol. xvii. p. 62).

266. *PECTEN* *SENATORIUS*, Gmelin.

*Hab.* Moluccas, Philippines, Red Sea, &c.

267. *PECTEN* *LIVIDUS*, Lamarck.

*Hab.* Red Sea, Mauritius; Aden (*Caramagna*).

268. *PECTEN* *LUCULENTUS*, Reeve, var.

*Hab.* North Australia.

Two specimens from Aden agree exactly with the type as regards form, but differ in colour. Besides the golden yellow tint and the dark spotting between the ribs mentioned by Reeve, the valves in the shell figured are ornamented with a sort of irregular subreticulation of white lines. The specimens from Aden are white or washed with pale rose and conspicuously spotted with black in the furrows between the principal nine or ten ribs, the dots forming an equal number of uninterrupted colour-rays. These examples also exhibit the irregular opaque white lines. The ribs are finely prickled and the surface is ornamented throughout with a microscopic sculpture.

269. *PECTEN* *PLICA*, Linn.

*Hab.* China, Ceylon, Red Sea; Aden (*Caramagna*).

Two valves of a species of *Spondylus* (270), an *Anomia* (271), a *Plicatula* (272), and an Oyster (273) were also collected by Major Yerbury, but these I refrain from attempting to name, as they belong to genera requiring special study.





Smith, E. A. 1891. "On a Collection of Marine Shells from Aden, with some Remarks upon the Relationship of the Mollusean Fauna of the Red Sea and the Mediterranean." *Proceedings of the Zoological Society of London* 1891, 390–436. <https://doi.org/10.1111/j.1096-3642.1891.tb01764.x>.

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