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# Z O O L O G Y

OF THE

## VOYAGE OF H.M.S. SAMARANG.





THE  
**ZOOLOGY**  
OF THE  
**VOYAGE OF H.M.S. SAMARANG;**

UNDER THE COMMAND OF  
CAPTAIN SIR EDWARD BELCHER, C.B., F.R.A.S., F.G.S.,

DURING THE YEARS 1843-1846.

BY  
JOHN EDWARD GRAY, F.R.S.; SIR JOHN RICHARDSON, M.D., F.R.S.;  
ARTHUR ADAMS, F.L.S.; LOVELL REEVE, F.L.S.;  
AND  
ADAM WHITE, F.L.S.

EDITED BY ARTHUR ADAMS, F.L.S.,  
ASSISTANT-SURGEON TO THE EXPEDITION.



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## P R E F A C E .

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THE survey of the various coasts and islands in the Eastern Seas, made by Sir Edward Belcher in H.M.S. Samarang, in the years 1843-6, afforded many valuable opportunities for adding to our knowledge of the Zoology of those parts of the world ; and the Lords Commissioners of the Admiralty having been pleased to sanction the publication of the materials that were collected, a liberal grant was made by the Government for carrying their Lordships' intentions into effect.

The following brief retrospect of the course of the Expedition will at once point out the widely-extended range of the field of our researches.

From St. Jago, Cape de Verds, the Samarang passed to windward of Ascension along the African coast, and, after touching at the Cape, anchored off Anger Point in Java. Her course from thence was to Singapore, Saràwak, Hong-Kong, Macao, and the coast of China. The Bashee Islands were next visited, and afterwards the small island of Sama-Sana, viewing the coral-bound shores of Formosa on the passage. After surveying Pa-tchung-san, and other islands of the Meiacoshima group, the vessel proceeded to Hong-Kong ; she subsequently visited Manila, and, when the Panagatan Shoals were surveyed, arrived in the Samboangan Roads, off the island of Mindanao ; she shortly afterwards anchored at the Island of Tawee-Tawee. The Expedition then proceeded along the east coast of Borneo to the province of Unsang, and next reached Cape Rivers, in the island

of Celebes, touching at Manado, landing on the islands of Mayo, Ternate, and Gillolo. Proceeding southward, Bouru was sighted, the Boutong Passage passed, the Great Solombo and the Caramata Islands were observed, and the Samarang again arrived at Singapore. Sailing a second time for Sarawak, Ambong, Tampasook, and Dumaran Island were visited; some stay was made at Manila; the Sooloo Roads and Archipelago were again reached; the vessel remained a short time at Maratua Island and Leegeetan in Borneo; touched at Mindanao, sailed for Manila, and once more anchored at Hong-Kong. Starting again for Batan, one of the Bashce Islands, the Samarang, proceeding northward, passed near Botel Tobago, examined Sama-Sana, and afterwards, more in detail, Pa-tchung-san; visited the little Hoa-pin-san and Ty-pin-san Islands, and remained some time at the Great Loo-Choo. The Expedition then sailed for Corea, Quelpart, and Kiusu, and after navigating among the numerous almost unexplored islands of the Yellow Sea, and visiting Nangasaki in the Japanese Empire, proceeded a second time to Loo-Choo, and eventually reached Hong-Kong. Homeward bound, the vessel touched at the Keeling or Cocos Islands, remained off the Cargados Garajos, or St. Brandon Shoals, in the Indian Ocean, a sufficient time for their being surveyed, touched at the Mauritius, the Cape, St. Helena, and Ascension, and arrived in England in December 1846.

With reference to the natural history of the Philippines, that sagacious and most indefatigable traveller, Hugh Cuming, Esq., had anticipated us in many points, and to his advice and liberality in the loan and comparison of specimens greater accuracy in the determination of new species has been secured.

The desire shown by the Commander of the Expedition to afford every facility in the pursuit of science, enabled me to bring together numerous observations, to collect specimens, and make sketches and drawings of many of those more rare and evanescent forms which it is my hope may help to advance the Zoology of that part of the globe. To these favourable circumstances, and the gratuitous services of the able and talented individuals who have assisted me, the public are indebted for the following work.

JOHN EDWARD GRAY, F.R.S., Keeper of the Zoological Department in the British Museum, has furnished a most valuable List of the MAMMALIA of the Eastern Islands.

Sir JOHN RICHARDSON, M.D., F.R.S., &c., has, by his description, imparted a peculiar interest to the new species of FISH.

Professor OWEN, F.R.S., &c., has contributed an elaborate memoir on the SPIRULA.

LOVELL REEVE, F.L.S., &c., has afforded his valuable aid in the description and identification of the MOLLUSCA.

ADAM WHITE, F.L.S., &c., of the British Museum, has been my able collaborator in the determination of the CRUSTACEA.

And I avail myself of the present opportunity to offer my best thanks to the above-mentioned gentlemen for their very valuable assistance. With respect to the execution of the Plates, it is only necessary to observe that they are the production of Messrs. SOWERBY, WING, and HAWKINS, to assure the public of their accuracy and excellence.

ARTHUR ADAMS.





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- Fig. 1. *Carpilius signatus*.

- Fig. 2. *Galene ? ochtodes junior*.

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- Fig. 1. *Panopeus dentatus*.  
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 5. *Harrovia albolineata*.  
 6. *Stenopus hispidus*.  
 7. *Galathea elegans*.

## ERRATUM.

For descriptions of *Chitons* figured in Plate XV., and inadvertently omitted in the text, see Monograph of that genus in 'Conchologia Iconica.'



# V E R T E B R A T A,

BY

JOHN EDWARD GRAY, ESQ., F.R.S.

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## I. MAMMALIA.

Captain Sir Edward Belcher brought home several drawings, made by Mr. Adams, of the different *Mammalia* which he had observed in the Islands of the Indian Ocean. It has occurred to me that it might be useful to give a list of all the species which have hitherto been discovered inhabiting those islands and the country near to them, intercalating in their places the descriptions of the hitherto unfigured species.

### Fam. 1. SIMIADÆ.

#### 1. SIMIA.

1. SIMIA *Satyrus*, Linn. *Muller, Verhand. Zool.* vol. i. 1-56. t. 1 to 7 \*. *S. agrias*, *Schreb.* *Papio Wurbii*, *Latr.* *Simia Abelii*, *Fischer.* *S. Wallichii*, *Blainv.* *S. Pongo*, *Fischer.* *S. giganteus*, *Pearson*, *Pithecus Satyrus*, *Martin.* *Satyru rufus*, *Lesson.* *S. bicolor*, *J. Griff.* (PLATE I.)

Var.  $\beta$ . *Cantor, Mamm. Malay* 2. *Simia Abelii, Fischer.* Orang outang, *Brooke, Pro. Zool. Soc.*, 1842, 9.

HAB. Sumatra; British Museum. Var.  $\beta$ . in Borneo; B. M.

B

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## 2. SIAMANGA.

1. SIAMANGA *syndactyla*, Gray, *List Mamm.* 1. *Simia syndactylus*, *Raffles*; *Horsf. Java*. *Syndactylus Siamang*, *Boitard, Jardin Plantes*.

HAB. Sumatra. B. M.

## 3. HYLOBATES.

1. HYLOBATES *Lar*, *Lesson*; *Cantor, Mamm. Malay*, 2. Grand Gibbon, *Buffon, Hist. Nat.* *Homo Lar*, *Linn. Syst. Nat.* *Simia longimana*, *Schreb.* t. 2. f. 1. *S. Lar*, *Gmelin, Syst. Nat.* *Pithecus Lar*, *Desm. Mamm.* *Simia albimana*, *Vigors et Horsf. Zool. Journ.* *Hylobates albimana*, *Schinz, Syst.*

Var.  $\beta$ . Petit Gibbon, *Buffon, Hist. Nat.* *Simia Lar,  $\beta$ . Gmelin, Syst. Nat.* *Pithecus variegatus*, *Geoff.* *Hylobates variegatus*, *Ogilby.* *Hilobates leuciscus*, *Cantor, Ann. and Mag. Nat. Hist.* (not Kuhl).

HAB. Malayan peninsula, *J. Reeves*; called *Ungka etam*; *Cantor.* Siam, Burmah, Tenasserim. B. M.

3. HYLOBATES *agilis*, *F. Cuvier, Man. Lith.*; *Cantor, Mamm. Malay*, 3. *Simia Lar*, *Vigors & Horsf.* (not *Linn.*). *Hylobates Lar*, *F. Cuvier, Man. Lithog.* *H. variegatus*, *Muller, Verh.* t. 7. *H. Rafflesia*, *Geoff.*

HAB. Malay peninsula, Malacca, Purlis, Keddah, Pungah; called *Ungka etam*; *Cantor.* Sumatra, *Muller.* Himalaya? B. M.

4. HYLOBATES *leuciscus*, *Kuhl*; *Gray, List Mamm. Brit. Mus.* 2. *Cantor, Mamm. Malay*, 3. *Simia leucisca*, *Schreb.* t. 3. *S. Moloch*, *Audeb.* *Pithecus cinereus*, *Latr. Singe.*

HAB. Java. B. M.

5. HYLOBATES *concolor*, *Muller, Verhand.* 1848.

HAB. Borneo.

## 4. NASALIS.

1. NASALIS *larvatus*, *Geoff.* *Cercopithecus larvatus*, *Wurmb.* *Simia Nasica*, *Schreb.* *S. longimanus*, *Link.* *Semnopithecus nasicus*, *Muller, Verh.* 62. 80. t. 12. f. 3. *Jun. Martin, Pro. Zool. Soc.* 1837, p. 70. *anat.* (young.) *Nasalis recurvus*, *Vigors & Horsf. Zool. Journ.* vol. iv. p. 110. (PLATE II.)

HAB. Borneo. B. M.

Capt. Sir Edward Belcher brought home a young specimen of this species, showing that *N. recurvus* is only the young of the common species.

## 5. PRESBYTES.

1. PRESBYTES *Nemæus*, *Gray.* *Simia nemæus*, *Linn.* *Semnopithecus Nemæus*, *F. Cuv. Man. Lith.* t. 12. *Muller, Verh.* 62.

HAB. Cochin China.

DSI

2. PRESBYTES *obscurus*, Gray, *List Mamm. Brit. Mus.* Lotong (*Simia maura*, Linn.), *Raffles, Linn. Trans.* vol. xiii. *Semnopithecus obscurus*, Reid, *Pro. Zool. Soc.* 1837, p. 14; *Martin*; *Cantor, Mamm. Malay*, 4. *Semnopithecus halonifer*, *Cantor, Pro. Linn. Soc.; Ann. & Mag. Nat. Hist.* 1845. *S. leucomystax*, *Temm. MS. Mus. Leyd.*; *Muller, Verh.* 59. *S. albocinereus*, *Eydoux & Soul. Voy. Bonite (fide Mus. Paris, not Desm.)* *Presbytes jubatus*, *Wagner*. *Simia maurus*, *Helfer*.

HAB. Malayan peninsula, Penang, and Singapore; called *Lotong*, or *Lotong etam*; *Cantor?* Siam, *Muller*. B. M.

3. PRESBYTES *cristata*, Gray, *List Mamm. Brit. Mus.* Chingkau (*Simia cristata*), *Raffles, Linn. Trans.* vol. xiii. *Semnopithecus cristatus*, *Horsfield*; *Martin*; *Muller, Verh.* 61. 77. t. 12. *S. pruinus*, *Desmar.* *S. maurus*, *Horsf. Java.* (not Cuv.)

HAB. Penang, *Cantor*; Sumatra, *Raffles*; Borneo, *Muller*. B. M.

4. PRESBYTES *maurus*. *Simia maura*, *Schreb.* not *Raffles*. *Presbytes maura*, *Gray, List Mamm. Brit. Mus.* 3. *Semnopithecus maurus*, *F. Cuv. Mamm. Lith.* t. 10; *Muller, Verh.* 61, 76, t. 12. *Simia Edwardsii*, *Fischer, Sim. Man.; Edw. Birds.* t. 311. *S. Maurita*, *Brun.*

Var.  $\alpha$ . Reddish, *Semnopithecus Pyrrhus*, *Horsf. Java*, t. 6.

Var.  $\beta$ . Golden, *Cercopithecus auratus*, *Geoff. Ann. Mus.*

HAB. Java. B. M.

5. PRESBYTES *rubicundus*. *Semnopithecus rubicundus*, *Muller, Verh.* 61, 69, t. 9 & 11.

HAB. Borneo. B. M.

6. PRESBYTES *melalophos*, Gray, *List Mamm. Brit. Mus.* p. 2. *Semnopithecus melalophos*, *F. Cuv. Mamm. Lith.* t. 7; *Muller, Verh.* 60, 66, t. 12\*. f. 2. *Simia melalophos*, *Raffles, Linn. Trans.* vol. xiii. p. 242. *S. melanolophos*, *Mus. Leyd.*

Var.  $\beta$ . *Semnopithecus flavimanus*, *J. Geoff. in Lesson Cent. Zool.* t. 40; *Muller, Verh.* 61, 67.

HAB. Sumatra. B. M.

7. PRESBYTES *mitratus*, Eschsch. *Kotzebu, Voy.* 196. t. 3. *Semnopithecus mitratus*, *Muller, Verh.* 60, 65, t. 12. 12\*. t. 24 *a*. *S. comatus*, *Desm. in Cuv. Mamm. Lith.* *Cop. Schreb. Sum.* *Simia fascicularis*, *Raffles*.

HAB. Java. B. M.

8. PRESBYTES *cinereus?* *Cercopithecus albocinereus*, *Desm.* *Semnopithecus albocinereus*, *Cantor, Mamm. Malay*, 4. *Presbytes cinerea*, *Gray, List Mamm. Brit. Mus.* 193. *Sem. nigromanus*, *J. Geoff.* *Semnopithecus dorsatus*, *Waterhouse, MSS.; Martin*, 481.

HAB. Malayan peninsula; called *ka ka*; *Cantor*.

9. PRESBYTES *chrysomelas*. *Semnopithecus chrysomelas*, *Muller, Verh.* 61. 71, t. 10, 11.

HAB. Borneo. B. M.

Capt. Sir Edward Belcher brought home a young specimen of this species, agreeing with *Muller's* figure, t. 10. f. 2.

10. PRESBYTES *Sumatranus*. Semnopithecus Sumatranus, *Muller, Verh.* 61, 73. t. 10\*. S. obscurus (part), *Cantor, Malay Mamm.* 4.

HAB. Sumatra. B. M.

11. PRESBYTES *frontatus*. Semnopithecus frontatus, *Muller, Verh.* t. 8. *Martin*, vol. i. p. 475. f. 285.

HAB. Borneo. B. M.

## 6. MACACUS.

1. MACACUS *cynomolgus*, Gray. Cereopithecus cynomolgus, *Ogilby ; Cantor, Mamm. Malay ; Cuming, Pro. Zool. Soc.* 1841, 33. Simia cynomolgus, *Linn.* S. aygula, *Linn.* ; *Muller, Verh.* 48. S. attys, *Schreb.* S. fascicularis, *Raffles, Linn. Trans.* Macaeus aureus, *J. Geoff. Belanger, Voy. Zool.* t. 2. M. Iris, *J. Geoff.* M. carbonarius, *J. Geoff. ?*

HAB. Malayan peninsula, Penang ; called *kra* ; *Cantor.* Java, Sumatra, Banka, Borneo, Celebes, and Timor, Tenasserim and Nieobar Islands, Philippines ; *Cuming.* B. M.

2. MACACUS *Nemestrinus* ; *Desm.* Inuus nemestrinus, *Linn. ; Muller.* Simia nemestrina, *Linn.* S. platypygus, *Schreb.* S. fusea, *Shaw.* S. carpologos, *Raffles.* S. longieruris, *Link.* S. porearia, *Brun.* Papiu nemestrinus, *Cantor, Mamm. Malay.* 6

HAB. Malayan peninsula, Penang ; called *Broh* ; *Cantor.* Sumatra, and Borneo. B. M.

## 7. CYNOPITHECUS.

1. CYNOPITHECUS *niger*, J. Geoff. Macaeus niger, *Gray.* Cynocephalus niger, *Desm.* C. Malayanus, *Desmoul.* Papiu Æthiops, *Zimm. ?* P. maurus, *Blainv.* Macaeus nigrescens, *Mus. Leiden.*

HAB. Celebes, Philippines. B. M.

## Fam. 2. LEMURIDÆ.

### 1. NYCTICEBUS.

1. NYCTICEBUS *tardigradus*, Gray, *List Mamm. Brit. Mus.* 194. *Cantor, Mamm. Malay*, 7. Stenops tardigradus, *Muller, Verh.* Lemur tardigradus, *Raffles, L. S.* vol. xiii. p. 247 ; *Bennett, Gard. Zool. Soc.* 339. *Hoeven, Nat. Tijdschr.* vol. viii. p. 345. t. 3, 4, 5.

HAB. Malayan peninsula, Penang ; called *kukang* ; *Cantor.* Java, Sumatra, Borneo ; *Muller.* B. M.

2. NYCTICEBUS *Javanicus*, Geoff. *Gray, List*, 16. Stenops Javanicus, *Hoeven, Nat. Tijdschr.* vol. viii. p. 343. t. 5. f. 1.

HAB. Malay peninsula, Penang, Java, Sumatra. B. M.

## 2. TARSIIUS.

1. TARSIIUS *spectrum*, Geoff. *Ann. Mus.* vol. xix. p. 168; *Cuming, Pro. Zool. Soc.* 1838, p. 66. Lemur *spectrum*, *Pallas?* Tarsius *Daubentonii*, Geoff. *Horsf. Java.* T. *Pallasii*, G. *Fischer.* T. *fuscomanus*, *Fischer*, t. 3, 4. T. *Fischeri*, *Desm.* T. *Bancanus*, *Horsf. Java.* *Didelphis macrotarsus*, *Schreb.* Tarsier, *Buffon, H. N.* vol. viii. t. 9. *Macrotarsus Buffonii*, *Link.* 1794.

HAB. Sumatra? Java, Borneo, Celebes, Banka; called *Podje*. Philippine Islands, where it is called *malmag*; *Cuming.* B. M.

## Fam. 3. GALEOPITHECIDÆ.

## 1. GALEOPITHECUS.

1. GALEOPITHECUS *volans*, Shaw, *Zool.* t. 38. G. *variegatus*, Geoff. *Temm. Muller, Verh.* 49. G. *Ternatensis*, *Desm.* G. *rufus*, *Audeb.* G. *undulatus*, *Wagner.* G. *Temminckii*, *Waterh. Pro. Zool. Soc. Cantor.* Lemur *volans*, *Linn. Marsden, Raffles.*

HAB. Malayan peninsula, Singapore, Penang, and other islands of the Straits. Lancavy Island; called *kubong* or *kurbong*. Pelew Island, Siam; *Cantor.* Java, Sumatra, Borneo; *Muller.* B. M.

2. GALEOPITHECUS *Philippinensis*, Waterhouse, *Pro. Zool. Soc.* 1838, p. 219; *Trans. Zool. Soc.* ii. Caguang, *Cuming, Pro. Zool. Soc.* 1838, p. 67. Gal. *macrourus*, *Temm. MSS.* (not described).

HAB. Philippines, Bohol and Mindanado. The skins are sold at Manilla.

## Fam. 4. VESPERTILIONIDÆ.

## 1. MEGADERMA.

1. MEGADERMA *spasma*, Geoff. *Ann. Mus.* vol. xv. t. 12; *Cantor, Mamm. Malay*, 9. *Vespertilio spasma*, *Linn.* V. *lanceolata*, *Deschamp.* *Megaderma trifolium*, Geoff. M. *Philippinensis*, *Waterhouse.*

HAB. Java; *Deschamp.* Penang, Singapore, Ternate; *Cantor.* Philippines; *Cuming.* B. M.

## 2. AQUIAS.

1. AQUIAS *luctus*, Gray, *Pro. Zool. Soc.* 1847, p. 16. *Rhinolophus luctus*, *Temm. Monog.* vol. iv. p. 24. t. 30. Rh. *morio*, Gray, *Ann. and Mag. N. H.* vol. x. p. 257.

HAB. Java and Sumatra; *Temm.* Singapore, *Gray.* B. M.

2. AQUIAS *trifoliatus*, Gray, *Pro. Zool. Soc.*, 1847, p. 16. *Rhinolophus trifoliatus*, *Temm. Monog.* vol. iv. p. 27. t. 30.

HAB. Java and Borneo. B. M.



## 3. RHINOLOPHUS.

1. RHINOLOPHUS *affinis*, Horsfield, *Java ; Cantor, Mamm. Malay*, 11.  
HAB. Java ; *Horsf.* Penang ; *Cantor.*
2. RHINOLOPHUS *pusillus*, Temm. *Monog.* ii. p. 36.  
HAB. Java.
3. RHINOLOPHUS *minor*, Horsf. *Java. Temm. Monog.* ii. p. 35.  
HAB. Java, Timor.
4. RHINOLOPHUS (Euryotis) *Philippinensis*, Waterhouse, *Pro. Zool. Soc.*, 1843, p. 68.  
HAB. Philippines ; *Cuming.* B. M.

## 4. HIPPOSIDEROS.

1. HIPPOSIDEROS *larvatus*, Gray, *Mag. Zool. & Bot.* ii. 11. Rhinolophus larvatus, *Horsf. Java.* 6. *Temm. Mon.* R. insignis, *Horsf. Java ; Temm. Monog.* ii. 14 to 29. f. 2. R. vulgaris, *Horsf. Java.* t. 7. f. 3 ; *Cantor, Mamm. Malay*, 13. R. deformis, *Horsf. Java.* Vespertilio Cyclope, *Desch. MSS.*  
HAB. Java ; *Horsfield.* Penang ; *Cantor.* B. M.
2. HIPPOSIDEROS *bicolor*, Gray, *List Mamm. Brit. Mus.* 33. Rhinolophus bicolor, *Temm. Monog.* ii. 18 to 32. f. 9, 10 ; *Waterhouse, Pro. Zool. Soc.*, 1843, 67.  
HAB. Java, Amboina, and Timor. Philippines ; *Cuming.* B. M.
3. HIPPOSIDEROS *pygmaeus*. Rhinolophus pygmaeus, *Waterhouse, Pro. Zool. Soc.*, 1843, 67.  
HAB. Philippines ; *Cuming.*
4. HIPPOSIDEROS *speoris*. Rhinolophus speoris, *Temm. Monog.* i. 17. Vespertilio speoris, *Schreb. Peron, Voy.* t. 33.  
HAB. Amboina, Timor.
5. HIPPOSIDEROS *murinus*, Gray, *Mag. Zool. and Bot.* ii. 11 ; *Cantor, Journ. Asiat. Soc. Beng.* xv. ; *Mamm. Malay*, 13.  
HAB. Penang ; *Cantor.* South Mahratta Country, Nicobar Islands. B. M.
6. HIPPOSIDEROS *galeritus*, *Cantor, Journ. Asiat. Soc. Beng.* xv. ; *Mamm. Malay*, 13.  
HAB. Penang ; *Cantor.*

## 5. PHYLLORHINA.

1. PHYLLORHINA *nobilis*, Gray. Rhinolophus nobilis, *Horsf. Java ; Waterhouse, Pro. Zool. Soc.*, 1843, 67.

HAB. Java, Sumatra, Amboina, Timor; *Muller*. Penang, Malayan peninsula; *Cantor*. Philippines; *Cuning*. B. M.

2. PHYLLORHINA *diadema*. *Hipposideros diadema*, *Gray*, *List Mamm. Brit. Mus.* *Cantor*, *Mamm. Malay*, 11. *Rhinolophus diadema*, *Geoff. Ann. Mus.* xx. t. 5.

HAB. Timor; *Muller*. Penang, Malay peninsula; *Cantor*. B. M.

3. PHYLLORHINA *griseus*. *Rhinolophus griseus*, *Meyer*, *Nov. act. Cæsar*, xvi. t. 46.

HAB. Philippine Islands; Luzon.

#### 6. ASELLIA.

1. ASELLIA *tricuspidata*. *Rhinolophus tricuspidatus*, *Temm. Monog.* ii. 20.

HAB. Amboina.

#### 7. PETALIA.

1. PETALIA *Javanica*, *Gray*, *Mag. Zool. and Bot.* ii. 12. *Nycteris Javanica*, *Geoff. Ann. Mus.* xx. t. 1. *Muller*, *Verh. N. Kuhlî*, *Temm.* *Vespertilio pollicaris*, *Deschamp. MSS.*

HAB. Java; *Deschamp*. B. M.

#### 8. PLECOTUS.

1. PLECOTUS *Timorensis*, *Guerin*, *Mag. Zool.* 1832. *Vespertilio Timorensis*, *Geoff. Ann. Mus.* viii. t. 47, cop. *Temm. Monog.* ii. 253. t. 57. f. 10.

HAB. Timor.

#### 9. VESPERTILIO ?

1. VESPERTILIO ? *pellucidus*, *Waterhouse*, *Pro. Zool. Soc.*, 1845. 3.

HAB. Philippines.

#### 10. KERIVOULA.

1. KERIVOULA *Hardwickii*, *Gray*, *List Mamm. Brit. Mus.* 27. *Vespertilio Hardwickii*, *Horsf. Zool. Java*; *Temm. Monog.* ii. 222. t. 55. f. 7-9.

HAB. Java, Sumatra. B. M.

2. KERIVOULA *tenuis*, *Gray*; *Cantor*, *Mamm. Malay*, 15. *Vespertilio tenuis*, *Temm. Monog.* ii. 220. t. 57. f. 5, 6, 7.

HAB. Java, Sumatra, Borneo; *Muller*. Penang; *Cantor*.

3. KERIVOULA *picta*, Gray, *Ann. & Mag. Nat. Hist.* 1842, 258; *Cantor, Mamm. Malay*, 15. *Vespertilio pictus*, *Pallas, Schreb.* t. 49; *Geoff.*; *Horsf.*; *Temm. Monog.* ii. 233. t. 56. f. 1, 3. *V. radiatus*, *Brunn.* *V. kirivoula*, *Boddaert, Fischer, Syn.* 106; *Geoff.* *V. Ternatanus*, *Seba.* *Muscardin volant*, *Daubenton.*

HAB. Java, Sumatra, Borneo. B.M.

4. KERIVOULA *trilatitoides*, Gray, *List Mamm. Brit. Mus.* 27. *Vespertilio trilatitius*, *Temm. Monog.* ii. 228. t. 57. f. 1-4, not *Horsf.* ? *V. Gärtneri. Kuhl.*

HAB. Java. B. M.

5. KERIVOULA *rufopieta*. *Vespertilio rufopictus*, *Waterhouse, Pro. Zool. Soc.*, 1845, 3.

HAB. Philippine; *Cuming.*

#### 11. TRILATITUS.

1. TRILATITUS *blepotis*, Gray, *Ann. and Mag. Nat. Hist.* 1842, 258. *Vespertilio blepotis*, *Temm. Monog.* ii. 212. t. 53. f. 1, 2.

HAB. Java, Amboina, Banda, Timor, Japan. B. M.

2. TRILATITUS *Horsfieldii*, Gray, *List Mamm. Brit. Mus.* 26; *Cantor, Mamm. Malay*, 15. *Vespertilio trilatitius*, *Horsf. Java.*

HAB. Java, Sumatra. Penang; *Cantor.* B. M.

3. TRILATITUS *Meyeni*. *Vespertilio Meyeni*, *Waterhouse, Pro. Zool. Soc.*, 1845, 3.

HAB. Philippines; *Cuming.*

#### 12. SCOTOPHILUS.

1. SCOTOPHILUS *Temminckii*, Gray, *Mag. Zool. and Bot.* ii. 15; *Cantor, Mamm. Malay*, 15. *Nycticejus Temminckii*, *Muller.* *Vespertilio Temminckii*, *Horsf. Zool. Java* (young). *V. Belangeri*, *J. Geoff. Belanger, Voy.* *V. noctulinus*, *J. Geoff.* (very young). *Nycticejus Belangeri*, *Temm.* *N. Noctulinus*, *Temm.*

HAB. Java, Sumatra, Borneo, Banda, Timor, Pondicherry. Calcutta; *Hardwicke.* Malayan peninsula and Island; *Cantor.* B. M.

2. SCOTOPHILUS *fulvus*, Gray, *List Mamm. Brit. Mus.* 31.

HAB. Java. B. M.

3. SCOTOPHILUS *Meyenii*. *Vespertilio Meyenii*, *Waterhouse, Pro. Zool. Soc.*, 1845, 3.

HAB. Philippines; *Cuming.*

4. SCOTOPHILUS *pachypus*. *Vespertilio pachypus*, *Temm. Monog.* ii. 217. t. 54. f. 4-6.

HAB. Java. B. M.

5. SCOLOPHILUS *Borbonicus*. Vespertilio Borbonicus, *Geoff. Ann. Mus.* viii. Nicticejus Borbonicus, *Temm. Monog.* ii. 153. t. 47.

Var. *Waterhouse, Pro. Zool. Soc.*, 1845, 10.

HAB. Philippines; *Cuming*.

6. SCOLOPHILUS *Hasseltii*. Vespertilio Hasseltii, *Temm. Monog.* ii. t. 56. f. 7, 8.

HAB. Java. B. M.

### 13. NOCTULINA.

1. NOCTULINA *Malaccensis*, Gray, *List Mamm. Brit. Mus.* 31.

HAB. Singapore. B. M.

2. NOCTULINA? *Eschscholtzii*. Vespertilio Eschscholtzii, *Waterhouse, Pro. Zool. Soc.*, 1845, 3.

HAB. Philippines; *Cuming*.

### 14. MINIOPTERIS.

1. MINIOPTERIS *macrotarsus*. Vespertilio macrotarsus, *Waterhouse, Pro. Zool. Soc.*, 1845, 3.

HAB. Philippines; *Cuming*.

### 15. MURINA.

1. MURINA *suillus*, Gray, *Ann. and Mag. Nat. Hist.* 1842, 259. Vespertilio suillus, *Temm. Monog.* ii. 224. t. 56. f. 4, 5, 6.

HAB. Java, Sumatra; *Temm.* Darjeeling; *Hodgson*.

The following species have been so indistinctly described by M. Temminck, that it is not possible to refer them to their proper genera until specimens are procured :—

1. VESPERTILIO *macellus*, *Temm. Monog.* ii. 230.

HAB. Borneo.

2. VESPERTILIO *macrotis*, *Temm. Monog.* ii. 218.

HAB. Sumatra.

3. VESPERTILIO *circumdatus*, *Temm. Monog.* ii. 219.

HAB. Java.

4. VESPERTILIO *adversus*, *Horsf. Java*; *Temm. Monog.* ii. 221; *Cantor, Mamm. Malay*, 14. V. cineraceus, *Blyth, MSS.*

HAB. Java; *Horsf.* Penang; *Cantor.* Calcutta; *Blyth.*



5. VESPERTILIO *papillosus*, Temm. *Monog.* ii. 220. t. 55. f. 1, 4.  
HAB. Java, Sumatra.
6. VESPERTILIO *imbricatus*, Horsf. *Java* ; Temm. *Monog.* ii. 216. t. 54. f. 1-3.  
HAB. Java.
7. VESPERTILIO *Horsfieldii*, Temm. *Monog.* ii. 226. t. 56. f. 9, 10, 11.  
HAB. Java.
8. VESPERTILIO *brachypterus*, Temm. *Monog.* ii. 213. t. 36. f. 5, 6.  
HAB. Sumatra.
9. VESPERTILIO *Malayanus*, F. Cuv. *Nouv. Ann. Mus.* t. 2. f. 3, cop. Temm. *Monog.* ii. 260.  
HAB. Malacca.
10. VESPERTILIO *Oreias*, Temm. *Monog.* ii. 270.  
HAB. Singapore ; Temm.

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#### 16. HARPIOCEPHALUS.

1. HARPIOCEPHALUS *rufus*, Gray, *Ann. Nat. Hist.* 259. Vespertilio harpyia, Temm. *Monog.* ii. 219. t. 55. f. 5, 6.  
HAB. Java. B. M.
2. HARPIOCEPHALUS *tristis*. Vespertilio tristis, Waterhouse, *Pro. Zool. Soc.*, 1845, 3.  
HAB. Philippines ; Cuming.

#### 17. EMBALLONURA.

1. EMBALLONURA *monticola*, Temm. *Zijdschr.* v. t. 2. f. 1, 2.  
HAB. Java.

#### 18. TAPHOZOUS.

1. TAPHOZOUS *saccolaimus*, Temm. *Monog.* ii. 285. t. 60. f. 1, 6.  
HAB. Java, Sumatra, Celebes, Ternate. B. M.
2. TAPHOZOUS *Philippinensis*, Waterhouse, *Pro. Zool. Soc.*, 1845. 9.  
HAB. Philippines ; Cuming.
3. TAPHOZOUS *melanopogon*, Temm. *Monog.* ii. 287. t. 60. f. 8, 9. Cantor, *Mamm. Malay*, 10.  
HAB. Java ; Temm. Pulo Tikus, Pulo Lancavy, Malayan peninsula ; Cantor. Caves of Kanner. B. M.

## 19. CHEIROMELES.

1. CHEIROMELES *torquatus*, Horsf. *Java*; *Temm.* *Dysopes cheiropus*, *Temm. Monog.* ii. t. 17. t. 23.  
 f. 15. *Molossus cheiropus*, *Lesson.* *Cheiromelcs caudatus*, *Temm. Monog.* ii. 348. t. 66.

HAB. Java, Sumatra, Borneo. B. M.

## 20. NYCTINOMUS.

1. NYCTINOMUS *plicatus*, Gray, *Mag. Zool. and Bot.* ii. 18. *Vespertilio plicatus*, *Buchann. Linn. Trans.* v. t. 13. *Nyct. Bengalensis*, *Geoff.* *Nyct. tenuis*, *Horsf. Java*, fide spec. *Horsf.*; *Cantor, Mamm. Malay*, ii.; *Waterhouse, Pro. Zool. Soc.*, 1845, 10. *Nyct. dilatatus*, *Horsf. Java*, fide spec. *Horsf.*

HAB. India, Bengal, Malayan peninsula; *Cantor.* Philippines; *Cuming.* Java, Sumatra, Borneo. B.M.

## 21. PTEROPUS.

1. PTEROPUS *Edwardsii*, *Geoff., Ann. Mus.* xv. *P. medius.*

Var. ? *P. Edwardsii*, var. *Waterhouse, Pro. Zool. Soc.*, 1843, 67.

HAB. India, Ceylon, Madagascar. Var. Philippines; *Cuming.*

2. PTEROPUS *edulis*, *Geoff. Ann. Mus.* xv.; *Temm.* *P. Javanicus*, *Horsf. Java.*

HAB. Java, Sumatra, Banda. B. M.

3. PTEROPUS *funereus*, *Temm. Monog.* ii. 68. t. 35. f. 4.

HAB. Sumatra, Borneo, Amboina, Timor. B. M.

4. PTEROPUS *jubatus*, *Eschscholtz, Zool. Atl.* t. 16; *Waterhouse, Pro. Zool. Soc.*, 1843, 67. *P. pyrrocephalus*, *Meyer, Nov. Act. Nat. Cur.* xvi. t. 45. f. 6.

HAB. Philippines; *Meyer*; *Cuming.*

5. PTEROPUS *Phaiops*, *Temm. Monog.* ii. t. 35. f. 3.

HAB. Celebes, Amboina, Banda.

6. PTEROPUS *chrysoproctus*, *Temm. Monog.* ii. t. 34. f. 2.

HAB. Amboina.

7. PTEROPUS *Alecto*, *Temm. Monog.* ii. 75.

HAB. Celebes.

8. PTEROPUS *griseus*, *Geoff.*; *Temm. Monog.* i. t. 35.

HAB. Amboina, Timor.

9. PTEROPUS *Maclotii*, *Temm. Monog.* ii. t. 35. f. 5.

HAB. Timor.

10. PTEROPUS *personatus*, Temm. *Monog.* i.

HAB. Ternate.

11. PTEROPUS *pallidus*, Temm. *Monog.* i. ; *Fischer, Syn.* 84.

HAB. Banda, Sumatra.

## 22. XANTHARPYA.

1. XANTHARPYA *amplexicaudata*, Gray. Pteropus amplexicaudatus, *Geoff.* ; *Temm. Monog.* i. t. 13.

HAB. Timor, Java, Sumatra, Amboina?, Philippines ; *Cuming* ; *Belcher.* B. M.

## 23. CYNOPTERUS.

1. CYNOPTERUS *marginatus*, Gray, *List Mamm. Brit. Mus.* 38. Pteropus titthæcheilus, *Temm.* Pachysoma titthæcheilum, *J. Geoff.* ; *Muller.* Vespertilio marginatus, *Hamilton (Buchanan).*

HAB. Java, Sumatra, India, Nepal. Philippines ; *Cuming.* B. M.

2. CYNOPTERUS *Horsfieldii*, Gray, *List Mamm. Brit. Mus.* 38. Pachysoma melanocephalum, *Muller.* Pteropus marginatus, *Horsf. Java*, not *Hamilton.*

HAB. Java. B. M.

3. CYNOPTERUS *brevicaudatus.* Pachysoma brevicaudatum, *J. Geoff.*

HAB. Sumatra ; *Cuming.* Philippines ; *Cuming.* B. M.

4. CYNOPTERUS *brachyotis.* Pachysoma brachyotis, *Muller, Verh.*

HAB. Borneo.

## 24. MEGÆRA.

1. MEGÆRA *ecaudata*, Temm. *Monog.* ii. ; *Muller, Verh.* Pachysoma ecaudata, *Temm. Monog.* ii.

HAB. Sumatra.

## 25. MACROGLOSSUS.

1. MACROGLOSSUS *minimus*, Gray, *Mag. Zool. and Bot.* ii. ; *Waterhouse, Pro. Zool. Soc.*, 1843, 67. Pteropus minimus, *Geoff. Ann. Mus.*, xv. 335. P. rostratus, *Horsf.* MacroGLOSSUS kiodotes and M. Horsfieldii, *Lesson.*

HAB. Java, Sumatra, Borneo, Celebes, Amboina, Banda, Timor. Philippines ; *Cuming.* B. M.

## 26. HARPYIA.

1. HARPYIA *cephalotis.* Harpyia Pallasii, *Temm. Monog.* ii. t. 40. Cephalotis Pallasii, *Geoff. Ann. Mus.* xv. Vespertilio cephalotis, *Pallas, Spic. Zool.* iii. t. 12.

HAB. Celebes, Amboina.

## 27. CEPHALOTES.

1. CEPHALOTES *Peronii*, Geoff. *Ann. Mus.* xv. t. 7. Pteropus Palliatus, Geoff. Hypoderma Moluccensis, Quoy and Gaim. *Voy. Astrol.*

HAB. Amboina, Banda, Timor, Celebes. B. M.

## ORDER II. FERÆ.

## Fam. 1. FELIDÆ.

## 1. TIGRIS.

1. TIGRIS *regalis*, Gray. Felis Tigris, Linn.; Muller, *Verh.* 52; Cantor, *Mamm. Malay*, 35.

HAB. Java and Sumatra. Malayan peninsula; called *Harimau* or *Rimau*. India. B. M.

## 2. LEOPARDUS.

1. LEOPARDUS *varius*, Gray. Felis pardus, Linn. F. varia, Schreb. F. Panthera, Erxleb. F. chalybeata, Herm. F. antiquorum, Fischer. F. fusca, Meyer. F. nirm, Ehrenb. F. melas, Peron.

HAB. Java and Sumatra. Malayan peninsula; called *Remau Bintang*; Cantor. India. B. M.

2. LEOPARDUS *macrocelis*. Felis macrocelis, Temm.; Horsf. Felis nebulosa, Griffith, A. K. Rimau dahau, Raffles, Linn. *Trans.* xiii.

HAB. Sumatra and Borneo.

3. LEOPARDUS *marmoratus*, Gray, *List Mamm. Brit. Mus.* 42. Felis marmoratus, Martin, *Pro. Zool. Soc.* Cantor, *Mamm. Malay*, 36. Felis Diardii, Fischer, *Sym. Mamm*; Jardine, *Cats*, t. 21, 22. Felis Charltonii, Gray, *Ann. Nat. Hist.* xviii. 1846, 211.

HAB. Malayan peninsula; called *Rimau dahau*; Cantor. Nipal; Charlton. B. M.

4. LEOPARDUS *Javensis*, Gray, *List Mamm. Brit. Mus.* 43. Felis Javensis, Horsf. Java; Cantor, *Mamm. Malay*, 36. F. Diardii, Griffith, A. K. t. 85; F. Cuv. *Mamm. Lith.* F. minuta, var. Temm.; Fischer; Muller, *Verh.* 54. F. undulata, Schinz.

HAB. Java, Borneo, Penang, Malay peninsula. B. M.

5. LEOPARDUS *Sumatranus*. Felis Sumatrana, Horsf. Java. F. minuta, var., Temm. F. undulata, Fischer.

HAB. Sumatra. B. M.

6. LEOPARDUS *megalotis*. Felis megalotis, Muller, *Verh.* 54.

HAB. Timor.

7. LEOPARDUS *Temminckii*. Felis Temminckii, Vigors. *Zool. Journ.* iv. 451. t. 22.

HAB. Sumatra; Vigors. B. M.



## 3. FELIS.

1. FELIS *domestica*, Linn.; *Cantor, Mamm. Malay*, 38.

HAB. Domesticated in the Malay peninsula; called *Kuching*; *Cantor*. B. M.

## 4. CHAUS.

1. CHAUS *planiceps*, Gray, *List Mamm. Brit. Mus.* 44. Felis *planiceps*, *Vigors and Horsf. Zool. Java*, vii. t. 2. F. *Diardii*, *Crawford*.

HAB. Sumatra, Borneo, Malayan peninsula; called *Kuching utan* or *Jalang*; *Cantor*. B. M.

## 5. VIVERRA.

1. VIVERRA *Zibetha*, Linn.; *Gray, Pro. Zool. Soc.*, 1832, 63; *Cantor, Mamm. Malay*, 27. V. *undulata*, *Gray, Spic. Zool.* 9. t. 8 (1830). V. *melanurus*, *Hodgson*. V. *orientalis*, *Hodgson*. V. *civettoides*, *Hodgson*. V. *Tangalunga*, *l. c.* 53. V. *Zibetha*, *F. Cuv. Mamm. Lith.* Civett (undescribed), *M'Clelland, Calcutta Journ. Nat. Hist.* Zibet, *Buffon, Hist. Nat.* ix. t. 34.

HAB. Malayan peninsula, Penang, Singapore; called *Tanggallong*; *Cantor*. Bengal, Nepal, Siam, South China, Sumatra, Borneo, Celebes, Amboina. B. M.

2. VIVERRA *Tangalunga*, *Gray, Pro. Zool. Soc.*, 1832, 63. V. *Zibetha*, *Raffles*; *F. Cuv. Mamm. Lith.*

HAB. Sumatra; *Raffles*. Borneo, Celebes, Amboina, Philippines, Penang, Singapore, Malayan peninsula; called *Musang jibat*; *Cantor*. B. M.

3. VIVERRA *Malaccensis*, *Gmelin*. V. *gunda*, *Hamilton*. V. *Rasse*, *Horsf. Java*; *Muller, Verh.* V. *Indica*, *Geoff.* V. *Bengalensis*, *Gray*. V. *pallida*, *Gray*. V. *Leveriana*, *Shaw*. *Genetta Manillensis*, *Eydoux*. *Viverricula Malaccensis*, *Cantor, Mamm. Malay*, 29.

HAB. Java, Malayan peninsula, Singapore, China, Philippine Islands, Cochin China, Tenasserim, India, Bengal, Nepal, Hindostan, Bombay. B. M.

## 6. LINSANG.

1. LINSANG *gracilis*, *Muller, Verh.* Felis (Prionodon) *gracilis*, *Horsf. Java*. Prionodon *gracilis*, *Waterhouse, Pro. Zool. Soc.*, 1842, 114; *Cantor, Mamm. Malay*, 29. Viverra? *Linsang*, *Hardw. Linn. Trans.* Viverra *Hardwickii*, *Lesson*, not *Gray*. V. *Genetta*, *Deschamp*. *Paradoxurus prehensilis*, *Schinz*.

HAB. Java, Sumatra; *Muller*. Borneo, Malayan peninsula, Siam; *Cantor*. B. M.

## 7. HERPESTES.

1. HERPESTES *Javanicus*, *Desm.*; *Gray, List Mamm. Brit. Mus.* 51; *Muller, Verh.*; *Cantor, Mamm. Malay*, 38. *Mangusta Javanica*, *Horsf. Zool. Java*. *Mustela*? *glauca*, *Linn.* *M. galera*, *Desch.*

HAB. Java; *Horsf.* Penang, Malayan peninsula; *Cantor*. B. M.

2. HERPESTES *griseus*, Desm. *Mamm.*; *Cantor, Mamm. Malay*, 34. *Ichneumon griseus*, Geoff. *Mangusta grisea*, Fischer. *M. Malaccensis*, Fischer, *Syn. Mamm.* *H. Edwardsii*, Fischer. *M. Nyula*, Hodgson. *H. ? pallidus*, Schinz.

HAB. Malayan peninsula; *Cantor*. Bengal, Hindostan, Scinde, Nepal. B. M.

3. HERPESTES *Nepalensis*, Gray, *Mag. Nat. Hist.* *Mangusta auropunctata*, Hodgson. *Herpestes auropunctata*, Hodgson; *Cantor, Mamm. Malay*, 34. *H. Javanica*, Hodgson, not Horsf. *H. Edwardsii*, Ogilby.

HAB. Malayan peninsula; *Cantor*. Bengal? Nepal? Scinde? Afghanistan? B. M.

4. HERPESTES *brachyurus*, Gray, in *Lond. Mag. Nat. Hist. new Series*, i. 1836, 578. *Cantor, Mamm. Malay*, 35. (PLATE III.)

Black hairs, yellow-ringed; under fur brown; face, cheeks, and sides of neck yellower; belly and tail darker; throat pale yellow-brown; forelegs and feet blackish; tail thick, about half as long as the body.

HAB. Malaccas, Malayan peninsula; called *musang turon*; *Cantor*. Borneo. B. M.

This species has much the appearance of *H. paludosus*, of South Africa, but is easily known by the yellower colour of the rings on the hair, and the shortness of the tail.

5. HERPESTES *semitorquatus*, Gray, *Ann. and Mag. Nat. Hist.* xviii. 211. (1846). (PLATE IV.)

Dark brown, yellow grised; sides and beneath rufous; feet blacker; tail paler; lips thin; throat and lower part of the side of the neck rufous, separated from the colour of the upper part of the neck by a well-defined straight line; fur rather rigid, with a fine brown undercoat; longer hair of the back dark brown, with a broad reddish yellow, sub-terminal band; of the sides bright red-bay; of tail pale yellow, with a broad dark band and yellowish tip. Length, head and body 18.6; tail 11 inches.

HAB. Borneo. B.M.

## 8. CYNOGALE.

1. CYNOGALE *Bennetti*, Gray, *Mag. Nat. Hist.* 1836, 1. 579; *Pro. Zool. Soc.*, 1836, 56; *Eydoux and Souleyet, Voy. Bonite Zool.* 24. t. 6; *Cantor, Mamm. Malay*, 38. *Potamophilus barbatus*, Muller, *Zijdsch. N. G.* v. 140 183; *Verh.* 115. t. 17. *Viverra* (Limictis) *Carcharias*, *Blainville, Ann. Sci. Nat.* viii. 279. t. 8 a.

HAB. Borneo; *Muller*. Sumatra and Malayan peninsula; called *Pane*; *Cantor*. B. M.

## 9. ARCTICTIS.

1. ARCTICTIS *Binturong*, Fischer, *Syn. Mamm.*; *Cantor, Journ. As. Soc. Beng.* xv.; *Mamm. Malay*. 22. *Viverra ? Binturong*, *Raffles, Linn. Trans.* xiii. 253. *Binturong*, *Farquhar, Icon. incl. Gray, Pro. Zool. Soc.*, 1831, 64. *Paradoxurus albifrons*, *F. Cuvier*. *Ictides ater*, *F. Cuvier*; *Blainv.*; *Calcutta Journ. Nat. Hist.* iii. 210. *Arctictis penicillata*, *Temm.*

HAB. Malacca; *Farquhar, Raffles*; called *unturong*. Tenasserim, Arracan, Assam, Bholan; *Duvaucell*. Nipal; *Hodgson*. Java and Sumatra; *Muller*. B. M.

## 10. PAGUMA.

1. PAGUMA *leucomystax*, Gray, *List Mamm. Brit. Mus.* 55; *Cantor, Mamm. Malay*, 30. *Paradoxurus leucomystax*, Gray, *Mag. Nat. Hist.* 1836, 579; *Temm. Monog.* ii. t. 64. f. 4, 6; *Muller, Verh.* 55. *Amblyodon auratus*, *Jourdan*.

HAB. Sumatra, Bornco; *Muller*. Malayan peninsula, Singapore; called *musang bulan*; *Cantor*. B.M.

2. PAGUMA *trivirgata*, Gray, *List Mamm. Brit. Mus.* 59. *Paradoxurus trivirgatus*, Gray, *Pro. Zool. Soc.*, 1832, 68; *Muller, Verh.* 55. *Viverra trivirgata*, *Reinw. MSS.*; Gray, *Spic. Zool.* 9.

HAB. Java; *Muller*. Malayan peninsula, Singapore, and Tenasscrim; called *musang akar*; *Cantor*. B. M.

## 11. PARADOXURUS.

1. PARADOXURUS *Zeylanicus*, Gray, *List Mamm. Brit. Mus.* 55. *Martes Philippinensis*, *Camel, Phil. Trans.* xxv. 2204. *Viverra Ceylonica*, *Pallas*. *V. Zeylanica*, *Schreb.* *V. Ceylonensis*. *Bodd.* *Paradoxurus Philippinensis*, *Temm. Monog.* ii. not *Jourd.* *P. aureus*, *F. Cuv. Mem. Mus.* ix. 7. t. 4.

HAB. Philippines. B. M.

2. PARADOXURUS *Pallasii*, Gray, *Pro. Zool. Soc.*, 1832, 67; *Illust. Ind. Zool.* *P. albifrons*, *Bennett, MSS.* *Viverra?* *fasciata*, *Desm.* *V. Geoffroyii*, *Fischer.* *P. Musanga*, *Cantor, Mamm. Malay*, 34.

HAB. Malacca, Malayan peninsula, Penang, Singapore; called *musang*; *Cantor*. B. M.

3. PARADOXURUS *Musanga*, Gray, *Pro. Zool. Soc.*, 1832, 66; *Muller, Verh.* 54. *Viverra Musanga*, *Raffles*; *Horsf.* *P. dubius*, *Gray, l. c.* 66.

HAB. Java, Sumatra, Borneo. B. M.

## 12. HEMIGALEA.

1. HEMIGALEA *Hardwickii*. *Viverra Hardwickii*, Gray, *Spic. Zool.* 9 (1830), not *Lesson*. *Hemigalea Zebra*, *Jourdon, Comp. Rendus*, 1837, 442; *Blainv. in Ann. Sci. Nat.* viii. 270 (not *Hemigaleus*, *Muller*). *Viverra Boici*, *S. Muller, Tijdsch. N. G.* v. 144. *Paradoxurus Derbianus*, Gray, *Pro. Zool. Soc.* 1837, 67; *Mag. Nat. Hist.* 1837, f. 579; *Cantor, Mamm. Malay*, 32; *Waterhouse, Pro. Zool. Soc.*, 1842, 114; *Viverra Derbyi*, "Gray" *fide Temm. Monog. Mamm.* 1841. ii. 343; *Eydoux and Souleyet Voy. Bonite*, 28. t. 5. *Paradoxurus Zebra*, Gray, *Mag. Nat. Hist.* 1837, 579.

HAB. Malacca; *Farquhar*. Malayan peninsula; called *masang batu* or *sangah prao*; *Cantor*. Borneo; *Muller*. B. M.

## 13. CUON.

1. CUON *primævus*, *Hodgson, Trans. Asiat. Soc.*; *Cantor, Mamm. Malay*, 26. *Canis primævus*, *Hodgson*. *Chrysæus primævus*, *H. Smith*. *Canis Dukhunensis*, *Sykes, Pro. Zool. Soc.*

HAB. Malayan peninsula; called *anjing utan*; *Cantor*. Bengal, Nipal. B. M.



2. *CUON Sumatrensis*. *Canis Sumatrensis*, *Hardw. Linn. Trans.* xiii. t. 23. *Canis rutilans*, *Boie MSS.*; *Muller, Verh.* 51. *C. Javanicus*, *F. Cuvier*.

HAB. Java, Sumatra? Borneo. B. M.

Is this different from the former, or does the Malacca specimen belong to this species?

#### 14. MARTES.

1. *MARTES flavigula*, *Hodgson*; *Cantor, Mamm. Malay*, 24. *Mustela flavigula*, *Bodd.* *Mustela Hardwickii*, *Horsf. Zool. Journ.* *Viverra quadricolor*, *Shaw.* *Must. leucotis*, *H. Smith.* *M. Henrici*, *Boie.* *M. lasiotis*, *Temm.*

HAB. Java, Sumatra; *Temm.* Malay peninsula; called *anga prao*; *Cantor.* India, Nepal. B. M.

#### 15. PUTORIUS.

1. *PUTORIUS nudipes*, *F. Cuvier*; *Cantor, Mamm. Malay*, 24. *Mustela nudipes*, *Desm.*

HAB. Sumatra, Borneo; *Temm.* Malayan peninsula; called *pulosan*; *Cantor.*

#### 16. MYDAUS.

1. *MYDAUS meliceps*, *F. Cuvier.* *Mephetis Javanensis*, *Raffles.* *Ursus fetidus*, *Desch.*

HAB. Java and Sumatra. B. M.

#### 17. HELICTIS.

1. *HELICTIS orientalis.* *Gulo orientalis*, *Horsf.*

HAB. Sumatra. B. M.

#### 18. LUTRA.

1. *LUTRA nair*, *F. Cuvier*; *Sykes*; *Cantor, Mamm. Malay.* 25. *Lutra Indica*, *Gray.* *L. Chinensis*, *Gray, Mag. Nat. Hist.* 1836. *L. Tarayensis*, *Hodgson.*

HAB. Malayan peninsula; *Cantor*; called *anjin ayer.* China, Bombay, South Mahratta.

2. *LUTRA?* *Simung*, *Muller, Verh.* 51; *Marsden's Sumatra*, t. 12.

HAB. Sumatra, Borneo; *Temm.* Malayan peninsula; called *murang* or *amrang*; *Cantor.*

#### 19. AONYX.

1. *AONYX leptonyx*, *Gray, List Brit. Mus.* 71; *Cantor, Mamm. Malay.* 25. *A. Horsfieldii*, *Gray.* *Lutra leptonyx*, *Horsf.*; *Muller, Verh.* 51. *L. cinerea*, *Illiger.* *L. perspicillata*, *J. Geoff.* *Mustela fusca*, *Desch.* *Mustela Lutra*, *Marsden.*

HAB. Java, Sumatra, Borneo. India, Nepal, Malayan peninsula; called *anjin ayer*; *Cantor.*



## Fam. 6. URSIDÆ.

## 1. HELARCTOS.

1. HELARCTOS *Malayanus*, Horsf.; *Cantor, Mamm. Malay.* 21. *Ursus Malayanus*, *Raffles.*

HAB. Sumatra; *Raffles.* Malayan Peninsula; called *bruang*. Tenasserim Provinces, Assam; *Cantor*.  
B. M.

Var.  $\beta$ . H. *Eurypilus*, Horsf. *Zool. Journ.* i. 221. t. 7. *U. Malayanus* var. *Temm.*

HAB. Borneo. B. M.

## Fam. 7. TALPIDÆ.

## 1. TUPAIA.

1. TUPAIA *Javanica*. *Hylogalea Javanica*, *Horsf. Java*; *Muller, Verh.* 161. 165. t. 26. f. 27.  
*Cerp, F. Cuvier, Mamm. Lith.*

HAB. Java, Sumatra, and Borneo. B. M.

2. TUPAIA *ferruginea*, *Raffles, Linn. Trans.* xiii. 256; *Cantor, Mamm. Malay.* 18; *Horsf. Java.*  
*Hylogalea ferruginea, Temm.* *Cladobates ferruginea, F. Cuvier.* *Glisorex ferruginea, Desm.*; *Muller, Verh.*  
160. 163. t. 26. 27. *Herpestes* n. sp. *McClelland, Calcutta Journ. Nat. Hist.* ii. 458. t. 13½. *Sorex*  
*Glis, Diard. As. Research.* xiv. t. 9.

HAB. Java, Sumatra, Borneo; *Temm.* Malayan peninsula, Penang, Singapore; called *tupai tana*;  
*Cantor.* B. M.

3. TUPAIA *Tana*, *Raffles, Linn. Trans.* xiii. 257; *Horsf. Zool. Java.* *Hylogalea Tana, Muller, Verh.*  
160. 161. t. 26. 27. *Cladobates speciosus, Wagner, Sought. Supp.* 43.

HAB. Sumatra, Borneo. B. M.

## 2. DENDROGALE.

1. DENDROGALE *murina*, Gray, *Pro. Zool. Soc.*, 1848, 23. *Hylogalea murina, Muller, Verh.* p. 50.  
161. 167. t. 26. 27.

HAB. Borneo.

## 3. PTILOCERCUS.

Head moderately large, tapering; whiskers elongated, rather rigid. Ears moderate, naked, exposed. Body slender, fur soft. Limbs moderately elongated, nearly equal. Toes 5.5. rather compressed, free. Thumb moderate, like the toes but shorter. Claws short, compressed, triangular, acute. Tail elongate, cylindrical, hairy quite at the base, then naked, covered with rings of square, broad, depressed scales, and short scattered hairs, and the hinder third with a series of elongate hairs, forming a barb on each side. Skull conical;

face rather short. Cutting teeth  $\frac{1.1.1.1.}{3.3}$ : upper elongate, far apart, rather curved; lower shelving, front pair conical, small, shorter than the middle pair, which are elongate, curved, acute, the hinder smallest and shortest. Canines none. Grinders  $\frac{7.7}{7.7}$ , the front 3.3 in each jaw, small; the hinder 4.4 large, square, acutely tubercular.

The skull is shorter, broader, and the face less elongated than that of the different species of *Tupaia*, and it differs from them in the two front teeth of the lower jaw being smaller and shorter than the succeeding one, while in all the species of *Tupaia* (including the genus *Dendrogale*) figured by Temminck, the four front teeth of the lower jaw are equally elongated. The hinder cutting tooth in the upper jaw is placed on the suture of the intermaxillary (and hence may be a true canine) and not in front of the suture of the intermaxillary, as is the case with the skull of *Tupaia tana* and *T. ferruginea* in the British Museum collection.

Borneo may be regarded as the proper home of the subfamily *Tupaina*, as it possesses all the genera, *Tupaia*, *Hylomys*, and one which, from the form of its tail, may be called *Ptilocercus*.

The true *Tupaia* have a broad hairy tail like the squirrels; the *Hylomys* have a very short, slender, cylindrical tail, covered with short close adpressed hair; and the *Ptilocercus*, on the other hand, have an elongated cylindrical tail, covered with rings of square broad scales, like the long-tailed rats, but the end of the tail is furnished with a series of rigid hairs on each side, like the barb of an arrow. I may remark, that besides the genera here noticed, the Dutch naturalists have described an animal under the name of *Hylogalea murina*, Verh. Mamm. t. 26. f. 3. t. 27. f. 17-18, also from Borneo, which differs from the *Tupaia* (or *Hylogale*) in having a cylindrical tail covered with short hair, but furnished with a pencil of longer hair at the tip, which I propose to separate from the other under the name of *Dendrogale*. Each of these genera has a peculiar livery; the *Tupaia* are grizzled yellow and brown, with a yellow streak across the shoulders; the *Hylomys* are uniform dark-coloured; the *Dendrogale* and *Ptilocercus* have no shoulder-streak, but a dark streak on the side of the face inclosing the eyes; the former having a white spot on the forehead not observed in the latter.

At first sight *Ptilocercus* has much the appearance of a marsupial animal allied to *Cuscus*, but this resemblance proves to be only in the mere external form, when the characters are examined, as, for example, it wants the large great-toe of that group.

The skulls of *Tupaia* and *Ptilocercus* have a considerable resemblance to those of the *Lemuridæ*, and particularly in having the orbits entire. The *Tupaia* are peculiar in having a large elongated aperture on the hinder-part of the middle of the zygomatic arch, while the *Ptilocercus* has only a small round perforation in the front part of the middle of the same part, which is probably the analogue of the hole in the former genus.

1. PTILOCERCUS *Lowii*, Gray, *Pro. Zool. Soc.*, 1848, 24. (PLATE V.)

Blackish brown, very minutely grizzled with the yellowish tips of the hairs; lips, lower part of cheeks, chin and beneath yellowish: sides of the face, inclosing the eyes, black. Tail black; barbs white, except a few hairs near the scaly part, which are black.

Length  $5\frac{1}{2}$  inches; tail  $6\frac{1}{2}$ ; hind foot 1. Skull: length  $1'' 4''$  tooth line,  $7\frac{1}{2}''$ ; of face  $5''$ ; of zygomatic arch  $7\frac{3}{4}$ , width at zygomatic arch  $9\frac{1}{2}''$ , at temples  $6\frac{1}{2}''$ , between orbits  $3\frac{3}{4}''$ .

HAB. Borneo (Sarawak); *J. Brooke, Esq.* B. M.

I have named this species after my friend Mr. Hugh Low, who has much enriched our knowledge of the natural productions of Borneo.

## 4. HYLOMYS.

1. HYLOMYS *suillus*, Muller, *Verh.* 50. 153. t. 25, 26.

HAB. Java and Sumatra. B. M.

## 5. SOREX.

1. SOREX *myosurus*, Pallas. *S. cærulescens* var., *Raffles.* *S. murinus*, *Linn.*; *Cantor, Mamm. Malay.* 21.

HAB. Java, Sumatra, Borneo, Amboina, Penang; called *chinchorot*; *Cantor.* B. M.

2. SOREX *tenuis*, Muller, *Verh.* 50.

HAB. Timor.

## 6. GYMNURA.

1. GYMNURA *Rafflesii*, Lesson; *Vigors and Horsfield*; *Cantor, Mamm. Malay.* 26. *Viverra?* *Rafflesii*, *Raffles.*

HAB. Malacca; *Farquhar*; *Cantor.* Sumatra. B. M.

Var. *Borneensis.* *G. Rafflesii* var., *Waterhouse, Pro. Zool. Soc.*, 1842, 114.

HAB. Borneo. *J. Brooke, Esq.*

## Fam. 8. MACROPODÆ.

## 1. CURSUS.

1. CURSUS *orientalis*, Gray, *List. Mamm. Brit. Mus.* 84. *Phalangista cavifrons*, *Temm. Mon.* i. t. 1. *Didelphis orientalis*, *Linn.* *Ph. rufa* and *Ph. alba*, *Geoff.*

HAB. Amboina, Timor. B. M.

Capt. Sir Edward Belcher brought home a female specimen of this species which is now in the British Museum.

2. *CUSCUS ursinus*, Lesson, *Mamm.* 219. *Phalangista ursina*, *Temm. Monog.* i. 10. t. 1. t. 2.

HAB. Celebes; *Temm.* B. M.

3. *CUSCUS chrysorrhos*. *Phalangista chrysorrhos*, *Temm. Monog.* i. 12. t. 1.

HAB. Amboina.

4. *CUSCUS maculata*, Lesson, *Zool. Coq.* i. t. 5. *Phalangista maculata*, *Temm. Monog.* i. 14. t. 2.

HAB. Amboina, New Guinea.

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### ORDER III. CETE.

#### Fam. 1. DELPHINIDÆ.

##### 1. STENO.

1. *STENO Malayanus*, Gray, *Zool. Erebus and Terror*, 43. *Delphinus plumbeus*, *Dussumier*; *Cuvier. R. A.* i. 288; *Cantor, Mamm. Malay.* 66. *D. Malayanus*, *Lesson, Voy. Coq.* t. 9. f. 5. *D. Capensis*, *Rapp, Cetac.* t. 2. f. 1 (not Gray). *D. Rappii*, *Reich, Cetac.* 117. 48. t. 18. f. 57. *D. à ventre roux*, *Voy. Pol. Sud.* t. 22. f. 2. t. 23. f. 3, 4.

HAB. Coast of Penang; called *parampuan laut*; *Cantor.* Malabar Coast. B. M.

#### Fam. 2. HALICORIDÆ.

##### 1. HALICORE.

1. *HALICORE dugong*, F. Cuvier. *Halicore Indicus*, *Desm.*; *Cantor, Mamm. Malay.* 66; *Owen Inkes, Voy. H.M.S. Fly*, ii. 323. f. 2, 4, 6. *Trichechus dugong*, *Eixleb.* *Halicore cetacea*, *Huger.* *H. dugong*, *Cuvier*; *Raffles.* *Dugong*, *Home, Phil. Trans.* 1821. t. 20. *Dugungus marinus*, *Tiedemann.* *Indian Walrus*, *Penn.*

HAB. Malayan peninsula, Singapore; called *dugong* or *parampuan laut*; *Cantor.* Sumatra, Philippines, Molucca, Sunda Island.

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### ORDER IV. GLIRES.

#### Fam. 1. MURIDÆ.

##### 1. MUS.

1. *MUS setifer*, *Horsf. Zool. Java*; *Gray, Pro. Zool. Soc.*, ii. 40; *Cantor, Mamm. Malay.* 46. *M. giganteus*, *jun.*, *Temm.*

HAB. Java, Sumatra; *Temm.* Penang; called *tikus virok*; *Cantor.*



2. *Mus Bandicota*, Bechstein; *Cantor, Mamm. Malay.* 45. *M. giganteus*, *Hardw. Linn. Trans. Temm.* *M. Malabaricus*, *Shaw.* *M. perchal*, *Shaw.* *M. Jeria*, *Buch, Ham. MSS.* *M. nemorivagus*, *Hodgson.* Bandicote Rat, *Penn.*

HAB. Java, Sumatra, Malay peninsula; called *tikus besar*; *Cantor.* Bengal, Nepal, South Mahratta country. B. M.

3. *Mus decumanus*, Pallas, *Glires*, 91; *Cantor, Mamm. Malay.* 46. *Mus Norvegicus*, *Brisson.*

HAB. Java, Sumatra, Banda, Borneo, Celebes, Amboina, Timor, Malayan peninsula, Penang; called *tikus*; *Cantor.* B. M.

4. *Mus rufescens*, Gray, *Mag. Nat. Hist.*; *Cantor, Mamm. Malay.* 46. *M. flavescens*, *Elliot.* *M. rufus*, *Elliot.*

HAB. Penang; *Cantor.* Dharwar, Madras, Bengal, Arracan. B. M.

5. *Mus musculus*, Linn.; *Cantor, Mamm. Malay.* 46.

HAB. Penang; called *tikus ruma*; *Cantor.* B. M.

## 2. PHLÆOMYS.

1. *PHLÆOMYS Cumingii.* *Mus (Phlæomys) Cumingi*, *Waterhouse, Pro. Zool. Soc.*, 1839, 108.

HAB. Philippines, Island of Luzon. B. M.

## 3. ? PITHECHIR.

1. *PITHECHIR melanurus*, F. Cuvier, *Mamm. Lithog.*

HAB. Java. Only known from a drawing.

## Fam. 2. HISTRICIDÆ.

### 1. ACANTHION.

1. *ACANTHION (Acantherium) Javanicum*, Gray, *Pro. Zool. Soc.*, 1847, 102. *A. Javanicum*, *F. Cuv. Mamm. Mus.* ix. t. 1. f. 3, 4. *Hystrix brevispinosus*, *Wagner.* *H. torquatus*, *Mus. Leyden.* *H. longicauda*, *Marsden, Sumatra*; *Cantor, Mamm. Malay.* 48. *H. macroura*, *Muller, Verh.*

HAB. Java, Borneo, Sumatra, Malayan peninsula; called *buli landak*; *Cantor.* B. M.

### 2. ATHERURA.

1. *ATHERURA fasciculata*, Cuvier; *Gray, Pro. Zool. Soc.*, 1847, 104. *Hystrix macroura*, *Linn.* from *Seba.* *H. fasciculata*, *Shaw* from *Buffon*; *Gray, Illust. Ind. Zool.* 6; *Temm.* *Mus fasciculata*, *Desm.* Landak, *Marsden, Sumatra*; *Raffles, Linn. Trans.* *H. opeigura*, *Hamilton, MSS.*; *As. Research.* xiv. 222.

HAB. Sumatra; *Raffles.* Borneo, Celebes; *Seba.* Penang; called *landak*; *Cantor.*

## Fam. 3. LEPORIDÆ.

## 1. LEPUS.

1. LEPUS *kurgosa*, Buchan. *Mysore*, i. 169. *Lepus nigricollis*, *F. Cuvier*; *Muller, Verh.* L. *mela-nauchen*, *Temm.* L. *ruficollis*, *Mus. Paris.*

HAB. Java; *Muller.* India. B. M.

## Fam. 4. JERBOIDÆ.

## 1. PTEROMYS.

1. PTEROMYS *nitidus*, *Muller, Verh.* 107. 112. S. *petaurista*, fem., *Cuvier, Reg. Anim.* P. *albo-venter*, *Gray, Pro. Zool. Soc.*, 1836, 88.

HAB. Java, Sumatra, Borneo. B. M.

2. PTEROMYS *elegans*, *Muller, Verh.* 56. 107. 112. t. 16. f. 1, 2, 3. *Pteromys punctatus*, *Gray, Ann. and Mag. Nat. Hist.* xviii. 1846, 211. P. *nitidus*, var., *Cantor, Mamm. Malay.* 44, note.

HAB. Java; *Temm.* Molucca; *Cantor.* B. M.

3. PTEROMYS *melanotis*, *Gray, Pro. Zool. Soc.*, 1836, 88. P. *nitidus*, *Gray, Illust. Ind. Zool.* P. *Diardii*, *Temm. MSS.*

HAB. Siam. B. M.

## 2. SCIUROPTERUS.

1. SCIUROPTERUS *Horsfieldii*, *Gray, List. Mamm. Brit. Mus.* 134; *Cantor, Mamm. Malay.* 45. *Pteromys (Sciuropterus) Horsfieldii*, *Waterhouse, Pro. Zool. Soc.*, 1837, 87. P. *aurantiacus*, *Wagner, Weigm. Arch.* 1843.

HAB. Malacca; *Gray.* Malayan peninsula; *Cantor.* Sumatra? or Java? *Waterhouse.* B. M.

2. SCIUROPTERUS *sagitta*, *Desm.* *Pteromys sagitta*, *Geoff.*; *Muller, Verh.* 109, 113. *Petaurista sagitta*, *Link.* *Sciurus sagitta*, *Schreb. Supp.* t. 224.

HAB. Java, Sumatra, Banka.

3. SCIUROPTERUS *genibarbis*, *Cantor, Mamm. Malay.* 48. *Pteromys genibarbis*, *Horsfield, Zool. Java.* P. *lepidus*, *Horsf. Java.*

HAB. Java; called *keehubu*; *Horsf.* Malayan peninsula; *Cantor.* B. M.

## 3. SCIURUS.

1. SCIURUS *Javensis*, *Schreb. Gaugh.* t. 216. *Sciurus bicolor*, *Sparrm., Goetheb. Handl.* 1778. 70. *Horsf. Zool. Java*; *Muller, Verh.* 85, 88; *Cantor, Mamm. Malay.* 38. S. *Bengmaricus*, *McClelland.* S. *Madagascariensis*, *Shaw.*

HAB. Java, Sumatra, Malacca, Cochin China, Assam; *Temm.* Penang; called *chingkrawah etam*. B. M.

2. *SCIURUS ephippium*, S. Muller, *Tijdsch. N. G.* 1838, 147; *Verh.* 86. 91. t. 13; *Waterhouse, Pro. Zool. Soc.*, 1842, 116. S. Javensis, var. ?

HAB. Borneo; *Brooke.* B. M.

3. *SCIURUS hypoleucus*, Horsfield, *Zool. Java*; *Muller, Verh.* 85, 90. S. humeralis, *Coulson?* S. Finlaysonii, *Horsf. Z. R.* S. aureiventer, *J. Geoff. Guerin. Mag. Zool.* 1841, t. 5; 1842, t. 34. S. Leschenaultii, *Desm. N. Dict. H. N.* x. 105. S. albiceps, *Desm.*

HAB. Java. B. M.

4. *SCIURUS aureiventer*, J. Geoff.; *Gray.* S. bicolor, var., *Horsfield*; *Cantor, Mamm. Malay.* 39.

HAB. Java. B. M.

5. *SCIURUS hippuris*, J. Geoff. *Mag. Zool.* 1832. t. 6. S. caudatus, *McClelland, Pro. Zool. Soc.*, 1839, 151; *Cantor, Mamm. Malay.* 41; *Muller, Verh.* 86.

Var. 1. S. *rufogaster*, *Gray.*

Var. 2. S. *castaneoventris*, *Gray, fide Cantor.*

HAB. Java, Sumatra, Assam; *Cantor.* B. M.

6. *SCIURUS Rafflesii*, Vigors and Horsf. *Zool. Journ.* iv. 113, t. 4; *Muller, Verh.* 56. 86. 93; *Cantor, Mamm. Malay.* 40; *Gervais, Mag. Zool.* 1842, t. 33. S. Prevostii, *Desm. Mam.* 335.

Var. 1. S. *rufogularis*, *Gray.*

Var. 2. S. *rufoniger*, *Gray.*

Var. 3. S. *redimitus*, *Boon.*

Var. 4. S. *Bornoensis*, S. *Rafflesii*, var., *Waterhouse, Pro. Zool. Soc.*, 1842, 116.

Var. 5. S. *Indica*, *Muller, Verh.* 86.

HAB. Borneo. Malacca; called *tupai belang*; *Cantor.* B. M.

7. *SCIURUS nigrovittatus*, Horsf. *Zool. Java*; *Muller, Verh.* 86. 95; *Cantor, Mamm. Malay.* 42. S. griseiventer, *J. Geoff. Mag. Zool.* 1832.

HAB. Java, Sumatra, Borneo, Malacca, Canton; *Temm.* Malayan Peninsula; *Cantor.* B. M.

8. *SCIURUS Platani*, *Zool. Java.* S. bilineatus, *Geoff. Desm. Mamm.* 336. S. notatus, *Bodd.*

HAB. Java, Sumatra. B. M.

9. *SCIURUS tenuis*, Horsf. *Java, Cantor, Mamm. Malay.* 42. Var. ? *Sciurus modestus*, *Muller, Verh.* 55. 87. 96. t. 14. f. 1. 3.

HAB. Sumatra, Borneo, Malacca, and Canton. Singapore; *Cantor.* B. M.

10. *SCIURUS vittatus*, Raffles, *Linn. Trans.* xiii. 259; *Muller, Verh.* 86, 94; *Cantor, Mamm. Malay.*
42. *Macroxus Toupai*, *Lesson*. *Sciurus bivittatus*, *Desm. Mamm.* 543 ? *S. flavimanus*, *J. Geoff.*  
 HAB. Sumatra, Borneo, Malacca; *Cantor*; *Temm.* Malayan peninsula, Singapore, Penang; called *Tupai*.
11. *SCIURUS rubiventer*, Forsten; *Muller, Verh.* 86.  
 HAB. Celebes.
12. *SCIURUS leucomus*, Forsten; *Muller, Verh.* 87.  
 HAB. Celebes.
13. *SCIURUS murinus*, Forsten; *S. Muller, Verh.* 87.  
 HAB. Celebes.
14. *SCIURUS Philippinensis*, Waterhouse, *Pro. Zool. Soc.*, 1839, 117. *Sciurus, Cuming, Pro. Zool. Soc.* 1838, 66.  
 HAB. Philippines, Mindanado.
15. *SCIURUS insignis*, *Desm.*, *Mamm.* 544; *Horsf. Zool. Java*; *F. Cuv. Mamm.*; *Muller, Verh.* 87, 93. *Grev. Mag. Zool.* 1842, t. 32.  
 HAB. Java, Sumatra, Borneo; *Temm.* China? *Reeves.* B. M.
16. *SCIURUS melanotis*, *S. Muller, Verh.* 87, 98. t. 14. f. 4, 5.  
 HAB. Java, Sumatra, Borneo. B. M.
17. *SCIURUS exilis*, *S. Muller, Tijds. N. G.* 148. *Verh.* 87. 97. t. 15. f. 4, 6.  
 HAB. Sumatra, Borneo. B. M.

## 4. RHINOSCIURUS.

1. *RHINOSCIURUS Tupaoides*, *Gray, List. Mamm. Brit. Mus.* 195. *Sciurus laticaudatus*, var., *Cantor, Mamm. Malay.* 43.  
 HAB. Malacca; *Gray*. Malayan peninsula; *Cantor*. B. M.  
 Var. 1. *Sciurus laticaudatus*, *Diard.*; *Muller, Verh.* 87. 100. t. 15. f. 1. 3.  
 HAB. Borneo (west coast).

## Fam. 7. ASPALACIDÆ.

1. RHIZOMYS, *Gray*.

1. *RHIZOMYS Sumatrensis*, *Gray, Pro. Zool. Soc.*, 1831, 98; *Cantor, Mamm. Malay.* 47. *R. Decan, Schinz.* *R. Sinensis, Cuming, Pro. Zool. Soc.*, 1848, 62 (not *Gray*). *R. cinereus, M'Clelland, Calcut.*



*Journ. Nat. Hist.* ii. 456. t. 14, Bamboo Rat, *Farquhar, Icon.* *Mus Sumatrensis*, *Raffles, Linn. Trans.* xiii. 258; *Temm. Mus. Leyden.* *Hypudeus* de Sumatra, *Temminck, Monog.* i. *Nyctocleptis* Dekan, *Temminck, Monog.* (very bad); *Voy. Bonite.* Rat Taupe de la Sonde, *Cuvier, R. A.* *Spalax Javanus*, *Cuvier, R. A.* ed. 2. i. 211.

HAB. Malayan peninsula; called *tikus bulow*; *Cantor.* Malacca; *Farquhar*; *Raffles.* Assam; Moulmein. (not Sumatra.)

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## ORDER V. UNGULATA.

### Fam. 1. BOVIDÆ.

#### 1. BOS.

1. *Bos Taurus*, var. *Indicus*, *Linn.*; *Cantor, Mamm. Malay.* 65.

HAB. Domesticated, Malay peninsula; called *sapi*; the bull, *sapi jatan*; cow, *sapi betina*; *Cantor.*

#### 2. BIBOS.

1. *BIBOS Gaurus*, *Hodgson, Icon.* t. 137; *Gray, Cat. Hodgson Collection,* 24. *Bos Gaurus*, *H. Smith, Griffith, A. K.* x. 894. *Bos Gaur*, *Evans.* *Bos Gour*, *Trail, Edin. Phil. Journ.* 1824; *Cantor, Mamm. Malay.* 64. *Bisonius subhemachalensis*, *Hodgson, Icon.* *Bos Bubalus gauvera*, *Penn.* *Bibos cavifrons*, *Hodgson.* The Bison, *Lowe, Hist. Tenasserim.*

HAB. India, Malayan peninsula; called *sapi utan*. Tenasserim, Hindostan, Assam, and Nepal; *Cantor.* (Common.) B. M.

2. *BIBOS Sondaicus.* *Bos Sondaicus*, *Muller, Verh.* t. 35. *Bos Bantinger*, *Temm. Mus. Leyden.* *B. frontalis*, part, *Fischer, Syn.*

HAB. Java, Borneo; called *bantinger*. B. M.

This species is very distinct from *Bos frontalis* and *B. gaurus*.

Is the *Sapi utan* of Malacca this species, or *B. gaurus*?

#### 3. BUBALUS, *H. Smith.*

1. *BUBALUS Buffalus*, *Gray, List. Mamm. Brit. Mus.; Catal. Hodgson Coll.* 25. *Bos Indicus*, *Pliny.* *Bos Bubalus*, *Linn.* *Bos Buffalus*, *Brisson.* *Bos arnee*, *Shaw.* *Bubalus Arna*, *Hodgson.* *Bubalus ferus* *Indicus*, *Hodgson.* Wild Buffalo.

HAB. Malay peninsula. Domesticated, Penang, Singapore; called *karbau*; *Cantor.* Tenasserim, Nepal, Southern China.

## 4. ANOA.

1. ANOA *depressicornis*, H. Smith, *Griff. A. K.* Bos (Anoa) *depressicornis*, Gray, *Spic. Zool.* 12. t. 11. f. 2, 3. Antelope *platyceros*, Temm. *MSS. Mus. Leyd. (Skin.)* A. Celebica, Temm. *MSS. Mus. Leyd. (Skull.)*. A. *depressicornis*, H. Smith, *Griff. A. K.*; Muller, *Verh.*; *Ann. Sci. Nat.* xix. 100. t. 10. Anoa *compressicornis*, Leach. Anoa Loten's, MSS. see Pennant *Quad.* 6. Anmoa, Zimm. *Geog. Zool.* ii. 93; *Donnd. Zool. Beitr.* i. 703. ? Buffalo with small horns, Cuming, *Pro. Zool. Soc.*, 1839, 93.

HAB. Celebes (Philippines?). B. M.

## 5. NEMORRHEDUS.

1. NEMORRHEDUS *Sumatrensis*, Gray, *List. Mamm. Brit. Mus.* Antelope *Sumatrensis*, Pennant, *Shaw. Zool.* ii. 354; *Raffles.* A. *interscapularis*, Lichst. Kambing utan, Marsden, *Sumatra*, 93. Cambatan, F. Cuvier.

HAB. Sumatra, Malayan peninsula; called *kambing utan*. Tenasserim; Cantor. (Common.)

## 6. TRAGULUS.

1. TRAGULUS *Javanicus*, Pallas; Gray; Cantor, *Mamm. Malay*, 61. Moschus *Javanicus*, Gmelin; *Raffles*; Muller. M. *Indicus*, Gmelin. *Tragulus affinis*, Gray. M. *napu*, F. Cuvier? *Napu*, *Raffles*.

HAB. Java; Muller. Malayan peninsula; called *napu*; Cantor. B. M.

2. TRAGULUS *kanchil*, Gray, *List. Mamm. Brit. Mus.* 173; Cantor, *Mamm. Malay*, 60. Moschus *napu*, Muller. M. *kanchil*, *Raffles*; Gray, *Pro. Zool. Soc.*, 1836, 64. M. *Pelandoc*, Marsden; *Raffles*; H. Smith. M. *fulviventris*, Gray, *Pro. Zool. Soc.*, 1836, 65.

HAB. Sumatra, Borneo; Muller. Malayan peninsula; called *kanchil* or *pelandok*; Cantor. B. M.

We have received a variety of *Memina Indicus* (*Moschus Memina*) from Singapore, *M. Malaccensis*, List *Mamm. Brit. Mus.* 172, but Dr. Cantor does not mention it in his list of the Mammalia of the Malayan Peninsula, so that perhaps the animal had been imported there.

## 7. MUNTJACUS.

1. MUNTJACUS *vaginalis*, Gray, *List. Mamm. Brit. Mus.* 173. Cervus *muntjac*, Zimm.; Muller, *Verh.* C. *vaginalis*, Bodd. C. *subcornutus* and C. *moschatus*, Blainv. C. *moschus*, Desm. C. *aureus*, H. Smith. C. *Philippinus*, H. Smith. C. *Ratwa*, Hodgson. C. *albipes*, F. Cuv. *Stylocerus muntjac*, H. Smith; Cantor, *Mamm. Malay*, 61. Red-faced Deer, Marsden, *Sumatra*.

HAB. Java, Sumatra, Banka, Borneo; Muller. Malayan peninsula; called *kidang*; Cantor. Tenasserim, Nepal, Assam, Dukhun, Bengal, and Southern Mahratta; Cantor. B. M.

## 8. AXIS.

1. *AXIS maculatus*, H. Smith; *Cantor, Mamm. Malay*, 62. *Cervus axis*, *Erxleb.* *C. nudipalpebra*, *Ogilby, Pro. Zool. Soc.*, 1831, 136. *Axis major* and *A. minor*, *Hodgson*.

Var. *Cervus pseudaxis*, *Zool. Bonite*, 64.

HAB. Malayan peninsula, Penang; called *rusa bunga*; *Cantor*. Bengal, Assam, Nepal, Southern Mahratta. Ceylon and Sumatra (?); *Cantor*. Var. Philippine Islands.

Not mentioned by Muller as a Sumatran species.

## 9. RUSA.

1. *RUSA equina*, H. Smith; *Cantor, Mamm. Malay*, 63. *Cervus equinus*, *Cuvier, Os. Foss.* *Rusa etam* or *kumbang*; *Cervus rusa*, *Raffles.* *C. Malaccensis*, *F. Cuv. Mamm. Lith.*?

HAB. Sumatra, Borneo; *Muller*. Malayan peninsula; called *rusa* or *rusa etam*; *Cantor*.

2. *RUSA Peronii*? *Cervus rusa*, *Muller, Verh.* 56, not *Raffles.* *C. Peronii*, *Cuv. Os. Foss.* t. 5. f. 41? *C. axis*,  $\beta$ , *Gmelin*?

HAB. Java, Borneo.

3. *RUSA Molluccensis.* *Cervus Molluccensis*, *Muller, Verh.* *C. Timorensis*, *Geoff. and F. Cuvier, Mamm. Lithog.*?

HAB. Celebes? Boeroe, Amboina, Timor.

4. *RUSA Kublii*, *Muller, Verhand.* t. 44.

HAB. Island Baviaan; *Muller*.

5. *RUSA*? *Mariannus.* *Cervus Mariannus*, *Quoy and Gaim.*

HAB. Philippines, Marianna Island; *Quoy*.

N.B. See also *Tamaroo*, *Cuming, P. Z. S.*, 1840, 33, from Philippines; what is it?

## 10. PANOLIA.

1. *PANOLIA Eedii*, Gray; *Cat. Hodgson Coll.* 34. *Panolia acuticornis*, *Gray, List. Mamm. Brit. Mus.* *P. platyceros*, *Gray, List. Mamm. Brit. Mus.* *Cervus (Rusa) frontalis*, *M'Clelland.* *C. lyratus*, *Schinz.* *C. Eedii*, *M'Clelland, Calcutta Journ. N. H.* p. 415. t. 12.

HAB. Malayan Peninsula, *Cantor*. Munneepore. *Animal, Mus. Ind. Company.* *Horns*, B. M.

## Fam. 2. EQUIDÆ.

## 1. EQUUS.

*EQUUS Caballus*, Linn.; *Cantor, Mamm. Malay.* 59.

HAB. Domesticated, Malayan peninsula; called *kuda*; *Cantor*. Imported from Siam, Burma, or Sumatra.

## Fam. 3. ELEPHANTIDÆ.

## 1. ELEPHAS.

1. ELEPHAS *Indicus*, Linn.; *Muller, Verh.*; *Cantor, Mamm. Malay*, 52. E. maximus, Linn. E. Asiaticus, *Blumenb.*

HAB. Sumatra, Borneo; *Muller*. Malayan peninsula; called *gagak*; *Cantor*. India, Borneo, Siam, Ceylon; *Cantor*. B. M.

## 2. TAPIRUS.

1. TAPIRUS *Malayanus*, Raffles, *Horsf.*; *Cantor*, 58. T. *Indicus*, J. *Cuvier*; *Muller, Verh.* T. *Sumatranus*, *Gray*. T. *bicolor*, *Wagner*.

HAB. Sumatra, Borneo; *Muller*. Malayan peninsula; *Farquhar*; called *badak, kuda ayer*, or *fenna*; *Cantor*. B. M.

## 3. SUS.

1. SUS *scrofa*, var. *Sinensis*, Linn.; *Cantor, Mamm. Malay*, 54.

HAB. Domesticated, Malayan peninsula; called *babi*; *Cantor*.

2. SUS *Indicus*, *Gray, List. Mamm. Brit. Mus.* 185; *Cantor, Mamm. Malay.* 53; *Wagner*. S. *scrofa*, *Elliott*. S. *scropha*, *Hodgson*.

HAB. Malayan peninsula, Penang, Singapore, Lancavy Island; called *babi utan*; *Cantor*. Bengal, Nepal.

3. SUS *vittatus*, *Schlegel; Muller, Verh.* 173. t. 29-32. f. 56.

HAB. Java, Sumatra, Banka?

4. SUS *verrucosus*, *Muller, Verh.* 175. t. 28. t. 32. f. 1, 2, 3, 4.

HAB. Java. B. M.

5. SUS *Celebensis*, *Muller, Verh.* 177. t. 28 \* f. 1, 2, 3.

HAB. Celebes. B. M.

6. SUS *Timorensis*, *Muller, Verh.* 178. t. 31. f. 1, 2, 3.

HAB. Timor.

7. SUS *barbatus*, *Muller, Verh.* 179. t. 30. f. 1, 2. t. 31. f. 4, 5.

HAB. Borneo.

## 4. BABYRUSA.

1. BABYRUSA *Alfurus*, *Lesson, Mamm.* Sus *Babyrussa*, *Erxleb.* *Aper orientalis*, *Brisson*.

HAB. Celebes. Ternate. B. M.



## 5. RHINOCEROS.

1. RHINOCEROS *Unicornis*, Linn.; *Cantor, Mamm. Malay*, 54. R. *Indicus*, *Cuvier*. R. *Asiaticus*, *Blumenb.* R. *inermis*, *Lesson*.

HAB. Malayan peninsula: called *badak*; *Cantor*. Bengal, Assam, and Nepal.

2. RHINOCEROS *Sondaicus*, *Cuvier, Oss. Foss.* ii. 25, 33. iii. 384; *Muller, Verh.* 184. t. 33. f. 1, 2; *Horsf. Java*; *Cantor, Mamm. Malay*, 34. R. *Javanicus*, *F. Cuvier*. R. *Javensis*, *Schinz.*; *Bontius, Hist. Nat.* v. 50. 52; *P. Camper. Ouv.* i. 263.

HAB. Java. Called *Badac*, *Horsf.* Malayan peninsula; *Cantor*.

2. RHINOCEROS *Sumatrensis*, *Cuvier*. R. *Sumatranus*, *Raffles*; *Muller, Verh.* 190. t. 34. f. 1, 2. Sumatran Rhinoceros, *Bell*.

HAB. Sumatra.

3. RHINOCEROS ——— ?

HAB. Borneo; *Muller, Verh.*

## Fam. 4. DASYPIDÆ.

## 1. MANIS.

1. MANIS *Javanica*, *Desm.*; *Muller, Verh.*; *Cantor, Mamm. Malay*, 51. M. *pentadactyla*, *Raffles*, not *Linn.* M. *aspera*, *Sundeval*. Pangolin, *Buffon, H. N.* x. t. 34. t. 36. f. 1, 2, 3.

HAB. Java, Sumatra, Borneo. Malayan peninsula, Penang; called *pengoling*, or *tangiling*; *Cantor*. B.M.

From this list it appears that these islands have many animals in common with one another, and with the Malayan peninsula, which has several that are found in the interior of Continental India.

The following species, according to the present state of our knowledge, appear to be peculiar to the islands under which they are arranged, but they may hereafter be found to have a more extended distribution.

1. *Sumatra*.

*Simia Satyrus*, var. 1. *Hylobates syndaetylus*; *H. variegatus*. *Presbytes flavimanus*; *P. melalophus*. *Xantharpyia brevicaudatum*. *Megæra ecaudata*. *Vespertilio macrotis*; *V. brachypterus*. *Helietis orientalis*. *Rhinoceros Sumatrensis*. *Antelope Sumatrensis*.

2. *Java*.

*Hylobates leuciscus*. *Presbytes mitratus*; *P. pyrhus*; *P. maurus*. *Cynopterus melanocephalus*. *Rhinolophus* (?) *larvatus*; *R. insignis*; *R. pusillus*. *Petalia Javanica*. *Vespertilio Harpyia*; *V. Horsfieldii*; *V. imbricatus*; *V. Hasseltii*; *V. adversus*; *V. circumdatus*. *Embalonoura monticola*. *Seiuopterus sagitta*; *S. genibarbis*; *Sciurus hypoleucos*. *Pithechir melanurus*. *Sus verrucosus*.

3. *Amboina.*

Pteropus chrysoproctus. Rhinolophus tricuspidatus; R. Euryotis. Phalangista chrysorrhos.

4. *Timor.*

Pteropus Macklotii. Rhinolophus diadema. Sorex tenuis. Felis megalotis. Sus Timorensis.

5. *Celebes.*

Pteropus Alecto. Phalangista ursina. Sus —? Anoa depressicornis.

6. *Bavian.*

Cervus Kuhlii.

7. *Boeton.*

Sus —?

8. *Ternate.*

Pteropus personatus.

9. *Borneo.*

Simia Satyrus, var. 2. Vespertilio macellus. Dendrogale murina. Ptilocerus Lowii. Sciurus Ehippium; S. Rafflesia, var. Borneensis. Rhinoceros ———? Sus barbatus.

10. *Philippines.*

Galeopithecus Philippinensis. Pteropus keraudrenius. Rhinolophus griseus. Vespertilio tristis; V. Eschscholtzii; V. macrotarsus; V. pellucidus; V. Meyeni; V. rufopictus. Taphozous Philippinensis. Phlæomys Cumingii. Sciurus Philippinensis. *An unknown Ruminant*: Tamaroo.

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 II. *NEW GUINEA.*

The Mammalia hitherto recorded as found in New Guinea are of quite a distinct character from those inhabiting the other Malay Islands, they all (except a pig) belong to the *Marsupialia*, and of the divisions of them which have their head quarters in Australia, the species, though they belong to the same genera or groups, are all distinct from those from any part of Australia which has been yet explored; except *Petaurus Sciurus* (Muller

Verh.). I have not seen the New Guinea specimens of the species which Dr. S. Muller has so named, so that I am not able to determine which of the three Australian species, which have been confounded under this name, it is most allied to, but most probably, from its geographical position, it is the *Petaurus ariel* (*Belideus ariel* of Gould, Ann. and Mag. Nat. Hist. 1842, 404) found at Port Essington, if it is not distinct from it.

One species of *Cuscus* (*C. maculata*) is common to New Guinea and Amboina, the latter country appearing to be the home or centre of the genus *Cuscus*, three out of the known species being natives of that island, the fourth being confined to Celebes.

#### 1. PETAURUS.

1. PETAURUS *sciurus*, Muller, *Verhand.* (*Desm.*?). ? *Belideus ariel*, *Gould*.  
HAB. New Guinea; *Muller*. (Port Essington, *Gould*.)

#### 2. CUSCUS.

1. CUSCUS *maculata*, Lesson, *Zool. Coq.* *Phalangusta maculata*, *Temm. Monog.*  
HAB. New Guinea and Amboina. B. M.

#### 3. DENDROLAGUS.

1. DENDROLAGUS *ursinus*, S. Muller, *Verh.* 131. 141. t. 19. 22. 23. *Hypsiprymnus ursinus*, *Temm. Faun. Japon.* 6.

HAB. New Guinea. B. M.

2. DENDROLAGUS *inustus*, S. Muller, *Verh.* 131. 143. t. 20, 22, 23.

HAB. New Guinea.

#### 4. DORECOPSIS.

1. DORECOPSIS *Asiaticus*. *Didelphis Asiaticus*, *Pallas, N. A. Petrop.* 1777, 228. t. 9. *D. Brunii*, *Gmelin.* *Halmaturus Brunii*, *Illiger.* *Hypsiprymnus Brunii*, *Muller, Verh.* *Filander* or *Kengoeroe*, *Bruyn. Reizen.* 374. t. 213. 1714. *Dorecopsis Brunii*, *Muller, Verh.* 131. t. 21, 22, 23.

HAB. New Guinea; Island of Aroe.

#### 5. PERAMELES.

1. PERAMELES *Dorcyanus*, Quoy and Gaim. *Voy. Astrol.* t. 16. f. 1, 5. *Kalubu*, *Lesson, Voy. Coq.*

HAB. New Guinea.

#### 6. PHASCOGALE.

1. PHASCOGALE *melas*, *Sehinz.* *Phaseogalea melas*, *Muller* (tab. *Verh.* 149. t. 25).

HAB. New Guinea.

## 7. HALICORE.

1. HALICORE *australis*, Owen, in *Jukes' Voyage of Fly*, ii. 323. f. 1, 3, 5. 1847.

HAB. Timor Straits.

## 8. SUS.

1. SUS *Papuensis*, Lesson, *Voy. Coq. Muller, Verh.*

HAB. New Guinea; called *bene*.

## III. JAPAN.

Except the few species of Mammalia of these islands which were procured by Mr. Reeve at Canton, we are almost entirely indebted to the Dutch naturalists. For the knowledge of the Mammalia of this very interesting country, MM. Temminck and Schlegel have published from the materials collected by them, a specific work on the Mammalia, Birds, and Fish of Japan.

## Fam. 1. SIMIADÆ.

## 1. MACACUS.

1. MACACUS *maurus*, F. Cuvier. M. *arctoides*, *J. Geoff. Mag. Zool.* Simia Cuvieri, *Fischer.* Papio *melanotis*, *Ogilby.*

HAB. Japan? Cochin China?

2. MACACUS *speciosus*, F. Cuvier. Inuus *speciosus*, *Temm. Faun. Japon.* t. 1, 2. Inuus *fuscatus*, *Mus. Leyden.*

HAB. Japan. B. M.

## Fam. 2. VESPERTILIONIDÆ.

## 1. RHINOLOPHUS.

1. RHINOLOPHUS *Nipon*, *Temm. Monog.* ii. 50; *Faun. Japon.* 14. t. 3. f. 1, 2.

HAB. Japan. B. M.

2. RHINOLOPHUS *cornutus*, *Temm. Monog.* ii. 57; *Faun. Japon.* 14. t. 3. f. 3, 4.

HAB. Japan.

## 2. VESPERTILIO.

1. VESPERTILIO *molossus*, *Temm. Monog.* ii. 270; *Faun. Japon.* 15. t. 3. f. 5.

HAB. Japan; called *aka komuli*.



2. VESPERTILIO *abramus*, Temm. *Monog.* ii. 232. t. 58. f. 1, 2; *Faun. Japon.* 17.  
HAB. Japan; called *abamusi*.
3. VESPERTILIO *akakomuli*, Temm. *Monog.* ii. 223. t. 57. f. 8, 9; *Faun. Japon.* 17.  
HAB. Japan; called *komuli* or *akakomuli*. B. M.
4. VESPERTILIO *macrodactylus*, Temm. *Monog.* ii. 231. t. 58. f. 3, 4, 5; *Faun. Japon.* 17.  
HAB. Japan; called *komoli*.

## 3. NOCTULINIA.

1. NOCTULINIA (*attivolans?*). *Vespertilio noctula*, Temm. *Faun. Japon.* 15.  
HAB. Japan. Europe.

## 4. TRILATITUS.

1. TRILATITUS *Blepotis*. *Vespertilio Blepotis*, *Faun. Japon.* 16.  
HAB. Japan and Timor, Java. B. M.

## 5. PTEROPUS.

1. PTEROPUS *dasymallus*, Temm. *Monog.* i. t. 40; *Faun. Japon.* 12. *P. rubicollis*, *Siebold, Spicel. Faun. Japon.*  
HAB. Japan.
2. PTEROPUS *pselaphon*, Lay, *Zool. Journ.* iv. 457; *Temm. Monog.* ii. t. 37. *P. ursinus*, *Kittlis*.  
HAB. Japan, Island Bonin. B. M.

## Fam. 3. FELIDÆ.

## 1. CANIS.

1. CANIS *familiaris*, *Fauna Japon.* 37. t. 1.  
Var. 1. *Kari inu*, or *No inu*, *Fauna Japon.* t. 10. f. 1, 2.  
Var. 2. *Bawa inu*, or *kui ina*, t. 10. f. 4-6.  
Var. 3. *Tsin*. Introduced from China.
2. CANIS ———? *C. oakame*, *Fauna Japon.* 38.  
HAB. Japan (Mountains).
3. CANIS *hodophylax*, Temm.; *Faun. Japon.* 40. *C. hippophylax*, *Temm. Mus.* *C. hodophilax*, *Fauna Japon.* t. 9.  
HAB. Japan; called *Jama'nu*.

## 2. VULPES.

1. CANIS *Vulpes*, Temm. *Faun. Japon.* 39; not Linn.?

HAB. Japan; called *kiene*.

## 3. NYCTIREUTES.

1. NYCTIREUTES *Procyonoides*, Gray. *Canis procyonoides*, Gray, *Illust. Ind. Zool.* *Nyctireutes viverrinus*, and *N. procyonoides*, Temm., *Faun. Japon.* t. 40. t. 8.

HAB. Japan; called *Habsimon si*, *mami tanuki*, and *tanuti*, and *musina tanute*. B. M.

## 4. MARTES.

1. MARTES (*Mustela*) *melampus*, Temm. *Faun. Japon.* 31. t. 7. f. 3, 4. *M. melanopus*, Gray, *List. Mamm. Brit. Mus.* 63.

HAB. Japan; called *ten*, or *aka ten*. B. M.

## 5. MUSTELA.

1. MUSTELA *brachyura*, Temm.? *Japan*, 33.

HAB. Japan; called *iezoten*.

2. MUSTELA ———? *Faun. Japon.* 35.

HAB. Japan; called *tomatsu*; Siebold.

## 6. VISON.

1. VISON *Itatsi*, *Mustela* (*Putorius*) *Itatsi*, Temm.; *Faun. Japon.* 33. *M. Natsi*, Temm. *Fauna Japon.* t. 7 (misprint.)

HAB. Japan; called *Itatsi*. B. M.

## 7. MELES.

1. MELES *akakuma*, Temm. *Faun. Japon.* 30. t. 6. *M. Taxus*, var. Temm.

HAB. Japan; called *anakuma*. B. M.

## 8. LUTRA.

1. LUTRA (*Chinensis*, Gray?) *vulgaris*, Temm. *Faun. Japon.* 33.

HAB. Japan; called *kawa-uso*.

## 9. ENHYDRA.

1. ENHYDRA *Lutris*, Gray. *Enhydris marina*, Temm. *Faun. Japon.* 38. *Lutra marina*, Steller. *Mustela Lutris*, Linn.

HAB. Japan. California. B. M.

## Fam. 4. URSIDÆ.

## 1. DANIS.

1. DANIS *ferox*. ? *Ursus ferox*, *Temm. Faun. Japon.* 29; *Lewis and Clark?* *U. cinereus* and *U. griseus*, *Desm.* *U. horribilis*, *Ord.*

HAB. Japan; called *ohokuma* and *akakuma*. And N. America?

## 2. HELARCTOS.

1. HELARCTOS *Tibetanus*, Gray, *List Brit. Mus.* 73. *Ursus Thibetanus*, *F. Cuvier*; *Temm. Faun. Japon.* 29. *U. ferox*, *Robinson, Assam*, 69.

HAB. Japan; called *kuma*. India. China. B. M.

## 3. THALARCTOS.

1. THALARCTOS *maritimus*. *Ursus maritimus*, *Temm. F. Japon.* 30; *Linn.* *U. marinus*, *Pallas.* *U. polaris*, *Shaw.*

HAB. Japan. Polar Seas.

## Fam. 5. TALPIDÆ.

## 1. TALPA.

1. TALPA *Wogura*, *Temm.*, *Faun. Japon.* 19. t. 4. f. 2-5. *T. moogura*, *Temm. Icon.* t. 4. f. 1-5. (misprint).

HAB. Japan. B. M.

## 2. UROTRICHUS.

1. UROTRICHUS *talpoides*, *Temm.*, *Faun. Japon.* 30. 64. f. 6, 11. *U. Japonicus*, *Mus. Leyden.*

HAB. Japan; called *Himusi*, *Doinezume*, or *Jama-ugura*. B. M.

## 3. CROSSOPUS.

1. CROSSOPUS *platycephalus*. *Sorex platycephalus*, *Temm. Faun. Japon.* 23. t. 5. *Chrosopus platycephalus*, *Temm. l. c.*

HAB. Japan.

## 4. SOREX.

1. SOREX *Indicus*, *Temm.*, *Faun. Japon.* 25. t. 5.

HAB. Japan; *Temm.*

2. SOREX *Dsinezumi*, *Temm.*, *F. Japon.* 26. t. 5, 6. *S. kinezumi*, *Temm. Faun.* t. 5. f. 2, and *S. kinezumi*, f. 3. (misprints).

HAB. Japan.

3. *SOREX umbrinus*, Temm. *F. Japon.* 27.

HAB. Japan.

#### 5. ERINACEUS.

1. ERINACEUS ———? *Temm. Faun. Japon.* 19.

HAB. Japan.

### Fam. 6. PHOCIDÆ

#### 1. PHOCA.

1. *PHOCA barbata*, Muller? *Temm. Faun. Japon.* 2. *P. maxima*, *Steller.* *P. leporina*, *Lepechen.* *P. nautica*, and *P. albigena*, *Pallas.*

HAB. Japan; *Siebold.*

2. *PHOCA nummularis*, *Pallas, Z. Ross.* 117; *Temm. Fauna Japon.* 3. *P. n. 2.* *Steller, Camtsch.* 107. *P. vulgaris*, var., *Pallas.* *P. Largha*, *Pallas.*

HAB. Japan.

#### 2. ARCTOCEPHALUS.

1. *ARCTOCEPHALUS lobatus*, *Gray.* *Otaria Stelleri*, *Temm. Faun. Japon.* t. 21, 22. *O. cinerea*, *Mus. Leyden.* *Ph. australis*, *Quoy and Gaim.*

HAB. Japan. B. M.

### Fam. 7. BALÆNIDÆ.

#### 1. BALÆNA.

1. *BALÆNA Japonica*, *Gray, Zool. Ereb. and Terror*, 15. *B. Antarctica*, *Temm. Faun. Japon.* 18. t. 29, not *Gray.* *Balænoptera Antarctica*, *Temm. Faun. Japon.* 21. t. 28 (misprint).

HAB. Japan.

#### 2. BALÆNOPTERA.

1. *BALÆNOPTERA Iwasi*, *Gray, Zool. Ereb. and Terror*, 20. *B. arctica*, *Temm. Faun. Japon.* 26.

HAB. Japan.

#### 3. MEGAPTERON.

1. *MEGAPTERON Antarctica*, *Gray, Zool. Ereb. and Terror*, 17. *Balænoptera Antarctica*, *Temm. Faun. Japon.* t. 30. *Rorqual noueux*, *Voy. Pol. Sud.* t. 24.

HAB. Japan.

### Fam. 8. CATODONTIDÆ.

#### 1. CATODON.

1. *CATODON macrocephalus* (?) *Physeter* ———? *Temm. Faun. Japon.* 26.

HAB. Japan.



## Fam. 9. DELPHINIDÆ.

## 1. DELPHINUS.

1. DELPHINUS *longirostris*, Gray, *Spic. Zool.*; *Zool. Ereb. and Terror*, 42. Cuvier; *Temm. Faun. Japon.* t. 24. D. Capensis, Gray, *Spic. Zool.*, not Cuvier, nor Rapp.

HAB. Japan. Cape of Good Hope, Malabar, Ceylon. B. M.

## 2. GLOBIOCEPHALUS.

1. GLOBIOCEPHALUS *Sieboldii*, Gray, *Zool. Ereb. and Terror*, 32. Delphinus globiceps, *Temm. Faun. Japon.* 17. t. 27.

HAB. Japan; called *golo*.

## 3. GRAMPUS.

1. GRAMPUS *Sakamata*, Gray, *Zool. Ereb. and Terror*, 31. Delphinus orca, *Temm. Faun. Japon.* 25.

HAB. Japan; called *sakamata*; *Kuzira*.

## 4. NEOMERIS.

1. NEOMERIS *Phocænoides*, Gray, *Zool. Ereb. and Terror*, 30. Delphinus Phocænoides, Cuvier. D. melas, *Temm. Faun. Japon.* 14. t. 25, 26. Delphinapterus melas, *Temm. F. Japon.* 7.

HAB. Japan, Cape of Good Hope, Malabar.

## Fam. 10. MURIDÆ.

## 1. MUS.

1. MUS *argenteus*, Temm., *Faun. Japon.* t. 13.

HAB. Japan.

2. MUS *Molossinus*, Temm., *Faun. Japon.* t. 13.

HAB. Japan.

3. MUS *Negumi*, Temm., *Faun. Japon.* t. 13.

HAB. Japan.

4. MUS *speciosus*, Temm., *Faun. Japon.* t. 16.

HAB. Japan. B. M.

## Fam. 11. LEPORIDÆ.

## 1. LEPUS.

1. LEPUS *brachyurus*, Temm. *Faun. Japon.* t. 11.

HAB. Japan. B. M.

## Fam. 12. JERBOIDÆ.

## 1. SCIURUS.

1. SCIURUS *Lis*, Temm. *Faun. Japon.* t. 12. S. vulgaris, var. *Temm.*  
HAB. Japan.

## 2. PTEROMYS.

1. PTEROMYS *leucogenys*, Temm. *Faun. Japon.* t. 13.  
HAB. Japan. B. M.

## 4. SCIUROPTERUS.

1. SCIUROPTERUS *momoga*. Pteromys momoga, *Temm. Faun. Japon.* t. 14.  
HAB. Japan. B. M.

## 5. MYOXUS.

1. MYOXUS *elegans*, Temm. *Faun. Japon.* t. 14.  
HAB. Japan.

## Fam. 13. BOVIDÆ.

## 1. NEMORRHEDUS.

1. NEMORRHEDUS *crispus*. Antelope crista, *Temm. Faun. Japon.* t. 18, 19.  
HAB. Japan. Mus. Leyden.

## 2. RUSA.

1. RUSA *Sika*. Cervus Sika, *Temm. Faun. Japon.* t. 17.  
HAB. Japan.

## Fam. 14. ELEPHANTIDÆ.

## 1. SUS.

1. SUS *leucomystax*, Temm. *Fauna Japon.* t. 20.  
HAB. Japan.
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## IV. CHINA,

We are chiefly indebted to Mr. Reeves and his son, Mr. John Russell Reeves, for the knowledge of the animals of Canton and its neighbourhood, and this is almost the only part of China from whence Mammalia have been sent to England.

It must be observed that Japanese species are often to be procured at Canton, and that some of them have been mistaken for inhabitants of China.

## Fam. 1. VESPERTILIONIDÆ.

## 1. VESPERTILIO.

1. VESPERTILIO *irretitus*, Wieg. *Arch.* 1843, ii.

HAB. Island of Chusan.

## Fam. 2. FELIDÆ.

## 1. LEOPARDUS.

1. LEOPARDUS *Chinensis*, Gray, *List Mamm. Brit. Mus.* 43. *Felis Chinensis*, Gray, *Mag. Nat. Hist.* 1837.

HAB. China; *J. Reeves.* B. M.

2. LEOPARDUS *Reevesii*, Gray, *List Mamm. Brit. Mus.* 41.

HAB. China; *J. Reeves.* B. M.

## 2. NYCTEREUTES.

1. NYCTEREUTES *Procyonoides*, Gray. *Canis Procyonoides*, Gray, *Illust. Ind. Zool.* N. *viverrinus*, *Temm. Fauna Japon.*

HAB. China; *J. Reeves.* Japan. B. M.

## 3. VIVERRA.

1. VIVERRA *Zibetha*, Linn.; Gray. *V. undulata*, Gray.

HAB. China; *J. Reeves, Esq.* B. M.

2. VIVERRA *pallida*, Gray, *Pro. Zool. Soc.*

HAB. China. Mus. Zool. Soc.

## 4. PAGUMA.

1. PAGUMA *larvata*, Gray, *Pro. Zool. Soc.*, 1831, 95. *Gulo larvatus*, *Temm. Mus. Leyden*; *H. Smith, Griffith, A. K.* ii. 281. *Viverra larvata*, Gray, *Spic. Zool.* 9. 1830. *Paradoxurus larvatus*, Gray, *Pro. Zool. Soc.* 1832, 67; *Illust. Ind. Zool.*

HAB. China; *J. Reeves.* B. M.

## 5. HELICTIS.

HELICTIS *moschata*, Gray, *Pro. Zool. Soc.*, 1831, 94. *Melogale personata*, *J. Geoff.*?

HAB. China, Canton; *J. Reeves*. B. M.

## 6. LUTRA.

1. LUTRA *Chinensis*, Gray.

HAB. China; *J. Reeves*. B. M.

## Fam. 3. TALPIDÆ.

## 1. SOREX.

1. SOREX *murinus*, Linn.

HAB. China; *J. Reeves*. B. M.

## Fam. 4. JERBOIDÆ.

## 1. SCIURUS.

1. SCIURUS *insignis*, F. Cuvier.

HAB. China; *J. Reeves*. B. M.

2. SCIURUS *castaneo-ventris*, Gray, *List Mamm. Brit. Mus.* 143.

HAB. China; *J. Reeves*. B. M.

3. SCIURUS *Chinensis*, Gray, *List Mamm. Brit. Mus.* 144.

HAB. China; *J. Reeves*. B. M.

## Fam. 5. ASPALACIDÆ.

## 1. RHIZOMYS.

1. RHIZOMYS *Sinensis*, Gray, *Pro. Zool. Soc.*, 1831, 95; *Illust. Ind. Zool.* ii. t. R. *Chinensis*.

HAB. China, Canton; *J. Reeves*.

## Fam. 6. BOVIDÆ.

## 1. MUNTJACUS.

1. MUNTJACUS *Reevesii*. *Cervus Reevesii*, *Ogilby*, *Pro. Zool. Soc.*, 1838, 105.

HAB. China; *J. Reeves*; *Gardens Zool. Soc.*



## Fam. 7. DASYPIDÆ.

## 1. MANIS.

1. MANIS *Dalmani*, Sundeval, *K. V. Acad. Hand.*, 1842, 256.

HAB. China; *Dalmann*.

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 PLATE VII.

*GALIDICTIS vittata*, Gray, *Pro. Zool. Soc. Lond.*, p. 22. (1848).

HAB. Madagascar.

Grey, black and white grizzled; back and sides with eight nearly equal parallel, narrow, black-brown streaks; chin and beneath pale brown; hind-feet and outer sides of fore-legs reddish brown. Tail subcylindrical, bushy, black and grey grizzled, white towards the ends; hairs elongate, brownish white, with two (rarely three) broad black rings.

Length of body and head (when stuffed), 14 inches; tail, 12 inches.

The skull, which shows that the animal was not quite full grown, agrees in all the particulars with that figured by M. J. Geoffroy, in Guerin's *Mag. Zool.* t. 19, but is about one-fourth smaller in all its parts, and it has one more very small roundish false grinder on each side in front of the other (between it and the canines) in the upper jaw, which is not noticed in M. Geoffroy's figure and description, and which probably falls out when the animal arrives at adult age.

Dr. T. R. H. Thomson, Surgeon, R.N., who had one of these animals for six months on board ship, says it was procured at Tulyah Bay, Madagascar. It was at first extremely timid, but soon became tame and acquainted with the different parts of the vessel, and very partial to those who bestowed any attentions on it. It was remarkably agile, keeping its long bushy tail somewhat erect in running about, and uttering a sort of chirp not unlike a rat. Its chief food was uncooked meat, but it preferred raw eggs above all other articles when they could be procured. Its method of breaking them was not a little amusing; on receiving one it would roll it towards a projecting timber or gun-slide; then lying down on its side, the little creature would grasp the egg with all its feet and throw it by a sudden jerk, repeating the attempt until the contents were obtained. Turtles' eggs, being so soft and rich, were always eagerly sought by it. It was very irascible while feeding, and would attack those who interfered with it at such a time, although at others it delighted in being fondled, and would play like a kitten with those it knew. The habits of this interesting animal were not nocturnal. It died from convulsions, under which it had suffered for five weeks.

Its mode of breaking the egg is somewhat different from that of *Herpestes fasciatus*, which Dr. Thomson had also under observation for some time. This latter, after getting the egg close to a projecting object, seizes it with the two anterior feet, and then jerks it through between the hinder legs, which are raised somewhat to let the egg pass.

Geoffroy St. Hilaire, in the manuscript catalogue of the Mammalia in the Paris collections, notices a specimen from Madagascar which had been collected by M. Sonnerat, which he described in the following manner, under the name of *Mustela striata*:—"Supra saturatè fusca; striis quinque longitudinalibus angustis parallelis albis; gastræo pallidè canescente, caudâ basi fuscâ, reliquâ albâ; statura Mustelæ vulgaris."—Fischer, Syn. 224. M. Cuvier, in the 'Règne Animal' (ed. 2de, 144) described the same specimen under the name of "La Belette rayée de Madagascar, *Putorius striatus*, Cuvier, de la taille de la belette d'Europe, d'un brun roussâtre avec cinq lignes longitudinales blanchâtres; le dessous et presque toute la queue blanchâtre." M. Isidore Geoffroy St. Hilaire, in the notes to a paper on some Madagascar animals in M. Guerin's *Magasin de Zoologie* for 1839, p. 32, informs us that the specimen above described then existed in the collection, and that he had convinced himself that it was a young specimen of an animal rather more than two feet long, which had been sent to the Museum in 1834 by M. Goudot, under the name of *Vonsire blanc*, and called *Vonsira foutehe* by the Madecasses; and he gives a description and figures of the animal and its skull, t. 18, 19, forming for it a genus which he names *Galidictis*.

A few months ago the Museum purchased of Mr. Tucker of the Quadrant an animal from Madagascar, which is evidently nearly allied to the *Galidictis striata*, but differs from it in some particulars, which induce me to regard it as a second species of that genus. I may remark that it agrees with all the characters assigned to that genus by M. Isidore Geoffroy, except that the soles of the hind feet are more naked than he described those of his genus *Galidia* to be, though he observes that *Galidictis* has the feet "presque entièrement semblable" to that genus; for the naked part is nearly as broad as the foot, almost to the top of the heel. The chief difference between the Museum specimen and that described and figured by the two Geoffroys and Cuvier is in the colour of the tail, and I might think this depended on age, if the elder Geoffroy and Cuvier did not describe the young animal as being of the size of a weasel, and the younger Geoffroy the adult as having the same peculiarity, viz., a white tail; while our specimen has the tail of the same colour as the back, and even more distinctly variegated with black and white. The stripes are narrower, rather differently placed, and more equal in width than in the description and figure above quoted, and they do not extend so far up the neck towards the head.

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REEVE, BENHAM, AND REEVE,  
PRINTERS AND PUBLISHERS OF SCIENTIFIC WORKS,  
KING WILLIAM STREET, STRAND.

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*erectata.*



OURANG OUTAN or PONGO.

*Simia satyrus.*







PROBOSCIS MONKEY.

*Nasalis larvatus.*













HERPESTES BRACHYURUS.





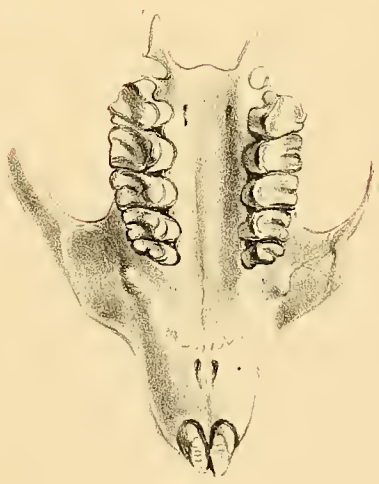
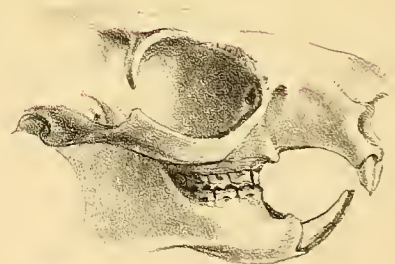


PTILOCERCUS LOWII Gray.





3 nat. size



PTEROMYS ELEGANS.







*GALIDICTIS VITTATA.*







PELAMIS MACULATA



# F I S H E S ;

BY

SIR JOHN RICHARDSON, M.D., F.R.S.

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## APISTES TRACHINOIDES, *Cuv.*

APISTES *trachinoides*, Cuv. et Val. Hist. des Poiss. vol. iv. p. 401. pl. 92. f. 1.

Radii.—B. 6; D.  $15\frac{1}{4}$ ; A.  $3\frac{1}{4}$ ; C.  $9\frac{3}{8}$ ; P. 13; V.  $1\frac{1}{4}$ .

### PLATE III. Fig. 3-5.

Our specimens agree exactly with the description and plate above quoted, except that there are only four soft rays in the ventrals, instead of five as quoted in the *Histoire des Poissons*. The small scales are very deeply imbedded in the skin, and are ranged on the sides in vertical lines not tiled. I have not been able to detect them in the space between the lateral line and fore part of the dorsal, but the whole of the shoulder for some distance below the lateral line is rough with prominent pores, as are also the sides of the head. On the limbs of the lower jaw, and the membrane connecting them, these pores render the surface villous.

The jaws, chevron of the vomer, and a narrow plate on the palatine bones are armed with fine short villiform teeth. Length,  $2\frac{3}{4}$  inches.

HAB. Sea of China.

## APISTES DEPRESSIFRONS, *Richardson.*

Radii.—B. 5; D  $13\frac{1}{7}$ ; A.  $3\frac{1}{5}$ ; C.  $10\frac{3}{8}$ ; P. 10; V.  $1\frac{1}{5}$ .

### PLATE III. Fig. 1-2.

This *Apistes* agrees with *trachinoides* and *dracæna* in the three anterior dorsal rays being stouter, approximated to one another and somewhat remote from the following ones.

B

20



Indeed it possesses so many of the characters ascribed to *dracæna* in the *Histoire des Poissons*, that we should have referred it to that species were it not that the preorbital and preopercular spines of the latter are said to be very large, while in our fish they are rather shorter than is usual in the genus. The anterior spinule of the preorbital is, however, larger than common, being half as long as the chief spine and, like it, slightly curved and directed backwards. The species differs from *A. belengeri* in the more posterior origin of the dorsal, and in having only two bony points or ridges on the operculum. *A. rubripinnis* of the *Fauna Japonica* has no scales above the lateral line.

The body is highest about the fifth and sixth dorsal spines, the height there being equal to one fourth of the total length, and the thickness to about half the height. The head is considerably depressed, the profile rising at an angle of only twenty-five degrees to the beginning of the dorsal. When the mouth is closed the under jaw forms the extremity of the head, and the cleft of the mouth descends almost vertically. There is a small knob beneath the symphysis of the mandible. The mandible can be depressed to the horizontal line, the upper jaw remaining nearly vertical. The length of the head is contained three and one third in the total length. When viewed in front, the interorbital space is seen to be traversed by two smooth ridges which are approximated to the mesial line; the edges of the orbits themselves are also prominent. The breadth of this space is less than the diameter of the orbit. The principal preorbital spine reaches to the anterior third of the orbit. The preopercular spine, which is of the same size, is straight, and there are three obtuse corners beneath it. The two opercular ridges are visible, but their points are scarcely pungent. The supra-scapular, however, has an acute point at the upper corner of the gill opening. The scales of the body are very small and remote from each other, are much sunk in the skin, and, being dark, look like little pits rather than scales on a cursory view.

The dorsal commences over the upper limb of the preoperculum. Its first three spines are a little stouter than the rest, are approximated to each other at the base and a little removed from the following one, to which the third one is connected by membrane. The second spine is a little taller than the first or third; the following ones are somewhat shorter and nearly all of one height, except the last, which, though more slender than the second one, is even taller. The anterior soft rays rather overtop the tallest of the spines: the last one is short and is bound to the back its whole length by membrane, which does not reach to the base of the caudal. The anal rays are fully taller than the soft dorsal ones; its spines, which are graduated, are shorter.

The teeth are in close-shaven, villiform bands on the jaws, prominent chevron of the vomer, and palatine bones. On the latter they form an elliptical patch.

The general colour of the specimen, which has been long in spirits, is brownish grey, the fins seem darker, and there are many obscure freeklings on the dorsal fin and back. Length,  $2\frac{3}{4}$  inches. This specimen had a surmullet in his œsophagus.

HAB. Sea of Japan.

APISTES MULTICOLOR, *Richardson*.

Radii.—B. 6; D. 15|6; A. 3|4; C.  $10\frac{2}{3}$ ; P. 11; V. 1|4.

## PLATE IV. Fig. 3-4.

In this *Apistes* the profile of the face is steep with an abrupt curve over the eye to join the dorsal line, which descends gradually from its summit at the temple to the tail. The height of the body is equal to one quarter of the total length of the fish, and its thickness is equal to the sixth of the same length. The head forms a third of the whole length, the mouth is at its extremity, the jaws being equal, and the gape, which is small, is nearly horizontal. The ventral line is more horizontal than the dorsal one, being even with the lower jaw as far as the anus, from whence it ascends to the base of the caudal, whose height is about one third of the height of the head. The edges of the orbits and two smooth ridges between them are equally prominent and equidistant. The interorbital space is one third narrower than the diameter of the eye. The jaws, prominent chevron of the vomer and palatine bones are set with close-shaven, villiform teeth.

The slender, acute preorbital spine reaches back to the posterior part of the eye, and there is a spinule at its base in front standing forwards and outwards. The axilla of the spine is filled by a small slip of membrane. The opercular spine, though conspicuous, is not so long as the preorbital one. There are four obtuse points beneath it. The operculum has two bony ridges whose points do not penetrate the skin. The scales of the body are small and the lateral line is formed of oblique tubes whose points are elevated. The last three dorsal spines are grooved at their tips so as to appear forked, and the same is the case with the anal spines. The spines are tipped by short skinny filaments, and the membrane is deeply notched between them. The last soft ray of the dorsal is attached to the back by membrane for nearly its whole length, and is divided to the base. The lowest ray of the pectoral is unbranched, the rest are forked. The ventral contains only four slender soft rays, the last of which is bound to the belly by a rather wide membrane.

The two specimens in the collection retain several lively colours, chiefly different shades of brown, red, and white; but there is considerable difference in the mode in which these tints are combined in the two individuals. Each of them has three conspicuous, lateral, white marks; viz., one on the fore part of the dorsal near its base, which descends from the third spine to the shoulder, another on the back under the last spine, and the third forming a bar which extends from the soft dorsal to the anal. The head is marbled like the back. The dorsal and anal are edged with aurora-red, and are dotted posteriorly with oblique rows of small white specks having broken black borders. On the fore part of the spinous dorsal the black, separating from the white centres, forms short oblique lines. Specks of the same kind are ranged in transverse lines on the caudal and pectorals. The ventrals are minutely freckled with brown and black, and are marked also by two or three white spots. Length, three or four inches.

HAB. Sea of China.



APISTES COTTOIDES, *Linn. (Perca.)*

*PERCA cottoides*, Lin. Mus. Ad. Fr. vol. xi. p. 84.

*APISTES cottoides*, Cuv. et Val. Hist. des Poiss. vol. iv. p. 413.

Radii.—B. 6; D. 14½; A. 3½; C. 11½; P. 6 et viii.; V. 1½.

## PLATE III. Fig. 6-7.

Our specimens agree with the Linnæan account of *Perca cottoides* in all respects, except that they have only six gill rays instead of eight, which latter number I consider to be a mistake; and in the rows of spots on the fins being more numerous than two. This also may be accounted for by a partial effacement of the markings, and I have therefore considered the specimens as examples of the species described by Linnæus.

The head is thick and large, with a considerably arched profile. It forms more than one third of the total length, while the height of the body scarcely exceeds the fourth. The thickness is a little more than half the height. The diameter of the eye is equal to one quarter of the length of the head. The principal preorbital spine reaches to beneath its centre, and is thrice as long as the smaller spine, which lies parallel to it, and is quite straight. The second-suborbital ridge is visible only when the integuments are suffered to dry. It is flat, quite unarmed, and runs close to the orbit. The preoperculum is armed by four small spines, the upper one being the largest but not equalling the preorbital spine; there is also an obtuse corner under the lowest spine. This bone is better described by the passage "*opercula branchiarum spinoso-serrata*" in this species than in any other *Apistes* that we have seen. The two ribs of the bony operculum can scarcely be detected, and present no pungent points. Neither are there any acute points on the suprascapular. The jaws and the acute prominent chevron of the vomer are armed by villiform teeth, rather coarser than in the other *Apistes* we have figured, and this species differs from them in the palatine bones being entirely toothless. The scales of the body, though small, are visible to the naked eye, and are more crowded or tiled than in some others of the genus. They are wanting above the lateral line as far back as the fifth or sixth dorsal spine, and a narrower smooth space extends along the base of the dorsal its whole length. The head is also quite destitute of scales. The lateral line, formed of a series of short tubes, is straight, and about one third of the height distant from the summit of the back.

The first dorsal spine stands between the anterior corners of the orbit. The third is the tallest, being equal to four fifths of the height of the body, and is almost twice as high as the first one. The membrane is notched between the spines. The soft dorsal is rounded, lower than the last spine, and ends opposite to the anal at some distance from the caudal. The membrane which connects the last rays to the tail is smaller than in most *Apistes*. The pectorals are rather oblique, and their eight lower rays have simple, thick, and prominent tips, the others being forked at the ends. The ventrals have only four rays. The caudal is even at the end.

The ground colour on the back is chestnut brown, distributed in five or six clouds or bars, the sides are very pale, and the belly quite white. The head and whole of the body down to the middle of the sides is thickly covered with small round dark brown dots, having paler disks. There are also some diluted spots on the lower lip. These dots are numerous on the base of the dorsal, and form rings on the spines. On the pectorals, anal and caudal, the markings assume the form of five or six freckled cross-bars, and there are also a few specks on the ventrals. Length,  $3\frac{1}{2}$  inches.

HAB. Seas of Borneo and China.

APISTES TÆNIANOTUS, *Cuv.*

*Apistes tænianotus*, C. et V. Hist. des Poiss. iv. p. 404; Lacépède, t. iv. pl. 3. f. 2. exclus. descript.

Radii.—D. 17|7; A. 3|5; C. 13 $\frac{3}{4}$ ; P. 12; V. 1|5.

PLATE IV. Fig. 1-2.

We have two examples of this *Apistes* before us, one measuring three inches and three quarters from Japan, and the other four inches and a half long from the Philippines. Both correspond well with the detailed description of the species contained in the *Histoire des Poissons*, but they differ from one another in colour. The Japanese specimen is of a pale, clear, wood-brown, with a dark brown spot on the dorsal between the fifth and sixth spinous rays, and two or three faint indications of spots on the body, besides a row of points crossing the middle of the caudal rays. The specimen from the Philippines is of a much darker colour generally, being deep liver-brown, and wants the dorsal spot above mentioned, though it has some smaller and less distinct ones in other parts of the fin and several on the body. There are two rows of points on the caudal rays. The greatest difference between the species is in the fin membranes, those of the specimen from the Philippines being much thicker and more spongy and opaque. The scales in both are small, roundish, and in contact with each other, but not tiled. When the skin is allowed to dry, they become concave.

In reckoning the soft rays of the dorsal and anal, we have enumerated one fewer than the number quoted in the *Histoire des Poissons*, by considering the posterior one of each fin to be divided to its base, the two branches or rays springing from the same point.

HAB. Malay Archipelago; Seas of China and Japan.

APISTES LEUCOGASTER, *Richardson.*

Radii.—Br. 7; D. 13|8; A. 3|7; C. 11 $\frac{1}{2}$ ; P. 15; V. 1|5.

PLATE V. Fig. 1-2.

The preceding *Apistes* are more or less completely scaly, the following one is entirely destitute of scales. It has a thick bluff head, from whence the moderately compressed body



tapers to the narrow base of the caudal, whose height is only about one quarter of that of the nape. The curves of the back and belly correspond, being but slightly arched. The profile of the head, from the mouth to the beginning of the dorsal, forms the sextant of a circle, and the lower jaw and throat form a smaller arc below. The total length is equal to thrice the height at the shoulder and one half, and the head makes one third of this length, while the thickness is two thirds of the height. The eye is situated high up, the margin of the orbit intruding slightly on the profile; the space between the eyes is equal to a diameter of the orbit and is concave; but the whole of the bones of the head are so covered with loose integument, that their forms are but very imperfectly distinguishable until the skin is suffered to dry. The mouth is terminal, and its moderately large gape descends obliquely till it comes under the middle of the eye. The jaws, chevron of the vomer, and palate bones are furnished with microscopical, close-shaven, villiform teeth. The preorbital spine is straight, and scarcely exceeds half the diameter of the orbit in length. There is no small spine at its base, but a blunt projection of the bone stands forwards in its usual site. The disk of the preorbital is flattish and its outline uneven. The second suborbital forms an acute uneven ridge without spinous points. The preopercular spine is stouter but not longer than the preorbital one, and has four obtuse corners beneath it, but none above it. Two ribs cross the operculum, the upper one being considerably curved with a perceptible point; the under one is straight. The soft flexible point of the suboperculum curves up behind the bony operculum, and forms the upper tip of the gill-cover. The gill-opening curves forward beneath, as far as the hinder part of the eye. The crests of the temples and suprascapulars are very uneven and indistinct. The dorsal commences between the posterior quarters of the orbits, and its posterior spines are rather taller than the soft rays. The last of the latter is bound to the back its whole length, but the membrane does not quite reach the base of the caudal, while the membrane of the anal attains that fin. The caudal is moderately rounded at the end. The pectoral is very oblique, its rays gradually diminishing as they descend; their tips are mostly curved and project beyond the membrane; but, except one or two of the lowermost, they are all more or less forked, the upper ones being most so. The ventral spine stands immediately in the axilla of the lowest pectoral ray, the last soft ray is bound to the belly by loose skin. The ventrals are small, the pectorals comparatively large.

The skin is perfectly smooth and scaleless. Two minute, simple, tapering barbels spring from the upper border of each eye. The lateral line is marked by a series of soft elevations which are rendered more prominent by drawing the finger backwards over them. The ground tint of the upper parts is purplish-brown, with one large patch over the pectorals, formed by a close marbling of liver-brown, and another under the soft dorsal. The head is more finely mottled with liver-brown. The whole under surface, including the lower part of the pectorals, is pure white. The lateral dark patches extend to the membrane of that fin. The rays are white, finely ringed with brown. The upper half of the pectorals, the end of the caudal, the anal, and tips of the ventrals, are freckled and minutely dotted with blackish brown. Length,  $2\frac{1}{2}$  inches.

The only *Apistes* noticed in the *Histoire des Poissons*, to which this fish bears a resemblance, is *niger*; but it would appear from the description there given, that *niger* has stronger spines, and the perfectly white ventral surface of *leucogaster* would ill accord with the specific name of *niger*.

HAB. Sea of China.

MINOUS ADAMSII, *Richardson*.

Radii.—B. 7; D. 10|10 vel 11; A. 10 vel 11; C.  $10\frac{2}{3}$ ; P. 11, I.; V. 1|5.

PLATE II. Fig. 4, 5.

This species agrees neither with the *M. wooru* nor *M. monodactylus* of the *Histoire des Poissons* in the number of its rays, and it further disagrees with the latter in wanting the three trenchant teeth of the second suborbital. As to the former, we have no specimen wherewith to compare ours; but Russell's figure, 159 A, has but a very imperfect resemblance to it in the head. We have therefore given it a distinct specific appellation, and, in doing so, embraced the opportunity of paying a tribute to the zeal and ability displayed by Mr. Adams in making the collection of fish on this voyage, and to his artistic skill evinced by the drawings of many which he executed at the time of their capture. The *M. pusillus* of the *Fauna Japonica* is evidently a distinct species.

The space between the eyes is concave, and is a little broader than the diameter of the orbit. It is traversed by two low acute ridges, which diverge a little as they run backwards. The anterior frontal is also marked by five prominent lines, which spread from an anterior point like the sticks of a fan, and form teeth on the fore edge of the orbit. The rest of the upper margin of the orbit is still more roughly crenated or toothed. A transverse furrow separates the frontals from the conical and ridged bones which lie between the nostrils and cover the maxillary pedicles. Behind the frontals there is another and a larger depression, which is traversed by the very uneven lateral ridges. These ridges have each three triangular, rough points, the terminal one being the largest. The temporal ridges are composed of two rough prominences, immediately behind which is the acute point of the suprascapular, at the commencement of the lateral line. The preorbital has five short crenulated crests diverging from its centre, one of them running out anteriorly into a short triangular point, which is directed forwards; behind it springs the slightly curved spine, which reaches back to the middle of the eye. The great suborbital has a central, thin, crenated crest, from which there radiates one thin crest forwards, a short one obliquely forwards and downwards, two backwards to the base of the preopercular spine, five short ones to the upper limb of the preoperculum, and a very low one directly upwards to the orbit. There is also a rugged conical point on this bone below the anterior ridge. All these lines are granulated and crenated, and the cheek of this fish is better protected by bone than in most of the family. The preoperculum has a somewhat concave disk, with both borders unequally prominent. The



spine of this bone is rather longer than the preorbital one, is compressed, grooved, quite straight, and very acute. There is one acute corner on the edge of the bone above it and five below, the latter ones being very conspicuous, and the one immediately below it acute enough to be named as a short triangular spine. The operculum is strengthened by two ridges which diverge greatly. The lower ridge and its point can be discovered only when the integuments are suffered to dry; but the point of the upper ridge projects immediately behind the soft tip of the gill-cover, which is formed of the flexible cartilaginous extremity of the suboperculum; when the gill-opening is closed beneath, there is a round orifice above this tip, which is seemingly kept open by the direction then taken by the upper ridge and spine of the operculum. The dorsal commences in the occipital notch over the posterior margin of the preoperculum, and its second ray stands even with the acute terminations of the lateral cranial crests. The last pair of soft rays of the dorsal and anal fins approximate at their bases, and may prove on dissection to be only one deeply divided ray, so that only ten soft rays ought in that case to be reckoned to each. If an anal spine exists, it cannot be seen through the integuments. The teeth are microscopical, in villiform bands, those on the prominent chevron of the vomer being with difficulty distinguishable even with the aid of a lens. A small white barbel hangs from each limb of the lower jaw, a little behind its middle.

The colours of the specimen in spirits are nearly the same with those attributed to *M. monodactylus* in the *Histoire des Poissons*. The ground tint is a pale brown with two darker diffused stripes on the back. The fins are clouded with black and white, and the caudal has two white bars alternating with three blackish ones. Length,  $2\frac{1}{2}$  inches.

HAB. Sea of China.

#### CHORIDACTYLUS MULTIBARBUS, *Richardson*.

Radii.—B. 5; D. 13|9; A. 2|8; C. 11 $\frac{2}{2}$ ; P. 10, III.; V. 1|5.

PLATE II. Fig. 1-3.

This fish has characters in common with several of the Cottoid genera. In union with the preorbital spines of *Apistes*, or *Minous*, it exhibits the hollow cheeks, prominent orbits, tall slender dorsal spines, the filaments of the fins, free pectoral rays, and ventrals adnate to the belly of *Pelors*. It has not, however, the elongated body, depressed head, and horizontally protruding muzzle, nor the vomerine teeth of this genus, and the membrane of its dorsal is complete, thick, and spongy, instead of being deficient between the posterior spines. In the lax skin, shape of the head, and general form, it comes nearer to some of the *Synanceiæ*, from which it is readily distinguished however by its free, curved, pectoral rays. The generic appellation is derived from *χωρισμος*, *sejunctio*, and *δακτυλος*, *digitus*.

The face of this fish is vertical, as high as the very prominent orbits, behind which there is a deep notch. The height of the shoulder is contained thrice and nearly one half in the total length, and the thickness is equal to three fourths of the height. The back is consi-

derably arched, the ventral line horizontal to the anus, whence it slopes upwards to the slender base of the caudal. The thickness is greatest at the gill-covers. The length, height, and thickness of the head are equal to one another, and to rather less than one fourth of the total length. Its shortness is owing to the vertical direction of the face, the front of the orbit being nearly as far advanced as the lips. The eyes are lateral, the upper bony margins of the orbits very prominent and uneven, presenting three irregular, angular corners. The anterior and posterior frontal bones, which form the upper part of the orbit, have each their diverging ribs. There is also a short longitudinal ridge on each elevated wall of the smooth mesial, inter-orbital furrow. The whole space between the edges of the orbits is equal to a diameter of the eye. The orbits are connected posteriorly by a slightly curved ridge, behind which there is a deep transverse depression, that is bounded behind by the first dorsal spine, flanked on each side by the conical eminences of the par-occipitals and temporal ridges. There is a very small depressed cheek beneath the eye. The comparatively small preorbital has an elevated, ridged centre, from which a short three cornered point descends anteriorly, and a slightly curved spine projects posteriorly. This spine reaches back to the middle of the eye. The great suborbital forms a conspicuous, prominent, very uneven ridge, which is not armed with spinous points. The preopercular spine equals the preorbital one in size; immediately beneath it, there is an acute angular point, and at some distance below a smaller point, the under limb of the bone having but a slight inclination forwards. The small operculum is situated almost wholly over the preopercular spine, and is furnished with two ridges, the point of the upper one alone penetrating the skin. The gill-cover is attached by membrane to the shoulder, but the curved gill-opening is ample, and runs forward beneath as far as the fore end of the preoperculum and middle of the eye. The mouth is small, terminal, with a slightly descending cleft, so that when the lower jaw is depressed it reaches rather farther forward than the upper one. The rounded margins of the jaws are covered with microscopical, densely crowded, close-shaven, villiform teeth. The vomer is prominent and apparently toothless, and there are no teeth on the palate bones. The tongue is thick but pretty free.

The skin is quite scaleless, and lax, and rather spongy. The lateral line runs in the upper quarter of the height, and is formed of a series of short tubes. There are two conspicuous fringed barbels attached to each limb of the lower jaw. There is also one attached to the upper part of the eye springing from within the orbit; several skinny prominences on the bony points of the head, and a row of round tufts on the second preorbital; numerous short filaments are crowded at the tips of the dorsal spines, and a row at the base of the spinous part of the fin is continued across the middle of the soft rays. There are also minute filaments on the pectoral rays. The dorsal commences in the occipital notch. It is more arched than the curve of the back. Its spines are tall and slender. The pectoral has three detached rays beneath, which curve downwards. The ventral spine is slender and shorter than the soft rays which are all forked: the last one is attached by membrane to the belly for its whole length. Only two anal spines could be detected without dissection, but there may be another small one hidden under the skin.



The colour of the specimen, as preserved in spirits, is chocolate-brown, more or less diluted on various parts of the body, and fading into white on the belly. A white band, proceeding from the third and fourth dorsal spines, passes down the sides; another crosses the basal half of the tail. The ventrals and the sides between them and the pectorals are covered with milk-white dots on a ground colour of blackish-brown. The pectorals are a little less dark, and the vertical fins are dark brown towards their edges and extremities. The extreme parts of the dorsal at the tips of the rays are white. Length, 3 inches.

HAB. Sea of China.

STHENOPUS MOLLIS, *Richardson*.

Radii.—B. 6; D.  $3-\frac{2}{8}$ ; A. 1|9; C.  $11\frac{2}{2}$ ; P. 15; V. 1|2.

PLATE II. Fig. 6-7.

In profile, the outline of the face being very little elevated is a prolongation of the moderately arched curve of the back, and the ventral line is nearly similar. When the mouth is closed, the nearly vertical lower jaw forms the obtuse fore end of the head, but the body tapers considerably posteriorly, the height of the base of the caudal being only one third of the height at the nape. The total length, caudal included, is equal to three times and three quarters the height, and to six times and a half the thickness. The head is large in proportion to the size of the fish, forming a third of the total length, and is high and compressed with flat sides. The eye is small and high up, but does not interfere with the profile. The space between the eyes equals the diameter of the orbit, and is occupied by three anterior detached rays of the dorsal. The shaggy skin conceals all the bones of the head. A transverse furrow is visible between the orbits and nostrils. The mouth descends almost vertically from nearly the level of the eye. The maxillary, covered with loose shaggy skin, shews a rather broad disk behind the premaxillary, which is in no way concealed when the mouth is closed. The preorbital is entirely hidden by the integuments, and on dissection is found to be a small subulate bone with a soft tip, proceeding forward from the suborbital chain, which is very narrow and forms the under margin of the orbit. A narrow plate of bone descends from the chain under the posterior part of the eye to the curve of the preoperculum, which is also concealed by the skin. The curve of the preoperculum is the segment of an oval, the upper limb being very short, and its whole edge perfectly entire. The operculum on dissection is seen to be thin and weak, with two inconspicuous ribs which end in feeble points not at all pungent, and it has a concave edge between them. The narrow suboperculum curves up behind the operculum, and furnishes to the gill-cover a small elastic tip, which points upwards, nearly on a level with the summit of the back, and encloses a small round portion of the gill-opening when the gill-flap is closed. There are no pungent points whatever on the head. The gill-opening is very large, and extends in the segment of a circle from high on the shoulder down, and forwards to beneath the nostrils. The branchiostegous

membrane is supported by six curved cylindrical rays. The four small branchial arches lie deep in the cavity covered by the ample gill-flap. They are furnished with sessile knobs on their borders. The teeth on the jaws are microscopical, and set in close-shaven, villiform bands. They are even smaller on the chevron of the vomer and in a narrower transverse band. The palatines are toothless.

The integuments are soft, lax, scaleless, and almost everywhere furnished with small slender filaments, either simple or bifid. These are numerous on the jaws and most parts of the head, and are most conspicuous on the spinous dorsal fins and lateral line. They are small, but numerous on the lower half of the pectoral, and exist on the soft dorsal anal and caudal. The lateral line runs parallel to the back in the upper quarter of the height, and is furnished with bifid filaments.

The anterior dorsal consists of three approximated rays which stand between the eyes: the middle ray is the tallest, and is connected to the other by membrane as high as the tips. The next dorsal ray is over the preoperculum, and is connected to the following ones by low membrane, but stands at a greater distance from them than they do from each other. The membrane is deeply notched between them, but they are all clothed with thick skin studded with filaments. The soft rays are higher than the spines, and the last one is connected to the caudal by low membrane. The existence of an anal spine was not clearly made out. The pectorals are obliquely rounded, but not connected to the sides after the manner of *Synanceia*. All the rays are jointed, unbranched, and have prominent curved tips, the lower ones being thicker. The ventrals are exactly under the base of the pectorals, are small, and are composed of a short spine and two soft rays. The generic name is derived from their comparatively diminutive size. The caudal is rounded at the end with the tips of the rays projecting.

The colour of the specimen, after immersion in spirits, is blackish-gray, passing on the under surface into pale purplish-brown and white. There is a row of pale spots on the lateral line, and there are some pale dots scattered over the head, flanks, and fins. The fin membranes, particularly the borders of the pectorals, are dark. Length, 3 inches.

HAB. Sea of China.

#### PODABRUS CENTROPOMUS, *Richardson*.

Radii.—B. 6; D. 10|–20; A. 18; C. 11 $\frac{3}{4}$ ; P. 17; V. 1|2.

#### PLATE I. Fig. 7–11.

This fish is much compressed, the height, which is greatest under the spinous dorsal, being more than twice the thickness. The profile approaches a semi-ellipse, the line of the belly being nearly horizontal with a slight convexity, while the back is elevated. The mouth is horizontal and low down, and the ascent from it to the dorsal is at an angle of 45°, nearly in a straight line; while the posterior part of the back is a little more arched than the under outline, both meeting in the very slender short trunk of the tail.



The head forms one third of the length of the fish, caudal excluded, or less than a fourth, including that fin. Its length exceeds the greatest depth of the body, and is twice its own height at the occiput. The eye is moderately large, forming a fourth part of the length of the head. It is placed one diameter of the orbit from the tip of the snout, two diameters from the apex of the gill-flap, and encroaches slightly on the upper profile. The nostrils are minute orifices without cirrhi before the eye, the anterior one being near to the end of the snout, and the posterior one more removed from the orbit. The space between the eyes is equal to almost two thirds of the diameter of the orbit, is covered with smooth skin, and is flattish. The preorbital has a smooth under edge, curved in the segment of an ellipse; the rest of the suborbital chain is concealed by the integuments; but a smooth, moderately wide process crosses the cheek from under the eye to the hollow of the preoperculum. This latter bone is curved, and its narrow disk, whose under edge is somewhat uneven, is also covered by the integuments continued from the cheek, so as not to be apparent in the recent fish: a little above the curve, there is a small, narrow, flat, obtuse spine or process, projecting from the upper limb of the bone. The interoperculum is rather narrow, flexible, and smooth. The operculum, of a triangular form, ends in an obtuse, thin point, which is not at all pungent, and is wholly concealed by the flexible, narrow, prolonged end of the suboperculum, that forms a conspicuous tip to the gill-cover. The gill-opening is pretty large, although it is restricted above by a membrane which runs from the tip of the suboperculum, and binds the gill-cover to the nape. The gill-membrane is also united to its fellow beneath and plays free over the isthmus, to which it is connected only at the root of the tongue. It is sustained by six pretty long, slender, curved rays on each side, and, when fully expanded, is convex externally. The mouth is horizontal, with a pretty large gape, though it does not extend so far back as the orbit. The under jaw is rather the longest. The margin of the mouth is formed by the premaxillaries and the mandible, and both are armed by villiform bands of teeth, which are broadest at the symphyses, where there are four or five teeth in the breadth of the bands; the individual teeth, when examined by the aid of a lens, appear to be subulate and acute. The projecting chevron of the vomer is similarly armed, and there are more minute ones covering the narrow edges of the palatine bones. The tongue is hemispherical and smooth. There are four branchial leaves and a small single one attached to the gill-plate. Each arch is armed interiorly by two rows of small, obtuse, sessile processes; and the posterior branchial leaf is bound to the shoulder by membrane, leaving only four openings from the gullet. The maxillary bone is closely bound by integument to the pre-maxillary its whole length, and glides partly under the edge of the preorbital: its lower end is wider and truncated.

The skin is smooth and scaleless, and the lateral line, which is composed of a series of short tubes, is much arched over the pectoral, and quite straight for the remainder of its course to the caudal fin.

The first dorsal is arched, the fourth and fifth rays being the tallest, and the last one

very short. All the rays are slender and flexible. The rays of the second dorsal are all unbranched and finely jointed. The anal is similarly constructed. The membrane of these and of the other fins is extremely delicate and easily torn, and as it has suffered some damage in the specimen, we cannot determine whether the two dorsals were connected by a low membrane or not, or whether the last rays of the dorsal and anal were bound to the tail. There is a deep furrow on the upper surface of the short trunk of the tail and a similar one below, in which the last rays of the dorsal and anal recline. The caudal is truncated at the end with a slight projection of the angles, and the membrane is notched between the tips of the rays, which are forked. The pectoral appears to have been pointed, but its rays being brittle have been mutilated. The ventrals are very small and are attached beneath, or rather behind, the attachment of the pectorals. The first ray is flexible without apparent joints, the other two, which are not separated from each other by membrane, are longer and distinctly jointed. Colour in spirits uniform and brownish. Mr. Adams has noted that the body and fore part of the dorsal are chestnut brown, the throat and belly orange. There are oblong, silvery spots on the sides, one of them extending from the eye to the gill-opening, another being in the axilla of the pectoral, and the third under the end of that fin, just where the lateral line begins to take a straight course. The eye is orange and golden. Length,  $4\frac{1}{2}$  inches.

HAB. The sea off the Island of Quelpart.

PODABRUS COTTOIDES, *Richardson*.

Radii.—B. 6; D. 10|–19; A. 18; C.  $11\frac{2}{5}$ ; P. 15; V. 1|2.

PLATE I. Fig. 1–6.

This fish is much less high and compressed in the body than *P. centropomus* and has a very different aspect, though it possesses the same generic characters. It has some resemblance to a *Cottus* or *Apistes*, but is distinguished from the former by its palatine teeth, and from the latter by its unarmed preorbital. It is moderately compressed, the height at the shoulder being twice the width; the dorsal line is continued from the eye to the caudal with a very slight convexity, and the descent of the snout is small; the ventral line is similar, both profiles meeting in the rather slender tail, which has scarcely a third of the height of the body at the pectoral. The belly is tumid. The head forms one third of the length of the fish, excluding the caudal, which is shorter than the head. The eye touches the profile, and its diameter is equal to about one fourth of the length of the head, and scarcely equal to the breadth of the cheek between the orbit and preopercular disk. The space between the eyes is less than the diameter of the orbit, whose upper margin is rather raised, and the interval in the skull is furrowed, but the inequalities are concealed by the integument. The jaws are equal; very little of the maxillary is concealed by the preorbital, and its truncated end falls back as far



as the middle of the orbit when the mouth is closed. The premaxillary does not reach quite to the corner of the mouth, which is membranous. The jaws are armed by bands of acicular teeth, standing about four deep at the symphyses, and narrowing to a single row towards the corner of the mouth. The edges of the palatine bones, the prominent chevron of the vomer, and the hemispherical pharyngeals are set with similar teeth. There is no tongue. The preorbital is not much broader than the rest of the suborbital chain, and its under edge is curved in the segment of an ellipse, and is slightly uneven. The process which crosses the cheek from the second suborbital to the preoperculum can be felt rather than seen. The preoperculum is curved with a narrow disk and no prominent angle, but is armed by a small acute spine, directed a little upwards, and springing from its upper limb above the apex of the curve. The triangular bony operculum is unarmed, and the gill-flap ends in a narrow strap-shaped tip, formed by the flexible extremity of the suboperculum. The upper edge of the gill-plate is connected to the shoulder by membrane, but the gill-opening is ample, and the thin gill membranes, supported on each side by six, slender, curved rays, are united beneath and play freely over the isthmus. The ventral is composed of two simple jointed rays, and a short spine. The lateral line, formed of a series of short tubes, is somewhat undulated and moderately curved over the pectoral, after passing which it runs straight to the caudal. The general tint is brownish, with some silvery tints towards the belly. The back is darker, and the sides are crossed by about six vertical brown bars of a deeper tint. The tubes of the lateral line are silvery, and are strongly relieved by a series of small brown spots. The head and lips are also spotted with brown, and the vertical fins are barred transversely, each by about four brown lines. The pectoral is likewise marked with brown.

Several shrimps were contained in the œsophagus of this fish. Length,  $3\frac{1}{2}$  inches.

HAB. Sea of China.

#### BATRACHUS QUADRISPINIS, *Cuv. et Valenc.*

BATRACHUS *quadrispinis*, Cuv. et Valenc., Hist. des Poissons, vol. xii. p. 487.

Radii.—Br. 6; D. 3|-17; A. 16; C.  $15\frac{2}{3}$ ; P. 21; V. 1|2.

#### PLATE I. Fig. 12-16.

Our specimen agrees with the description in the *Histoire des Poissons*, in the opercular and subopercular spines, and with the other particulars noticed in the brief description, except that the dark points or dots on the back and belly cannot be traced, but in place thereof the belly is pale without dots, and the back is clouded in a somewhat banded manner.

The head forms one third of the total length of the fish, including the caudal, and its height and thickness at the occiput are equal. The cleft of the mouth reaches to under the middle of the eye. The premaxillary teeth are in two rows and are acute, though short;

they are represented by mistake in figure 15 as uniserial. The vomerine and palatine teeth form a continued series of short teeth with rounded cusps, the vomerine teeth being somewhat larger and more prominent than the palatine ones. The mandibular ones resemble the latter, and stand in two rows at the end of the jaw. The first dorsal is connected to the second by membrane, and the pectoral and caudal are ovate. The ventrals are furnished with a spine and two unbranched jointed rays, the second soft ray being closely applied to the first and so slender as to be detected with difficulty. The dorsal and anal are connected to the base of the caudal by low membrane, and there are similar cutaneous folds in the axillary of the ventrals. Length,  $3\frac{1}{2}$  inches.

HAB. China Sea.

TETRODON ATRATUS, *Richardson*.

Radii.—B. 5; D. 9; A. 8; C.  $8\frac{1}{7}$ ; P. 17.

PLATE VII. Fig. 1-3.

This *Tetrodon* belongs to the group which have short heads, a generally hispid body, and pale spots. The spines are small, scarcely protrude even on the belly through the integument, and are but very little pungent to the finger, as they sink beneath the skin when pressed. They are most conspicuous on the belly, but become visible on the back when the skin is inflated. They can be traced over all the back, nearly to the base of the dorsal, and down the sides over the styloid bone, till they meet the spinous skin of the belly. Some very delicate ones are detected with difficulty on the lateral line, where it traverses the trunk of the tail, and a few also at the posterior part of the base of the dorsal. The top of the head is also set with minute spines, but the snout anterior to the nostrils, the chin, cheeks, the pectoral axillæ, the flanks posterior to the point of the styloid bone, and the whole of the tail, except the lateral lines, are smooth. The lateral line can be traced from near the nostril in a curve, under the eye, over the shoulder and pectoral fin with some slight undulations, and then straight through the tail, above the middle height. Porous lines can also be traced over the eye, and one line runs from the caudal fin through the lower third of the tail. The skin along this line is minutely granulated, as if spinous, but the spines are neither visible by aid of a single lens, nor sensible to the touch. The rest of the integument above and below is quite smooth.

The obtuse chin projects beyond the mouth, which is thus turned obliquely upwards. The profile is slightly concave at the nostrils, and convex at the eye, from whence it runs nearly horizontally to the dorsal. The belly is tumid, and is capable of considerable distention. The head, measured to the gill-opening, forms one-fourth of the total length of the fish, caudal included; its breadth at the gill-openings is equal to its length, and its height, when the skin is flaccid, is nearly equal to its breadth. The nostrils are two small contiguous



openings, situated before and above the level of the eye, the tips of the anterior opening being tumid. The distance between the eyes is nearly half the length of the head, and the mouth is small, with the loose tips granulated or fringed interiorly. The anus is lax, and is fully a quarter of an inch before the anal fin.

By dissection, the preoperculum is found to have a broad flat disk with numerous furrows towards its border. Its under limb is one-third longer than the upper one, which is vertical. They meet at a right angle, and the corner is very slightly rounded. The under edge is straight and horizontal, and lies in contact with, and partly conceals, the gill-rays. The body of the operculum is triangular, with a prominent ridge or crest near its articulation, and a narrow, flat process descending from its anterior edge, over a thin plate, formed by the interoperculum and suboperculum, which lie wholly behind the preoperculum, and are closely joined by membrane to one another. The hyoid bone gives attachment to five slender, curved branchiostegous rays, and the point of the uppermost can be felt through the integuments at the margin of the gill-opening, where it projects. Beneath the rays there is a broad thin plate, undulated so as to give lodgment to several large muscles, and articulated to the body of the hyoid bone. It looks like a greatly developed gill-ray, or rather like several (four) confluent rays, being traversed by three lines, indicating the points of union. The anal and dorsal are rather high, and the latter is the narrowest. The two fins terminate opposite to each other, but the dorsal commences a little farther forward. The caudal is even at the end, and the pectoral is much rounded.

The upper half of the fish is deep black, but there are some scattered round marks on the back of greyish-black, in general not much paler than the ground colour. In one specimen, however, these spots look whitish, as if the pigment were partially worn off. The under surface is white, and there are some orange tints on the flanks. The black and white meet in an irregular, clouded manner. The anal is white. The other fins are more or less clouded or mottled with black. Length,  $5\frac{1}{2}$  inches.

HAB. China Sea.

Of the species named in the *Règne Animal*, p. 368, as belonging to the division 1° D., *T. testudineus*, Bl. 139, differs in its colour and markings, as well as in the general diffusion of the spines on the chin, flanks, and tail, as well as on the belly and back. Lacépède would appear to have confounded more than one species under the name of *hispidus*, as he states it to be an inhabitant both of the embouchure of the Nile, and of the Indian Ocean. His figure is copied from one of Commerson's designs, and is studded on the back with round, well-defined, white dots, in which as well as in the band-like processes of the dark ground colour, which run from the back into the white of the belly, the species differs from *atratus*. The *T. hispidus* of Bloch, pl. 142, has similar lateral descending bars of the dark colour without the superior white dots. *T. patoca* of Buchanan Hamilton, pl. 18. f. 2, differs from *atratus* in its more arched back, more prominent upper jaw, and in the numerous yellow angular spots on the back. Of the many handsome species figured in the *Fauna Japonica* by M. Schlegel,

the only ones which require to be compared with *atratus*, are *rubripes*, pl. CXXIII. f. 1., and *firmamentum*, pl. CXXVI. f. 1. Both differ from *atratus* in the mouth being at the extremity of the head, and not the chin, and *rubripes* has the eye much more remote from the profile, and large black marks on the flanks, while *firmamentum*, with a more arched back, has the spines more generally diffused, and many pale oval or round spots equably placed on the head, back, belly, and basal half of the caudal fin. None of the species named under Cuvier's fourth division of the genus, characterized by smooth flanks, without tubercles, have any resemblance to *atratus*.

TETRODON HISPIDUS, *Lacépède*.

*Le Tetrodon hérissé*, Lacép. vol. i. p. 487. pl. 24. f. 1. ?

RADII.—D. 10; A.; C.  $9\frac{1}{2}$ ; P. 17.

PLATE IX. Fig. 3-4.

I refer this species, though not without doubt, to the *Tetrodon hispidus* figured by Lacépède, from a drawing of Commerson's, but it seems to be distinct from the *hispidus* of Bloch, which wants the white spots on the back. In retaining the specific name of *hispidus*, I have followed the *Règne Animal*, though without expressing an opinion as to the identity of Commerson's fish with the *hispidus* of the Nile and Mediterranean, which I have not seen.

This *Tetrodon* has a short thick snout, which in profile ascends to the prominent eyes. The back is moderately arched, and the belly can be distended to a semi-globular form. When the fish is fully blown up, the pectorals, dorsal and anal, are much concealed, as well as a considerable portion of the caudal. The space between the eyes is equal to two diameters of the orbits, and is slightly concave owing to the prominence of the upper borders of the orbits. The nostrils are pierced in two short barbels, which are connected at the base. The pectorals have an even or slightly crescentic edge, with rounded corners. The caudal is even, and the dorsal is placed, nearly its own breadth, before the anal. The lips are papillated. A ring round the mouth, the upper part of the snout, as far back as the nostrils, the narrow borders of the eyes, a ring round all the fins, the fins themselves, and the tail, posterior to the anal fin, are smooth. The rest of the integuments are spiny. The spines of the sides, belly, and cheeks, are closely set and rigid, and though small, are conspicuous enough. Those of the back are very short, scarcely penetrating the skin, and are not so numerous. They extend backwards behind the dorsal, and terminate over the fore-part of the anal.

The specimen, which has been long in spirits, has a grayish-brown colour above, and a white belly. The upper parts are regularly spotted with white, the dots being round on the snout, tail, and base of the caudal fin, and oval on the back. They coalesce into circular lines round the eyes and bases of the pectorals and dorsal fins; the bases, themselves, being dark. The end of the caudal is blackish brown, and there are some dark tints on the dorsal.



There is also a series of four deep black marks, or bars, on the sides, viz., one under the eye, another before the gill-opening, the third and largest under the pectoral, and the fourth rather before the dorsal. The ground colour of the back deepens slightly over these marks, as if in the recent fish they had formed the extremities of transverse dorsal bands; but they cannot be said to be mere prolongations of the ground colour into the white of the sides, such as the lateral bars of the *hispidus* of Bloch are described to be. When the skin is examined with a lens, it is seen to be composed of tessellated minute plates, having various forms in different parts. On the smooth skin of the tail they are round or polygonal. They are oblong, but very unequal on the back, and smaller, granulated, and irregular on the belly.

HAB. Eastern Atlantic.

TETRODON NARITUS, *Richardson*.

Radii.—D. 33; A. 28; C. 10; P. 17.

PLATE VIII. Fig. 1-3.

The usual number of rays in the dorsal fin of a *Tetrodon* is nine or ten. One species, the *nigro-punctatus*, is noted by Schneider as having only seven rays in that fin, in others the numbers amount to twelve or thirteen; but out of twenty-four species characterized by the author just named, only one is said to have as many as fifteen dorsal rays.<sup>1</sup> The species described below has more than twice that number of rays in the dorsal, and its anal is also proportionably great. It differs also from any other fish we have seen in its nostril, which is single and has an orifice equal in extent to the length and breadth of the cavity.

The length of the head, measured to the gill-opening, is one fourth of the whole length of the fish, caudal included; the breadth of the head is less, being contained five times and a half in the whole length. The eye is placed above the level of the mouth, and mid-way between the end of the snout and gill-opening. The nostril is before, and rather higher than the eye, and is a single, wide opening, with a smooth bottom, and a plaited, loose margin, which forms two small, narrow, obtuse lobes anteriorly, the border being deficient between the lobes, so as to form a small channel or notch on the anterior rim of the opening. The mouth is rather small, the lips granulated or papillated on the edges; and within close to the teeth, there is a narrow, prominent, more densely papillated ridge. The mouth is terminal, and the profile is gibbous over the eye. The belly is capable of considerable distention, so as to assume a semi-globular form. The tail, between the three vertical fins, has a peculiar shape, arising from an osseous enlargement of the upper and under interspinous bones, each about the size of a kidney bean. The dorsal and anal fins have a different shape from those of any other *Tetrodon* which we have seen, being longer than high, and considerably arched.

The skin is smooth on the back, and of a pale brownish-purple tint, with various reflexions, when taken from the spirits. The recent colours were not noted. The skin is

<sup>1</sup> This is the Chinese *ocellatus*, which has usually only fourteen rays in the dorsal.

traversed by various fine furrows, or depressed lines, whose course will be better understood by referring to the plates than by description. The spines are stronger than usual in the genus, and are each composed of a longitudinal base, imbedded in the integument, and a central subulate, acute stem rising from it through the skin at a right angle. These spines cover the belly, from the chin to the anus, leaving the cheek naked, but rising before the gill-opening to the temples and supra-scapular region. There are also five spines on the shoulder, behind and above the pectoral fin, the spiny surface there being bounded above by the undulating lateral line, and meeting beneath with the spiny ventral surface. The rest of the skin of the snout, top of the head, cheeks, and body, is smooth and polished, the axillæ of the pectorals alone being finely and softly granular. Length, 8 inches.

HAB. River Sarāwak, Borneo.

TETRODON MELEAGRIS, *Solander*. (Rich. Ichth. of Voy. of Sulph. p. 122. p. lvii. f. 1-3.) We take this opportunity of adding a short extract from Solander's Manuscripts, relating to this species. "*Caro venenata. Totus e purpurascenti nigricans undique adpersis maculis, parvis, numerosis, albidis etiam in pinnis. Spinulæ breves rigidæ, vix spinosæ, subcartilagineæ sunt in vel sub cute totius animalis, exceptis pinnis, sparsæ, numerosæ, in caudâ raræ; has vivus retrahere et exscrere potest, unde nunc uno nunc altero loco hispidus.*"—Sol. MS. p. 79.

#### TETRODON SOLANDRI.

*Tetrodon Solandri*, Richardson, Zool. Voy. of Sulph. Fish, p. 125.

*Tetrodon punctatus*, Solander, MS.

Since the figure and short description of this species were published in the work above quoted, I have had an opportunity of again consulting Solander's manuscripts and Parkinson's drawings, and find that I was in error in quoting *T. cinctus* of Solander, as a synonym of the species, the error having arisen from the figures of *punctatus* and *cinctus* being on the same leaf of Parkinson's volume, and being referred to by the same number. The following is Solander's account of the species.

"TETRODON PUNCTATUS, D. 10; A. 9; C. 10; P. 17. "Tæte." *Totus piscis (excluso abdomine) rufo-ferrugineus, punctis numerosis in corpore e viridi flavis, ubique circumcinctis, et inter oculos strigæ numerosæ cæruleæ, in dorso etiam puncta oblonga evadunt ut potius strigæ appellanda. T. dixit, piscis intoxicat illos qui illum edunt. Iris e viridi flava, annulo extero aureo. Pupilla nigra, annulo aureo. P. dorsi e glauco pellucida, basi carnosio nigricante, sub qua linea cærulea. P. pectoris glauco-pellucida. P. ani viridis, lineis duabus sordidè flavis. P. caudæ a basi ultra medium pallidè olivacea punctis ut in corpore, posticè e rubro lutea, strigis transversis interruptis seu potius maculis oblongis, cærucis, ipso apice cærulco. Abdomen setis brevibus hispidum, flaccidum e viridi flavum; carina abdominis mollis, cærulea, limitibus luteis; lineæ ad latera carinæ, obsoletæ, glaucæ. Gula dilutè crocea.*"—Sol. MS.



Parkinson's figure is nearly of the same size with that published in the Ichthyology of the Voyage of the Sulphur, which coincides with specimen, and measures four inches and a half in length. Parkinson has made a memorandum under the drawing, stating that "every spot is bordered with a dark line, which turns paler as the ground colour does." The specific name of *punctatus* having been given in Schneider's edition of Bloch to a Brazilian *Tetrodon*, cannot be retained for Solander's fish.

TETRODON CINCTUS, which is also figured on the sixty-sixth folio of Parkinson's drawings, has a short head, obtuse snout, and a nearly globular form, when the belly is distended. It is also studded with small round dots on the upper surface, and on the caudal fin, but is characterized by two oblique black bars, which embrace the fore-part of the belly, whence its specific name. The intervals between the bars are light yellow, and there are several bars in outline on the remainder of the belly, but their colours are not specified. I have not found any reference to this species in Solander's Manuscripts. Like the preceding species, it was discovered at Otaheite, or, as Parkinson writes the name of the island, Taitai. Supposing all the bars on the belly to be black, the species will closely resemble the *lineatus* of the *Fauna Japonica*.

#### TETRODON INSIGNITUS, *Richardson*.

RADII.—D. 9; A. 8; C.  $9\frac{1}{4}$ ; P. 16.

#### PLATE IX. Fig. 1-2.

This *Tetrodon* belongs to the third division of the genus, characterised by a keeled back, and of which only two species are named in the *Règne Animal*, viz., *T. rostratus*, Bl. 146, 2, to which *T. electricus*, Paterson, Phil. Trans. p. 76. pl. 3, is referred; and *T. Gronovii*, Cuv. Our fish resembles *T. grammatocephalus* of the *Fauna Japonica* (pl. exxvi. f. 3.) so much, that I have great doubt as to its being really distinct; but M. Schlegel's figure does not show the striking ocellated mark at the base of the dorsal, nor the stripes on the back, and spots on the sides, and as the letter-press referring to this plate has not yet reached us, we do not know the condition of the specimen, or whether the colours had perished or not. *T. ocellatus* of Bennett, (Fishes of Ceylon, pl. 21,) has some resemblance to *insignitus*, but the eyed spot surrounds the base of the dorsal in the same way as it does in the *ocellatus* of Bl. p. 145, and the dorsal bands and streaks do not correspond with those of our fish. Nothing is said, in Mr. Bennett's text, of spines, nor are any represented in his figure.

In *insignitus* the belly and back are studded with minute spines, which roughen also the top, and entire sides of the head. There is a narrow ring of smooth integument round the base of the lips, the eyes, and gill-openings. The spines of the belly rise as high as the under ray of the pectoral, and backwards to the anus, while those of the back extend to the dorsal, and as low as the level of the centre of the eye. The axilla of the pectoral, the sides, and tail, are smooth, including the bases of the dorsal and anal fins.

The head forms one-third of the entire length of the fish; the snout is conical, and the profile in rising becomes a little gibbous at the eyes, and attains its summit in a prominent point, directly over the gill-opening, from whence it is horizontal to the dorsal fin. The belly is round and prominent, but apparently not capable of much distention. Posterior to the anus, the compression of the tail is considerable. The space between the eyes is rather concave transversely, and equals in breadth a diameter and a half of the orbit. This space narrows to a point posteriorly, the summit of the dorsal line, which is an acute point of bone covered by integument, forming, when viewed in front, the apex of a flat triangle. From thence the back to the dorsal is ridged, but not very acutely. The snout, before the eyes, is rounded, and tapers to the mouth. There is a low cutaneous seam on the mesial line of the belly. The nostril is a small round opening before the eye, which is so closed by a flat operculum, that when the skin is allowed to dry, it can with difficulty be discovered. The dorsal is a little before the anal, and the caudal is even at the end, with the tips of the rays projecting.

The specimen in spirits has a brown colour above, and is pale or whitish beneath. The snout and cheeks are marked with numerous round, blue-eyed spots, with darker borders, which fade under the pectorals, into an indistinct marbling, and entirely disappear farther back. The upper parts are marked with blue lines having dark borders. Two of these cross the upper surface of the snout before the nostrils, one crosses the nostrils and extends from eye to eye, four others cross the inter-orbital space, and five radiate from the posterior part of the orbit backwards; there is also one beneath the eye. Many short ones undulate longitudinally in the back and upper parts of the sides, and there are a few on the upper surface of the tail behind the dorsal. All these will be better known by consulting the figures than by description. They have much resemblance to the lines of *Tetrodon mappa* of Lesson. On each side of the base of the dorsal, there is a somewhat triangular black spot, with a pale blue border. These spots do not touch each other in front of the dorsal, and there is a still broader space between them behind. The fins are pale and transparent. Length,  $2\frac{1}{2}$  inches.

HAB. Sea of China.

#### BALISTES RINGENS, *Bloch*.

BALISTES *ringens*, Bloch, pl. 152. f. 2. Bl. Schn. p. 472. Lacép. vol. i. p. 370. pl. 18. f. 1. (*B. sillonné*.)

BALISTES *niger*, Osbeck. Voy. Bl. Schn. p. 471.

BALISTES *radula*, Solander, MS.

RADI.—D. 31-31; A. 28; C.  $10\frac{1}{4}$ ; P. 16.

#### PLATE 6. Fig. 1-4.

The reference to Bloch's plate 152. f. 2, is made on the authority of the *Règne Animal*, for the figure is so bad a representation of our fish, that without the opportunity of verifying it by consulting Bloch's specimens, enjoyed by Cuvier, we could not have quoted it with confidence.



It is incorrect in the general profile of the fish, and in the vertical fins. Lacépède's figure is better. The species enters the group, which is characterized in the *Règne Animal* by six or seven rows of spines on the tail. Schneider attributes *seven* rows to *niger*, and *eight* to *ringens*. Solander, again, mentions nine rows as existing on the tail of his fish. There are in our specimen nine rows, four of which attain the base of the caudal, but the uppermost three and the lowermost two are shorter. The upper rows begin opposite to the anterior third of the dorsal fin, and the lower ones above the same part of the anal. These lines can scarcely be said to be spinous: they are rather low ridges, formed by a narrow, rough elevation of the transverse or short diameter of each scale. (fig. 3.) The scales, generally, are regular rhombs, having their surfaces densely, but equably scabrous, and are separated from each other by smooth lines. The rhombs are mostly vertical, and are higher and proportionally narrower on the tail than elsewhere. They are shorter, without losing their width near the pectoral fin, are more oblique on the belly, and make an approach in form to hexagons on the cheek. Behind the gill-opening there are a few scales, rather wider than the others, but not much longer. The dorsal spine is stout, cylindrical, obtuse, and slightly curved. It is not serrated in front, like the spine of Bloch's figure of *ringens*, nor does it taper so much. Its front is, in fact, villous, appearing so to the eye, but feeling smooth to the touch; and it is made rough on the sides by fine and crowded, hard granulations. The second ray of the first dorsal is short and slender, and the third one is far back, and so short, that it does not rise above the level of the furrow, which receives the fin when depressed. The dorsal and anal are arched in front, and lower and more even posteriorly. The exterior rays of the caudal are stout, with rough surfaces, which project beyond the intermediate straight, or slightly convex border, forming falcate points, equal in length to about one-third of the length of the fin. The ventral spine is short and truncated, and is raised only by force from a depression into which it fits. There is no thin membrane, nor appearance of rays behind it, the belly remaining roundish between it and the anus; but the narrow rows of scales which converge towards that part, are rough on the rim, or mesial line of the belly, making a low ridge. The length of the head is contained four times and one-third, in the total length, caudal included. The mouth is small, the eye quite round and high up, and the upper and under profiles of the fish are alike. The height of the body equals two-fifths of the whole length.

The colour of the specimen in spirits is dark brown, with a blacker face and chin. Some pale lines cross the nape and forehead, and there are darker lines on the body and tail corresponding to the centres of the rows of scales. The lines of skin, which appear between the scales, are pale and bluish, though they have been represented necessarily by the artist as dark. A milk-white line runs along the bases of the dorsal and anal rays, and there is a dark crescentic line, edged with a pale tint, within the border of the caudal.

The following is Solander's description, taken from his manuscript *Animalia Oceani Pacifici*.

“BALISTES RADULA. *Totus piscis e fusco nigricans, cute cœruleâ quæ in inferiore capite,*

pectore et precipuè abdomine sæpe inter squamas apparet, quod pulchrum reddit piscem. Pinnae magis fuliginosæ. Ad basin pinnae dorsalis posterioris et pinnae ani strigæ pulcherrimè glaucæ seu e cæruleo albæ. Pupilla olivacea. Iris nigra. Ordines novem spinarum carinatarum in posteriore parte piscis æquales; sex ad basin pinnae caudali extenduntur. Pinna dorsalis anterior bi-radiata.

“Squamæ in inferiore parte piscis sub-olivaceæ quod inter cutem cæruleum strigas obliquas olivaceas efficit. Pinna caudalis posticè lunulato fasciâ nigricante ornata, limite posteriori sordidè glaucescente. Aelhi pahah or Aelhe pahahah.” Solander, MS. An. Oc. Pacif. p. 86.

#### BALISTES SENTICOSUS, *Richardson.*

Radii.—D. 31–25; A. 22; C. 12; P. 15.

#### PLATE IX. Fig. 5–8.

This *Balistes* belongs to that division of the genus which has no peculiar armature on the tail, for though the scales there are spiny, they are more or less so over the whole fish. When newly removed from the spirits in which the specimens are kept, the form of the scales cannot be well perceived, but as the skin is allowed to dry, it is seen to be covered with small, roundish, or obscurely tetragonal, or hexagonal scales, which have an elevated point in the centre, from whence lines radiate to the edges. On the scales of the head and breast, the elevation of the central point is less, and it does not appear much more conspicuous than several other rough points which stud the disk. On the back, sides, and tail, however, the central point becomes a true, small, acute spine, and the disk of the scale is more elevated, with radiating lines, but the other points are comparatively smaller. There are nine rows of scales on the trunk of the tail, laterally, and the scales on the narrow upper and under surfaces of that, have also spines, though not so large. On the under surface and point of the pelvic bone, the central spines and other points on the scales are larger and more acute, and on the edge of the dew-lap, between the pelvic bone and anus, the scales are ranged in pairs, and their central spines are bifid. The front of the dorsal spine is roughened by four rows of spinules, and the rays of all the other fins, pectorals included, are also rough, except the upper and under ray of the caudal, which are smooth. The scales behind the gill-opening are no larger than elsewhere, but on the immediate border of the opening the points on the scales are smaller, and more equable in size, and numerous.

The shape of this fish is much like that of *B. capriscus*. Its height is equal to half its length, caudal included. It is much compressed, the greatest thickness being at the temples. The space between the eyes is convex, and almost ridged in the specimen we have figured; but in younger individuals, from the greater prominence of the orbits, it appears concave. The length of the head is contained thrice and nearly one-half in the total length of the fish. The pectoral fin is small, the dorsal and anal high and rounded. The front spine of the first



dorsal is stout, and the third is as tall as the second, and rises considerably above the edge of the furrow which receives the fin. The dew-lap is not greatly distensible, and presents no resemblance of rays.

Our specimens are streaked and dotted with black, in the directions of the centres of the scales, but the pigment seems to be perishable, and the specimens are not in a perfect state, so that the proper colours cannot be described. Length, from one to six inches.

HAB. Sea of China.

Sir Edward Belcher's collection contains several other *Balistes*, such as

BALISTES ACULEATUS, *Lin.* Bl. pl. 149.

*Balistes ornatus*, Solander, MS., An. Oceani Pacifici, p. 93. Parkins. Icon. pl. 59, Mus. Banks.

This species has an extensive range, and appears to be abundant in most places where it is found. Sir Edward Belcher's collection contains several specimens. The following is Solander's account of it.

“BALISTES ORNATUS, (*B. aculeatus*, L. Syst. 406-6, *secundam*, Sebam.) “Aer'h. Aelhitea.”

“*Piscis supra medium anticè pallidè olivaceus, posticè fuliginosus infra medium albicans. Maxillæ sordidè lutescentes. Fascia intensè cærulea supra maxillam superiorem, unde vitta utrinque ad latera capitis, paulo ponè basin pinnæ pectoralium extensa lutca. Inter oculos fasciæ quatuor cæruleæ. Infra oculos ad basin pinnarum pectoralium fasciæ tres angustæ cæruleæ. Infra medium corpus fasciæ quatuor obliquæ. Prima incipiens paulo ponè pinnas pectoris ad anum extenditur: Secunda angustissima pinnæ parallela: Tertia primæ similis: Quarta infernè flavescens. In caudâ quatuor ordines spinarum nigrarum. P. D. 1 ma. cærulescenti-pallida: 2da. pellucida. Anus intensè cæruleus. Iris lutescens. Pupilla nigra. Cauda intra aculeos glaucescens. Pinnæ pectoris pellucidæ immaculatæ.*”

HAB. Polynesia, Australia, Malay Peninsula, Seas of Borneo and China.

BALISTES VERRUCOSUS, *Linn.* (Cuv. *Règn. An.*)

*Balistes pratin*, Lacép. vol. i. p. 365.

HAB. Sea of China, Polynesia.

BALISTES RECTANGULUS, *Bl. Schn.*

*Balistes angulatus*, Solander, MS. *Anim. Oceani Pacif.* p. 57. Park. Icon. Bibl. Banks, no. 58.

Solander's description is as follows:—

“BALISTES ANGULATUS. “Aedhi, Oedi, or Oehli.”

“*Supernè sc. caput supernè et superna pars corporis ex olivaceo castaneæ. Gula, pectus, abdomen ad anum usque alba. Labia cinerea. Arcus cæruleus supra labium superius. Striga*

*nigricans ab anteriori parte orbitæ ad basin pinnæ pectoralis. Ab oculis obliquè descendit supra pinnam pectoris per latera ad pinnam caudalem, area magna latissima, nigra, prope oculos angustior, pone pinna pectoris maximam partem lateris occupans. Prope basin posticam pinnæ ani, et dorsi posterioris strigæ duæ e viridi flavæ, antrorsum obliquè exeunt, angulos acutos a latere formantes: primus angulus ad medium latus extenditur, alter dimidio brevior. Cauda nigra, quæ nigredo in angulum acutum antrorsum intra angulos lutescentes extenditur. P. caudalis basis tecta corio olivaceo castaneo, striga transversa lutea inter hanc et nigredinem caudæ. Pinna pectoris e glæneo pelluceida, prope basin striga transversa miniata. Aculei recumbentes plurimi in cauda: ordines tres intermedii plurimi (9-10) aculeis compositi: laterales ab unico tantummodo vel altero.*"—Solander, l. c.

Parkinson's figure represents the colour as buff orange, with an oblique black stripe crossing the pectoral region, and extending from the eye to the tail. The acute, black chevron on the tail has green borders and lines, and the caudal is green.

HAB. Polynesia. Sea of Borneo and China.

#### NEMICHTHYS SCOLOPACEA, *Richardson.*

PLATE X. Fig. 1-3.

Of this apparently novel form I can give but an imperfect account. There is only a single specimen which I am unwilling to mutilate by dissection, and from its shape, it cannot be examined otherwise by a microscope, while its parts are too minute to be readily seen by the aid of a common eye-glass.

Its general form is thread-like, more slender near the head, swelling out by degrees in the anterior quarter of the body, and again tapering imperceptibly into the caudal extremity, which is as fine as a hair. The eye is large, and is very conspicuous from its dark purplish blue colour. The jaws are long and slender, and the cleft of the mouth extends back to the posterior part of the eye. The length of the upper jaw seems to depend on the prolongation of the premaxillaries, and the slender maxillaries lie more exteriorly at the angle of the mouth, which they form, their lower ends slightly overlapping the limbs of the mandible. The interior surfaces of both jaws are convex, and are entirely covered like a file with short triangular or semi-lanceolate teeth, having their points inclined backwards. There appear to be about six rows of these teeth on each premaxillary, and the dental surface narrows off to a mesial point at the entrance of the gullet. The maxillaries are armed with three rows of similar teeth. The limbs of the mandibles recede towards the angles of the mouth, so as to receive the mesial dental plate of the upper jaw between them, the maxillaries lying exterior to both. There is no visible tongue. Nine or ten gill-rays, as slender as a fine hair, and curved like the gill-rays of a *Muraena*, support the branchiostegous membrane. A narrow space beneath divides the gill-openings, which reach upwards to about half the height of the head. The anus is placed between the middles of the small pectorals, and is with great difficulty detected.



The very tender, pointed pectorals, are sustained by about eleven rays. Between them the belly bulges a little. The back is furnished with a numerous series of short, subulate, acute rays, each having a short membrane in its axilla, and being destitute of joints, but shrivelling as they dry, and without pungency. They can be traced from the occipital crescent of the cranium to within an inch of the hair-like point of the tail, but as this has been injured by handling, their exact termination could not be determined. The tip of the tail under a high magnifying power showed no vestige of caudal rays, but its surface being somewhat abraded, the absence or presence of dorsal or anal rays on it could not be determined. The anal rays commence at the verge of the anus, and are considerably larger and more numerous than the dorsal ones. They are also unjointed, but one or two of them in the middle of the series, where they are longest, are split at the tips. A low continuous membrane connects their bases, and probably originally extended to their tips, but if so, it has, from its delicacy, been in great part destroyed. A fine groove running along the middle height of the body represents the lateral line. Mr. Adams has noted the colours of the recent fish as being dull white, with dark brown spots, and the head as having a pink tint. The spots are small, and mostly confined to the ventral surface, very few rising above the lateral line. Under the lens their borders appear radiated. The skin is quite scaleless. Length, 14 inches.

HAB. Southern Atlantic.

CIRRHITES ARCATA, *Cuv. et Val. Hist. des Poiss.*

*Perca? areata*, Solander, MSS. A. 64.

Radii.—Br. 5; D. 10|11; A. 3|6; C. 15 $\frac{6}{8}$ ; P. 8 et VI.; V. 1|5.

PLATE V. Fig. 3-5.

This fish is described in the *Histoire des Poissons* by the specific name which we have adopted, though the preferable orthography is *arguata* or *arcuata*. In Solander's MSS. the word appears to be *areata*, and the following is his account of the species:—

“PERCA AREATA (“Pahulhu-t'aeo”). *Piscis glaucus, area lata a medio pisce ad caudam per lineam lateralem e rubicundo aurantiaca. Ponè oculum arcus oblongus aurantiacus, limitibus rubris, inferiore in lamina postrema operculorum lituræ tres luteæ. Margo infimus laminae operculorum branchiarum aurantiacus, carina juguli nigricans. Apex labii inferioris flavus. Striga flava, supra mandibulam superiorem. Pinnae ventrales ponè pinnas pectorales. Narium apertura antica tubulosa, saturatissimè aurantiaca. Iris argentea. Pupilla oblonga nigra. Pinnae sordidè lutescentes, exceptá pinná caudali quæ in medio glauca. Squamæ majusculæ. In multis similis PERCÆ MUNDÆ.*”—Solander, l. c.

The various-coloured lines mentioned by Solander can still be distinctly traced on our specimens. The length of the head is contained three and one-third in the total length of

the fish, caudal included. The thickness of the body scarcely exceeds one-third of its height, and this again is more exactly one-third of the length. The upper margins of the orbits are prominent but obtuse, rendering the space between them concave. The width of this is rather less than a diameter of the orbit. The line of the closed mouth descends with a moderate curvature, and does not extend backwards beyond the front of the eye. The teeth on both jaws are disposed in dense villiform bands, with an exterior row of stouter subulate ones, not rising much above the general surface, nor very regular. There is a stout conico-subulate canine on the front of each premaxillary at some distance from the symphyses, and a somewhat more slender one on the anterior third of the mandible. Between these and the symphyses, above and below, there are several smaller subulate teeth in the exterior row. The prominent chevron of the vomer is covered with fine, short, villiform teeth; the palate-bones and tongue are toothless. The height of the preorbital does not quite equal the diameter of the orbit, its disk is uneven, and its edge entire. The rest of the suborbital chain is narrow. The large cheek is covered by six oblique rows of scales, intermixed with numerous much smaller scales. It is bounded posteriorly by the curved preoperculum, which is entire on its lower third, and finely and equally toothed on the edge above. The opercular scales are larger, but are also mixed with minute ones. The bony operculum ends in an obtuse corner, beneath which the bone is rounded off. Very small, densely crowded scales cover the interoperculum, limbs of the mandible, temples, and interorbital space, but there are none on the maxillary. Forty-six rows of scales exist between the upper angle of the gill-opening and base of the caudal. The lateral line runs parallel to the back, bounding the upper third of the height, and is traced by a series of small, short tubes, as well as by the rows of scales beneath it being more oblique than the upper rows. Length, 5 inches.

HAB. Otaheite. Mauritius. Cape of Good Hope.

Solander mentions a variety in the following terms:—

“Pahulhu toeo, A. 167, no. 6. PERCA AREATA *varietas absque areâ laterali. Piscis e purpureo-cinereus. Corpus immaculatum. Caput naresque omnino uti in antecedente. Iris ex argenteo extus rubicundo, intus lutea. Pinna dorsalis anticè e pallidè-miniato, viridinebulosâ; posticè basi rubescens; medio glauca, apice flavescens. Pinnæ pectoralis corpore concolores immaculatæ. Pinnæ ventrales et ani fuscæ. Pinna caudalis radiis luteis. Piscis idem cum antecedente eodem die captus.*”

#### APERIOPTUS PICTORIUS, *Richardson.*

Radii.—D. 13; A. 11; C.  $18\frac{2}{3}$ ; P. 11; V. 9.

PLATE X. Fig. 4-5.

Of this fish I can give no details. There were two specimens which I unfortunately placed in the hands of the artist before I had examined them, except very cursorily. While he was employed in sketching, he put them into a plateful of water for the purpose of ex-

panding their fins more perfectly, and forgetting that he had not returned them into the spirits, they were thrown out and lost. The general aspect of the fish is that of a slender *Galaxias*, but there are no teeth on the jaws. The orifice of the mouth is a narrow vertical oval, which is restricted on the sides by membranous processes. The figure is of the natural size.

HAB. Borneo.

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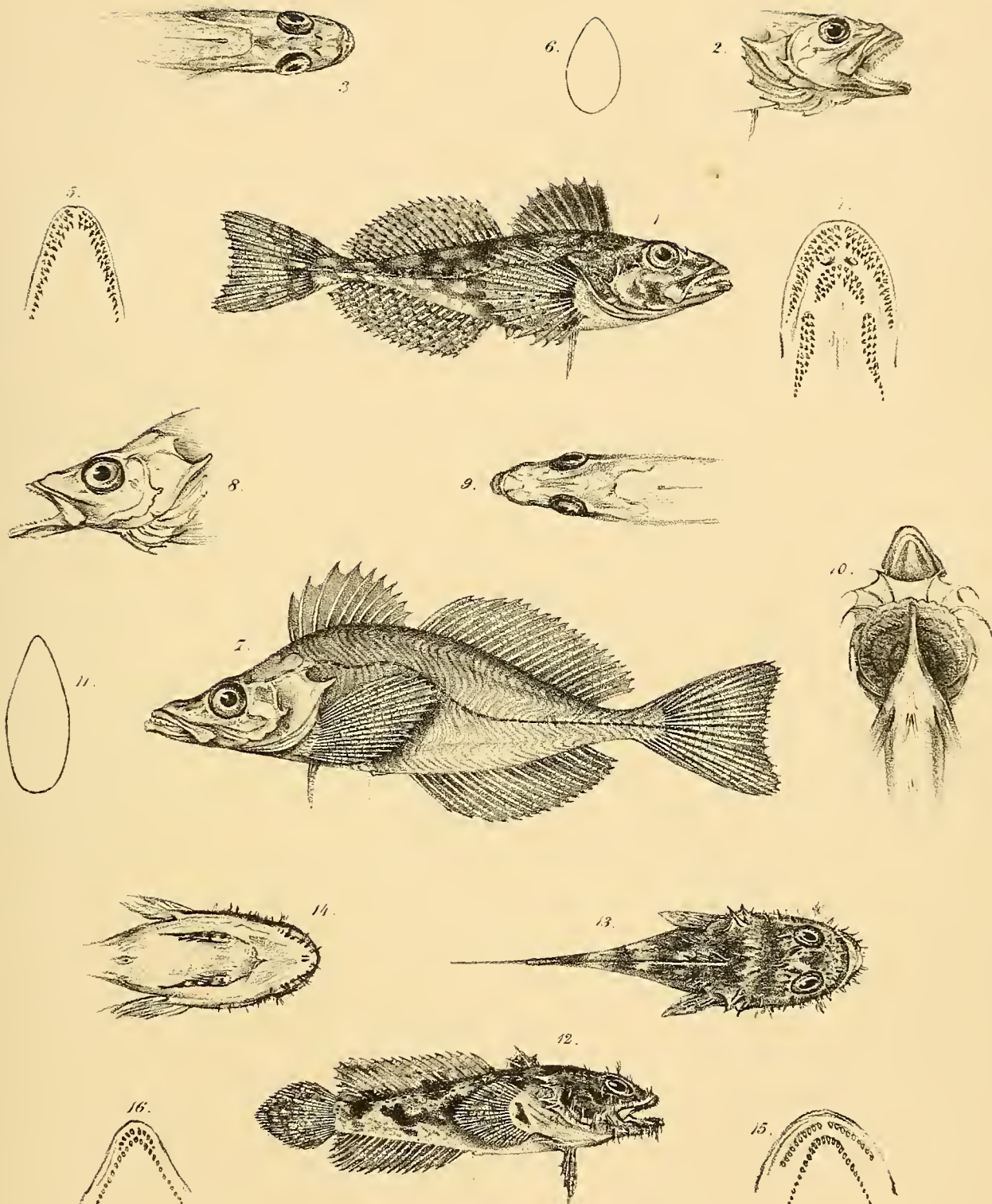


FIG. 1-6. PODABRUS COTTOIDES. FIG. 7-11. PODABRUS CENTROPOMUS.

FIG. 12-16. BATRACHUS QUADRISPINIS.



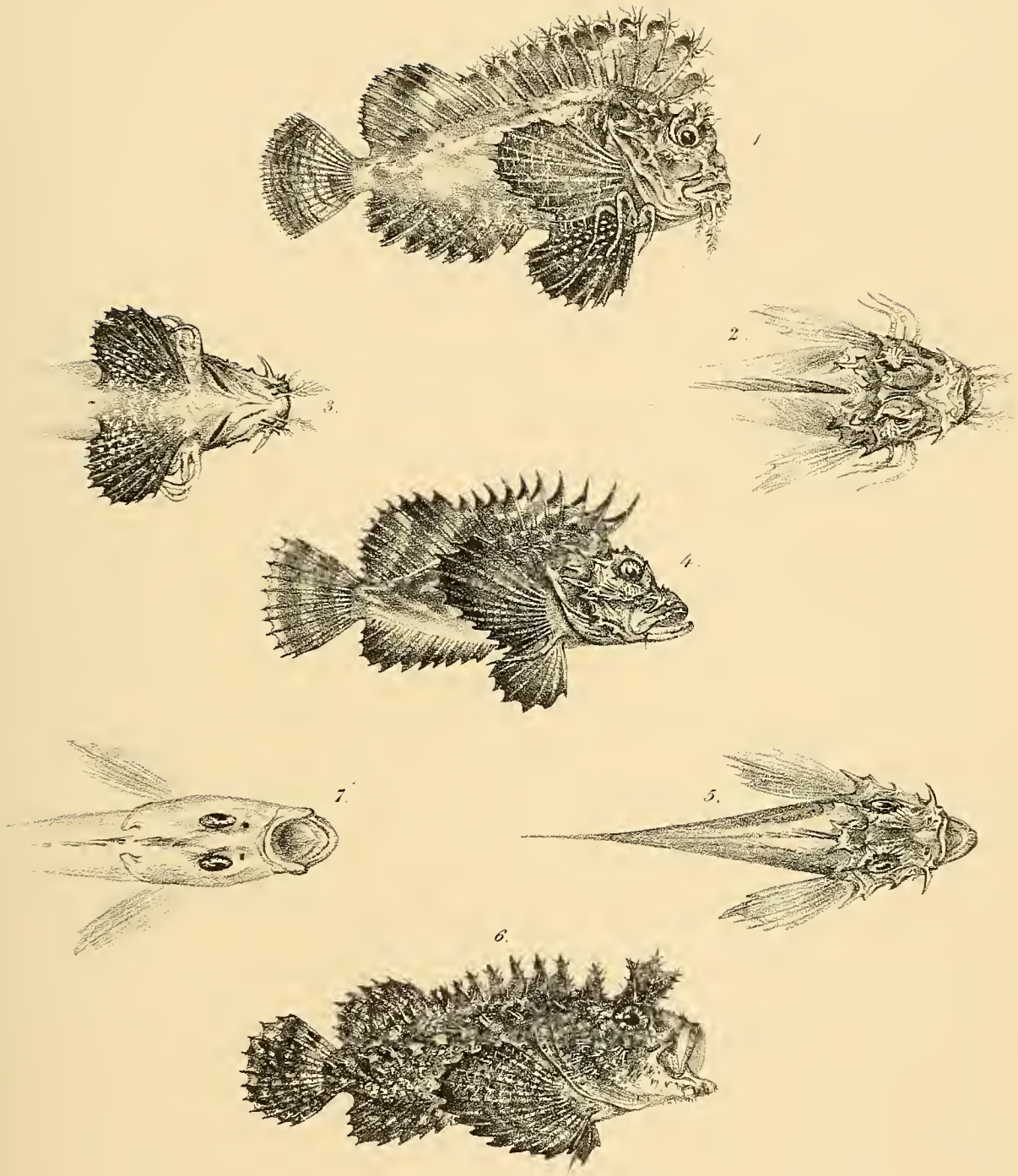


FIG. 1-3. *MEGALACTYLUS MULTIBARBUS*. FIG. 4-5. *MINOUS*. (DANIEL)

FIG. 6-7. *STHENOPUS MOLLIS*.





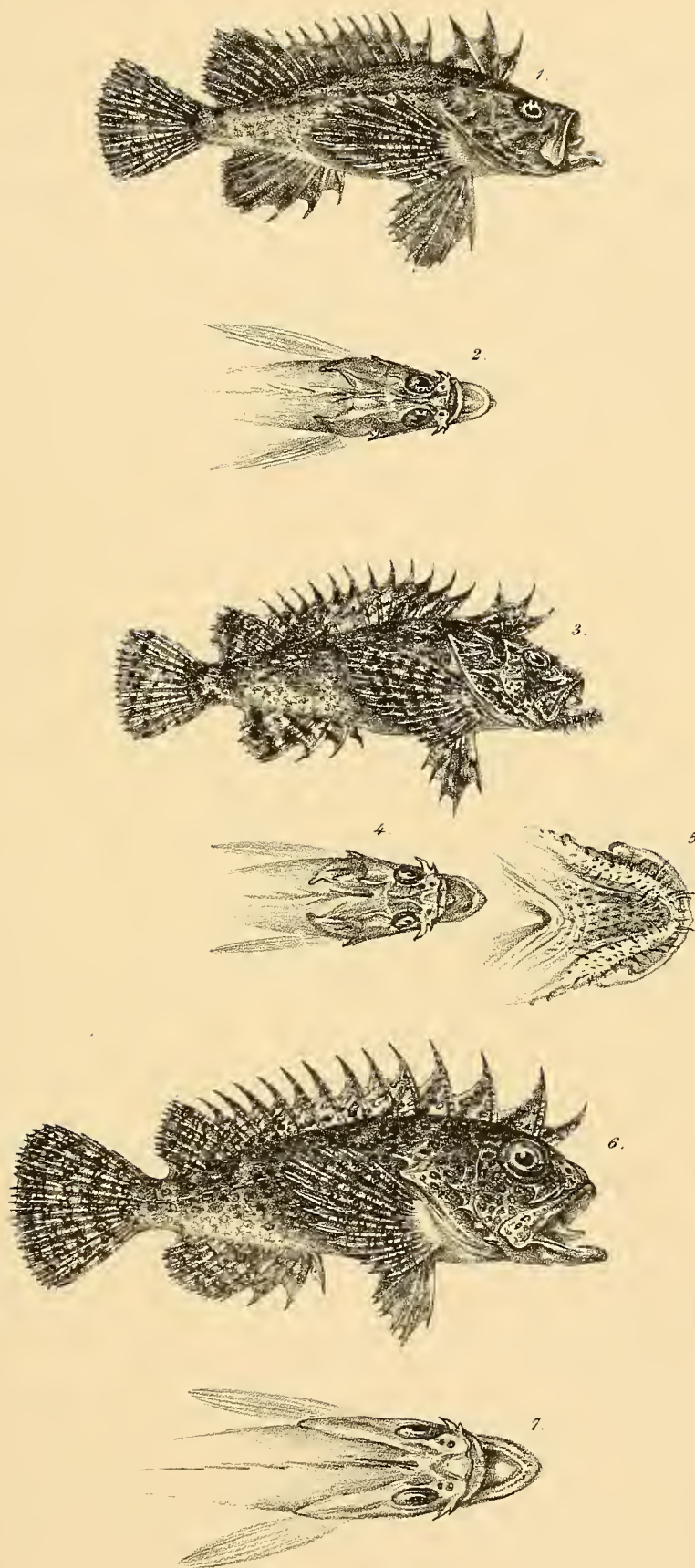


FIG. 1—2. APISTES DEPRESSIFRONS.  
— 3—5. APISTES TRACHINOIDES.  
— 6—7. APISTES COTTOIDES.





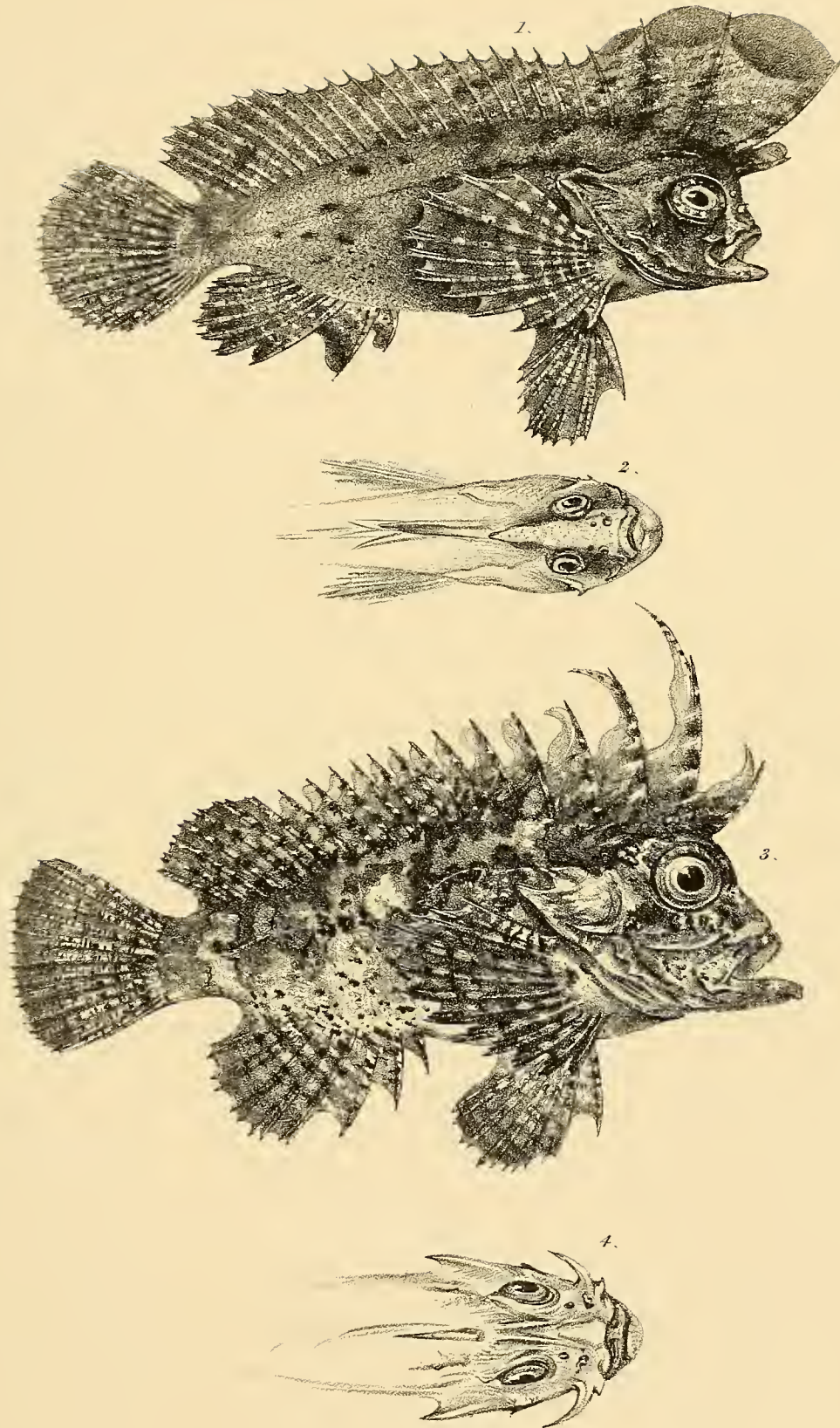


FIG 1, 2 APISTES TÆNIANOTUS

FIG 3, 4 APISTES MULTICOLOR



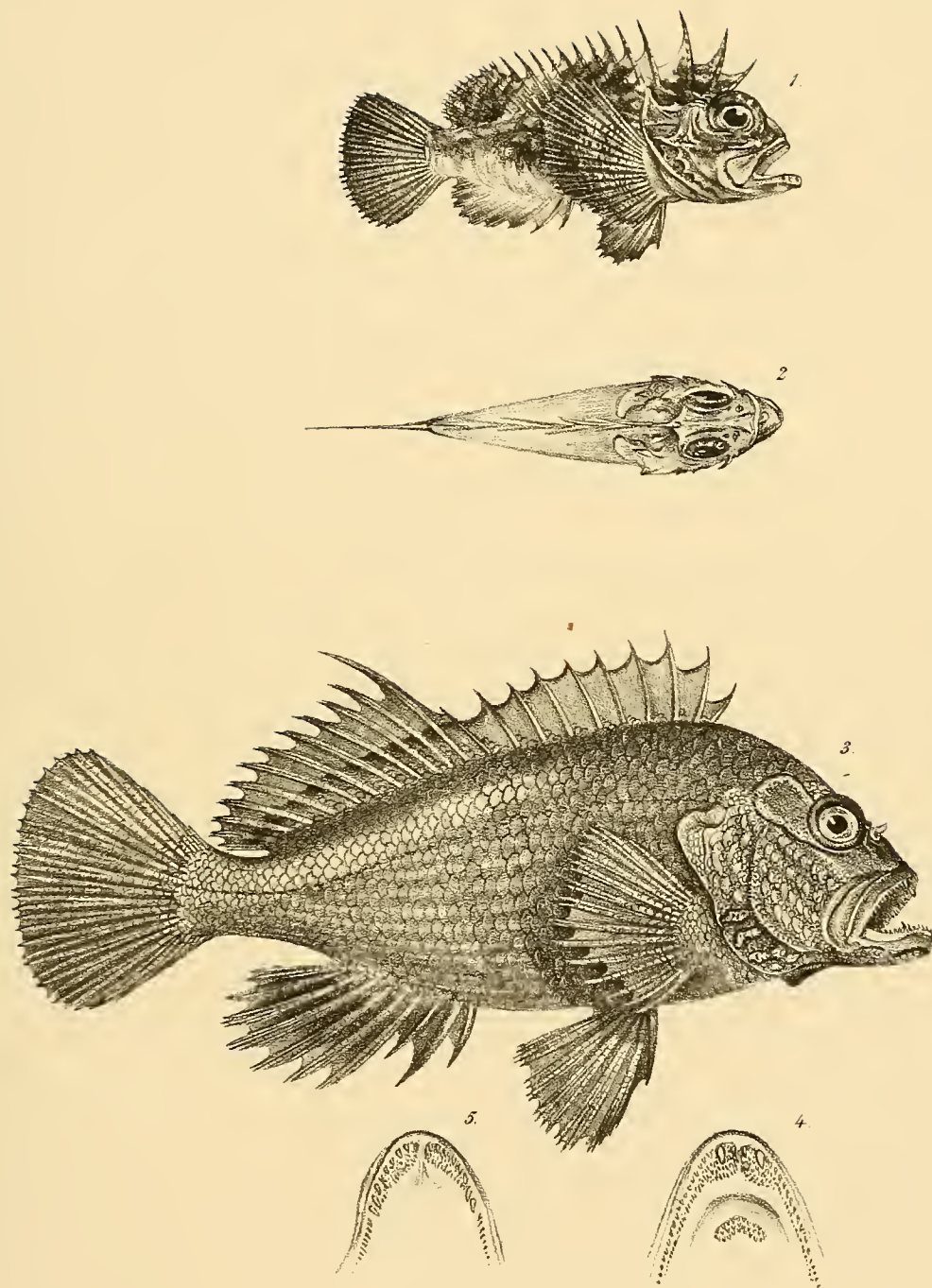
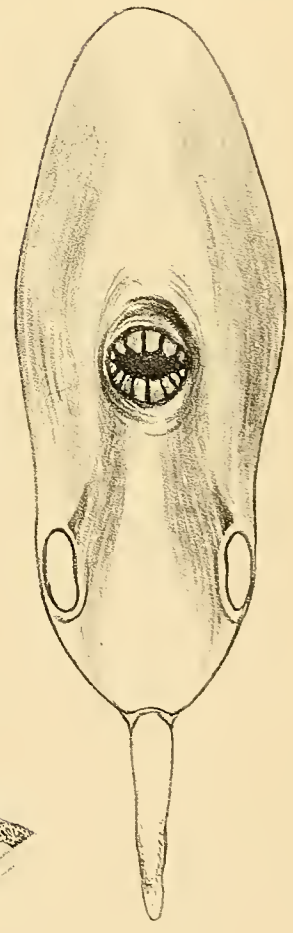
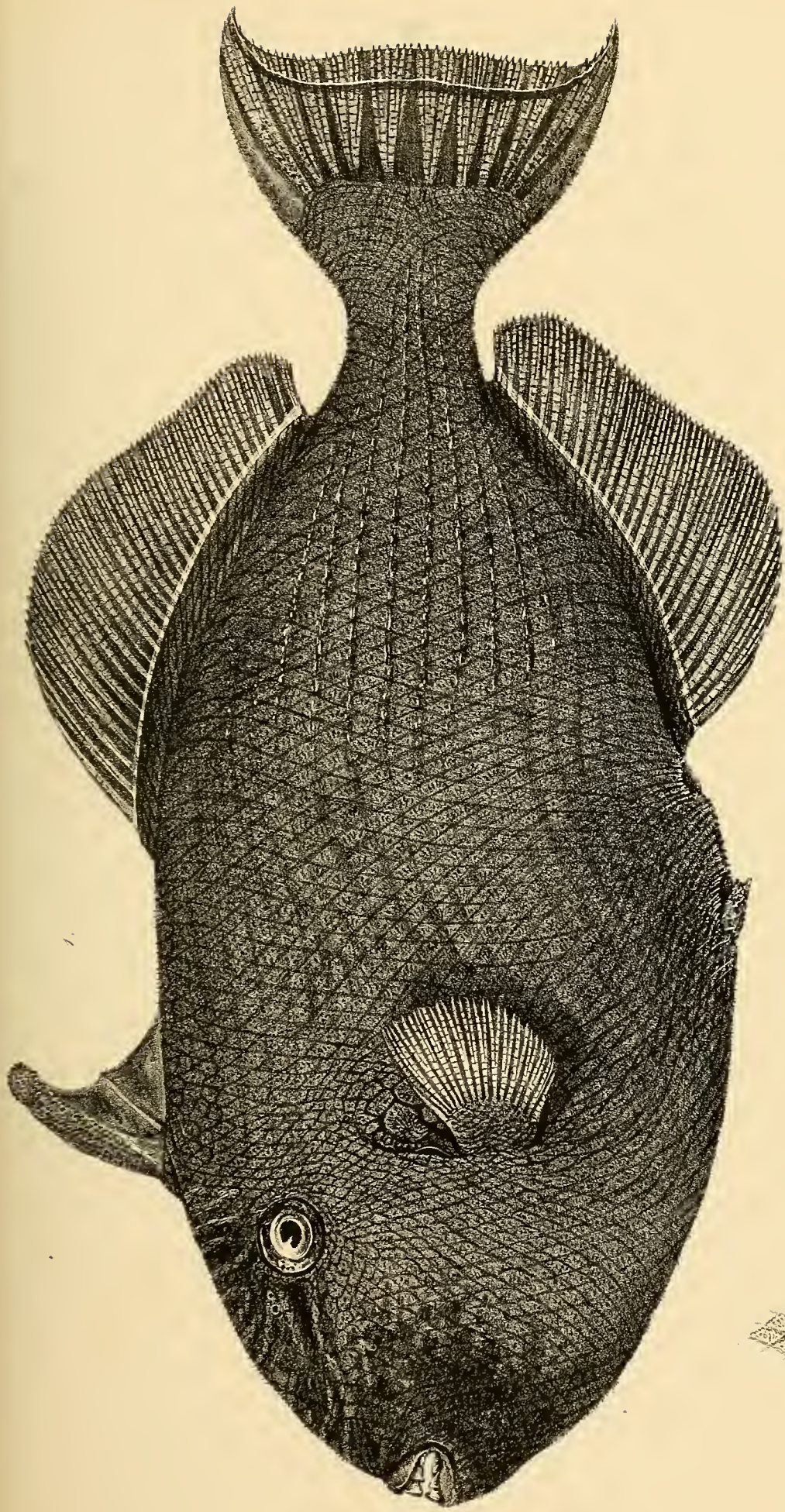


FIG. 1-2. *APISTES LEUCOGASTER*.

FIG. 3-5. *CIRRHITES ARCATA*.



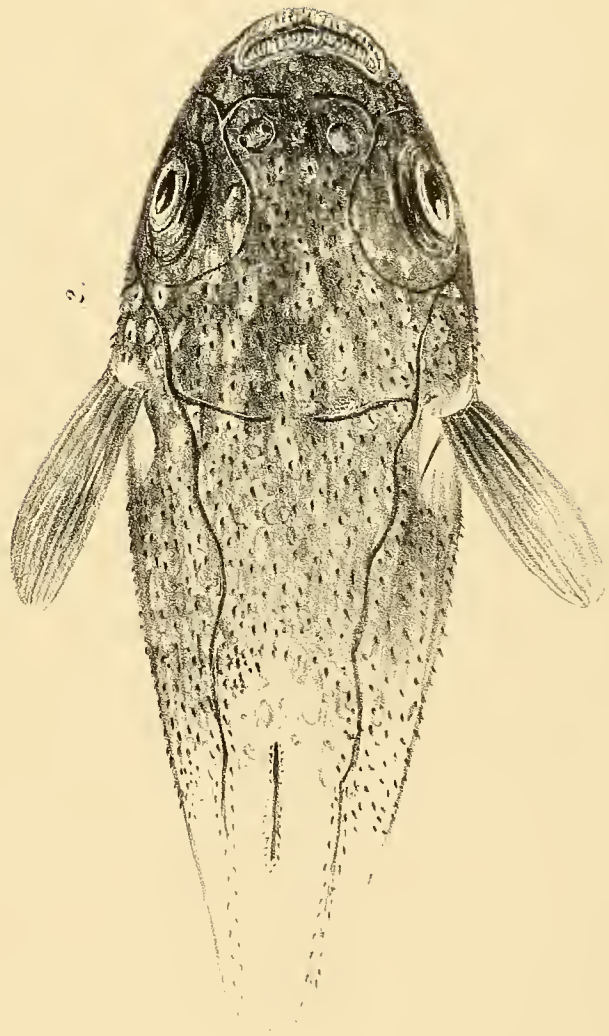
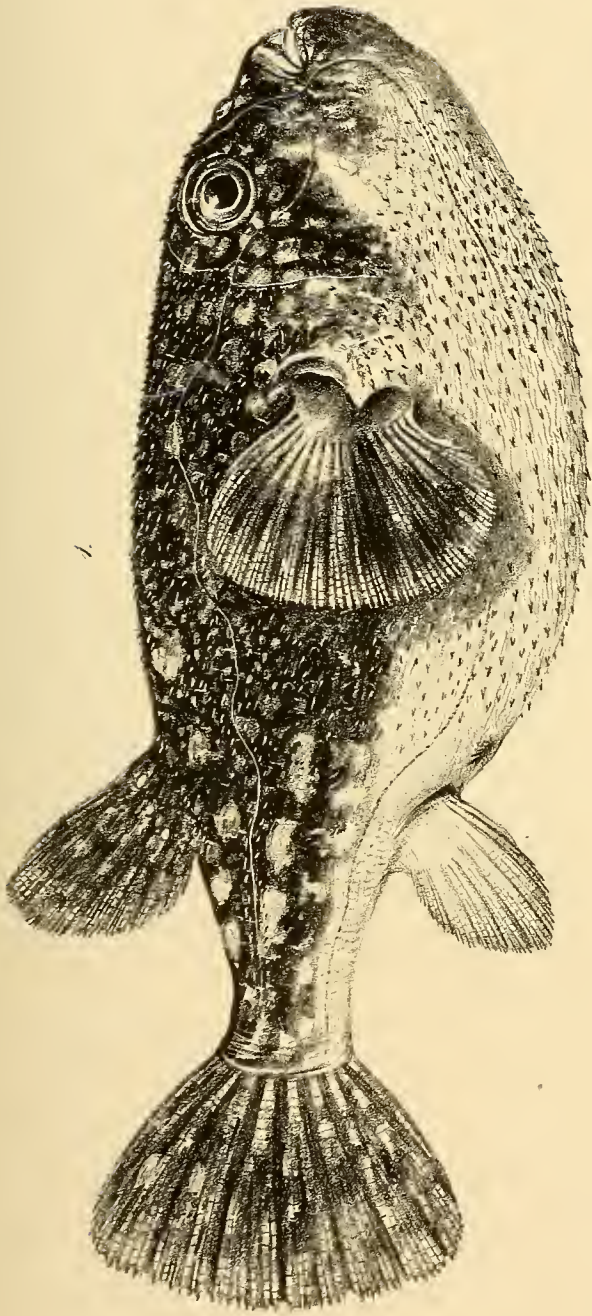




BALISTES RINGENS





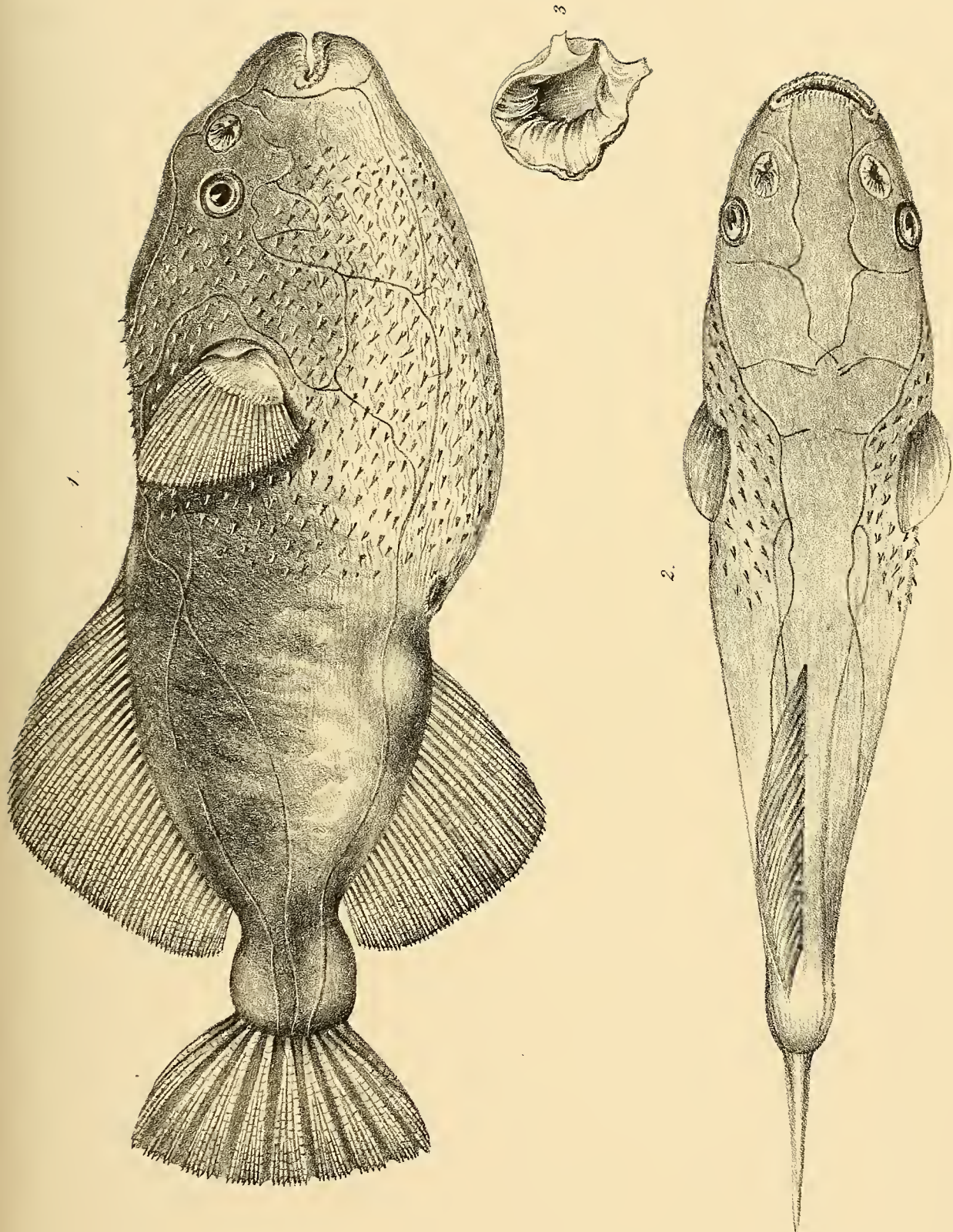


TETRODON ATRATUS





TETRODON NARITUS.







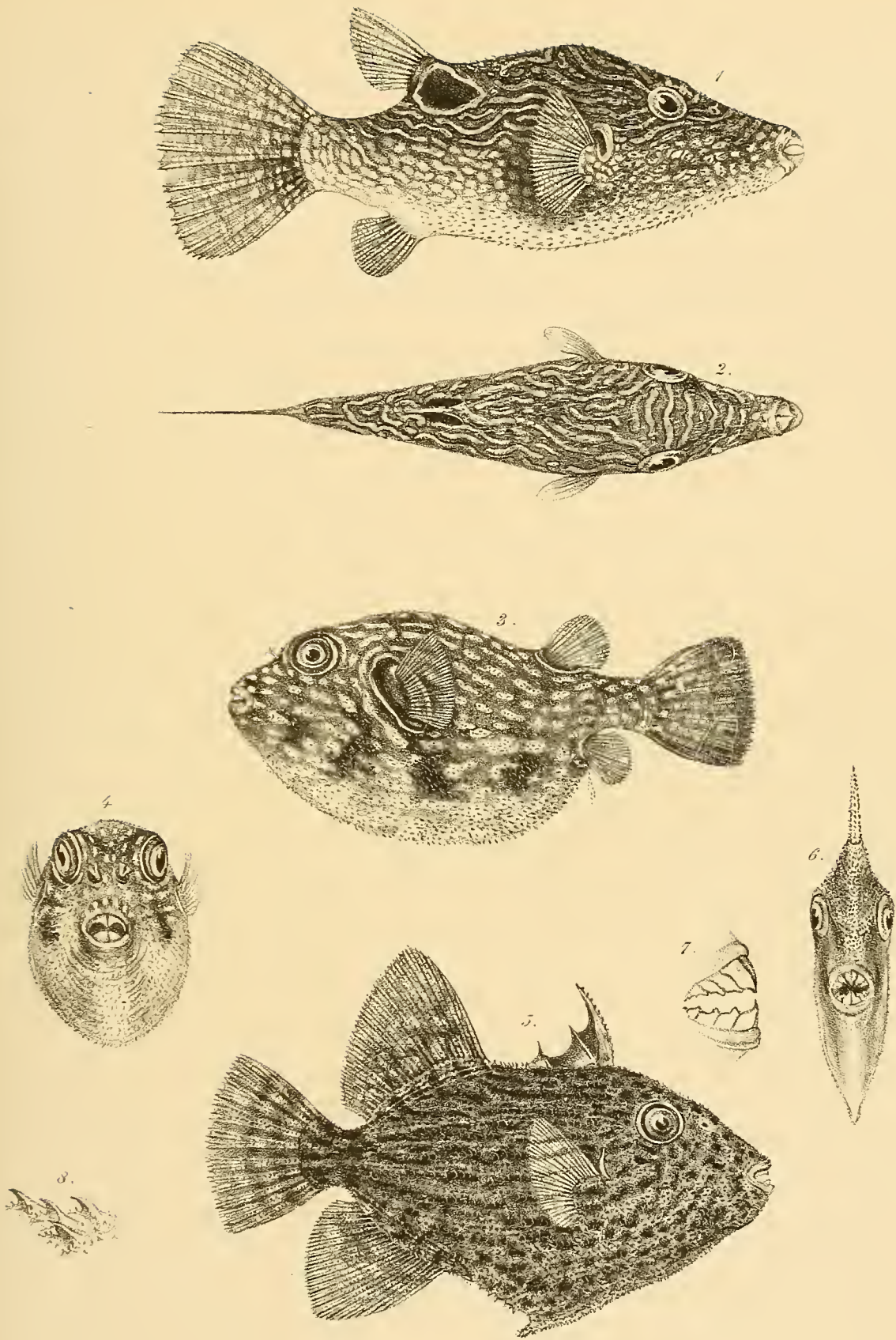


FIG 1 2. TETRODON INSIGNITUS. FIG 3. 4 TETRODON HISTIDUS.

FIG 5 6 BALISTES SENICOSUS.





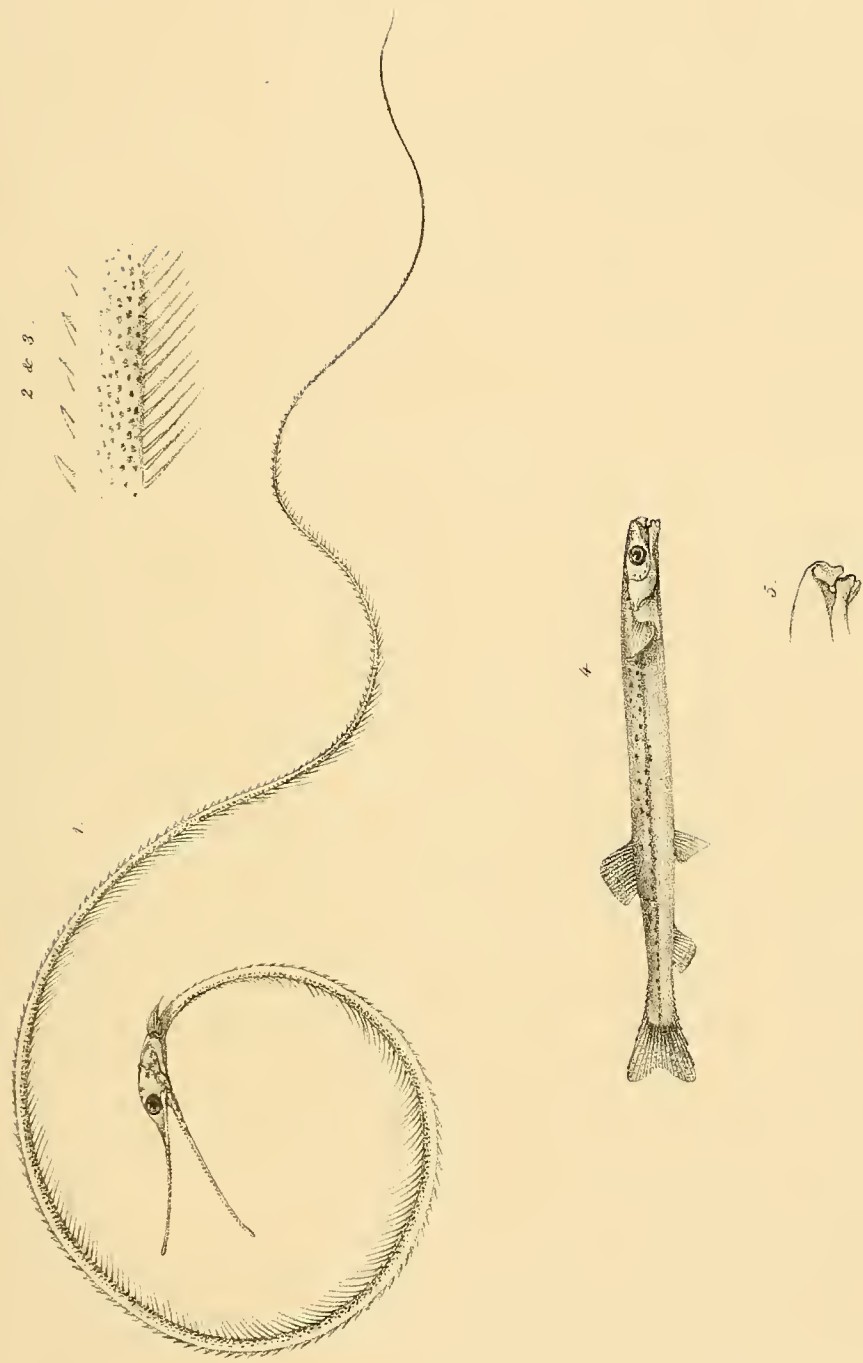


FIG. 1-3. NEMICHTHYS SCOLOPACÆA. FIG. 4-5. APERIOPTUS PICTORIUS.

Beane, Buchanan & Rowe, 1849



## INTRODUCTION TO THE MOLLUSCA.

pp. 1-24 - 1848; pp. 25-44, 1850, pp. 45-88, 1850

THE portions of the bed of the ocean subject to examination during the Voyage of H.M.S. Samarang comprised the coasts of that portion of the volcanic zone of islands termed the Banda Group, including Java, Timor, Ternate, &c., from thence to the great chain commencing with Gillolo, Borneo, and Celebes, northwards through the Philippine Islands and Bashee Group to the north-east, through the Loo-Choo Archipelago, the Meiacoshima Islands, and Corean Archipelago, as far as Japan; and homeward across the Indian Ocean, visiting the lagoon islands of Keeling, the great barrier reef and islets of St. Brandon, the Mauritius, and the Agulhas Bank, to the Cape of Good Hope.

In the Straits of Sunda an opportunity was afforded of examining for the first time the animal of *Phorus*, six out of seven species of which are natives of these seas. Passing through the Straits of Gaspar, the soundings varied from sixteen to twenty fathoms, the floor being soft mud: the Mollusca obtained were species of *Clavatula*, *Pleurotoma*, *Phos*, *Ringicula*, *Ovulum*, and *Erato*. In that portion of the China Sea which lies between the extremity of the peninsula of Malacca and the island of Borneo, we obtained *Crassatella radiata*, *Cancellaria antiquata*, *Corbula tunicata* and *crassa*, several species of *Cylichna*, *Ringicula*, *Nucula*, *Pleurotoma*, *Marginella tricineta*, and single valves of the *Cardilia semi-sulcata*, besides *Phorus Indicus* and *Solarioides*, *Terebellum subulatum*, and *Rostellaria fissa*. The China Sea, forming one of the narrow gulfs or divisions of the great Pacific Ocean, enclosed by Borneo, the Philippines, and Formosa, seems to resemble a shallow basin, the floor of which is formed of mud, gravel, and the debris of dead shells; and although probably the sediment of the numerous large rivers, which carry down mud, sand, and gravel, would



not raise its bed in any considerable degree for ages, yet the Meinam and Camboja rivers, subject to inundations which loosen the earth of their banks, must continually alter the nature of the floor. The Hoang Ho, or Yellow River, alone daily contributes forty-eight millions of cubic feet of earth, which may partly contribute to the turbid appearance of its waters, and cause an uneven surface, inhabited chiefly by mollusks whose progression is rather a succession of jumps than a gliding motion. The gradual accumulation of alluvial matter must destroy large numbers of molluscous animals that live buried or at the surface of the mud, and as successive generations take their place above them, which in turn suffer the same fate, vast beds of accumulated shells will be formed like those among which our dredging operations were conducted, which in process of time will fill up the estuaries and increase the dimensions of the continent. Many new species were procured by placing the produce of the dredge in large wire sieves, washing it clean by pouring water on it, and picking out the small shells with forceps: in this manner several beautiful *Triphoris*, *Scaligeria*, and *Liotia* were obtained. In the Sooloo Islands the water is very deep outside the barrier reefs, the bottom is for the most part muddy, and the tide runs between the islands at the rate of four miles and a half per hour; the *Phos roseatus*, *reticulosus*, *Blainvillii*, and *senticosus* were abundant, the caudal extremity of the animals of all the species ending in a slender filament. *Terebræ*, *Mitræ*, *Pectunculi*, *Carditæ*, and *Conus thalassiarehus* were obtained. Crossing from Sooloo, we proceeded along the east coast of Borneo, and anchored for about twelve days outside a sand-bank about a mile and a half from the easternmost point of the province of Unsang. This part of the coast of Borneo is very flat, the bottom within the fringing reefs is sand and broken coral: numerous species of *Cypræa*, *Rotella*, and *Oliva* were obtained here; and in the large swampy lagoons and rivulets of brackish water slender *Melania*, *Assimineæ*, and *Neritinæ* were collected. Within Cape Rivers, at the north-western extremity of Celebes, a belt of coral extends from the extreme outer islet to the southward for about a mile and a half, where it joins the main and forms a snug harbour, with about eight fathoms in the bight. As there is a rise of tide of about nine feet, many parts of these reefs are left bare at low water, and abound in Mollusca. In many places the dark and slug-like bodies of *Parmophori*, and the crawling forms of the *Stomatellidæ*, especially those named by Mr. J. E. Gray *Gena*, which cover a portion of their shells with the foot, were seen gliding about the coral beds; while scarce a stone was turned without disturbing

*Chitonelli*, which slide rapidly away or conceal themselves in holes. In every part where solid rock was seen the bright blue gills of the *Tridacna* were visible in the fissures, while *Nerita* and *Patella* covered the stones along the shore. As soon as the tide rose and bathed the rocks, *Conia* and *Balani* that encrust them exhibited a strange appearance, millions of branchiated feet being then extruded from the apertures of their shells, all vibrating at once in a regular measured manner, and forming little vortices around them; various Gastropods, now beginning to feel the water welling up around them, would be seen to dilate their locomotive discs, exert their siphons, and cautiously forsake the holes and crevices where they had lain concealed; while on the sandy patches the siphons of the *Solen* and the *Maetra* were protruded from innumerable holes, stirring the soil with their beautiful fimbriated extremities. At Manado, another part of the coast of Celebes, the coast line is very different, and seems to consist of the side of a volcanic mountain, the anchorage, at the distance of a mile from the shore, being in 150 fathoms, with a floor composed of iron-stone sand. In the fresh-water ponds and rivulets *Aurricula subulata* and *Conovulus leucodon* were found upon the moist banks in company with species of *Assimineæ*, and on the mud-flats of the river, during the reflux of the tide, myriads of *Clithon*, *Neritina*, and *Melania* were observed; while *Pirena* were numerous in the bed of the river, where the water was deeper. The *Neritina sulcata* was found on the foliage of tall trees, many hundred yards from the river. *Neritina* and *Navicella* were obtained from floating sticks, and from the petioles and roots of the Nipah palm; while *Ampullariæ* were not uncommon in the still ponds, many being observed on the stones out of the water. The shores of the volcanic island of Gillolo, and others of the Molucca Archipelago, with arms separated by narrow channels of the sea, surrounded by barrier reefs and coral fringes, abound with molluscous animals. On some of the shallow shores, especially where there were no currents, the water was appreciably warm, averaging about 84° Fahr., whereas throughout the ocean generally it is usually about 39° Fahr. Among these islands, as elsewhere, we found herbivorous mollusca, that feed upon the *Algæ* and *Fuci* covering the rocks and stones:—*Purpura*, *Littorina*, and *Nerita* on exposed rocks, *Chiton* and *Doris*, *Patella*, *Siphonaria*, and *Vermetus* adhering to the stones, with *Mytilus*, *Ostræa*, and *Byssosarca* anchored in the clefts. A little further out, the *Natica* and *Olives*, partly covered by their foot, form burrows in the sand in company with *Nassa* and *Pyramidella*, while *Venus*, *Solen*, and the

light-shelled *Maetra* perforate obliquely the yielding soil. On the reef *Cowries* and *Stomatella* abound; outside the barrier *Marginella*, *Fusus*, *Pleurotoma*, *Clavatula*, and *Strombus*; while in the deep water, more seaward, *Terebratula*, *Cylichna*, *Nucula*, and *Neera* are met with. At Leegeetan, in Borneo, there are many miles of low mangrove-swamp, partly watered by trickling rivulets, where thousands of *Telescopium* and *Potomis*, or *Cerithium palustre*, are seen partially buried in the mud, their spires bristling the surface; amongst the tangled mangrove-roots were numerous *Cassidula* and *Quoyia*; in the half-stagnant ponds *Melania* were abundant, and, crawling on the soft muddy banks, forming slender tracks, were *Nematuro* and *Assimineia*; in the damp woods near, *Auricula Midæ*, *Scarabi*, and *Pedipes* were obtained; *Pterocyclos parvus*, *spiraculum*, and *spiracellum*, and *Cyclostoma planorbulum* were found among decayed leaves, in the fissures of rocks near the margin of the forest, while *Choanopoma concinnum* and *nitidum* were seen inhabiting the foliage of the trees; *Scarabi* were very numerous, usually hiding under dead leaves, but crawling about briskly after rain. The number of herbivorous mollusca peculiar to Borneo, judging from our limited exploration, does not seem so great as we might be led to expect from its abundant vegetation and warm, humid atmosphere; the large *Helix Brookei* and the *Bulimus Adamsii*, together with *Nanina vittata* and some others, were, however, obtained from this island.

From the circumstance of the islands of the Eastern Archipelago lying within the tropics, the equinoctial line extending nearly through the centre, the Mollusca partake of characters exhibiting general uniformity; but when one group is separated from the rest, as the Philippine by the seas of Sooloo and Celebes, several peculiarities occur in their distribution. The genera *Stomatia*, *Gena*, *Stomatella*, *Mitra*, *Mangelia*, and *Liotia* appear principally confined to this group. Whether it is owing to the laborious and successful efforts of the Prince of Collectors, Hugh Cuming, Esq., which have made the Mollusca of these islands known, or whether to natural causes, it is certain these islands harbour a vast number of forms. The constant flow of water towards these equinoctial regions may tend to favour the submarine migration of Mollusca thither, added to which, the vast stores of nutriment and the higher degree of temperature of the water, favour their growth and reproduction. Upwards of fourteen species of *Cyclostrema*, as many of *Liotia*, whose habitats are known, have been collected among the Philippine Islands; while sixteen



species of *Stomatella*, nine of *Stomatia*, sixteen of *Gena*, and a small new genus belonging to the same group, were also procured by Mr. Cuming from the same locality, appearing to represent the *Haliotis* family of Australia and the *Chitonidæ* of America. The members of this group are tolerably brisk in their movements, crawling among the stones and coral at high water, and hiding under stones during the reflux of the tide; they have the power of spontaneously throwing off the hind part of the foot when taken, in the same manner as the *Ophiurus* parts with a ray, or a Crustacean a claw. Out of forty-seven species of *Mangelia* described by Mr. Lovell Reeve in his beautiful monograph of that genus, no less than forty-three are from these islands; their favourite locality is coarse loose sand, either sand-patches on the reefs, or under stones in deeper water outside the reefs, or in still deeper water where the sand is mixed with mud. The species which live at considerable depths, as *M. abyssicola*, *cinnamomea*, and *tenebrosa*, are dark-coloured and strongly ribbed; those that prefer the loose sands are generally granulated, finely ribbed or cancellated, and of a light brown colour; while light-coloured species, as *M. Marginelloides*, which are seen crawling over mud-flats, are often covered with a fuscous epidermis. Perhaps the amount of colour in shells depends upon the degree of light they are subject to: as light does not penetrate lower than 700 feet, Mollusca dredged from very deep water are usually colourless, while species living on the rocks are usually brightly coloured. On turning large stones, groups of *Ricinula Columbelloides*, *Rissoæ*, and other gregarious genera, as *Truncatellæ* and *Melampii*, which are amphibious, were constantly met with, and during the night *Neritæ* were observed crawling actively in company over the stones; and in the pools within the barrier reefs, numbers of *Limæ* were observed darting rapidly about. In the Samboanga Roads very few shells were obtained, as the tide sets through them with great rapidity, and no soundings can be obtained further off shore than half a mile, where the floor is composed of dead coral, black sandy mud, and loose pebbles; a coral reef, however, borders the shore all along this part of Mindanao, within which the water is comparatively shallow and filled with marine vegetation supporting numerous *Fissurellæ* and *Emarginulæ*. In fresh-water ponds and rivulets near the village of Calderas, *Navicellæ*, *Melaniæ*, and *Neritinæ* were very numerous; but no *Ancylæ*, *Ampullariæ*, or Bivalves could be detected. The *Bulimus chloris* was very abundant on the mountains: it glues itself to the under surface of leaves; the eggs are very large, oval, calcareous, and of the same size at each end, and the young shell, which

occupies the entire cavity before extrusion, is perfectly pellucid. In the woods of Ambolan and other small islands at the east end of Mindoro, although the pulmoniferous Gastropods were in a state of æstivation, specimens of *Caracolla* (*Listeri* and *rota*) were obtained from under loose bark; *Helicina polita*, *Bulinus fetilis* and *sylvanus*, adhering to the branches; *Chondropoma atricapillum* and *læve* attached to the under surface of the leaves; *Megalomastoma alatum*, *Pupina Mindorensis*, *similis*, and *lubrica* hiding in clusters amid the holes and fissures of the banks; and species of *Cyclostoma* proper, concealed under loose stones and dead leaves, at the foot of the trees. While slowly sailing through the calm and beautiful sea of Mindoro, the young of two species of *Dolium* occurred in light brown patches, mixed with floating *Algae*, among which were also species of pelagic *Aplysiadæ* and several Nudibranchs, which seem to browse on these pygmy forests like caterpillars on the trees, clinging by their long grooved foot to the stems of the *Fuci*, and relieving by their gaudily-coloured bodies the monotony of the submarine scenery.

The Batani Islands, or Bashees, a volcanic group, which forms a link of the great chain connecting the Philippines and Formosa, and which is continued by means of isolated craters to the Loo-Choo and Japanese Archipelagoes, exhibits rather a barren field to the labours of the malacologist. Originally torn from the Philippine chain, they still bear traces of their plutonic origin in the shape of old exhausted volcanoes and magnetic iron-stone. On the sheltered side of Ibujos, however, extensive reefs afford good retreats for mollusca; but the strong tides and black shifting sand render the other shores very unproductive. The inland parts, however, harbour numbers of the beautiful *Helix speciosa* and three varieties of *Bulinus Kochii*, together with a new sinistral snail, our *Helix Batanica*. There appears to be a sandy belt between China and the Bashee group, for on the coast, about forty miles from the north-east point of Hong-Kong, soundings were obtained in thirty-four fathoms, fine sand; this extends as far as the Pratas shoals, and between the latter and the Bashee Islands. *Clavatula robusta* and other species, *Murex pinnatus*, *Isocardia Moltkiana* and *vulgaris*, and a small species of *Scalaria*, were dredged here. From the North Bashees to Sama-Sana the full force of the N.E.E. current is felt, the nearer Formosa the stronger, but north of this it perceptibly diminishes; hence, northern species of marine mollusca would be more probably met with as you approach the islands of the Eastern Seas, than southern species among the Korean Archipelago; the currents, moreover, isolating the islands from

the main land, may possibly assist in determining a peculiar Fauna, but as we did not visit the opposite shores of Asia, we were unable to judge from personal observation if such is the case; near Botel Tobago sounding could not be obtained with 150 fathoms of line. The Meiacoshima group, though never forming Attolls, abounds in barrier reefs and coral fringes, which sometimes extend from a half to three-quarters of a mile from the shore. *Fissurellæ* abound within the reefs, where the vegetation is abundant, and where, together with *Emarginulæ*, they crawl among the branches of the arborescent *Algæ*. The flats and plains covered with coral, forming extensive shoals among these islands, are frequently dry at low water, where *Mitra exasperata* and *arenosa*, with *Turbo*, *Ricinula*, *Conus*, *Cypræa*, *Lima*, *Pecten*, *Terebra*, *Pteroceras*, &c., occur in tolerable abundance.

The superficial temperature gradually diminishes from the tropical seas towards the southern hemisphere; hence we find the forms of molluscous animals growing less numerous and of less brilliancy of colouring as we recede from the equator. The most favourable localities for harbouring Mollusca are among the bays and reefs of archipelagoes where the coasts are low and shelving, and where the water remains shallow at some distance from the shore. On this account the Philippine and Gallapagos Islands afford rich harvests to the collector, but bold and rugged coasts, particularly if the result of volcanic agency, are not prolific in mollusks; the waves dash against them and rend off large masses, which, falling into the sea, alter the nature of the floor, while the soundings give a great depth of water close in shore. This we found to be the case with the Bashees; when, however, the tops of ancient submarine mountains are crowned with belts of coral, as in the Loo-Choo, Meiacoshima, and Corean groups, mollusks are tolerably abundant; but even here their existence seems to depend upon the presence of coral. In Quelpart, for instance, where the perpendicularity of the sides of this deep-seated submarine mountain will not allow of the formation of coral, few shells are found. This island appears to be surrounded by a zone of lower submerged hills, for in lat.  $33^{\circ} 24' N.$ ,  $127^{\circ} 47' E.$ , we made the east point (west  $37''$ ) and obtained soundings in fifty-five fathoms; as we neared the land, however, the water gradually increased till within a distance of five miles, when it again gradually decreased, and the same circumstance was observed on approaching it at other points. *Haliotis gigantea* was found strewing the ground in large numbers; the *Terebratula picta* of Chemnitz, and other species, were obtained from the deep channels between the islands, and *Stomatia rubra* and *Crepidulæ* from the reefs.



Among these islands we were fortunate enough to discover four new species of Chitons, a circumstance the more satisfactory from the fact of so few species of this genus having been noticed in the Asiatic region, and most of those confined to the Philippine Archipelago; for while the Australian region boasts of the greatest number of *Haliotides*, the American can muster the largest amount of Chitons, and the other zoological regions would appear to be remarkably deficient in both genera. Out of one hundred and forty-three species described and figured in Mr. Recve's beautiful monograph of the genus, sixty-six come from America, forty-two from Australia, fourteen from Asia, twelve from Europe, and nine from Africa. But two or three have been found in the Pacific, while ten are peculiar to the Philippines. *Chiton hirudiniformis* was found by us among these islands, and is also peculiar to the Gallapagos Archipelago; and *C. spiniger*, of the Philippines, appears to represent *C. occidentalis* of the West Indies. The largest and most brilliant species come from the tropical seas; the smallest and most obscure from cold climates, or from considerable depths, in accordance with the known laws of geographical distribution. Northern Chitons have the valves covered either partially or entirely by the mantle, as in *Chiton Sitkensis*, *C. tunicatus*, and *C. auriculatus*; the *C. chlamys* will probably be found to have come originally from a cold climate. I have frequently found Chitons among the islands of the Oriental Archipelago, adhering to the stones in the society of *Neritæ* and *Patellæ*, at very considerable distances from the water, and perfectly exposed to the burning rays of a tropical sun. At Cape Rivers we discovered, adhering to stones on the reefs, three new and beautiful species, namely, *Chiton pectatus*, *C. acutirostratus*, and *C. formosus*.

The floor along the eastern coast of Africa consists of fine clear sand, forming in many situations vast accumulations, like the Agulhas bank projecting from the Cape, which arises to within a few fathoms of the surface. These banks are prolific in *Ancillariæ*, *Marginellæ*, and *Bulliæ*. The shells collected at the St. Brandon Shoals, or Gargados Garajos, were remarkable for their white appearance; *Voluta costata*, *Cerithium*, and *Cardium* were all of this colour, as were also the only species of Cone (*Conus verrucosus*) and of *Pleurotoma P. virgo*.—A. A.

# MOLLUSCA,

BY

ARTHUR ADAMS, F.L.S., & LOVELL REEVE, F.L.S.

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## I. CEPHALOPODA.

The chief objects of scientific interest collected during the voyage of the Samarang among the highest forms of Mollusca, consist of a new *Loligopsis*, *Argonauta gondola* with the soft parts, a species not hitherto described which we propose to name *A. Owenii*, and two mutilated specimens of the *Spirula Peronii*. No living *Nautilus* was detected throughout the course of the expedition, though it was assiduously sought for, which circumstance may be recorded in further testimony of the rare appearance of this deep-dwelling animal on the surface of the ocean. A very complete specimen was collected by Sir Edward Belcher in the Sulphur, and its anatomy has been fully demonstrated by Owen, Valenciennes, and Vogel. The capture of the animal of *Spirula*, of which the shell has been so long and abundantly known to naturalists, though imperfect, was a matter of great good fortune, and it is with much pleasure we are enabled to give a detailed account from the pen of Professor Owen of such parts of its anatomy as the specimens present. The drawing of *Argonauta gondola*, taken from life, presents an additional evidence, if any were needed, of the cephalopodic origin of these fragile Paper Sailors, and the *Loligopsis*, of which Professor Owen kindly promises the dissection before the close of our volume, will prove a valuable acquisition towards the history of that somewhat obscure and little-known genus.

Before proceeding to describe these animals in detail, Mr. Adams notes the following on the *Octopi* of the Eastern Seas.

*Octopi* of enormous size are occasionally met with among the Islands of the Meïa-co-shimah Group. I measured one, which two men were bearing on their shoulders across a pole, and found each brachium rather more than two feet long, giving the creature the power of exploring an area of about twelve feet

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without moving, taking the mouth for a central point, and the extremities of the arms, to describe the circumference. Dorsal plates of *Sepiæ*, a foot and a half in length, are found strewn the beaches. I have frequently observed the *Sepiæ* and *Octopi* in full predatory activity, and have had considerable trouble and difficulty in securing them, so great is their restless vivacity at this time, and so vigorous are their endeavours to escape. They dart from side to side of the pools, or fix themselves so tenaciously to the surface of the stones, by means of their sucker-like *acetabula*, that it requires great force and strength to detach them. When removed, and thrown upon the sand, they progress rapidly in a sidelong, shuffling manner, extending their long arms, ejecting their ink-like fluid in sudden violent jets, and staring about with their huge shining eyes, which at night are luminous, like a cat's, in a very grotesque and hideous manner. *A.A.*

### 1. LOLIGOPSIS, *Lamarck.*

1. LOLIGOPSIS ELLIPSOPTERA. *Lolig. pallio* magno, laxo, infundibuliformi, anticè aperto, semipellucido, per cujus parietes viscera obscurè conspiciuntur, extremitate caudali longâ et fastigiâtâ, confirmatâ, atque intus corpore longo, gracili, penniformi, corneo sustentatâ; *lobis* caudalibus, sive pinnis, magnis, depressis, extra rotundatis, formâ semicirculari conjunctis, pinnam ovalem horizontalem terminalem efficientibus; *infundibulo* permagno, extremitate truncatâ; *capite* magno, rotundato, utrinque dilatato, oculis grandibus, depressiusculis, argenteo-iridescentibus, pupillo nigro; *brachiis* octo trifariam divisus, duobus superioribus medianis, tribus inferioribus brevibus, acetabulis undique munitis.

HAB. North Atlantic Ocean.

The *Loligopsis* belongs to that family of Cryptodibranchiate Cephalopods which is characterized by the possession of eight brachial appendages around the head; differing in this respect from the *Loligo* of Lamarck, and the *Cranchia* of Leach, which belong to the decapodous division or those with ten arms. M. de Férussac considered, however, that the genus *Loligopsis* should be reunited with *Cranchia*, so little was then known of the nature of this mollusk. Lesueur has bestowed the name of *Leachia* on this genus, which, in addition to its conferring an honour on our illustrious countryman, Dr. Leach, would, perhaps, have been more appropriate than the received appellation, which sometimes tends to confound it with *Loligo*. This present species, which appears to come nearest to the *Loligopsis pavo* of D'Orbigny, is of a delicate flesh colour, with scattered, pale brown blotches, the whole surface of the mantle being finely punctulated with a deep brown colour. The mantle is large, loose, infundibuliform, and wide open anteriorly; it is semipellucid, and the internal viscera may be indistinctly seen through its parietes. The caudal extremity is long and tapering, strengthened and supported internally by an elongated, slender, pen-shaped, corneous body. The caudal lobes, or fins, are large, flattened, rounded externally, semicircular in outline, and forming together an oval, horizontal, terminal fin, which constitutes the principal organ of progression. The funnel, of great size, is nearly cylindrical, semitransparent, and rather expanded at its fixed or basal portion. The head is large, rounded, and considerably dilated from side to side. The eyes are very large, in form of a flattened spheroid, having the black-coloured sclerotic marked, on the under-surface, with four silver spots; the iris is of a beautiful golden hue, and the pupil is large, black, and circular. The brachia, eight in number, are divided, by reason of their length, into three sets: the central set, con-



sisting of two upper and two lower, are short; the two external and upper ones are longer and thicker; and the two external and lower are of much greater length, strength, and thickness. They are all provided with acetabula on the lower-surface.

The name *elliptoptera* has been suggested by the curious oval fin which is developed at the caudal extremity. The drawing which accompanies this description was taken from the living animal, and is enlarged one-third of its natural dimensions.

PLATE I. Fig. 1. Increased one-third larger than life.

## 2. ARGONAUTA, *Linn.*

Of the Argonauts captured during the voyage, we are enabled, with the assistance of some specimens collected in the same seas by Mr. Cuming, to confirm the value of two very excellent species, *A. hians* and *gondola* described in 1817 by Mr. Dillwyn<sup>1</sup> but not figured; one subsequently named *A. nitida* by Lamarek, the other quoted by M. Deshayes as a variety of *A. tuberculosa*. To these we have the pleasure of adding a third species, *A. Owenii*, which has been satisfactorily determined by a comparison of the shells of each in different stages of growth. The soft parts of *A. hians* are figured in the beautiful work of De Férussac and D'Orbigny on the Cephalopods.<sup>2</sup> Of the *A. gondola*, Mr. Adams was fortunate enough to preserve a young individual for some days alive, during which time he made a careful drawing of it, including the development of the ovum. Living specimens were also taken of the *A. Owenii*, and placed in spirits, but the liquid having escaped from the bottle through some accident in the packing, the animals dried up and were found partially decomposed; the shells were preserved entire and form a characteristic series of different ages, agreeing with one of adult growth in the collection of Mr. Cuming.

1. ARGONAUTA GONDOLA. *Arg. corpore* elongato-ovato, lateribus subcompresso, pallio amplo punctis grandibus vividè rufis ornato; *capite* subangusto, *brachiis* tumidis breviusculis, acetabulis paucis, grandibus confertiusculis rufo-marmoratis; *velamentis* minutè rufo-punctatis; *infundibulo* lato, breviusculo, ad extremitatem bifurcatim tubuloso; *testâ* lateribus subplanulatâ, radiatim rugatâ, rugis subprominentibus, vix undulatis, alternis brevioribus, medio descendentes, supernè dilatâtâ, auriculis extrorsum valdè prolongatis; *carinâ* latissimâ, fortiter tuberculatâ, tuberculis acutè compressis; *aperturâ* latissimâ, suboblongo-quadratâ, anticè utrinque spiram canaliculatâ; *colore* lacteâ, sordidè fusco ad latera plus minusve tincto. *A. gondola*, *Dillwyn, Descriptive Catalogue of Shells*, vol. i. p. 335.

HAB. South Atlantic Ocean.

The animal of *A. gondola* approaches nearer to the *A. hians* figured by De Férussac and D'Orbigny in the work already referred to; from which the shell differs most remarkably by the outwardly prolonged growth of the auricles on each side of the spire. The keel is moreover wider with the tubercles rather distant and more compressed. The wrinkles are much less numerous than in *A. tuberculosa*, and do not fade into solitary warts as in that species.

<sup>1</sup> Catalogue of Shells, vol. i. p. 334-5.

<sup>2</sup> Hist. Nat. Moll. 1834. pl. 5.

There is a considerable difference in the general aspect and disposition of the spots, &c., between the animals of *Argonauta gondola* and *argo*. In *A. gondola* the sac-like mantle is more ovoid and elongated; the head is narrower; the funnel broader, shorter, and furnished, at the upper and anterior extremity, with two conical elongations; the eyes are considerably larger and slightly more prominent; the tentacular arms are much shorter in comparison and of greater width, more particularly at their basal portions; the suckers are much larger, more prominent, and placed closer together. This species varies also considerably in colour from *A. argo*. The extremities of the brachia are marbled with deep red-brown, and, in the other parts, are covered with large, irregular, oval, reddish blotches, each margined with a dark colour; the circumference of the suckers is marked with brown spots; the upper surface of the funnel is covered with pale pink, rather scattered and irregular, quadrate blotches, margined with dark red-brown; the mantle, on the dorsal surface, is densely sprinkled with round and square spots of a chestnut-brown and crimson of different sizes; the velamenta are minutely dotted with crimson and red-brown, and have a more bluish tinge than those of *A. argo*; the under surface is mottled and minutely dotted with dark chocolate on the arms, and on the body is marked with small, irregular, dark red-brown spots. *A. A.*

PLATE I. Fig. 2 *a*. Animal swimming, embracing the shell with its velamenta. Fig. 2 *b*, the same divested of its shell. Fig. 2 *c* to *h*, development of the ovum,—*c*, impregnated egg; *d*, three spots appear; *e*, head and mantle indicated; *f*, rudiments of brachia; *g*, yolk-bag seen; *h*, lateral view of the same. Fig. 2 *i*, egg-mass *in situ*; 2 *k*, egg-mass unravelled; 2 *l*, front view of egg-mass. Fig. 2 *m* and *n*, acetabula; 2 *o* and *p*, the mandibles.—Fig. 2 *a*, *b*, *i*, *k*, and *l*, of the *natural size*, the remainder *more or less magnified*.

PLATE II. Fig. 2 *q*. Front view of a full grown specimen of *A. gondola*, from Mr. Cuming's Collection, showing the outward extension of the auricles. Fig. 2 *r*, *s*, and *t*, lateral views of specimens of different ages.

2. ARGONAUTA HIANIS. Arg. *testa* lateribus convexis, radiatim rugatis, rugis exiliuseulis, vix undulatis, alternis brevioribus medio descenditibus, *carinâ* latâ, tubereulis compressis, *aperturâ* subquadrato-oblongâ, auriculis simplicibus; colore fusceseente. *A. hians*, *MSS. Dillwyn, Desc. Cat. of Shells*, vol. i. p. 334. *Argonauta vitida, Lamarck*.

HAB. South Atlantic Ocean.

Several examples of this species, easily distinguished from the *A. gondola* by the following characters, were collected in the South Atlantic Ocean. The wrinkles are more faintly developed, the keel is not so broad, and the tubercles are much less prominent; the auricles are but slightly prolonged, and the shell has frequently a peculiar yellowish-brown glazy appearance, which probably suggested the name given to it by Lamarck. Both animal and shell have been figured by De Férussac and D'Orbigny in the work already referred to. The latter is here introduced for the sake of exhibiting a comparison of the species, and on account of that work being so little known to English conchologists. The shell there figured as the young of *A. hians* is our *A. Owenii*.

PLATE III. Fig. 2 *a*. Front view of the shell showing the aperture and simple auricles. Fig. 2 *b* and *c*, lateral views of specimens of different ages.

3. ARGONAUTA OWENII. Arg. *testâ* lateribus convexo-compressâ, radiatim rugatâ, rugis angustis, valdè prominentibus, undulatis, alternis brevioribus medio descenditibus; *carinâ* mediocri, fortiter tuberculatâ, tubereulis valdè promiuentibus; *aperturâ* subangustâ, auriculis simplicibus; colore fulvo-fusceseente.

HAB. South Atlantic Ocean.

A fine adult specimen of *A. Owenii* (Fig. 1 *b*), collected by Mr. Cuming, has enabled us



to attach an interesting importance to several examples of this species in an early stage of growth, which were captured alive, but unfortunately dried up from an accident in the packing. It is mainly distinguished by the prominent structure of the lateral wrinkles and tubercles, and these are developed with equal force in the youngest specimens. It is clearly distinct from *A. hians*, for the young of which species a small specimen was figured by De Férussac and D'Orbigny in their great work on the Cephalopods, Hist. Nat. Moll., published in 1837. In naming this shell we have availed ourselves of the rare occurrence of a new species to dedicate it to Professor Owen.

PLATE III. Fig. 1 *a*. Front view of the shell, showing the aperture and simple auricles. Fig. 1 *b*, *c*, and *d*, lateral views of specimens of different ages.

On our passage home across the South Atlantic, I enjoyed numerous opportunities of observing the animals of *Argonauta argo* and *gondola* in the living state, specimens having been captured by us in large numbers by means of a trawl, as they came to the surface of the water at the decline of day in calm weather, in company with *Carinaria*, *Hyalea*, *Firola*, and *Cleodora*. My observations all tend to prove, as might have been expected, the accuracy of Madame Power's observations on the Cephalopodic origin of the shell, and the fanciful nature of the statements of Pliny, Poli, and the poets.

It is quite true that the female Argonaut can readily disengage herself from the shell, when the velamentous arms become collapsed, and float apparently useless on each side of the animal; and it is equally certain that she has not the power or, more properly, the sagacity to re-enter her nest and resume the guardianship of her eggs. On the contrary, she herself, if kept in confinement, after darting and wounding herself against the sides of the vessel in which she is confined, soon becomes languid, exhausted, and very shortly dies. Numbers of male Argonauts were taken by us, at the same time, without any shells, and this being the season of oviposition may account for the females, in such a number of instances, being found embracing their calcareous shell-nests, which, so ingeniously formed by the instinct of the mother for the protection of her eggs from injury, resemble, in some measure, those nidamental capsules secreted by many marine Gastropods for the preservation of the immature embryo.

To satisfy myself that the thin shell of the Argonaut is employed by the female merely as a receptacle in which to deposit her eggs, I dissected a specimen of *A. gondola*, with an egg-mass occupying the discoidal part of the shell and the posterior portion of the roof. The eggs, very numerous, ovoid, pale yellow, and semipellucid, are all united together by a delicate, glutinous, transparent, filamentous web which is attached to each ovum by a slender tapering peduncle at the anterior extremity. The entire egg-mass is suspended to the body-whorl of the spire at its anterior part by means of a pencil of delicate glutinous threads which retain it in a proper position.<sup>1</sup>

The posterior globular part of the body of the female is in close apposition to the mass of ova, and thus, like a strange aquatic Mygale, or other spider, does this remarkable Cephalopod carry about her eggs in a light calcareous nest, which she firmly retains possession of by means of the broad, expanded, delicate membranes of the posterior pair of tentacles. When disturbed or captured, however, she loosens her hold, and leaving her cradle to its fate, swims about independent of her shell.<sup>2</sup> There is not, indeed, the slightest

<sup>1</sup> Poli in his magnificent work "Testacea utriusque Siciliae," where he has represented the egg-mass, though not "in situ" (Tab. XLI. f. 2.) but unravelled, observes concerning it: "Ovorum congeries eboris nitorem æmulantium, partim jam ab ovario emissa, ac racemorum instar composita, cymbæ puppi involutæ adhærebat." Professor Owen, in his lectures on Comparative Anatomy, p. 360, mentions the same fact: "In the Argonaut the minute ova are appended by long filamentary stalks to the cavity of the involuted spire of the shell where they are hatched."

<sup>2</sup> This is probably but for a limited period, as it does not appear that the animal is able to exist long when disengaged from its shell.



vestige of any muscular attachment. In the specimen of *A. gondola* from which the accompanying drawing was made, the ovary was distended with ova, but in a much less advanced stage of development than those deposited in the shelly nidus. Some of these latter were sufficiently matured to enable me to trace, under the microscope, the early indications of the being of the Argonaut; and although the progress is not followed very far, it is sufficient to ascertain the similarity with the changes observed by Poli in the same genus, with whose writings I afterwards compared my remarks; the only difference of any importance appears to be that Poli regarded as the shell what I have called the yolk-bag. At first, the ova are semi-opaque, pale yellow, and apparently speckled minutely, which is owing to the granular yolk; afterwards they become clouded with light brown blotches, and three dark spots make their appearance, one for each eye and one for the viscera; these spots, in the next stage, approach each other, and a faint outline of the future Argonaut is visible, a club-shaped embryo, rounded in front and tapering behind. The front part is then lobed; a black mark for the horny mandibles is perceived, and the eyes are large and prominent; the yolk-bag, or vitellus, is next seen very distinctly, and the processes extending from the head are more elongated. Here, however, I was obliged to stop, this being the most perfectly developed embryo I could find amongst the ova. The eggs in contact with the front part of the body-whorl of the shell, where the egg-mass is attached by the glutinous threads, are the most forward in their development, while those in the posterior part of the chamber are much less matured.<sup>1</sup> *A.A.*

### 3. SPIRULA, *Lamarck*.

Description of two mutilated specimens of *Spirula Peronii*, with some observations on *S. australis* and *reticulata*.

PLATE IV.

(By PROFESSOR OWEN, F.R.S.)

IT IS remarkable of the two known genera of polythalamous Cephalopods, *Spirula* and *Nautilus*, that both should be noted for the extreme rarity of the entire animal, as compared with the frequency of the shell in collections of Natural History; and this is more particularly the case with the *Spirula*, on account of the mutilated state, with a single exception, of all the few examples of the animal or soft parts hitherto described. The specimen captured by Capt. Sir Edward Belcher in the Indian Archipelago, is no exception to the rule. Like that inspected and described by Professor De Blainville in the *Annales Françaises et Etrangères d'Anatomie et de Physiologie, pour l'Année, 1837*, vol. i. pp. 369, 382, the head has been torn from the body, and the opposite extremity, or the part answering to that which supports the appendages, described as fins in M. de Blainville's memoir, is also wanting; so that the last whorl of the shell is terminal, as in the specimen figured in the Atlas of the Voyage of Péron and Lesueur, pl. 30. fig. 4. It does not necessarily follow, however, that this difference is the result of mutilation, and that the terminal part in question has existed in these specimens and been torn away. At least in Sir Edward Belcher's specimen, the rounded posterior terminations of the lateral lobes of the mantle, fig. 1, 4, 5, 7, *d d*, are entire, and covered by the epiderm, which shows no sign of laceration or abrasion.

To Lamarck<sup>1</sup> and Péron<sup>2</sup> we owe the knowledge of the acetabuliferous character of the *Spirula*; whence, after the dissection of the *Nautilus*, its dibranchiate organization was to be

<sup>1</sup> Encyclopédie Méthodique, Atlas, Coquilles, pl. 465, fig. 5, *a b*.

<sup>2</sup> Loc. cit.

inferred.<sup>1</sup> M. de Blainville<sup>2</sup> has demonstrated some of the chief characteristics of the dibranchiate type of structure from which the decapodous character of the head (wanting in his specimen) might be deduced, and thus concomitant inferential proof be had of the accuracy, before doubted, of Lamarck's figure. Finally Mr. Cuming's specimen, described and figured by Mr. Gray<sup>3</sup> and Mr. Lovell Reeve,<sup>4</sup> sets at rest the question of the external decapodous characters of *Spirula*, and confirms M. de Blainville's description of the terminal appendages of the mantle and the position and degree of exposure of the shell, at least in certain specimens of *Spirula*. It needed but the examination of the internal structure of Mr. Cuming's specimen to prove the accuracy of the inference of the dibranchiate type of internal organization from the decapodous external structure of the animal, and reciprocally.

Another point also remained for consideration, viz., whether the figure by Péron (pl. iv. fig. 1 \*), showing a comparative shortness of the mantle in proportion to its breadth, and the absence of the terminal disc and fin-like appendages, truly indicated such a form of *Spirula* in nature? Or, whether the continuous exposure of so large a portion of the outer whorl of the shell, as is represented by Péron, might not be due to accidental laceration of the disc and appendages from the rest of the mantle? And whether, if such differences were natural, they were differences of age, or sex, or species? Towards the solution of these questions, and the completion of the anatomy of the *Spirula*, the facts which I have now to offer, though not of much importance, may contribute: they are the result of careful and, I trust, faithful observation, and every little will be welcome to the genuine student of nature in a question of so much difficulty and interest as the present.

The specimen of *Spirula* (pl. iv. fig. 1, 4, 5, 6) which Capt. Sir Edward Belcher was so obliging as to place in my hands for description and dissection, like that of M. de Blainville, had the head and its appendages torn away; but the infundibulum (*c*) was left, with the mantle and shell (*ck*). The shell, partly imbedded in the hinder end of the mantle, had the greater part of the last whorl uninterruptedly exposed (fig. 7), and the thick borders of the terminal lobes of the mantle (*dd*, fig. 4, 7, and 11) which extended over the umbilicus and inner whorls of the shell, were smooth, rounded, and entire. The exposed part of the shell was coated by a thin epiderm: the last whorl was directed from the ventral to the dorsal aspect, bending round the end of the body, and advancing forwards, not again entering the mantle, but with the last or open chamber, terminating freely over a small opening of the mantle (fig. 6, *fn*) through which the membranous siphon of the shell (*sl*) passed, and from which opening part of the second whorl of the shell protruded. The proportions of the body, or mouth, especially its shortness as contrasted with its dorso-ventral diameter, accord with those of Péron's specimen (op. cit. and fig. 1 \*): as does also the exposed position of the last whorl of the shell, concomitant upon the absence of the terminal fleshy disc and its appendages.

<sup>1</sup> Owen, Memoir on the Pearly Nautilus, p. 54, and Classification of Cephalopods, Zool. Trans. v.ii. pp. 123, 129.

<sup>2</sup> Loc. cit.

<sup>3</sup> Annals of Natural History, vol. xv. p. 257. pl. XV.

<sup>4</sup> Elements of Conchology, p. 16. pl. A.



Figures 5 and 6 give a view of the mantle of the specimen here described from the dorsal aspect: the anterior aperture of the mouth is trilobed, the lobes obscurely pointed; one, *a*, projects forwards from the middle of the dorsal aspect, the two others, *b b*, from the ventro-lateral aspect, on each side of the base of the funnel, *c*. Some lacerated remnants of the retractor muscles of the head also projected from the aperture of the mantle, as figured at *e*, fig. 1; but these are omitted in fig. 3, as they obscured the view of the funnel or expiratory tube, *c*: letters *d d* are the lateral terminal lobes of the mantle applied over the inner whorls and umbilicus of the shell (*ch*). The ventral aspect of the specimen, fig. 4, shows the beginning or narrower part of the last whorl of the shell as it first protrudes from between the lateral terminal lobes of the mantle, *d d*. The two ventro-lateral anterior lobes are shown at *b b*, and the funnel (*c*) projecting between them: behind this is the torn portion of the muscles of the head.

The side view of this specimen, fig. 1, shows the greater antero-posterior diameter of the mantle as compared with the transverse diameter in fig. 4 and 5. It also shows the free termination of the shell at *f*, and the rounded contour and extent of the terminal lobe, *d*. This part was subjected to a careful and minute scrutiny, but no signs of laceration could be detected: it presented a thick convex border like the bottom of a bag or sac on both sides of the shell (see the magnified view in fig. 11); this border being, as it were, tucked up or bent in towards the umbilicus; becoming thin and smooth and of a softer texture next the shell, as shown in fig. 7, *d* and *e*, which gives a view of the hinder extremity of the specimen, with the lateral terminal mantle-lobes drawn a little away from the shell to show the delicate portion of the pallial membrane, *e*, which passes from one lobe to the other through the umbilicus.

The ordinary surface of the mantle is smooth. Its structure, like that in other di-branchiates, presents a delicate epiderm, a thin stratum of pigmental cells, and a fibrous muscular corium forming the chief substance of the mantle. The dorsal part of the mantle shown in fig. 5, was continued from the anterior pointed lobe, *a*, backwards to beneath the open end of the shell at *fn*. fig. 2; where it thinned off to the border of a small aperture through which projected the dorsal part of the shell; there was a small space between this whorl and the anterior border of the aperture, through which aperture the membranous siphon (*sh*) was continued from the shell into the cavity of the mantle. The aperture seemed much too small to have ever admitted the termination of the shell, *f*: but it is to be presumed that after the natural connections of the last chamber of the shell with the muscular retractors of the head had been violently disturbed, the mantle may have contracted at the rent, from which the open end of the shell was withdrawn, to the dimensions of the aperture that now admits only the siphon. Nothing at least can be safely argued against M. de Blainville's description of the muscular attachments of the *Spirula* to its shell from the obviously mutilated specimen here described. A small part of the second whorl of the shell was visible at the aperture, *fn*.



The dissection of the specimen was commenced by laying open the mantle along the median line of the ventral or infundibular aspect to near the border of the posterior fossa from which the shell began to protrude. On divaricating the divided mantle, the parts were exposed which are shown in fig. 11; viz., the base of the funnel, with its two narrow, elongated articular cavities (*g g*), the linear elevations on the inner surface of the mantle corresponding thereto (*g' g'*); the membranous and muscular tunic, *h*, enveloping the liver, perforated on each side posteriorly by the pallial nerve-trunks, which immediately swell into the pallial ganglions, *i*, fig. 12 and 13; posterior to which ganglions the bases of the gills are attached; and, in the ventral interspace of these, there is a low conical prominence with three valvular apertures: the middle one, of an infundibuliform anus, *k*, fig. 12, and on each side a more minute orifice (*l*) with a plicated prominent border. Behind the base of the left gill, *n'*, a fourth orifice at the extremity of a short tube (*m*, fig. 12), also communicates with the branchial or external compartment of the pallial cavity. The branchial chamber showed no trace of a muscular or membranous septum ("bride antérieure," Cuv. in the Octopods). The gills (*n n'*) have the usual elongated narrow triangular form: each is supported on a fleshy stem, extended along its outer border, perforated by the branchial artery, and connected to the walls of the branchial chamber by a duplicature (*n''*, fig. 13) of the delicate lining membrane, which is reflected upon the basal half of the stem, and invests the whole complex gill: the base of the stem itself is attached to the septum dividing the branchial from the pericardial and visceral chambers. Each gill consists of about twenty-four pairs of plicated folds extended between the fleshy stem, and the trunk of the branchial vein that traverses the opposite or inner border of the gill. The principal venous trunks (*o*, fig. 13) of the general system, enter the peritoneal compartments on each side the rectum, and there develop the venous follicles, in the form of irregular puckered subelongate bulgings out of their coats, which give a spongy aneurismal character to their trunks; they unite into a single trunk on each side, which enters a small branchial heart, *p*, with an appendage. The branchial artery is continued directly into the fleshy stem. The branchial veins, *q*, pass behind the spongy veins, and terminate in the outer ends of a transversely elongated fusiform ventricle, *r*, from which a large anterior and small posterior aorta is given off.

Directing my attention, next, to the mass covered by the muscular investment, *h*, I slit up the funnel and exposed the small terminal valve, *c'*, fig. 14, and raising the valvular base of the funnel, removed, first, the covering formed by the lining membrane, and exposed the longitudinal fasciculi of the muscular tunic, *h*, fig. 14. On dissecting away this, as on the left half in fig. 14, the corresponding lobe of the liver was shown, as at *s*. On removing the whole of the muscular investment, together with the funnel, the parts were exposed which are shown in fig. 15. The liver consists of two lobes, distinct from their anterior apices (*s s*) to near their opposite ends: here they had been torn, so that whether they were distinct throughout or not, I could not determine. On divaricating them, as in fig. 15, the œsophagus, *t*, was seen penetrating their interspace, with the aorta and the trunk of the visceral nerve. Behind the

funnel was found that part of the cartilaginous cranium which forms the capsules of the organs of hearing: these formed two oval cartilaginous cups (*w*), their walls confluent at the median line, but their cavities distinct, with a thin semitransparent oval portion on their ventral walls, through which the small opaque white otolite within could be discerned: the line is drawn from this thinner part to the letter *w*, in fig. 15. Behind the ear-capsules emerged the œsophagus, with the slender duct, *v*, of the large salivary gland, *u z*, and on each side were the larger pallial nerves, *i i*; these indent the sides of the salivary gland in their passage downwards, backwards, and outwards, to penetrate the lateral fasciuli of the muscular investment of the liver. The œsophagus does not expand into a crop or ingluvies, but maintains the same diameter until it terminates in a small stomach, *x*, which is succeeded by a second cavity of almost equal size, *y*, forming the laminated or pancreatic sac, which receives the ducts of the liver; these (*c y*) appeared to have been beset by numerous minute cystic follicles. The intestine is very short, and makes one slight bend backwards before it advances, as rectum, to terminate in the infundibuliform anus, *k*, which it forms as soon as it has perforated the peritoneal septum, shown in fig. 11. A very minute pyriform ink-bag, *z*, is situated close to the rectum, and its duct opens within the verge of the anus. The anus does not protrude and float freely in the branchial chamber, nor is it provided with valvular or filamentary appendages.

The visceral cavity is continued into each of the terminal lobes of the mantle, as shown in fig. 15, where they are laid open. They were occupied principally by the generative organs, which seemed to be in a feebly developed state. Either from the state of the specimen or my own ill success in the attempt, I could not satisfactorily make out the precise forms and relations of these organs. On the right side was situated the principal gland, either ovary or testis, *A*, and on the left side there was the chief part of the efferent duct, *B*, either vas deferens or oviduct, slightly convoluted, and complicated with some other parts where it communicated below, or behind, the intestine with the ovarium or gland on the right side. This gland consisted of minute, close-set, subelongate follicles, with the cellular nuclei of either ova or spermatozoa.

From the acceptable Mémoire by Professor de Blainville, “Sur l’animal de la *Spirula*, et sur l’usage du siphon des coquilles polythalamées,” published in the *Annales Françaises et Étrangères d’Anatomie et de Physiologie*, tom. i. p. 369 (1837), we learn, that in the *Spirula* the funnel has its parietes entire<sup>1</sup> (i. e., not longitudinally slit, as in the *Nautilus*); that the gills are two in number; that the intestinal canal extends between the two masses of the generative apparatus, is accompanied by an ink-bag, and terminates by a small free floating appendage; and that there is an ovary and an organ of digestion.<sup>2</sup>

<sup>1</sup> “L’entonnoir fort considérable entièrement fermé.” p. 378.

<sup>2</sup> “Vers le milieu de la face inférieure de la masse viscérale le canal intestinal se terminant par un petit appendice libre, flottant, largement ouvert, absolument comme dans les sèches, et accompagné dans toute son étendue entre les deux masses de l’appareil générateur, par le canal de la vessie à encre, contenant de la matière noire que j’ai



If these facts in the organization of *Spirula* be compared with the following characters of Dibranchiate Order of Cephalopods; viz.,

“The gills not exceeding two in number; but the branchial circulation is aided by two muscular ventricles, situated at the base of each gill in addition to the third systemic ventricle; there is an organ for secreting and expelling an inky fluid. The parietes of the funnel are entire<sup>1</sup>,”—it will afford a striking instance of the power of prediction afforded by the laws of correlation of animal structures, and of the truth of the inference that a Cephalopod “proved to have eight short arms and two long tentacles,”<sup>2</sup> must, notwithstanding it possessed a polythalamous shell, have the characteristic organization of the Dibranchiate Order, in contradistinction to that of the Nautilus, the type of the Tetrabranchiate Cephalopods.

The additional facts derived from the dissection of the specimen obtained by Capt. Sir Edward Belcher, show that the funnel of the *Spirula* is provided with an apical valve, and with two basal lateral joints; that the skull is provided with two large cartilaginous acoustic capsules with otolites; that the œsophagus, after passing through the cartilaginous skull, rests upon a large salivary gland, and is then continued, preserving its slender diameter, to a small gizzard; that this is followed by a laminated pancreatic bag, from which the short intestine proceeds and forms, after one slight bend, the rectum; that the anus is infundibuliform, and without an appendage; that the liver consists of two lobes enveloped in a muscular capsule; and that the cystic ducts are beset with numerous glandular follicles before terminating in the pancreatic sac; that each gill has its branchial heart, and that this heart is provided with an appendage; that the systemic heart is transversely fusiform, with an anterior process; and that the branchial compartment of the mantle is devoid of any trace of median septum. By these additional facts we are enabled to test the value of the assumed co-existence of certain modifications of the Dibranchiate structure with the superaddition of two peduncles to the eight ordinary arms, as shown by the figures of the *Spirula* given by Lamarck and Péron.

The Octopods, both *Octopus* proper and *Argonauta*, have a well-developed septum of the branchial chamber: Cuvier describes it as the “bride antérieure qui lie la bourse à la masse viscérale.” The muscles corresponding to this “bride antérieure” also exist in *Sepiolo*; but in the Cuttles (*Sepia*) and Calamaries (*Loligo*), both these muscles and the septum of the branchial chamber are absent as we find them to be in *Spirula*. The base of the funnel is provided with a large valvular fold on each side in *Octopus* and *Eledone*, but has no lateral joints; it possesses these joints in the Cuttles and Calamaries, but has not the lateral valvular folds. The interior of the funnel is provided with a valve near its apex in the Calamaries and Cuttles, but not in the Octopods. In the characters of the funnel we find the *Spirula*

pu faire sortir par un petit orifice situé à gauche de l'anus. Les deux parties principales de l'appareil générateur femelle, savoir, d'un côté, à droite un ovaire considérable et de l'autre sans doute un organe de la digestion, formant à eux deux presque toute la face inférieure de la masse.” p. 379.

<sup>1</sup> Art. CEPHALOPODA, Cyclopædia of Anatomy, vol. i. p. 519.

<sup>2</sup> *Ib.* p. 520.



agreeing with the Decapods. The branchial hearts are devoid of the appendage in the Octopods, but this is present in the Decapods, and equally characterizes the *Spirula*. In the Octopods the gullet dilates into a crop, but not in the Decapods, neither in the *Spirula*, in which, as in other *Decapoda*, it is remarkable for its length and tenuity. In *Octopus* the liver consists of one lobe, and has the ink-bladder imbedded in it: in *Sepia* the liver consists of two lobes, and the ink-bag is not in any way connected with it; the *Spirula* agrees with the Cuttle-fish in these respects. In all Octopods the hepatic ducts are simple; in all Decapods they are complicated with numerous small blind pouches, which have been regarded as a *pancreas*; these cystic follicles are equally present in *Spirula*. So far, then, as the organization of the *Spirula* is known, its modifications are those that characterize the Decapodous type of the Dibranchiate structure in the class *Cephalopoda*. If, therefore, the accuracy of Lamarck's highly important original description and figure of the animal, inasmuch as relates to the superaddition of two long peduncles to the eight ordinary arms, had not been confirmed by Mr. Percy Earl's discovery of the entire animal, figured in the Annals of Natural History, vol. xv. pl. 15, and more accurately in Mr. Lovell Reeve's Elements of Conchology, part 1, pl. A., fig. *a, b, c*, and which unique specimen is now in the unrivalled conchological cabinet of Mr. Hugh Cuming, the confidence that had been placed in Lamarck's accuracy would have been fully justified by the well-marked repetitions of the decapodous modifications of the Cephalopodic structure which the dissection of Sir E. Belcher's specimen has brought to light.

The mere description of appearances, even of the interior structure, still less of the exterior surface of an animal, without the deductions which they legitimately yield, is of comparatively small value to the philosophic Naturalist; for of what value are facts until they have been made subservient to establishing general conclusions and laws of correlation, by which the judgment may be safely guided in regard to future glimpses at new phenomena in Nature, such as those which the figures and descriptions of Lamarck and Péron afforded of the *Spirula*, before the publication of the anatomy in the *Annales d'Anatomie*, and in the present Work? The combination of deduction with observation in Natural History has, indeed, been so rare, and the grounds for confidence in such laws of correlation as have served to deduce one type of Cephalopodic structure from the absence of an ink-bag, and another from its presence, have been so recently attained, and are appreciated by so few, that the scepticism in the deductions from such laws in regard to the *Spirula* may be readily pardoned. In perusing the observations of so respectable an authority as the author of the article "*Turritiles*" in the Penny Cyclopædia, tending to show the insufficiency of the grounds of my separation of *Spirula* and *Belemnites* from the *Nautilus*, and other Tetrabranchiate Cephalopods with chambered shells; and the statement of the author of the Elements of Conchology (p. 11), that "a difference in the number of branchiæ seems scarcely of sufficient importance to warrant the association of the *Spirula* with the Argonaut, separate from the *Nautilus*;" I

recollected that these writers had the authority of Cuvier<sup>1</sup> for continuing to associate together Cephalopodic animals with shells so similar in their complex chambered structure, as those of the *Nautilus* and *Spirula*. But at the same time I retained all my convictions that the period would arrive when it should be demonstrated that a Cephalopod with arms and peduncles, like those of a *Sepia*, would have the same type of Cephalopodic organization as the *Sepia*: a type so modified from that of the many-armed *Nautilus* as to forbid their association in the same Order in any system professing to be based on Nature; i. e. on the totality of the organization of its objects.

The chief addition made by M. de Blainville's Memoir of 1837 to the knowledge of the exterior characters of the *Spirula* was the existence of a circular disc with a pair of fin-like appendages ("aplatissement oblique au milieu duquel est un bouton terminal, accompagné à droite et à gauche d'une petite nageoire demi-circulaire," l.c. p.376. see fig.15\*, *ac*. in pl. iv.) at the posterior end of the body, covering and concealing the part of the last whorl of the shell which winds round that end, and which whorl was exposed in Lamarck's and Péron's specimen (fig.1\*) as it is Sir Edward Belcher's (fig. 7). The same disc, with rudiments of the terminal fins or appendages, is present in Mr. Cuming's perfect specimen (fig. 8, *ac*). The disc is called "a thick gland" by Mr. Gray (l. c. p. 259), and a "leathery gland" by Mr. Reeve (l. c. p. 16); but the texture of the part is not described by either author. It remains to be seen whether this appendage be truly constant in nature, or whether it be characteristic of age, or sex, or species. Mr. Gray in his brief notice of some of the exterior characters of Mr. Cuming's specimen of *Spirula*, affirms that "it differs from the Cuttle-fish in being entirely destitute of any fins" (tom. cit. p. 258. 2): but Mr. Reeve, by a more accurate observation of the same specimen, confirms M. de Blainville's description of two terminal and lateral fins to the *Spirula*; stating that "they are clearly definable, one at each lateral extremity, on either side of the terminal gland" (l. c. p. 18). Their condition is accurately given in the figure representing the hind end of Mr. Cuming's *Spirula* (pl. iv. fig. 8, *ac ac*). With regard to the structure of the intervening subcircular disc (*ad*), I could not detect any trace of the pores of glands upon its surface, and the structure of the same part in the mantle of the *Spirula reticulata* (fig. 3 and 9) was that of condensed cellular tissue only. This I determined by microscopical examination. The central orifice (*ad*, fig. 9) leads merely to the interspace between the disc and the last whorl of the shell, and is not the excretory outlet of any glandular cavity. In the specimen of *Sp. reticulata* which consisted of the mantle only, with its terminal appendage and the shell, the latter, by the violence that has torn away the head and viscera, has been displaced and turned half round with the open end of the last whorl projecting through the ventral aperture (fig. 3, *fm*). The lateral fin-like appendages

<sup>1</sup> Règne Animal, vol. iii. (1830) p.17. "DES NAUTILES.—"Une d'elles appartient en effet à un Céphalopode très semblable à une seiche, mais à bras plus courts; c'est le genre *Spirula*, Lam."

<sup>2</sup> Mr. Gray, however, after having been made acquainted with M. de Blainville's Memoir, corrects his error in a supplementary note in a subsequent number of the Annals (p. 445).



(*ac ac*) differ from the short, terminal, subcircular, true fins in *Cranchia* and *Loligopsis*, in having their plane transverse to the axis of the body instead of parallel with it: their base is attached, in the dorso-ventral direction of the trunk, to the sides of the terminal disc, as shown in fig. 9. Their structure is fibrous, the fibres are collected into fasciculi, directed from the base to the free margin of the appendage; they are probably contractile, but the ultimate fibres are smooth, more minute than those of voluntary muscle, and devoid of transverse striæ. The disc adheres pretty closely to the epithelium of the part of the shell which it conceals. The appendages are part of the disc, which has very little organic connection with the terminal lobes of the mantle. In the specimen obtained by Mr. G. Bennett (fig. 3 and 9), the surface of the integument differs in a well-marked degree from that in Capt. Sir E. Belcher's or Mr. Cuming's specimens. Instead of being smooth, it is pitted by small close-set angular depressions, which give a well-marked reticulate character to the whole surface of the true mantle. The surface of the cellular disc and its appendages is quite smooth. I regard the character of the skin in the mantle of the *Spirula* just described, as indicative of distinction of *species*, and propose for it the name of *Spirula reticulata*. The general shape of the mantle differs from that of the *Spirula australis*, obtained by Mr. Percy Earl in New Zealand, in so far as that, instead of being compressed laterally, it is broadest from side to side; the difference is well shown in the two figures 8 and 9; but I do not lay stress upon it in the question of their specific distinction, on account of the mutilated state of the specimen of *Spirula reticulata*.

Whether the difference in the development of the appendages of the terminal disc in the *Spirula australis* (fig. 2 and 8) and *Spirula reticulata* (fig. 3 and 9) be specific, or due to accident, may be questioned; but from the dotted character of the integument in the figures of M. de Blainville's specimen (fig. 15\*), in which those appendages are as well developed as in *Spirula reticulata*, it might be suspected that the integument presented a similarly reticulate surface; and this may, perhaps, account for the differences in the condition of the anus and the fins, observable in fig. 15\*, copied from M. de Blainville's Memoir, and in fig. 11, which gives a similar view of the parts in Sir E. Belcher's specimen.

Whether the terminal disc be a normal generic character of *Spirula*, cannot be conclusively determined from the actual evidence: it has the character of an adventitious growth, and is certainly not a part of any of the organs of the vegetal or animal functions: the influence of the appendages of the disc in the locomotion of the *Spirula reticulata* must be feeble, if any; in the *Spirula australis* (fig. 2 and 8) they could have had none. Is the disc with its appendages a sexual character? It might serve for the attachment of the cluster of ova after their extrusion, and be peculiar to one sex: that of M. de Blainville's specimen was female. I regret that all my pains failed me in determining the sex of Sir E. Belcher's specimen; had it been unequivocally a male, it would have supported the hypothesis of the sexual character of the appendages in question, since it does not possess them, and seems not to have possessed them.



A second hypothesis of the function of the terminal disc and appendages, present in the individuals or species of *Spirula*, might explain them as organs of adhesion or anchorage when the creature wished to be at rest, and to resist the fluctuation of the surrounding element; and this view derives some support from a passage in Rumphius' 'D'Amboinische Rariteit-Kamer,' p. 68; where, after pointing out the distinction of the shell of the *Spirula* from that of the young *Nautilus Pompilius*, he says: "But, on the contrary, these little Post-Horns (*Spirulæ*) have in their first chamber a slimy (or molluscous) animal, which does hang to the rocks by a thin and small (disc or) door, through which the creature in the first gate goes, and sets itself fast to the rocks."<sup>1</sup> The passage is obscure, and some of the details unintelligible to me; but my experience of the accuracy of Rumphius in regard to the *Nautilus major*, or Pearly Nautilus, gives me confidence in his having drawn his statement from nature respecting the *Spirula*. His description and figure (pl. xx. n. 1) of the shell admit of no doubt respecting the genus which he was describing.

On the hypothesis of the terminal disc and appendages being a specific character, the *Spirulæ* devoid of them and with the last whorls of the shell exposed behind, might be indicated under the name of *Spirula Peronii*, and the second synonym of Lamarck be restricted to such individuals.

To M. de Blainville's description of the soft siphon of the *Spirula*, as a solid tendon by which the retractor muscles of the mantle are inserted into the calcareous hollow siphon, and in which tendon they are said to terminate after filling the last chamber of the shell, I can at present only oppose the clearly recognisable fact that the soft or membranous siphon in Sir E. Belcher's specimens of *Spirula* was hollow,—in fact, a tube. I have already mentioned that it was continued from the hard siphon and last chamber of the shell through the semi-circular aperture of the mantle (fig. 6, *sh*, *fn*) into the visceral cavity, where it was lost in the remains of the membrane or capsule of the lacerated termination of the liver. On gently raising the exposed portion of the siphon (*sh*, fig. 6) with a needle, the soft siphon was withdrawn without sensible resistance from the tube of the hard siphon: the portion so withdrawn must have reached nearly to the innermost whorl. It exhibited a slight segmentation answering to the successively sheathed parts of the calcareous siphon. Under a magnifying power of three hundred linear dimensions, the dark contour of the central cavity could be traced from end to end, the larger extremity withdrawn from the body shewed plainly the circumference of the aperture of the central cavity from which a minute filament, either vessel or nerve, protruded; the texture of the walls of the canal was minutely fibrous, the fibres being longitudinal, and of the size of the elementary fibres of cellular tissue. This difference from the account of the membranous siphon given by M. de Blainville<sup>2</sup> leads me much to desire the opportunity

<sup>1</sup> "Daar en tegen deze Posthoorentjes hebben in hunne voorste kamer een slymerig dier, t'welk aan de klippen hangt, met eenen dunnen en smallen dooren, die door het beest en de eerste gaatjes gaat, en aan de klippen vast zit," p. 68. The marginal indication of this paragraph is "En zit aan de klippen," i. e. "It sits on the rocks."

<sup>2</sup> "Le siphon de la coquille est formé d'une suite de petits entonnoirs s'emboitant plus ou moins les uns dans

of studying in a better specimen the relations of the shell of the *Spirula*, and especially of its last or open chamber with the muscular system of the animal.

And, indeed, notwithstanding the specimen which I have had the good fortune here to examine, has contributed some additional facts relative to the principal parts of the body of the *Spirula*, many others of equal importance still remain to be determined. Such, for example, as the structure of the male organs, the structure of the female organs, particularly as to whether the oviduct be single or double; whether complicated by glandular enlargements, or associated with independent rudimental glands. M. de Blainville notices the fact of one large eye remaining attached to his mutilated specimen. That the eyes are sessile, the law of the interdependencies of the dibranchiate organic characters would justify us in concluding in the Decapodous *Spirula*; but the structure of the eyes and the condition of the cyclids have yet to be determined. The brain and cranium, the principal nerves, the tongue, beak, and lips, are also amongst the wholly unknown organs of the *Spirula*; and every earnest cultivator of Natural History in its comprehensive and truly scientific sense, must greatly desiderate the requisite means of effecting that which would enable the zoologist to say with truth, that he at length possessed an exact description of all the principal parts of the body of the *Spirula*.

#### DESCRIPTION OF PLATE IV.

Fig. 1. Side view of Sir E. Belcher's specimen of *Spirula Peronii*.

Fig. 4. Front view of ditto.

Fig. 5. Back view of ditto.

Fig. 6. Back view with the shell depressed, exposing the aperture of the mantle through which the siphon passed to the base of the liver:—*all of the natural size*.

Fig. 1.\* Side view of the specimen of *Spirula Peronii*, figured by Péron, copied from the Atlas du Voyage aux Terres Australes, tab. xxx. fig. 4.

Fig. 2. Side view of the specimen of *Spirula australis* from New Zealand, in the Museum of Hugh Cuming, Esq., F.L.S.:—*natural size*.

Fig. 3. Side view of a mutilated example of *Spirula reticulata*, captured by George Bennett, Esq., off Timor:—*natural size*

les autres, de manière quelquefois à former un tout solide" (Ib. p. 375). "Le siphon membraneux n'est lui-même qu'une partie de ce muscle (le muscle columellaire ou rétracteur de la tête). Il est assez difficile de concevoir que si le prolongement tubuliforme qui se loge dans le siphon de la Spirule n'est pas creux, il le soit dans le Nautilus," p. 380. To this not very philosophic scepticism of my account of the siphon in the Nautilus, Mr. Broderip has replied by referring M. de Blainville to the easy determination of the tubular structure of the membranous siphon of that genus, by examining its dried remains in any recent Nautilus' shell. He refers to my preparation (no. 900, B, Physiological Series, Coll. of Surgeons), in which a part of the siphon is preserved attached to the animal which I dissected in 1832, and says, "We have minutely examined the preparation, and can vouch for the accuracy of the description; no one at all versed in the subject can see the former without being satisfied that the prolongation of the mantle and membranous tube to form the siphon is tubular, and not solid."—Penny Cyclopædia, Article *Spirulidæ*.



Fig. 7. Hinder end of the body of *Spirula Peronii* (fig. 1, 4, 5, 6):—*twice the natural size.*

Fig. 8. Hinder end of the body of *Spirula australis* (fig. 2):—*twice the natural size.*

Fig. 9. Hinder end of the body of *Spirula reticulata* (fig. 3):—*four times the natural size.*

\* \* The engraver has added to the original drawing the impressions round the aperture of the siphon, discovered by Charles Stokes, Esq.

Fig. 10. Section of the hinder end of the mantle of *Spirula reticulata*, showing one of the terminal sacs of the visceral cavity.

Fig. 11. The specimen of *Spirula Peronii*, fig. 4, with the mantle laid open:—*twice the natural size.*

Fig. 12. Shows the relative position of the anus, *k*, the valvular apertures of the sacs of the venous (renal?) follicles, *l*, and of the generative outlet, *m*. The fig. *k'* shows the termination of the duct of the ink-bag, *z*, within the verge of the vent, *k'*, *magnified.*

Fig. 13. Branchial and systemic hearts and venous follicles.

Fig. 14. The livers *in situ*, with part of its capsule dissected off.

Fig. 15. Cranium, acoustic sacs, digestive organs, branchiæ, &c., of *Spirula Peronii.*

Fig. 15.\* From M. De Blainville's Mémoire Sur l'Animal de la *Spirula*, "Annales Françaises et Etrangères d'Anatomie et de Physiologie," tom. i. 1837.

\* \* In the preceding figures the same letters are used to denote the same parts, and are explained in the text.

## II. GASTEROPODA.

### 1. CONVOLUTA.

Out of from eighty to a hundred species of Cones collected during the voyage of the Samarang, only four proved to be new, the greater number of those of recent discovery having been anticipated by Mr. Cuming during his researches among the Philippine Islands, and described in the 'Conchologia Iconica.' The genus *Ovulum*, not having been examined since the publication of Mr. Sowerby's 'Species Conchyliorum,' afforded a greater amount of novelty. Mr. Sowerby, junr., being engaged in preparing a monograph of this genus for the forthcoming number of his 'Thesaurus,' it was thought desirable to place the specimens collected in his hands for comparison, and we are indebted to him for the descriptions and figures of eleven new species. A few species of *Erato* were collected, and in the genus *Cypræa*, some interesting observations were made at Singapore upon some living specimens of *C. annulus* in its early winged state, procured from the parent animal, and examined in activity under the microscope.

### 1. CONUS.

1. CONUS PAPILLARIS. Pl. V. Fig. 7 *a, b.* Con. testâ fusiformi-oblongâ, spirâ elevato-turritâ, apice papillari, anfractibus supernè acutè concavo-angulatis, peculiariter tenuicoronatis, nodulis subobliquis, infra lævibus; albidâ, aurantio-ferrugineo longitudinaliter strigato-nebulatâ.

HAB. — ?

This remarkable species of *Conus*, undoubtedly new, was found amongst the shells collected by Sir Edward Belcher during his voyage round the world in H.M.S. Sulphur, and



overlooked by Mr. Hinds in describing the Mollusca of that expedition. It had unfortunately no memorandum of its locality.

The upper portion of the whorls is sharply angled, and distinguished by a row of fine obliquely disposed nodules, the interstices between which are stained with the same rusty brown colour with which the rest of the shell is bedaubed. The apex is papillary.

2. *CONUS BORNEENSIS*. Pl. V. Fig. 8 *a, b, c, d*. Con. testâ fusiformi, medio attenuatâ, spirâ acutè elevatâ, anfractibus supernè concavis et angulatis, infra transversim lineari-sulcatis, sulcis ætate plus minusve obsoletis, longitudinaliter lineis incrementi arcuatim striatis; albâ, rufo-fusco sparsim maculatâ.

HAB. North-east coast of Borneo (in ten fathoms, sandy and stony bottom).

The main distinction between this species and the *C. arcuatus*, to which it is so closely allied, consists in its attenuated growth, a character satisfactorily observed by a careful comparison of several specimens with the type of that species in Mr. Cuming's collection.

3. *CONUS FLORIDULUS*. Pl. V. Fig. 9 *a, b*. Con. testâ oblongo-turbinatâ, solidiusculâ, basi tumidiusculâ, liris perpaucis subdistantibus, spirâ striatâ, obsoletè obliquè coronatâ, apice acutâ; violascente-albâ, basi vividè roseo-violaceâ, medio fasciatim immaculatâ, supra infraque aurantio-fusco tinctâ et punctatâ, apice pallidè rufescente.

HAB. — ? (from the Sulphur Voyage).

A shell of rather solid growth, very deeply stained with violet at the base, and delicately suffused with that colour throughout; a pale band being formed round the middle by the interruption of the orange-brown dots, which are painted above and below it. The spire is very indistinctly undulately noded, and faintly spotted with orange-brown, with which colour it is also tinged at the apex.

4. *CONUS PICA*. Pl. V. Fig. 10 *a, b, c, d*. Con. testâ sub-cylindracco-ovatâ, tenuiculâ, tumidâ, inflatâ, spirâ depresso-convexâ, creberrimè impresso-sulcatâ, apice parvo, acutè elato; basi lineari-sulcatâ, sulcis subdistantibus; albâ, fusco-nigricante plus minusve grandimaculatâ et minutè punctatâ.

HAB. Island of Balambangan, north end of Borneo (on a shallow coral reef).

Very closely allied to the *C. spectrum*, but distinct in form and style of painting.

5. *CONUS PIGMENTATUS*. Pl. V. Fig. 11 *a, b*. Con. testâ oblongo-turbinatâ, transversim obsoletè crebrisulcatâ, spirâ striatâ et obliquè coronatâ; albâ, violascente tinctâ, olivaceo maculatâ, flocculis albis hic illic aspersâ, basi et aperturæ fauce vividè cæruleo-violaceis, spirâ albâ, apice intensè roseo.

HAB. — ? (from the Sulphur Voyage).

An extremely interesting species in which the apex is remarkable for its intense crimson-rose colouring in all stages of growth. The ground colour is a pale verdigris blue, the shell is then crossed by olive lines which form two broad bands, and these are sprinkled with little opaque-white flakes ranging mostly in a longitudinal direction, and the crimson apex rising in the centre of a pure white spire is very conspicuous. The interior is a rich violet.

The Cones have the siphon in general very much elongated, and curved upwards and backwards over the shell; the head is usually somewhat produced, and furnished with a retractile proboscis, the eyes vary in position, being in some instances situated on the outer side near the extreme end of the tentacles, whilst in others they are placed in the middle, and even at their outer bases. Their bodies are not unfrequently handsomely marked and marbled, but, as a general rule, are less brilliant in colour than the shell.

The Cones become more numerous and varied in their colours as we approach the equatorial seas. They seem to prefer fissures and holes of the rocks, especially among coral reefs, living in the warm shallow pools within the barrier, where, although slow-moving, they lead a predatory life, boring into the substance of the shells of other mollusks, for the purpose of sucking the juice from their bodies. They crawl but slowly, and usually with their tentacles in a straight line before them. They are very timid, and shrink within their shells quickly on the approach of danger. Some species affect deep water, and one was dredged by us in the Sunda Straits, in thirty fathoms; and another, the *Conus thalassiarchus*, at Sooloo, in about forty fathoms. In the Asiatic region, the species of this beautiful genus seem greatly to predominate, there being more than one hundred and twenty peculiar to this portion of the globe, while there are but two or three known in Europe, about twenty in Africa, thirty in Australia, and about fifty in America. The animal of *Conus aulicus* has the proboscis beautifully varied with red and white, and there is a square and very minute operculum on the dorsal surface of the hinder part of the foot. Its bite produces a venomous wound, accompanied by acute pain, and making a small deep triangular mark, which is succeeded by a watery vesicle. At the little island of Mayo, one of the Moluccas, near Ternate, Sir Edward Belcher was bitten by one of these Cones, which suddenly exerted its proboscis as he took it out of the water with his hand, and he compared the pain he experienced to that produced by the burning of phosphorus under the skin. The instrument which inflicted the wound, in this instance, was probably the tongue, which in these mollusks is long, and armed with two ranges of sharp-pointed teeth.

In many species of *Conus* I have noticed a very peculiar dilatation of the anterior extremity of the siphon, reminding one of that singular inflated portion of the mantle in *Terebellum*, which performs the office of a siphon; and the shell of this genus more nearly approaches those species of Cones in which the eyes become nearly terminal, and in which the operculum, horny and triangular in outline, is partially free. The Cones are not unfrequently marked somewhat in accordance with the colours of their shells. *A.A.*

## 2. OVULUM, *Brug.*

1. OVULUM VOLVA. Pl. VI. Fig. 9. Ovul. pallio elongato, utrinque valdè producto, mamillarum serie regulari prope margine munito, mamillis subequidistantibus; pede et corpore opaco-albis, corporis extremitate posticâ intensè nigrâ, pallio pellucido-carneo, manillis nigricantibus.

The principal specific peculiarity of the mollusk which produces the well-known shell of the Eastern Seas, termed the "Weaver's Shuttle," consists in the mantle being furnished near the edge with a row of blackish nipple-like tubercles extending to the end of the prolonged extremities. The specimen from which the drawing is taken was dredged in about five fathoms, from a rocky coral bottom off the Island of Basilan, between the Islands of Mindanao and Sooloo, in the Mindoro Sea. It was in a living state but had not arrived at maturity, the lip not being thickened or reflected, and of that tenuity, that the mamillæ of the mantle, which, partially withdrawn probably, lined the interior, were visible



through it as represented in the accompanying figure. Whether this peculiarity in the soft parts of the *Ovulum volva* sufficiently entitles the species to rank as a genus, as proposed by De Montford under the name of *Radius*, remains a matter of opinion.

The mantle of the *Ovulum volva* is furnished near the margin with a row of nipple-shaped tubercles, the nipples and areolæ of which are dark coloured. The tubercles extend to the extremities of the beaks of the shell. The foot is of moderate size and folded longitudinally. The tentacles are elongate and subulate. The mantle covers a small portion of the shell on the left or inner side, where it is partially reflected over the pillar lip, but it does not extend beyond the margin of the thin outer lip; at least it did not in the specimen from which this description is taken, which, however, was not perfectly adult. In older specimens, it may perhaps be reflected over the outer lip as well as over the columella. The eye, large and black, is placed on the side of the head, at the base of, and below, the tentacles. In the figure, the dark-coloured tubercles are seen through the shell, the mantle adhering to and lining the interior. In colour, the body and foot of this mollusk are of an opaque pearly white, but the mantle is thin, semitransparent, and flesh-coloured; the posterior sharp produced portion of the foot is sooty black.

The *O. volva* is slow and languid in its movements, sliding along deliberately, and not more sensible to alarm than *Cypræa*. From the foot being rather narrow, and folded longitudinally upon itself, this animal is no doubt in the habit of crawling upon and adhering to the slender round coral branches and fuci, in like manner as smaller species are not unfrequently seen on *Gorgonia*. A.A.

2. OVULUM VERRUCOSUM. Pl. LI. Fig. 7. Ovul. pallio utrinque lobato; pede amplo, tenui, plicato-expanso, capite brevi, planulato, obtusè producto; opaco-albâ, nigro maculatâ, maculis parviusculis, subdistantibus, capite nigro unimaculatâ, tentaculis vertice nigro fasciatis.

The animal of *Ovulum verrucosum* approaches much nearer to the Cowry type than the preceding species, having the mantle partially lobed on either side. The shell likewise partakes more than any other *Ovulum* of the *Cypræa* character; the callosities, from which it derives its name, may be seen in a modified form in the *C. bicallosa*. The soft parts of *O. verrucosum* are of the same delicate opaque white as the hard, the difference being that the former are prettily painted with black spots, the latter unspotted, but suffused with a soft blush of pink. The specimen represented in the accompanying plate was taken alive at the southern extremity of the Island of Mindoro, one of the Philippines, where several were observed gliding cautiously along a bright sandy bottom in shallow water. This species, which De Montford also proposed to elevate to the rank of a genus, under the title of *Calpurnus*, possesses much less claim to that distinction than the preceding.

In the *Ovulum verrucosum* the mantle adheres to the sides, but does not entirely cover the shell. It is dead-white and covered with round black spots. The foot is large, thin, flat, expanded, and marked like the mantle. The tentacula are tapering, of a pure pearly white colour, with a broad black band near their extremities. The eyes are large and black, and placed at the outer base of the tentacles. The head is short and flattened, and ends in an obtuse rounded muzzle. The longest slope and narrowest end is the fore-part of the shell.

In its habits it is a very slow-moving and sluggish mollusk, with all the peculiarities of the Cowries, and exhibits a singularly beautiful and striking appearance under the calm shallow water as it glides



tranquilly along the bright sandy bottom. The spots on the mantle are much smaller and more irregular in form than those on the foot. The head is pure opaque white, with the exception of one large black spot placed in the centre of the fore-part, which, with its large black eyes and black-tipped tentacles, gives it a very peculiar appearance. *A.A.*

3. OVULUM ACUMINATUM. Pl. VI. Fig. 1 *a, b*. Ovul. testâ subovali, in medio sub-ventricosâ, ad extremitates sub-rostatâ, lævi, albâ, longitudinaliter fasciatâ; dorso margine distincto; canalibus ad dorsum elevatis; labio externo crasso, lævi, ad extremitates recedente, anticè sub-angulato, ad canalem emarginato; labio interno tumido, intus uniearinato, posticè spiraliter uniplicato, ad canales rectiusculo.

HAB. The east coast of Bilaton.

Differing from *O. secale* in being proportionately ventricose in the middle, and having the extremities turned upwards at the back.

4. OVULUM COARCTATUM. Pl. VI. Fig. 2 *a, b*. Ovul. testâ elongatâ, sub-cylindraceâ, fulvâ, striatâ, supra medium gibbosâ, ad extremitates coarctatâ, labio externo paululum incrassato, lævi, anticè sub-angulato; labio interno intus sub-depresso, ad extremitates acuminato.

HAB. Straits of Sunda, near Java.

This shell resembles *O. hordacea* in some degree, but is not angular, and has the outer lip smooth. It may, however, very possibly be a young shell.

5. OVULUM RECURVUM. Pl. VI. Fig. 3 *a, b, c*. Ovul. testâ elongatâ, medio ventricosâ, sub-angulatâ; lævigatâ, ad extremitates attenuatâ, recurvâ; labio externo crasso, anticè angulatim arcuato, ad extremitates truncato; labio interno in medio ventricoso, ad extremitates attenuato, recurvo.

HAB. China Seas.

The canals are not so much attenuated as in *O. longirostrum*, and the outer lip is more suddenly narrowed into the anterior canal. It is thick, and pressed closely against the body whorl at the upper part, so as to leave the aperture very narrow. The shell is almost white, slightly tinged with pale buff.

6. OVULUM DENTATUM. Pl. VI. Fig. 4 *a, b*. Ovul. testâ parvâ, oblongâ, sub-angulatâ, minutè striatâ; pallidè roseâ, fusco rubescente variegatâ; canalibus sub-productis, emarginatis; aperturâ angustatâ; labio externo breviusculo, complanato, intus et ad extremitates usque ad marginem dentato; labio interno lævi, intus longitudinaliter sulcato, posticè tumorem elevatum crenulatum ferente, ad canalem recedente; anticè angustato, tumido; ad canalem sub-uniplicato.

HAB. Caramata Passage, near Singapore.

Not so angular as *O. striatulum*. The teeth of the outer lip extend to the outer margin at the upper extremity where they form denticulations. The colour is pale rose, strengthened at the ends with two longitudinal waved bands at the back.

7. OVULUM BULLA. Pl. VI. Fig. 5 *a, b*. Ovul. testâ ventricosâ, subcylindraceâ, lævi, anticè sub-acuminatâ; canalibus brevissimis integris; labio externo in medio sub-rotundo, intus crenulato; labio interno posticè tumorem parvum ferente, ad canalem angustato, uniplicato, intus paululum excavato.

HAB. China Seas.

Differing from *O. margarita* and *O. punctatum* in form, being more cylindrical and very narrow at the anterior extremity.

8. OVULUM FORMOSUM. Pl. VI. Fig. 6 *a, b*. Ovul. testâ elongatâ, in medio sub-angulatâ, violaceâ, ad extremitates fuscâ, lineis puncturatis cinctâ; canalibus brevibus, validè emarginatis; aperturâ angustâ; labio externo in medio sub-angulato, denticulato, ad extremitates brevi, posticè ad marginem externum dentato; labio interno lævi, longitudinaliter sulcato, posticè tumido, ad canalem angusto, rectiusculo, anticè ad canalem rectiusculo.

HAB. East coast of Borneo.

Of an elongated angular form, and of a remarkably bright violet colour, with yellow tips; the spiral striæ are regular and beautifully punctured. The extremities rather produced, the outer lip short at the ends and denticulated, the denticulations reaching the outer margin at the posterior extremity.

9. OVULUM CONCINNUM. Pl. VI. Fig. 8 *a, b, c*. Ovul. testâ parvâ, ventricosâ, angulatâ, albâ vel roseâ, minutissimè striatâ; dorso tumido, anguloso; canalibus brevibus obtusis, integris; aperturâ angustâ; labio externo intus denticulato, in medio anguloso, labio interno posticè tumorem angulosum crenulatum ferente, internè longitudinaliter sulcato, anticè angustato, ad canalem posticum recedente, ad canalem anticum prominente, angustato sub-uniplicato.

HAB. Isle of Capul, Philippines.

A miniature resemblance of *O. angulosum*; more angular, minutely striated with a groove along the inner lip, with an elevated, angular tumidity on the body whorl near the angle. It is white, or pale rose.

10. OVULUM SUB-REFLEXUM. Pl. VI. Fig. 10 *a, b*. Ovul. testâ oblongâ, albidâ, lævigatâ, sub-rostratâ; dorso in medio sub-angulato; extremitatibus sub-recurvis; aperturâ angustatâ; canalibus sub-emarginatis; labio externo lævi, rotundato, supra medium sub-angulato, anticè sub-angulatim arcuato; labio interno posticè tumido, ad canalem producto, recedente, intus longitudinaliter depresso, anticè ad canalem producto.

HAB. Coast of Bilaton.

An oblong, smooth, white shell, with the extremities rather produced, blunt and turned upwards. The outer lip is smooth, round, and flexuous.

11. OVULUM GRACILE. Pl. VI. Fig. 11 *a, b, c*. Ovul. testâ elongatâ, fusiformi, minutissimè striatâ, ad extremitates attenuatâ, recurvâ; labio externo lævi, sub-angulatim arcuato; labio interno lævi, in medio sub-ventricoso, ad extremitates attenuato, acuminato; colore pallidè fulvo, dorso prope marginem longitudinaliter rubro-fasciato.

HAB. East coast of Borneo.

Fusiform, striated, more gradually ventricose in the centre, and less attenuated at the canals than either *O. longirostrum* or *O. recurvum*. At the back, near the margin, is an irregular longitudinal band of dull red, interrupted in the centre.



12. OVULUM NUBECULATUM. Pl. VI. Fig. 12 *a, b, c*. Ovul. testâ ventricosâ, sub-pyriformi, pallidè rubro vel fulvo nubeculato; dorso obscurè costellato; canalibus brevibus, vix emarginatis; aperturâ angustâ, labio externo intus crenulato, prope medium sub-complanato; labio interno tumorem elevatum crassum ferente, ad canalem breve et recedente, anticè tumido, intus excavato, ad canalem sub-uniplicato.

HAB. Isle of Basilan.

More pyriform than *O. carneum*; posterior canal shorter, posterior tumidity more elevated. The colour consists of pale or strong brownish red, arranged in three cloudy bands.

13. OVULUM BULLATUM. Pl. VI. Fig. 13 *a, b*. Ovul. testâ ovali-oblongâ, minutè striatâ, roseo tinctâ, ad extremitates fusco lineatâ; dorso ad marginem sulcato; canalibus sub-productis, integris; aperturâ angustâ, labio externo intus crenato, complanato; labio interno tumido, lævi, intus depresso, sub-sulcato, posticè bullulam prominentem crenulatum ferente, ad canalem sub-tortuoso, anticè sub-excavato, ad canalem uniplicato.

HAB. Caramata Passage, near Singapore.

Of an oval form, striated at the back. The inner lip of the posterior canal slightly tortuous, the outer lip flattened, slanting inwards and crenulated, the body whorl in front near the posterior angle having a raised, rounded, prominent pustule.

*Figures all more or less magnified.*

### 3. CYPRÆA.

From the rare occurrence of a new *Cypræa* it will not be a matter of surprise that no additional species were collected of this genus. Some observations were, however, made at Singapore on the Cowry in its early winged state, which it will be interesting to record, as confirming the following by Professor Edward Forbes in the Edinburgh Philosophical Journal, (vol. xxxvi. p. 326): "All Gasteropoda commence life under the same form, both of shell and animal, namely, a very simple spiral helicoid shell, and an animal furnished with two ciliated wings or lobes by which it can swim freely through the fluid in which it is contained. At this stage of the animal's existence, it corresponds to the permanent state of the *Pteropod*, and the form is alike, whether it be afterwards a shelled or a shell-less species."

While staying at Singapore I had an opportunity, in conjunction with Dr. Trail of that place, of observing the fry of *Cypræa annulus*, the species being then in spawn. Several specimens collected by us at low water were seen to have conglomerated masses of minute transparent shells (Pl. V. Fig. 4 *a, b, c*.) adhering to the mantle and other parts of the animal, which masses, when placed in a watch-glass of salt water, under the microscope, became disintegrated, and detached individuals were perceived quitting the rest, and moving in rapid gyrations, with abrupt jerking movements, by means of two rounded flattened alar membranous expansions, reminding one of the motions of some of the *Pteropods*. When at rest they joined the principal mass, or adhered, by means of their dilated expansions, to the surface of the watch-glass. Owing to the deficient powers of the microscope, I was precluded from making further observations, but a small mass of these objects was brought home and is represented in the plate above referred to.



While crossing the Mindoro Sea in calm weather, masses composed of many hundred individuals were obtained of similarly formed young shells, which were believed to be the young of two species of *Dolium*, some being smooth and some hairy. These clung chiefly to floating masses. *A.A.*

The minute helicoid shell of the young Cowry forms the nucleus of that which afterwards grows and undergoes several changes in form, gradually becoming more and more complicated until the outer lip is inflected and at length denticulated. The converse of this would appear, however, to take place in other *Gasteropoda*, as shown in the development of *Doris*, *Aplysia*, *Tritonia*, and others, where the shell at first turbinated and nautiloid in shape, afterwards becomes a merely internal rudimentary plate or altogether disappears.

On placing the young of *Cypræa* in a watch-glass of sea-water they may be seen to whirl about like the *Hyalæa* and *Cleodora*, and, like *Atlanta*, to adhere when fatigued to foreign bodies, not by any disc, but by means of the dilated expansions of their mantle. In the course of growth these fleshy expansions become entirely absorbed and do not ultimately constitute the lobes of the mantle which embrace and partially cover the shell in the adult. It would be interesting to observe the transitions in the figure of the animal and shell throughout the entire series of Mollusca; many phases exhibited in their metamorphoses would throw new light, not only on the identity of species, but on the reality of the existence of certain genera.

Of the rarer species of *Cypræa*, the *C. subviridis* and *pyriformis* were collected at Unsang, east coast of Borneo, on coral reefs; *C. flaveola* at Ambolan, eastern extremity of the Island of Mindoro, Philippines, from a sandy and weedy bottom in shallow water; and the small banded variety of *C. Humphreysii* at the Island of Gilolo, under stones on a reef; an enormous specimen of the white variety of *C. gangrenosa* was also taken from the coral flats at the Island of Panagatan. The most important addition to the genus consisted of some fine specimens of the *C. producta*, described by Mr. Gaskoin in the Proceedings of the Zoological Society for 1835, from a single worn specimen, of which no other example had been seen. They were collected at Unsang, east coast of Borneo, on the coral reefs, together with specimens of *C. rubinicolor*, of the same author, of almost equal rarity. The following are the principal observations upon the living animal *in situ*.

Although I have examined hundreds of *Cypræa tigris* in a living state, I never saw those changes of colour in the mantle of the animal described by Mr. S. Stutchbury in the Zoological Journal, who moreover states that they crawl about usually exposed to the sun, while the result of my experience would lead me to believe that they almost invariably lurk in holes of rocks, or under loose stones and among branching coral.

The soft parts of the different species of *Cypræa* vary considerably in colour, the animal of *Cypræa carneola*, for example, is of a beautiful red colour with the foot and mantle covered with numerous opaque oval white spots; that of *C. Talpa* is of a pale brownish black, with minute whitish specks; that of *C. caput-serpentis* is of a rich green brown; and in *C. lynx* the mantle is covered with numerous tufts of various forms, nodulous, trifid, or ending in two short processes; that of *C. Mauritiana* has conical tubercles, of *C. erosa* (Plate V. Fig. 6) numerous, rather long, branching, arborescent appendages; of *C. moneta* with

but few, and those chiefly around the free upper edge of the mantle; while in some these processes are altogether wanting.

In *Cypræa erosa* (Pl. V. Fig. 6) the siphon is of a dirty white colour; the tentacles orange; the eyes black; the mantle brown, covered with small dark spots; the foot white, with black reticulated markings.

In *Cypræa caurica* (Pl. V. Fig. 5) the mantle is light brown, perfectly smooth, and covered with dark brown reticulations; the foot is brown, with minute white spots; the peduncle of the eye is of a brilliant white; the head is brown; the base of the tentacles dull white; the tentacles beyond the eyes light brown.

In Quoy's figure of *Cypræa Isabella* (Voy. Astrol. t. 48. f. 15) the edge of the mantle is simply lobed, and the remainder of the surface naked and void of appendages. In the animal of *C. caurica*, the edge of the mantle forms a continuous slightly-waved line, and the surface covering the shell is perfectly smooth, with the delicate anastomosing lines mentioned above. *A. A.*

#### 4. ERATO, *Risso*.

1. ERATO CALLOSA. Pl. X. Fig. 32 *a, b*. Erat. testâ pyriformi, crassâ, tumidâ, callosâ, spirâ breviusculâ, subobtusâ, columellâ excavatâ, labro conspicuè denticulato; carneâ, subtus albicante.

HAB. China Sea.

An interesting species of rather large size, distinguished by its callous, thickly-enamelled growth.

#### 2. COLUMELLATA.

A considerable number of species of *Mitra* were collected, but as in the case of the Cones, nearly all had been described and figured in the 'Conchologia Iconica,' chiefly from the researches of Mr. Cuming in the same locality. An important accession was made to the genus *Voluta* by the discovery of the first recent analogue of a well-known fossil type, abounding in the Eocene portion of the Tertiary beds of the Isle of Wight, dredged at the depth of a hundred and thirty-two fathoms off the Cape of Good Hope; and some interesting species of *Marginella* were procured, with the animal in a living state, of which drawings were made.

#### 5. VOLUTA, *Linnaeus*.

1. VOLUTA ABYSSICOLA. Pl. VII. Fig. 6 *a, b, c, d*. Vol. testâ pyriformi, tenui, spirâ brevi, sub-turritâ, apice acutâ, anfractibus supernè depresso-caniculatis, liris numerosis, acutis, longitudinalibus et transversis undique creberrimè subprofundè cancellatis, liris supernè mucronatis, columellâ quadriplicatâ, aperturâ subangustâ, labro tenui; fulvescente-cinereâ, fasciis rufo-fuscis angustis tribus vel quatuor cingulatâ.

HAB. Cape of Good Hope.



This elaborately carved species is one of considerable interest in a geological point of view, from the circumstance of its being the first living representative yet discovered of a group of highly sculptured Volutes abounding in the Eocene portion of the Tertiary beds of the British Isles. The principal of these, *V. lima*, *elevata*, *crenulata*, and *digitalina*, were distinguished by Mr. Swainson as a subgenus, under the name *Volutilithes*. The *Voluta abyssicola* is not identical in species with the fossils, being characterized by a closer and more sharply-defined pattern of lattice-work, which comprises as many as thirty transverse, and forty longitudinal, ridges in a whorl. The upper edge of the whorls is depressly flattened at the sutures, forming a narrow ascending canal. The ridges are slightly nodulous at the point of crossing, and round the upper extremity impart a coronated aspect to the shell. The columellar plaits, four in number, are sharp and delicate. The outer lip is thin, and does not appear to be mature. The only specimen collected was dredged from a bank of dead shells and rounded iron-stones, at the depth of 132 fathoms.

#### 6. MITRA, *Lamarck*.

The animal of *Mitra* has in general a very short foot, straight and continuous from side to side in some species, but in others notched, and produced, with a thickened anterior margin. It is commonly narrow and rounded, or acuminate posteriorly, and it bears a very small semi-transparent horny operculum, in some instances scarcely visible. The siphon is mostly directed forwards, and the somewhat short tapering tentacles have the eyes either situated about half-way, or they are placed on the outer side of the base. The head is long and very flat, and the tentacles are very close together at their bases. The proboscis is rarely exerted when they are crawling and lively, but as they become languid after capture it becomes distended with water and protrudes considerably.

1. MITRA RUFILIRATA. Pl. X. Fig. 26. Mitr. testâ ovato-fusiformi, spirâ subcanaliculatâ, apice acutâ, transversim undique lirâtâ, litarum interstitiis creberrimè subtiliter clathratis, columellâ sexplicatâ, aperturâ longiusculâ, angustâ, labro simplici; virescente-albâ, liris lineis rufo-fuscis interruptis undique tinctâ, in medio subobscurè fasciatâ.

HAB. Chiua Sea.

The colouring is very characteristic in this species. The ridges are regularly stained throughout with interrupted red-brown lines, a profusion of which in the middle produces an obscure band.

2. MITRA SULUENSIS. Pl. X. Fig. 27. Mitr. fusiformi-turritâ, apice acutâ, anfractibus subrotundato-angulatis, undique longitudinaliter lirato-costatis, costarum interstitiis sulcato-clathratis, columellâ quadriplicatâ, aperturâ angustâ; fulvo, fusco, cæruleoque variè tinctâ, apice fusco.

HAB. Sooloo Islands.



Very closely allied to *M. cruentata*, from which it chiefly differs in its more slender fusiform growth.

3. *MITRA SEMISCUPTA*. Pl. X. Fig. 28. Mitr. testâ oblongo-fusiforimi, apice acutâ, anfractibus duodecim, posticis longitudinaliter costatis, costarum interstitiis sulcato-clathratis, anfractibus anticis lævigatis, columellâ tri-quadriplicatâ, aperturâ angustâ, labro simplici; plumbeâ, lineis tenuibus ferrugineis undulatis obscure pictâ, anfractu ultimo pallidè unifasciatâ, apice fusco.

HAB. Sooloo Islands; at a depth of about thirty fathoms.

All the specimens collected were of the same uniform lead-colour, the last and penultimate whorls being smooth, whilst the rest are highly sculptured.

4. *MITRA DICHROA*. Pl. X. Fig. 29. Mitr. testâ obeso-ovatâ, crassiusculâ, obliquè subobscure plicato-costatâ, columellâ subobscure triplicatâ; intensè cæruleo-nigro et albo transversim alternatim fasciatâ.

HAB. Philippine Islands.

Belonging to that obese section of the genus of which *M. lauta* and *leucodesma* are typical examples.

5. *MITRA RUBELLA*. Pl. X. Fig. 30. Mitr. testâ fusiformi-turritâ, anfractibus supernè tumidiusculis, infernè contractis, undique creberrimè clathratis, columellâ quadriplicatâ, basi subcontortâ et recurvâ; rubellâ.

HAB. Sooloo Islands.

Of a uniform, delicate rose-tint, and finely cancellated throughout, the whorls being swollen behind, and attenuated and recurved in front.

6. *MITRA INCISA*. Pl. X. Fig. 31. Mitr. testâ oblongo-ovatâ, apice acutâ, anfractibus angustè sulcatis, sulcis spiræ latoribus et crenulato-punctatis; sordidè luteo-albicante, anfractu ultimo anticè castaneo-rufescente.

HAB. China Sea.

Remarkable on account of the contrast between the sculpture and colouring of the front and hind part of the shell.

The Philippine Islands would seem to harbour the greatest number of these elegant and beautiful shells, although a great many species were obtained by Mr. Cuming in tropical America. They appear to be chiefly confined to the equatorial regions, scarcely any being natives of cold climates. I have met with several among the Meia-co-shima Islands, at Loo-Choo, at Japan, and at the Keeling or Cocos Islands. They are most frequently to be met with in somewhat shallow water among the ledges of rocks, between small islands where the water barely covers the land, and within the shelter of coral-reefs; sometimes preferring a clear sandy bottom, and sometimes affecting a hard muddy sandy soil. The transversely ribbed species are frequently found in very deep water, and many were dredged by us in twenty and thirty fathoms at Sooloo and in the China Sea.

The animal of *Mitra flammigera*, one of these deep-water species, is very prettily marked. The body is grey, varied with round, well-defined, white spots, and dark-brown blotches, of a pyramidal form, arranged in a row round the lower edge in a Vandyke pattern, and below that a white rim with a row of small, linear, horizontal, black spots; the head is white, marbled with grey-brown; the eyes black and the tentacles white, with a large, oval, black spot in their middle; the siphon is brown, edged with black, and with a broad white band at its free extremity. The operculum is very minute, horny, and transparent.—Caramata Passage; fourteen fathoms, hard muddy bottom, mixed with sand and broken shells.

Another species, with the same habits, the *Mitra interlirata*, is semiopaque, white, faintly mottled with light brown, with the eyes at the outer base of the tentacles and black.—China Sea; ten fathoms.

The animal of that division of the genus which Swainson included under *Conohelix* is the same as in the typical species. I have found the *Mitra Conus* buried rather deep in the soft black mud under the roots of trees in mangrove swamps, above high-water mark, in the Island of Basilan. The *M. conica* is found in company with other species of Mitres, crawling slowly over the sandy mud in shallow places, among the islands of the Philippine group.

Although M. Quoy has rightly termed the *Mitra* an "animale apathique," I have seen the small longitudinally-ribbed species crawl about pretty briskly over the smooth sand among the low coral islands. The *Mitra episcopalis*, probably on account of the small size of its locomotive disc, and the ponderous nature of its long shell, is a very sluggish mollusk. I have observed some of the *Auricula*-shaped Mitres that live among the Philippines, in the shallow pools left by the receding tide, crawling about the stones out of the water, in company with *Planaxis* and *Quoyia*. The Mitres, like many of the large *Volutes*, prefer, however, to associate together, and may be seen in dozens crawling over the sandy mud-flats in shallow water, being most active just as the flood-tide makes. When the tide recedes, they bury themselves superficially in the yielding soil, and are with difficulty discovered. Some of the small-ribbed species cover themselves entirely with the sandy mud, and in that disguised condition travel about with comparative security. On one occasion, on the small island of Ambolan at the south end of Mindoro, I was walking up to my ankles over a firm sandy mud-flat, taking little notice of the *Cones*, *Strombi*, *Meleagrinae*, and *Volutes*, which people the water in great numbers, but looking about anxiously for the rarer Mitres, when I first perceived these small species, under their ingenious disguise, marching in towards the shore as the tide flowed rapidly over the level surface. Persons, by the way, should never venture in places of this description barefooted, as there is a species of *Pinna* which buries its sharp end in the mud, but leaves the thin trenchant edges of the gaping extremity exposed, and, when trodden on, inflicts very deep and painful incised wounds. Both myself and several of the boat's crew suffered in this way. *A. A.*

## 7. MARGINELLA, Lamarck.

1. MARGINELLA DIADOCHUS. Pl. VII. Fig. 4 *a, b, c.* Marg. testâ oblongo-ovatâ, spirâ subpromiulâ, anfractibus quinque, supernè declivibus et tumidiusculis, columellâ quadriplicatâ, aperturâ subangustâ, labro vix incrassato; olivaceo-carneolâ, lineis nigris distantibus conspicuè subirregulariter cingulatâ.

HAB. Straits of Sunda; from a sandy floor at a depth of about three fathoms.

The animal of this beautiful species may be described as follows:—Tentacles yellowish, with a row of marbled crimson spots; eyes black and minute; mantle pale, semi-

transparent, pinkish-yellow, with a row of semioval crimson spots round the thin free edge, the remainder being covered with radiating linear spots and short waved lines of a crimson colour; siphon marbled with crimson; foot of a delicate yellowish-pink, marked with deep crimson rays. The shell is of a bright olive carnelian hue, conspicuously encircled at irregular intervals with broad black lines, having almost the consistency of bands.

2. MARGINELLA UNDULATA. Pl. VII. Fig. 5 *a, b, c.* Deshayes, Anim. sans vert. vol. x. p. 451. *Voluta glabella undulata*, Chemnitz, Conch. Cab. vol. x. pl. 150. f. 1423-4. *Voluta strigata*, Dillwyn. *Marginella strigata*, Kiener.

HAB. East Coast of Africa; from a sandy floor.

This fine species was also taken alive. The tentacles, siphon, foot, and mantle are of a delicate, semitransparent, yellowish ground colour, streaked and mottled with carmine, the border of the mantle being richly spotted with the same. The left lobe of the mantle is more produced over the shell than the right.

The tentacles of the *Marginellæ* appear to vary in different species. In those observed by M. Deshayes on the shores of the Mediterranean, the tentacles are described as being short, whilst in this and the preceding species they are slender and elongated. It may be remarked, too, that the eyes of the *Marginella diadochus* are more pedunculated than those of *M. undulata*.

3. MARGINELLA ONYCHINA. Pl. X. Fig. 25. Marg. testâ ovatâ, subobesâ, spirâ plano-depressâ, ferè occultâ, anfractibus supernè rotundato-tumidis, columellâ fortiter sexplicatâ, aperturâ elongatâ, labro incrasato; albidâ, cinereo-griseâ, confertim promiscuè strigatâ, obscurè trifasciatâ, labro albo.

HAB. China Sea.

This species might be readily confounded with the *Marginella tricincta*, but it differs materially in form, being more depressed and rounded at the hinder extremity, with the spire buried as in the Cowries, and less swollen in the middle. The streaky character of the painting is also characteristic.

### 3. PURPURIFERA.

The *Purpurifera* are most abundant in the Eastern Seas, and were collected in great numbers; but, as monographs of the principal genera have been only lately published, little remained that was new. No *Columbellæ* were taken but what have been already figured in the 'Thesaurus Conchyliorum;' it has, however, been thought desirable to figure the living *C. fulgurans* and *semipunctata*, the habits of which afforded some observations. Five species of *Terebra*, differing from any of those described in Mr. Hinds' recent monograph of that genus, were collected, and a magnificent addition was made to the limited genus *Oniscia*.



## 8. TERE BRA.

1. *TEREBRA SEROTINA*. Pl. X. Fig. 20. Ter. testâ lanceolato-turritâ, basi breviter recurvâ, anfractibus planulatis, supernè plicato-nodulosis, deinde arcuatim liris, liris striis transversis numerosis irregularibus decussatis; citrino-aurantiâ.

HAB. Japan Island, Nangasaki Bay.

The noded sculpture round the edge of the whorls, forming somewhat of a shelf, makes the sutures very distinct. The nodules are slightly plicate and pass into arched concentric ridges.

2. *TEREBRA ALBICOSTATA*. Pl. X. Fig. 21. Ter. testâ subulatâ, anfractibus supernè plicato-nodosis, deinde costatis, costis angustis, subirregularibus, interstitiis transversim impresso-striatis; castaneo-rufâ, costis nodisque albidis, anfractu ultimo basin versus albifasciato.

HAB. China Sea.

The ribs and nodules, although naturally white, appear colourless from the effect of abrasion.

3. *TEREBRA CÆLATA*. Pl. X. Fig. 22. Ter. testâ lanceolato-turritâ, anfractibus longitudinaliter arcuatim plicato-costatis, costis liris duplicatis striisque transversis cancellatis, sulco unico conspicuo infra suturas; albâ.

HAB. Philippine Islands.

The chief peculiarity of this delicately carved species consists in the transverse ridges being finely duplicate.

4. *TEREBRA AREOLATA*. Pl. X. Fig. 23. Ter. testâ lanceolato-turritâ, gracili, anfractibus planis, longitudinaliter plicato-costatis, costis tumidiusculis, confertis, subundulatis, interstitiis alveolatis; rubellâ, albo variegatâ.

HAB. China Sea.

The opaque white marbling of the shell is mainly upon the ribs, which have a swollen appearance, and are unusually close-set.

5. *TEREBRA ROSEATA*. Pl. X. Fig. 24. Ter. testâ subulatâ, anfractibus plicato-costatis, costarum interstitiis liris tenuibus clathratis, sulco prominulo infra suturas; pallidè roseâ.

HAB. Sooloo Islands; from sandy mud, at a depth of about thirty fathoms.

Of a uniform, delicate, transparent, pink colour.

6. *TEREBRA TORQUATA*. Pl. X. Fig. 13. Ter. testâ lanceolato-turritâ, anfractibus concavis, arcuatim costatis, supernè biserialim, infrâ uniserialim, nodosis, transversim striatis; fusciscente-albâ, ferrugine marmoratâ.

HAB. China Sea.

The whorls of this species are concave and arcuately ribbed, the ribs being characterized by two rows of nodules at the upper part, and one below.

### 9. OLIVA, *Bruguère*.

1. OLIVA FULGURATA. Pl. X. Fig. 12. Oliv. testâ fusiformi, lævissimâ, nitente, spirâ acuminatâ, columellâ arcuatâ, parùm sulcatâ, truncatâ, aperturâ oblongâ, labro subdilatato; albidâ, castaneo longitudinaliter conspicuè fulguratâ, columellâ castaneo-rufo fasciatâ.

HAB. China Sea.

A highly polished shell, very conspicuously painted with longitudinal, zigzag, chestnut bands upon a whitish ground, the columella having a reddish tinge of colour.

### 10. ANCILLARIA, *Lamarck*.

The animal of *Ancillaria* is voluminous, covering the entire shell, with the exception of the spire. The head, which is entirely concealed by the reflected portions of the foot, consists of a short, inflated, cylindrical, annulated proboscis, above which is a semilunar veil formed by the dilatation and union of the tentacles; there is no indication of eyes. The mantle lines the shell, and is produced anteriorly into a long siphon. The foot is large and bursiform, the side-edges being greatly extended and reflected over the shell, meeting in the middle on the back. As in *Oliva*, it is deeply fissured anteriorly, forming a semilunar disc before the head, divided by a deep longitudinal groove into two lateral, triangular lobes, acuminate transversely; posteriorly it is bilobed, and is either without an operculum, or is provided with a thin, horny, unguiform one, with apical nucleus, semilunar striæ, and an oval muscular impression.

1. ANCILLARIA OBTUSA. Pl. XIII. Fig. 6 *a, b*. Swainson, *Journ. Sci. Lit. and Arts*, vol. xviii. p. 282. Sowerby, *Species Conchyliorum, Anc.* p. 5. Fig. 24, 25.

HAB. East coast of Africa, below Port Natal.

The specimen taken alive at the above-named locality was of a dirty white colour, marked with dull brown, elongated blotches, distributed with scarcely so much regularity as represented in our figure. Fig. 6 *b* represents the operculum.

The *Ancillariæ* resemble the *Olivæ* in their habits, dwelling among the smooth sands in which they frequently bury themselves. They crawl with a quick sliding motion, and, as they glide briskly along, the tubular cylindrical siphon only is visible, directed backwards and upwards, and even laid flat upon the back; the alar expansions of the foot slightly overlap each other in the middle, and, extending considerably beyond the spire, form posteriorly a loose open sac. It is possible that the dilated lobes of the foot are sometimes extended and serve for swimming, as D'Orbigny has observed in *Oliva Tehuelchana*, *Voy. Amér. Mérid. Moll.* p. 419. *A. A.*

11. EBURNA, *Lamarck*.

An interesting drawing was made of the living *Eburna areolata*, Lamarck, but no new species were collected of the genus. It agrees in all respects with the generic description of the animal given by M. Deshayes (*Anim. sans vert.* vol. x. p. 231), and is only inserted here for the sake of its specific characters.

1. EBURNA AREOLATA. Pl. VIII. Fig. 5. Lamarck, *Anim. sans vert.* vol. x. p. 235. *Eburna tessellata*, Swainson. Head flat, extended; tentacles very long and slender; eyes consisting of a yellow iris and black pupil mounted upon pedunculated swellings on the outer base of the tentacles; siphon large, fleshy and slightly curved; foot long, fleshy and robust, acuminated behind and carrying a horny operculum. Colour dull pinkish-white, sprinkled with large, light brown, irregular blotches; siphon and tentacles mottled with spots of the same colour.

HAB. China Sea; from mud at the depth of fourteen fathoms.

It is extremely rare to find any sort of concordance between the colouring of a mollusk and its shell. In the present instance there is a characteristic resemblance in this respect.

12. BUCCINUM, *Linnaeus*.

1. BUCCINUM HINNULUS. Pl. VII. Fig. 10 *a, b*. Bucc. testâ ovato-turbinatâ, ventricosâ, basi contortâ et recurvâ, anfractibus septem, transversim crebriliris, supernè angulato-declivibus, ad angulum exiliter nodulosus; albidâ, aurantio-fusco sparsim maculatâ et strigatâ.

HAB. Cagayan-Sooloo.

Closely encircled throughout with contiguous slightly convex ridges, promiscuously blotched with rich orange chestnut upon a white ground.

2. BUCCINUM CLATHRATUM. Pl. XI. Fig. 12. Bucc. testâ fusiformi-oblongâ, crassiusculâ, anfractibus septem, supernè tumidiusculis, liris longitudinalibus et transversis undique creberrimè clathratis, columellâ laminâ callosâ indutâ, aperturâ angustâ, labro incrassato, supernè vix sinuato; fuscoseente-albâ, obscurè bi-trifasciatâ.

HAB. Cape of Good Hope; dredged from the depth of a hundred and thirty-six fathoms.

This interesting deep-water species, and that which follows, approximate to the form distinguished by Bivona as a genus under the name *Pisania*. It is of rather solid growth, very closely sculptured throughout with lattice-work.

3. BUCCINUM MITRELLA. Pl. XI. Fig. 13. Bucc. testâ angustè fusiformi, spirâ exsertâ, anfractibus octo, convexo-planis, lineis elevatis, longitudinaliter areuatis et transversis subtiliter cancellatis, aperturâ angustâ, brevisculâ, labro subincrassato, supernè vix sinuato; albâ, maculis subquadratis spadiceis obscurè tinetâ.

HAB. China Sea; from ten fathoms.



Characterized by the same idea of form and sculpture as the preceding species, though materially distinct in detail.

4. *BUCCINUM FILOSUM*. Pl. XI. Fig. 18. Bucc. testâ acuminato-oblongâ, crassiusculâ, spiræ suturis canaliculatis, anfractibus plano-convexis, lævibus, lincis incisîs subdistantibus transversim regulariter sulcatis, columellâ arcuatâ, peculiariter abbreviatâ et truncatâ, margine uniplicatâ, aperturâ anticè dilatâtâ, posticè submarginatâ; carneâ et cinerascens, sulcis alternis rufo-fuscescentibus maculisque obscure bifasciatâ.

HAB. China Sea.

This shell, which is remarkably characterized by the abrupt truncature of the columella, and by its anteriorly dilated aperture, might possibly belong to an animal generically distinct from *Buccinum*. If such should prove hereafter to be the case, we propose to regard the species as the type of a new genus, with the name *Truncaria*.

5. *BUCCINUM ALBIPUNCTATUM*. Pl. XI. Fig. 21. Bucc. testâ acuminato-ovatâ, anfractibus septem, tribus obliquè plicatis, cæteris lævibus, nitentibus, ad suturas subtiliter marginatis, aperturâ parviusculâ, labro subincrassato, limbo spinoso-crenulato, supernè sinuato; pallidè fulvescente, punctis minutis opaco-albis seriatim notatâ, apice rosaceo.

HAB. Island of Mindanao, Philippines; on the shore.

*B. albipunctatum* belongs to that section of the genus distinguished by Mr. Gray with the title of *Northia*, of which *B. pristis* is the type; and it is very closely allied to a species improperly referred in the 'Conchologia Iconica' to the genus *Pleurotoma*, Sp. 111, *P. Rissoides*.

### 13. CYLLENE, *Gray*.

1. *CYLLENE LUGUBRIS*. Pl. X. Fig. 10. Cyll. testâ ovatâ, crassâ, spirâ acutâ, anfractibus undique creberrimè sulcatis, supernè tumidis, subtiliter noduloso-plicatis; intensè castaneâ, labro albo, anfractuum margine superiore albivarietatâ.

HAB. Sooloo Islands.

A fine stout species of this characteristic, but little known, genus, in which the whorls are finely nodulously plicated round the upper part.

2. *CYLLENE PULCHELLA*. Pl. X. Fig. 11. Cyll. testâ ovatâ, crassiusculâ, spirâ subacuminatâ, acutâ, anfractibus medio tumidis, transversim lincari-sulcatis, apicem versus subtilissimè plicatis; albâ, flammis pallidè rosaceis obscure variegatâ, apice roseo.

HAB. Borneo; on the shore.

An extremely delicately painted species, with light pink waves, and pink apex.

### 14. PURPURA, *Lamarck*.

1. *PURPURA CUSPIDATA*. Pl. XI. Fig. 35. Purp. testâ abbreviato-ovatâ, spirâ brevi, acutâ, anfrac-

tibus supernè coneavis, infrà quadriliratis, liris duabus superioribus eompresso-squamatis, squamis supremis grandibus, erectis, spinosis ; nigricante-fuscâ, liris quatuor albis, aperturæ fauce æeruleseente-albâ.

HAB. China Sea.

Several examples of this species, differing materially from any hitherto described, were collected in the China Sea, with scarcely any variation of form or colouring.

### 15. COLUMBELLA, *Lamarck*.

The animal of *Columbella* has a long and somewhat narrow vertically depressed head, with the eyes sometimes placed on the outer side of the base of the tentacles, and sometimes on the outer side of reflected prominences, situated at some little distance from the head. The siphon, long and directed forwards, is considerably dilated at the anterior extremity. The foot is short and pointed posteriorly, and bears a small, semitransparent, horny operculum, with concentric elements. Anteriorly the foot is often considerably produced beyond the head, where it forms a long, thick, flattened, fleshy, finger-like process. Sometimes it is expanded laterally, when it is truncate anteriorly and furnished with two lateral angular processes.

1. COLUMBELLA TÆNIATA. Pl. XI. Fig. 19. Col. testâ fusiformi-ovatâ, anfractibus plano-convexis, lævibus, nitentibus, aperturâ parvâ, labro incrassato, supernè sinuato ; rufeseente-carneâ, maculis quadratis rufo-fuscis tæniatâ.

HAB. Borneo.

There are two fillets of square red-brown spots on each whorl, the lower of which is concealed in all but the last whorl.

2. COLUMBELLA SEMIPUNCTATA. Pl. XIII. Fig. 7. Lamarck, Anim. sans vert. (Deshayes' edit.) vol. x. p. 267.

HAB. Shores of Borneo.

The animal of this species has a white head, marked with a series of large orange blotches on the upper surface ; the siphon is of a deep orange colour at the anterior extremity, and is ornamented with two rows of large, oval, orange spots, placed alternately with each other. The eyes are black ; the tentacles are dead white, and deep orange at their distal extremities ; the body is handsomely marbled with orange and yellow, the latter colour forming a loose open net-work, with irregular, lozenge-shaped meshes.

3. COLUMBELLA FULGURANS. Pl. XVII. Fig. 8. Lamarck, Anim. sans vert. (Deshayes' edit.) vol. x. p. 272.

HAB. From the shingly beach of a small islet off Billiton.

The animal of *Columbella fulgurans* has the head white, covered with large, black, oval

spots; the tentacles pure white; the siphon elegantly annulated with alternate, broad, black and white rings, the white rings being much narrower than the black; the foot is of a clear dead white, covered with large, black, somewhat scattered, oval spots.

The *Columbellæ* live in shallow water, some species crawling on the surface of sand-flats, and some affecting stony beaches, where they congregate about the stones in considerable numbers. *C. varia*, observed in plenty at the Island of Billiton, on a coral and stony bottom, is of a pure dead white; the body, head, and foot being covered with large, oval, black blotches, and the tentacles marked with a row of black spots along their entire length. The siphon is annulated alternately with brown and white. *A. A.*

#### 16. ONISCIA, *Sowerby*.

1. ONISCIA EXQUISITA. Pl. V. Fig. 3 *a, b*. Onisc. testâ subtrigono-ovatâ, basi obtusè recurvâ, spirâ brevi, acutâ, anfractibus octo, supernè concavo-depressis, tuberculis papillaribus undique angulatis, lirâ subobscurâ interveniente, labro columellari latè expanso, granulis valdè irregularibus, labro externo incrassatim reflexo, liris brevibus dentiformibus irregulariter munito; albidâ, aurantio-fusco hic illic sparsim punctatâ, et pone labrum trimaculatâ, labris pallidè purpureo-rosaceis, apice rufo.

HAB. Sooloo Archipelago; outside a coral reef near the city of Sooloo, in about sixteen to twenty fathoms, sandy mud.

The surface of this very chaste and delicate *Oniscia* is covered with papillary tubercles, in rows of about ten either way, transversely or longitudinally. The columella and outer lips are enamelled of a livid purplish-pink colour.

#### 4. ALATA.

#### 17. STROMBUS, *Linnaeus*.

1. STROMBUS CORRUGATUS. Pl. X. Fig. 19. Stromb. testâ fusiformi-turritâ, anfractibus novem, transversim undique creberrimè liratis, supernè rotundato-angulatis, ad angulum plicato-costatis, costis subcorrugatis, in anfractu ultimo gradatim distantioribus et majoribus, tubercula formantibus, aperturâ subangustâ, labro columellari calloso, externo ponè incrassato; albâ, fulvo-castaneo subirregulariter fasciatâ, aperturæ fauce albâ.

HAB. Korea.

Distinguished by its corrugated ribs, which in the last whorl gradually pass into tubercles, larger, and at more distant intervals.

#### 18. ROSTELLARIA, *Lamarck*.

1. ROSTELLARIA RECTIROSTRIS. Pl. V. Fig. 2 *a, b, c*. Lamarck, Anim. sans vert. (Deshayes' edit.) vol. ix. p. 655.

HAB. Coast of Borneo; dredged from black sandy mud at the depth of thirty-one fathoms.

Animal with a subcylindrical annular proboscis, coloured by a broad, central, dark



bronze line, the edges of which are yellow, bordered with vermilion; eyes deep blue, with black pupils, surmounted on long cylindrical peduncles; tentacles white, with a narrow vermilion streak along their anterior surface; body cylindrical and much elongated, marked with red-brown on the outer surface, white beneath; foot narrow, rather dilated and rounded in front, with a thickened anterior margin, small and subquadrate behind, the two portions separated by a deep notch; operculum ovate-triangular, annular, horny, semitransparent.

The *R. rectirostris*, like the rest of the *Alata*, progresses by bending the foot under the shell and suddenly straightening, which enables it to roll and leap over and over. It is extremely timid in this respect, unlike *R. fissa*, of which the animal is light brown varied with lighter markings of the same colour.

### 19. TEREPELLUM, *Klein*.

The discovery of the living *Terebellum* has occasioned the removal of that genus to this family, on account of its affinity with *Strombus*. The eyes are pedunculated, and the mantle is characterized by the same peculiar divided edge. In the narrow form of the foot and proboscis-like head it is allied to *Struthiolaria* and *Aporrhais*, and, like *Oliva*, the mantle has a long filamentary cord winding into the sutures of the shell.

1. TEREPELLUM SUBULATUM. Pl. IX. Fig. 6. Lamarck, Anim. sans vert. (Deshayes' edit.) vol. x. p. 584.

HAB. China and Sooloo Archipelago.

The animal of *Terebellum* may be thus described:—Head probosciform; tentacles connate with the long cylindrical eye-peduncles, at the ends of which are placed the eyes; mantle with the right edge reflexed over the outer lip, produced in front into a short siphon, and furnished behind with three or four filaments, the inner edge spread over the columella and ending behind in a long slender filament, which occupies, as in *Oliva*, the channelled suture of the spire; foot large, ovate, fleshy, laterally compressed, with a lobe at the fore part, rounded behind, and bearing a minute, horny, triangular operculum.

The eye-peduncles of this species are finely dotted with brown, the proboscis and the fore part of the body is punctulated with the same; the rest of the body is opaque white, with three large irregularly-shaped red-brown blotches on the fore part; the under-surface of the foot is light brown, with a white subcruciate marking.

The *Terebellum* is extremely shy in its movements. Poising its shell in a vertical position, and cautiously protruding its longest telescope-eye from the truncature in the front of the shell, it will remain stationary until assured of security. It will then use its pointed foot as a lever and roll its shell over and over, progressing by a series of irregular leaps. When removed from the water before dying, it will jump several inches from the ground. Mr. Cuming assures me his knowledge of the animal coincides with my own experience, and that on one occasion he lost a fine specimen owing to its suddenly leaping from his

hand into the water. I have observed both the varieties of this species alive. In the spotted variety, the muzzle is reddish towards the tip, the body is opaque pearly white, the eye-peduncles mottled with dark red; in the common variety there are three large red-brown blotches on the fore part of the body, and the under surface of the foot is light brown with a cross-like mark of darker brown. *A. A.*

## 20. TRITON, *De Montford.*

1. TRITON TESTUDINARIUS. Pl. IX. Fig. 3 *a, b.* Trit. testâ trigono-fusiforâ, longicaudatâ, varicibus senis septemve, spirâ obtuso-elongatâ, anfractibus supernè concavo-declivibus, transversim noduloso-costatis, et tuberculatis, tuberculis grandibus, costis super varices duplicatis, aperturâ parviusculâ, labro intus fortiter tuberculato-dentato; rufescente-fuscâ, columellâ intensè rufo-purpureâ, albirugosâ.

HAB. China Sea.

An interesting species, having the form of *T. tripus*, with the colouring of *T. cynocephalus*, which is always well characterized by the deep purple colouring of the columella.

2. TRITON PYRULUM. Pl. X. Fig. 17. Trit. testâ clavæformi, longicaudatâ, varice unicâ, anfractibus supernè declivibus et rotundatis, transversim subtiliter crenato-liratis et multinodatis; albidâ, fuscescente hic illic pallidè tinctâ.

HAB. Eastern Seas.

Very like *T. canaliculatus*, except that the spire is not canaliculated.

3. TRITON MONILIFER. <sup>Pl. X, Fig. 18 [ex Index]</sup> Trit. testâ clavato-pyriformi, varice unicâ, anfractibus supernè angulatis, liris crenatis subdistantibus cingulatis, ad angulum acutè plicato-nodosi, labro columellari subincrassato, aperturâ ovali, intus corrugato-dentatâ; albidâ, varicibus rufo-fusco tessellatis.

HAB. Eastern Seas.

Distinguished by its pyriform growth, and general detail of sculpture.

## 21. RANELLA, *Lamarck.*

In *Ranella* the tentacles are commonly somewhat closer together than in *Triton*, and the head is longer and narrower than in *Murex* and *Fusus*; the eyes in some species are nearly basal, but are generally placed about the middle of the tentacles on their outer sides; the siphon is short and directed upwards, the foot larger than in *Triton*, *Murex*, or *Fusus*, and considerably dilated both before and behind; the mantle does not appear to be furnished with fimbriated processes as seen in some Murices. In some species the trunk is enormously developed, whereas in others it is not protruded in the usual condition of the animal. In colour the *Ranellæ* are usually of a pale brown, marbled and mottled with deeper brown. The operculum is ovate, horny, with a lateral nucleus and semicircular elements.

1. RANELLA ALBIVARICOSA. Pl. XIII. Fig. 4. Reeve, Conch. Icon. *Ranella*, pl. 1. f. 2. The animal

of this species is white, faintly marbled with grey; the eyes are black, and there is a dark transverse band across the middle of each tentacle. Operculum horny, semicircular, with the lines of growth distant.

HAB. Java Sea.

The *Ranella* is by no means an inactive animal, but moves with considerable animation, thrusting out its head, dilating its foot, and protruding its tentacles and sometimes its proboscis with much vivacity; it will even crawl with considerable facility up perpendicular surfaces, supporting its somewhat weighty shell with comparative ease. In a species dredged from twenty fathoms in the Java Sea, the very long extensile proboscis was exerted to the distance of three inches from the head, and the animal appeared to employ it as an exploring organ, moving it about in all directions.

## 22. MUREX, *Linnaeus*.

1. MUREX EURYPTERON. Pl. VIII. Fig. 1 *a, b*. Reeve, Conch. Icon. *Murex*, pl. 34. f. 176.

HAB. Japan.

The shell here figured is only the second specimen yet discovered of this fine species, and is remarkable for its elegant growth.

2. MUREX RORIFLUUS. Pl. VIII. Fig. 2 *a, b*. Mur. testâ fusiformi, subventricosâ, anfractibus transversim obscurè liratis, rugosis, quadrivariosis, varicibus rudibus, simplicibus, planulatis, obscurè denticulatis, aperturæ margine dentato; sordidè cinerascente, intus nigricante-castaneâ, varicibus albidis.

HAB. Korean Archipelago.

Chiefly distinguished by the simple character of the varices.

3. MUREX FLORATOR. Pl. VIII. Fig. 3 *a, b*. Mur. testâ trigono-ovatâ, anfractibus lævibus, trivariosis, varicibus compresso-alatis, aperturâ parvâ, rotundatâ, canali clauso; castaneo-fuscâ, medio transversim albizonatâ.

HAB. Korean Archipelago.

This shell is somewhat worn, but two or three specimens were collected, all having the same characteristic form and dark chestnut colouring.

4. MUREX BURNETTI. Pl. VIII. Fig. 4 *a, b*. Mur. testâ trigono-ovatâ, crassiusculâ, anfractibus transversim obsolete costatis, trivariosis, varicibus latè fimbriatis, dente unico marginali prominente, aperturâ ovali, canali clauso; albidâ, castaneo-fusco plus minusve tinctâ.

HAB. Korean Archipelago.

Another species from the same locality, of which two or three specimens were collected in worn and broken condition. Each varix is furnished with a prominent tooth, the outer varix being finely winged. The canal of the shell is closed over. We have the pleasure to name this fine species in honour of Sir William Burnett, F.R.S.



23. FICULA, *Swainson*.

Head elongated, slender, flattened; tentacles long, subulate, placed at the sides of the front, separated by a wide interval at their base; eyes large, black, and sessile on the outer side of the base of the tentacles; siphon elongated, subcylindrical, and produced; mantle thin and membranous, produced on each side into a rounded lobe equally reflexed on each side over the shell; foot large, expanded, rounded in front, rather produced on each side of the front edge, expanded, broad and tapering, and not furnished with any operculum.

1. FICULA LEVIGATA. Pl. IX. Fig. 4. Reeve, Conch. Icon. *Ficula*, pl. 1. f. 4. *Bulla ficus*, Linnæus. *Pyrula ficus*, Lamarck. Head and neck pink, varied with scattered yellow spots, mantle bright pink, mottled with white and darker pink; under surface of foot dark purple chocolate, varied with yellow scattered spots.

HAB. Sooloo Sea, at the depth of thirty-five fathoms.

The dark chocolate colouring of the under surface of the foot presents a rich contrast with the bright freckled pink of the upper.

2. FICULA RETICULATA. Pl. IX. Fig. 5. Reeve, Conch. Icon. *Ficula*, pl. 1. f. 1. *Pyrula reticulata*, Lamarck. Head and tentacles white, mantle light pink, marbled and reticulated with darker pink; foot pink, with six large opaque white spots at about equal distances.

HAB. West coast of Borneo; from mud at a depth of about seventeen fathoms.

The head of this species differs from that of the former in being colourless. The mantle is characterized by the same pink reticulated marbling as the foot.

The *Ficula* is a very lively animal when observed in its native element, crawling along with considerable velocity, and, owing probably to the lightness of its shell, able to ascend the sides of a glass vessel, in which I had it captive, with facility. The proboscis is rarely exerted when the animal is in motion, but the long slender tentacles are stretched out to their full extent. *A. A.*

24. PLEUROTOMA, *Lamarck*.

The animal of *Pleurotoma* has rather a short flattened body, with the foot notched in front, and the two angles produced on the sides; the posterior part is rounded and bears a small, semitransparent, horny operculum, with concentric elements. The head is very long, flattened, and but little produced in front; the tentacles are subulate and close together at the base, and the eyes are near the outer side of the tip, which latter tapers off beyond them.

The *Pleurotomæ* generally inhabit deep water and crawl rather quickly.

1. PLEUROTOMA IMPAGES. Pl. IX. Fig. 1 *a, b*. Pleur. testâ clavato-turritâ, solidiusculâ, anfractibus novem ad decem, medio tumidiusculis, concentricè obscurè plicato-rugatis, canali brevissimo, truncato, aperturâ oblongâ, labro leviter emarginato; albidâ, carneo-fuscescente suffusâ, inter rugas saturatiore.

HAB. China Sea.

A solid, club-shaped shell, in which the surface is slightly disposed in concentric folds.

2. *PLEUROTOMA FAGINA*. Pl. IX. Fig. 2 *a, b*. Pleur. testâ elongato-fusiforâ, solidâ, anfractibus quatuordecim, supernè depresso-cauliculis, infra spiraliter costatis, costis planiconvexis, interstitiis impresso-striatis, columellâ basi umbilicatâ, labri sinu profundo.

HAB. China Sea.

Of solid fusiform growth, strongly spirally ribbed and deeply channelled.

3. *PLEUROTOMA LURIDA*. Pl. X. Fig. 5. Pleur. testâ gracili-fusiforâ, anfractibus decem, transversim subtiliter striatis, supernè concavo-angulatis, ad angulum plicato-nodosis et transversim obtusè costatis, sinu subamplo; ferrugineo-fuscâ, infra angulum albidâ.

HAB. China Sea.

A shell of light substance, in which the sculpture is of a tremulous or corrugate character.

4. *PLEUROTOMA ALBICINCTA*. Pl. X. Fig. 6. Pleur. testâ subabbreviato-fusiforâ, anfractibus decem, transversim subtiliter striatis, supernè concavo-declivibus, deinde obliquè plicato-nodatis, sinu latiusculo; fulvescente, saturatè variegatâ, medio albizonatâ.

HAB. China Sea.

The white zone passes over the nodules upon the angle in the centre of each whorl.

5. *PLEUROTOMA LEUCOTROPIS*. Pl. X. Fig. 7. Pleur. testâ fusiforâ, medio subobesâ, solidiusculâ, anfractibus undecim, levibus vel tenuissimè striatis, superuè concavis, deinde acutè carinatis, anfractu ultimo inferuè bicarinato, sinu peramplo; ustulato-fuscâ, carinâ albidâ.

HAB. China Sea.

Distinguished by the broad slanting concavity round the upper part of the whorls, and prominent central keel.

6. *PLEUROTOMA COREANICA*. Pl. X. Fig. 8. Pleur. testâ fusiforâ, canali breviusculo, anfractibus novem, supernè concavis, deinde exiliter obliquè nodulosis, sinu peramplo, profundo; cereo-albâ, fasciâ latâ fuscâ infernè cingulatâ.

HAB. Korea.

A very characteristic species, of a wax-white aspect, encircled round the lower part of the last whorl with a broad brown band.

7. *PLEUROTOMA GRIFFITHII*. Pl. XIII. Fig. 13. Gray, Reeve Conch. Icon. *Pleurotoma*, pl. 7. f. 57. Body without any kind of marking, of a semi-opaque white, with the eyes black.

HAB. Java Sea; from a muddy stony bottom, at the depth of fourteen fathoms.

There is little of painting in the shell, and none in the animal.

25. MANGELIA, *Leach*.

1. MANGELIA TRIVITTATA. Pl. X. Fig. 9. Mang. testâ subtrigono-fusiforimi, spirâ breviusculâ, acutâ, anfractibus supernè angulatis, longitudinaliter costatis, costis ad angulum nodulosis, interstitiis concavis, transversim sub lente subtilissimè striatis; albidâ, rufescente pallidè trivittatâ.

HAB. Island of Mindoro, Philippines.

This appears to be distinct from any of the many pretty species of *Mangelia* collected by Mr. Cuming in the same locality, and described in the 'Conchologia Iconica.'

26. FUSUS, *Lamarck*.

1. FUSUS GRACILLIMUS. Pl. VII. Fig. 1. Fus. testâ gracillimo-fusiforimi, undique spiraliter sulcatâ et lirâtâ, anfractibus rotundatis, longitudinaliter plicato-costatis, costis latiusculis, medio unicarinatis, labrum versus evanidis; castaneo-fuscescente.

HAB. Eastern Seas.

Nearest allied to the *F. longicaudatus*, from which it may be readily distinguished.

2. FUSUS SPECTRUM. Fus. testâ elongato-fusiforimi, anfractibus convexis, transversim subtilissimè striatis, longitudinaliter tuberculatis, tuberculis apicem versus fortioribus, valdè conspicuis, anfractibus ultimi ferè evanidis, nisi in carinam acutè compressam; albâ, epidermide tenui lutescente indutâ.

HAB. Eastern Seas.

The rib-like tubercles of this species are developed with great force in all except the last whorl, in which they are merely represented by a compressed keel.

3. FUSUS ACUS. Pl. VII. Fig. 3 *a, b*. Fus. testâ lanceolato-fusiforimi, gracillimi, solidiusculâ, anfractibus longitudinaliter plicato-costatis, spiraliter sulcatis, sulcis subtilibus, confertis, peculiariter plano-excavatis, aperturâ parvâ, canali ferè clauso; rufo-ferrugineâ.

HAB. China Sea, off Borneo.

A narrow lanceolate shell, of a solid, constricted growth.

27. CANCELLARIA, *Lamarck*.

1. CANCELLARIA MACROSPIRA. Pl. X. Fig. 2. Canc. testâ acuminato-turritâ, solidiusculâ, vix umbilicatâ, spirâ valdè exsertâ, suturis plano-excavatis, anfractibus octo, convexis, apicem versus plicato-costatis, hic illic undique obscurè varicosis, liris tenuibus longitudinalibus et transversis, subobsoletè crenulatis, eximiè clathratis, columellâ tenuiter triplicatâ, aperturâ parvâ, labro incrassatim varicoso, supernè producto; cereo-albicante.

HAB. Coast of Borneo, China Sea.

Remarkably distinguished from any species hitherto described by the elongated convolution of the spire.



2. *CANCELLARIA SEMIPELLUCIDA*. Pl. X. Fig. 3 and 3 *a*. Canc. testâ ovato-ventricosâ, tenuiculâ, vix umbilicatâ, spirâ breviusculâ, suturis profundè impressis, anfractibus quinque, supernè rotundatis, longitudinaliter obliquè plicato-costatis, liris transversis, costas super nodulosis, subobsoletè decussatis, columellâ triplicatâ, aperturâ ovatâ, effusâ, labro simplici; fuscescente-albâ, semipellucidâ.

HAB. Sooloo Sea.

A light inflated shell, with the sutures rather deeply channelled.

3. *CANCELLARIA LYRATA*. Pl. X. Fig. 4. Canc. testâ acuminato-ovatâ, umbilicatâ, spiræ suturis profundè impressis, anfractibus sex ad septem, subangustis, rotundatis, prominentibus, longitudinaliter costatis, costis elevatis, compressis, distantibus, e suturis descendentibus, liris tenuibus transversim regulariter sculptis, lineâ elevatâ interveniente, columellâ triplicatâ, plicâ anticâ subobsoletâ, aperturâ trigono-ovatâ, parvâ, subeffusâ; albicante, costis pallidè fuscescentibus.

HAB. China Sea.

The sculpture of this species, under the lens, is extremely characteristic.

4. *CANCELLARIA PYRUM*. Pl. X. Fig. 16. Canc. testâ ovato-pyriformi, solidâ, spirâ brevissimâ, parum exsertâ, anfractibus quinque, apicem versus clathratis, anfractu ultimo lævigato, granoso-corrugato, supernè calloso, columellâ triplicatâ, plicâ posticâ prominulâ, acutâ, anticâ obsoletâ, aperturâ oblongâ, subamplâ; sordidè albâ, epidermide corneâ fuscâ indutâ, columellâ et aperturæ fauce luteo-aurantiis.

HAB. China Sea.

A fine solid bulbous species, richly enamelled about the aperture.

## 28. *TURBINELLA*, *Lamarck*.

1. *TURBINELLA BELCHERI*. Pl. VII. Fig. 7 *a, b*. Turb. testâ fusiformi, spirâ subturritâ, anfractibus transversim subtiliter striatis, supernè concavis, medio ventricosis, serie duplici tuberculorum, deinde serie nodulorum cinctis; aperturæ fauce striatâ; albâ, maculis flammisque nigris conspicuè pictâ, epidermide luteâ indutâ.

HAB. Cargados Garajos, Indian Ocean (coral bottom).

This very beautiful new species, which we have the pleasure to dedicate to the Commander of the Expedition, is remarkable for its bold and characteristic painting.

2. *TURBINELLA LANCEOLATA*. Pl. VII. Fig. 8. Turb. testâ lanceolato-fusiformi, hexagonali, lævigatâ, basin versus rudè liratâ, anfractibus tuberculis grandibus costæformibus continuis undique longitudinaliter decussatis; aperturæ fauce tenuistriatâ; luteo-fuscescente, aperturâ vividè violacæâ.

HAB. Philippine Islands.

Distinguished from its nearest ally, *T. nodata*, in being of a more sharply lanceolate growth, whilst the whorls are less rounded, and the ribs, following continuously one beneath the other, impart a hexagonal form to the shell. The aperture, which in *T. nodata* is pink, in the present species is of a deep violet.

3. *TURBINELLA PICTA*. Pl. VII. Fig. 9. Turb. testâ ovato-fusiforâ, medio ventricosâ, anfractibus transversim sulcatis, longitudinaliter obtusè plicato-costatis, supernè concavis, deinde tuberculis compressis, quorum supremis majoribus cingulatis; aperturæ fauce striatâ; albâ, maculis numerosis nigricante-fuscis, lineisque transversis coccineis et luteis pulcherrimè pictâ, columellâ fusco-rosacâ.

HAB. Feejee Islands.

A pretty species, of rather solid growth, extremely richly painted.

The animal of *Turbinella cornigera* is of a deep purple, finely marbled with white, the colours being fainter towards the margin of the foot. The eye is distinct and well formed, having a black pupil and iris of a light yellow colour. It crawls with deliberation and with apparent difficulty, appearing to labour under the weight of its heavy shell as a tortoise does under that of its carapace. It is, moreover, of a very timid disposition; shrinking also, like a tortoise, quickly within its shell on the slightest alarm. The specimen from which the foregoing observations were taken, was procured in about a fathom water, from a weedy bottom, on the shores of Billiton, an island in the Java Sea, between Borneo and Sumatra.

The only notice in M. Rang's 'Manuel' is "Animal très imparfaitement connu." This species must vary in colour, as Quoy (Voy. Astrol.) states that the animal is "pale olive, darker spotted." Singularly enough, Quoy in his figure, as copied by Mrs. Gray ('Figures of Molluscous Animals,' t. 8. f. 8), has altogether omitted the operculum, which forms such a conspicuous appendage to the foot. It is a large, thick, dense, nearly opaque, claw-shaped operculum, composed of horny laminae, and is free at its posterior, curved, sharp-pointed extremity, like the operculum of *Fasciolaria Tarentina*, according to Della Chiave (Mrs. Gray's 'Figures of Molluscous Animals,' t. 8. f. 4). A. A.

## 29. CERITHIUM, *Bruguère*.

1. *CERITHIUM ARTICULATUM*. Pl. X. Fig. 14. Cer. testâ subulato-turritâ, solidâ, anfractibus planulatis, subobsoletè varicosis, transversim regulariter sulcatis, aperturâ parviusculâ; livido-albicante, varicibus subobscure albis, anfractuum margine superno rufo-fusco longitudinaliter lineato et maculato, anfractibus infrâ transversim articulatis.

HAB. Coast of Borneo, China Sea.

Each whorl has a narrow collar, as it were, round the upper part, in which the markings are longitudinal, while below they are transverse.

2. *CERITHIUM LONGICAUDATUM*. Pl. X. Fig. 15. Cer. testâ acuminato-turritâ, suturis concavo-impressis, anfractibus longitudinaliter nodoso-plicatis, transversim sulcatis, anfractu ultimo lativaricoso, canali retrorsum valdè producto, aperturâ parvâ; fuscescente-spadiceâ, anfractuum margine superno rufo maculato.

HAB. Korea.

Readily distinguished by the elongately produced structure of the canal.

3. *CERITHIUM OBTUSUM*. Pl. XIII. Fig. 3 *a, b*. Lamarck, Anim. sans vert. (Deshayes' edit.) vol. ix. p. 294.

HAB. Borneo and Siugapore; at the mouths of rivers.

The animal of *Cerithium obtusum* has a broad, suborbicular, and expanded foot, and an elongated, subcylindrical, annulated trunk, of a light brown colour, with three rather broad, well-defined, opaque, yellow lines extending along its upper surface, the central one of which extends from the head to very near the extremity of the proboscis, where it is bifid, the two forks diverging; the two lateral lines are shorter, not bifid at their extremities, and reach forward on the head to within a little distance of the origin of the tentacles; the tentacles are very short, annulated, with the eyes (which are small, though with a distinct iris and pupil) situated at their tip, whereas they are mostly placed on tubercles situated on the outer side of the base of the tentacles, or on the tentacles themselves at a little distance from their origin. The foot is of a light pinky brown on its upper surface, mottled with a deep, rich brown, and on the under surface is lilac.

The *Cerithia obtusa* live in brackish water in mangrove-swamps and the mouths of rivers, in Singapore and Borneo. Sometimes they crawl on the stones and leaves in the neighbourhood, and are not unfrequently found suspended by glutinous threads to boughs and the roots of the mangroves, as represented in our plate. The operculum is round, horny, with a central nucleus and concentric elements; it is semitransparent, and borne upon the posterior part of the foot at its extreme end. When the animal hibernates, it retracts itself into the shell, and brings its operculum to fit closely into the aperture, after having previously affixed sixty or seventy glassy, transparent, glutinous threads to the place of attachment, when they occupy the outer or right lip and extend half-way round the operculum.

A species of *Cyclostoma* (*Megalomastoma suspensum*, Guilding) was found by the Rev. Lansdowne Guilding at the Island of St. Vincent, suspended in like manner from the trees; and *Rissoa parva* has been observed by Mr. Gray, upon our own shores (Pro. Zool. Soc. 1833, p. 116), to have the power of emitting a glutinous thread by which it attaches itself to floating sea-weeds.

There is a very handsome *Cerithium* closely allied to the foregoing, which I have frequently found crawling languidly on the leaves of the *Pontedera* and sedges in the fluviatile marshes on the banks of the rivers in many parts of Borneo, and many miles in the interior where the water is perfectly fresh, and which has the eyes likewise terminal and the proboscis marked with crimson and yellow; the foot is very dark brown, and has a vivid scarlet line extending round the lower margin. The position of the eye varies considerably in this group. In an amphibious Bornean species, allied to *C. decollatum*, they are terminal at the end of peduncles; in other words, the tentacles are connate with the eye-peduncles for the whole of their extent. In *C. microptera* the tentacles extend a third beyond the eye-peduncles; in *C. decollatum* the eye-peduncles are truncated, with the eyes at the end, while the tentacle extends beyond them in the form of a minute filament; all these species have circular multispiral opercula.

In another species, from the Island of Billiton, coral reef, two fathoms and a half, the animal is of a greenish brown, minutely punctulated with darker brown, and covered moreover with small, light red, round spots. The operculum is oval, horny, and semipellucid, the elements not concentric, curving from a nucleus at the anterior extremity towards the periphery. In this species the foot is moderately



broad, notched in front, rounded behind, and extended on either side towards the front part; there is a small, short siphon and a not very prominent muzzle; the tentacles are subulate, very thick at their base, and bearing the eyes on very distinct reflexions towards the tip on the outer surface. The eyes are furnished with a distinct pupil and iris. *A. A.*

### 30. TRIPHORIS, *Deshayes.*

1. TRIPHORIS SPECIOSUS. Pl. XI. Fig. 28 *a, b.* Triph. testâ acutè turritâ, medio subcylindraceâ, anfractibus octodecim ad viginti, biseriatis nodatis, nodorum serie superiore prominulâ, anfractu ultimo tubulato, valdè producto, canali etiam tubulato; albidâ, lineâ spirali aurantio-rufâ undique tinctâ.

HAB. China Sea.

The last whorl is curiously produced beyond the diameter of the shell in the form of a tube; and the canal is also tubular. The whorls are characterized by two rows of nodules, of which the upper is much the more prominent, and has a fine, spiral, orange-red line beneath it.

2. TRIPHORIS SUTURALIS. Pl. XI. Fig. 29 *a, b.* Triph. testâ turritâ, anfractibus duodecim ad tredecim, eximiè triseriatim granuloso-carinulatis, suturis concavo-impressis, lævigatis; pellucido-albâ.

HAB. China Sea.

The aperture of this delicately grain-keeled species, which is characterized by its hollow sutures, is incomplete.

3. TRIPHORIS ALVEOLATUS. Pl. XI. Fig. 30 *a, b.* Triph. testâ elongato-pyramidali, anfractibus viginti ad quatuor et viginti, planulatis, spiraliter triseriatim hiratis, hiarum interstitiis clathratis; intus extusque fuscâ.

HAB. China Sea.

The whorls of this species are flattened and deeply latticed throughout. The aperture is incomplete.

4. TRIPHORIS DEXTROVERSUS. Pl. XI. Fig. 31 *a, b.* Triph. testâ elongato-pyramidali, gracili, anfractibus sedecim ad octodecim, medio concavis, spiraliter tricarinatis, carinâ medianâ multò minore, carinarum interstitiis sub lente minutè concentricè striatis, sordidè albâ.

HAB. China Sea.

This species differs from the rest of the *Triphorides* under consideration in being convoluted to the right. The surface of the whorls is concave, and keeled at the upper and lower margins. A fine keel intervenes in the centre, and the interstices are sculptured concentrically with very minute striæ.

5. TRIPHORIS VERRUCOSUS. Pl. XI. Fig. 32 *a, b.* Triph. testâ gracillimo-subulatâ, anfractibus octodecim ad viginti, granoso-clathratis, granis transversè oblongis; sordidè albâ.

HAB. China Sea.

A slender species, latticed throughout with transversely oblong granules.

6. *TRIPHORIS GRANULATUS*. Pl. XI. Fig. 33 *a, b*. Triph. testâ turritâ, medio subcylindraceâ, anfractibus duodecim ad quatuordecim, triseriatim granulatis, granulis regularibus confertis, anfractuum suturis subimpressis; sordidè albâ.

HAB. China Sea.

Distinguished by its short, cylindrical form, and by the precise arrangement of the granules with which it is sculptured.

7. *TRIPHORIS GEMMULATUS*. Pl. XI. Fig. 34 *a, b*. Triph. testâ pyramidali, basi concavo-planulatâ, anfractibus duodecim ad quindecim, planulatis, triseriatim granulatis, seriebus distantibus, medianâ ferè obsoletâ, inferiore prominulâ; pellucido-albâ.

HAB. China Sea.

A very distinct species, of true pyramidal form, encircled with three distant necklaces of granules, of which the middle is almost obsolete.

8. *TRIPHORIS PYRAMIDALIS*. Pl. XI. Fig. 36 *a, b*. Triph. testâ pyramidali, basi subplanatâ, anfractibus ad octodecim, supernè et infernè bicarinatis, carinis granulatis, inferiore minore; rufo-fuscescente.

HAB. China Sea.

Each whorl of this species is encircled with two granuled keels round the upper part and two round the lower part, and in each instance the lower keel is the smaller. The aperture, as in the preceding species, is incomplete.

9. *TRIPHORIS NODIFERUS*. Pl. XI. Fig. 37 *a, b*. Triph. testâ turritâ, anfractibus duodecim ad quatuordecim, medio subaugulatis, triseriatim nodosis, nodis transversim oblongis, ad angulum majoribus, aperturâ rotundâ, supernè sinuatâ, canali tubulato; albâ.

HAB. China Sea.

This, and the first here described, are the only species of which the specimens are complete at the aperture, and have the tubular canal which is characteristic of the genus.

## 6. PARASITICA.

### 31. *STYLIFER*, *Broderip*.

The accounts hitherto given of this parasitic mollusk, not being derived from living specimens, have not been satisfactory. Mr. Broderip described the mantle (Pro. Zool. Soc. 1832, p. 61) as thick, very large, and cup-shaped, enveloping the last whorl of the shell, whilst the animal presented only the rudiment of a foot. Mr. Gray observes (Zoology of

Beechey's Voyage, p. 138, sub nom. *Stylina*) that what has been considered the enlarged mantle is in reality the foot. The following observation is from the living animal.

The *Stylifer Astericola* (Pl. XVII. Fig. 5), found living in the body of a star-fish (*Asterias*), on the coast of Borneo, has two elongate, subulate tentacles, with the eyes sessile near the outer side of their base, and a small rounded head. The mantle is entirely enclosed and covered by the thin shell, and the foot is narrow, slender, very much produced beyond the head in front, and scarcely extended at all behind.

For the anatomy by Professor Owen, see Reeve's Conch. Systematica, vol. ii. p. 174.

## 7. TURBINACEA.

### 32. TURRITELLA, *Lamarck*.

The animal of *Turritella* is rather small for the size of the aperture of the shell; the head is small and oblong; the tentacles short and subulate, with the eyes on the middle of their outer side. The foot is moderate and slightly notched in front. Operculum orbicular, horny, many-whorled, with an epidermic fimbriated margin.

This mollusk is very shy and sensitive; retiring quickly within its shell on the slightest alarm. It is slow-moving and inactive. It seems to balance its unwieldy shell, though of comparatively light structure, with some degree of difficulty, and occasionally will remain fixed for hours in one spot. The fringed veil over the head is not usually visible, nor is the head of the animal often seen, so excessively timid is its disposition.

1. *TURRITELLA BICOLOR*. Pl. XII. Fig. 1. Turr. testâ acuminato-turritâ, anfractibus decem ad duodecim, convexis, subtilissimè quadrilatis et striatis, liris distantibus, obscurè granulatis; aureo-luteâ, suturis lirisque nigrescente-purpureis.

HAB. China Sea.

In addition to the above characters, there are a few puckered obliquely-wrinkled striae next the sutures.

2. *TURRITELLA CONGELATA*. Pl. XII. Fig. 2. Turr. testâ acutè subulatâ, basi angulatâ, anfractibus sedecim, convexo-planis, lævibus, obscurè triliratis, liris tenuibus, distantibus; pellucido-albâ.

HAB. China Sea.

Transparent at the base; towards the apex more opaque.

3. *TURRITELLA CONSPERSA*. Pl. XII. Fig. 3. Turr. testâ turritâ, anfractibus duodecim, supernè declivibus, deinde tumidis, et conspicuè bicarinatis et liratis; lutescente-albâ, fuscescente longitudinaliter undulatâ et punctatâ.

HAB. China Sea.

Delicately mottled throughout with irregular light-brown waved streaks, forming dots here and there next the sutures.



4. *TURRITELLA MULTILIRATA*. Pl. XII. Fig. 4. Turr. testâ acuminato-turritâ, anfractibus supernè contractis, infrâ leviter declivibus, internè canaliculatis, spiraliter multiliratis, liris subtilissimè granulatis; pellucido-albâ.

HAB. China Sea.

An extremely delicate transparent shell, encircled with numerous granulated ridges.

5. *TURRITELLA VITULATA*. Pl. XII. Fig. 5. Turr. testâ acuminato-turritâ, basi subconcovâ, anfractibus duodecim, ad suturas contractis, creberrimè spiraliter striatis, striis elevatis, subirregularibus, anfractibus perpaucis primis bicarinatis; fuscescente, striis interruptè castaneis.

HAB. China Sea.

The striæ of this species are not reticulated with chestnut, but merely coloured in an irregularly interrupted manner.

6. *TURRITELLA MONILIFERA*. Pl. XII. Fig. 6. Turr. testâ acuminato-pyramidali, basi depresso-concovâ, et acutè angulatâ, anfractibus quindecim, carinâ latiusculâ iufra suturas, medio convexis, deinde bi-liratis; rosaceo-albâ, carinâ punctis distantibus obliquis rufescente-fuscis ornatâ.

HAB. China Sea.

The only painting in this species, beyond its delicate pink hue, consists in the necklace-like row of red-brown dots upon the keel.

7. *TURRITELLA OPALINA*. Pl. XII. Fig. 7. Turr. testâ subventricosu-turritâ, tenuiculâ, anfractibus duodecim, rotundatis, supernè depresso-caniculatis, sub lente minutissimè creberrimè inciso-striatis; pellucido-albâ, fuscescente pallidè concentricè flammâtâ.

HAB. China Sea.

Distinguished by its rounded whorls and opal-white substance.

8. *TURRITELLA FASTIGIATA*. Pl. XII. Fig. 9. Turr. testâ gracillimo-subulatâ, tenuiculâ, anfractibus octodecim ad viginti, supernè contractis, declivibus, deinde rotundatis, undique subtilissimè liratis et striatis, apicem versus bicarinatis; violaceo alboque pallidè variegatâ, strigis fusciscentibus obliquis, liris obscurè fusco punctatis vel articulatis.

HAB. China Sea.

The oblique clouded streaks of painting are very characteristic in this species.

9. *TURRITELLA DECLIVIS*. Pl. XII. Fig. 10. Turr. testâ pyramidali-turritâ, basi plano-angulatâ, anfractibus octodecim, plano-declivibus, basin versus gradatim latioribus, undique creberrimè subtilissimè undulato-striatis, prope apicem medio plicatis; lutescente-albâ, livido-fusco tinctâ et apicem versus peculiariter maculatâ.

HAB. China Sea.

In this very interesting species the livid brown appears in the first few whorls in a necklace of spots beneath the sutures.

10. *TURRITELLA CANALICULATA*. Pl. XII. Fig. 11. Turr. testâ acuminato-turritâ, anfractibus duodecim, spiraliter acutè sex-liratis et striatis, interstitiis striis obliquis cancellatis, liris tenuibus duabus inferioribus prominulis; sordidè albâ.

HAB. China Sea.

The two lower ridges, more prominent than the rest, form a spiral channel immediately above the suture.

### 33. EGLISIA, *Gray*.

1. *EGLISIA TRICARINATA*. Pl. XII. Fig. 8. Egl. testâ acutè turritâ, anfractibus ad octodecim, supernè contractis et declivibus, deinde tricarinatis, sub lente longitudinaliter creberrimè et tenuissimè cancellato-striatis, aperturâ parvâ, rotundâ; sordidè cinereo-fuscâ.

HAB. China Sea.

The cancellated structure of this species very much resembles that of *Eglisia lanceolata*.

### 34. LITTORINA, *Férussac*.

1. *LITTORINA CASTANEA*. Pl. XI. Fig. 8. Litt. testâ ovato-conicâ, spirâ breviusculâ, apice acutâ, anfractibus supernè depressis, rotundatis, spiraliter carinatis, columellâ arcuatâ, callosâ, aperturâ suborbiculari; intensè castaneâ.

HAB. Eastern Seas.

Very near the typical form of the genus, strongly spirally keeled throughout.

### 35. MARGARITA, *Leach*.

1. *MARGARITA BICARINATA*. Pl. XI. Fig. 11 *a, b*. Marg. testâ depresso-orbiculari, perampliter umbilicatâ, apice acutâ, anfractibus spiraliter bicarinatis, carinis distantibus, interstitiis concavis, spiraliter creberrimè lineatis, concentricè striatis; fuscescente aut flavicante, flammulis rubidis variè pictâ, carinis rubido obliquè articulatis, aperturæ fauce iridescente.

HAB. Eastern Seas.

This very interesting species of *Margarita* is characterized externally by a certain metallic hue, whilst it is particularly iridescent in the interior.

### 36. ROTELLA, *Lamarck*.

1. *ROTELLA CONICA*. Pl. XI. Fig. 22 *a, b*. Rot. testâ conoideâ, lævigatâ, obsoletè concentricè striatâ; cupreo-castaneâ, apicem versus rubescente-purpureâ, lineis fuscis concentricis undulatis obscure notatâ.

HAB. Mouth of the Lundu river, coast of Borneo.

Notwithstanding that the painting of the *Rotella* is extremely variable, all that were collected of this species are characterized by the same dark purple-red chestnut.

37. PHORUS, *De Montfort.*

The propriety of distinguishing the 'Carrier *Trochi*' as a separate genus, is fully confirmed by the present discovery of two living species, in both of which the soft parts are distinct from those of *Trochus* proper. Except in that the eyes are not raised on pedicles, the outward form of the animal is similar to that of *Strombus*, which *Phorus* resembles also in its mode of progression. The shell produced by these genera is, however, so materially different in its formation, there can be but little zoological affinity between them.

The animal of *Phorus* is very slender in proportion to the size of the aperture of the shell. The foot is small, produced, as it were, into two parts, of which the front is rather expanded and more subservient to the purposes of locomotion, and the hinder tapering, supporting a large horny operculum, which is partially free, as in *Solarium*. The proboscis is very prominently developed and annulate; and the tentacles are long and tapering, with the eyes completely sessile on the outside of their base. The portion of the mantle lining the aperture of the shell is vascular, thin, and delicate, extending over the front and outer lip, which is often much produced and uneven in outline, especially in *P. Indicus* and *exutus*.

The *Phori* are arranged by Mr. Gray next in order to the *Calyptrae*, but it is obvious that the genera, as already anticipated in the 'Conchologia Iconica,' are very remote from each other; the former have a divided *Stromb*-like operculated foot, are of active habits, and produce a regular convoluted shell, whilst the latter have a simple foot, live attached to foreign bodies, are incapable of progression, have no operculum, unless the rare secretion of a calcareous plate to the place of attachment can be regarded as the analogue of one, and the shell is not formed on the spiral type; all which external differences concur to show that the *Phori* and *Calyptrae*, whether regarded as genera or families, have little or no affinity with each other.

The *Phori* invariably inhabit rough places incapable of accommodating a gliding motion, and their mode of progression, like that of the *Strombi*, is by little jumps. Each species has its own peculiar manner of collecting the debris of shells or pebbles which cover the ground it inhabits, and each has, to a certain extent, its peculiar kind of debris; their conchological peculiarities have, however, been already described in detail in the 'Conchologia Iconica.'

1. PHORUS SOLARIOIDES. Pl. XVII. Fig. 6. Reeve, Conch. Icon. *Phorus*, pl. 3. f. 8. The animal of this species is characterized throughout by numerous circular striae, the tentacles are laterally compressed and rather prismatic, the proboscis is long and transversely wrinkled, yellow at the tip and on the under surface, but pink between the tentacles, which are straight, rigid, and opaque dead-white; the eyes are black and conspicuous.

HAB. China Sea.

2. PHORUS EXUTUS. Pl. XVII. Fig. 7. Reeve, Conch. Icon. *Phorus*, pl. 2. f. 7 a, b. The animal



of this species is smoother than that of the preceding, the tentacles being longer and the eyes smaller, placed on slight swellings, not, however, resembling even the rudiments of peduncles.

HAB. Eastern Seas.

The *operculum* of *Phorus* is horny, soft, and flexible, formed of concentric and radiating fibres. On the under surface it is smooth and attached to the foot by the central part, and free around the circumference and posterior portion. On the upper surface it is covered with radiating ridges, or salient processes formed by the constituent fibres being elevated in succession one above another.

### 38. DELPHINULA, *Lamarck*.

1. DELPHINULA STELLARIS. Pl. XI. Fig. 7. Delph. testâ orbiculari-discoideâ, spirâ depresso-planâ, subampliter umbilicatâ, anfractibus supernè concavo-angulatis, ad angulum squamato-carinatis, squamis compressis, erectis, infrâ regulariter squamato-spinosis; albâ, purpurascente sparsim tinctâ.

HAB. Eastern Seas, near Basilan.

This has very much the appearance of an immature shell, although it differs from the young of any of the larger described species.

### 39. SCALARIA, *Lamarck*.

1. SCALARIA MACULOSA. Pl. XI. Fig. 14. Scal. testâ elongato-turritâ, vix umbilicatâ, anfractibus decem, rotundatis, lævibus, politis, costis annularibus subdistantibus, tenuibus, prope suturas latioribus et flexuosis; cærulescente-albâ, fusco promiscuè maculatâ.

HAB. China Sea.

The brown spots which characterize this species have a promiscuous blotchy appearance, about two between each annular rib.

2. SCALARIA NEGLECTA. Pl. XI. Fig. 15. Scal. testâ conico-turritâ, profundè umbilicatâ, anfractibus septem ad octo, rotundatis, lævibus, aut, sub lente, minutè spiraliter impresso-striatis, costis annularibus subdistantibus, angustis, elevatis, prope suturas spiuoso-uncinatis, aperturâ rotuudatâ, labro dilatato; carneo-fuscescente, costis albis.

HAB. China Sea.

The hook-like spine upon the upper part of the ribs is laterally very compressed and bent slightly backwards.

3. SCALARIA EXIMIA. Pl. XI. Fig. 16. Scal. testâ pyramidali-turritâ, acutè acuminatâ, haud umbilicatâ, anfractibus novem, costis annularibus numerosis, angustis, lamellatis, prope suturas conspicuè spinoso-uncinatis, costarum interstitiis eximiè spiraliter liratis; cærulescente-albâ.

HAB. China Sea.

The prominent uncinat spine upon each rib gives a beautiful pyramid-like form to

the shell, which is further characterized by having the interstices of the ribs sculptured with spiral equidistant ridges.

#### 40. CHEMNITZIA, *D'Orbigny*.

1. CHEMNITZIA GRANDIS. Pl. XI. Fig. 17. Chemn. testâ elongato-turritâ, anfractibus compluribus, plano-convexis, suturis tamen distinctis, longitudinaliter creberrimè costatis, costis subprominentibus, flexuosis, anfractu ultimo infrâ lævigato; albâ.

HAB. Eastern Seas.

The ribbed sculpture of the whorls ceases at the sutures; below that point the whorls are smooth, as shown in the last whorl.

#### 41. EULIMA, *Risso*.

The head of *Eulima* is small, with the tentacles subulate, and close together at the base, where they are rather swollen. The eyes are situated at the back of the head, behind the tentacles. The foot is rather expanded, especially at the sides, and is furnished with an ovate sub-spiral operculum. The polish of the shell is occasioned by the front edge of the mantle being extended over it; the lobes are, however, difficult to observe, in consequence of the extreme timidity of the animal in speedily retracting them, when disturbed.

The soft parts of *Eulima major* are, like the shell, of which several fine specimens were collected, of an opaque pearly white, except that the tentacles are delicately tinged with orange in the middle and with yellow at the tip. The eyes, which are black, are usually concealed beneath the front of the shell.

1. EULIMA UNILINEATA. Pl. XI. Fig. 23. Eul. testâ aciculatâ, anfractibus octo, plano-contiguus, aperturâ suboblongâ; rufo-brunneâ, lineâ unicâ nigricante cingulatâ.

HAB. Sooloo Sea.

A rich red-brown sharply aciculated shell, with the sutures almost obsolete, encircled throughout with a faint blackish line.

2. EULIMA BILINEATA. Pl. XI. Fig. 24. Eul. testâ aciculatâ, anfractibus novem ad decem, plano-convexis, aperturâ oblongâ, labro supernè inflexo; pellucido-albâ, vitreâ, lineis tenuibus duabus castaneis cingulatâ.

HAB. Sooloo Sea (from the stomach of an *Echinus*).

A light transparent glassy shell, encircled with two delicate brown lines, of which the lower falls exactly in the place of the sutures.

3. EULIMA MINDOROENSIS. Pl. XI. Fig. 25. Eul. testâ elongato-turritâ, basi subobesâ, suturis impressis, anfractibus decem, convexis, aperturâ ovatâ; pellucido-albâ, opaco-albo maculatâ et lineatâ.

HAB. Mindoro Sea, Philippines.

Unlike the preceding species, the sutures of this are rather strongly impressed.

4. *EULIMA TORTUOSA*. Pl. XI. Fig. 26. Eul. tortuoso-acuminatâ, anfractibus duodecim ad quatuordecim, plano-contiguus, obliquè varicosis, aperturâ parviusculâ; eburneâ, infra suturas obscure lineatâ.

HAB. China Sea.

Only the tortuous species of *Eulima* are varicose, depending doubtless on some concomitant peculiarity of the animal.

5. *EULIMA SOLIDULA*. Pl. XI. Fig. 27. Eul. testâ abbreviato-turritâ, solidulâ, tortuosâ, varicosâ, anfractibus novem ad decem, convexis, aperturâ parvâ; eburneâ.

HAB. China Sea.

A solid contracted shell, with the whorls more convex than in the preceding species.

#### 42. *RISSOA, Fréminville.*

1. *RISSOA INSIGNIS*. Pl. XI. Fig. 20. Riss. testâ abbreviato-turritâ, basin versus obesâ, anfractibus supernè plano-angulatis, ad angulum acutis, spiraliter striatis, anfractibus primis valdè contractis et longitudinaliter peculiariter foveolatis, aperturâ subamplâ, dilatatâ; albidâ.

HAB. China Sea.

This is truly a remarkable shell: the upper part of the first few whorls is peculiarly flatly angled and deeply pitted longitudinally; at the last whorl but one the angle and the pits suddenly cease.

### S. PLICACEA.

#### 43. *PYRAMIDELLA, Lamarck.*

1. *PYRAMIDELLA MAGNIFICA*. Pl. X. Fig. 1. Pyram. testâ pyramidali-conicâ, subcylindraceâ, spiræ suturis impressis, anfractibus quatuordecim, plano-convexis, supernè canaliculatis, longitudinaliter crebriliratis, interstitiis foveolatis, anfractu ultimo ecostato, promiscuè foveolato, columellâ fortiter triplicatâ, aperturâ anticè subemarginatâ; albidâ, ferrugineo-fusco tinctâ et maculatâ.

HAB. Shores of Borneo, China Sea.

This fine species of *Pyramidella*, of which only a single specimen was collected, forms an interesting addition to this very limited genus.



## 9. IANTHINEA.

44. IANTHINA, *Lamarck*.

1. IANTHINA STRIOLATA. Pl. XI. Fig. 9. Ianth. testâ subgloboso-ovatâ, spirâ brevi, suturis parum impressis, anfractibus rotundatis, spiraliter impresso-striatis, striis tenuibus, flexuosis, aperturâ orbiculari-ovatâ; pallidè violaceâ.

HAB. Pacific Ocean.

Several examples were collected of this species, as well as of *I. globosa*, to which it is so closely allied. It differs in having the spire less depressed and the aperture less dilated in front, whilst the spiral striæ are peculiar and the shell is uniformly of smaller size.

2. IANTHINA PLANISPIRATA. Pl. XI. Fig. 10. Ianth. testâ discoideâ, spirâ depressâ, plano-convexâ, anfractibus ad peripheriam subacutè rotundatâ, aperturâ latiusculâ, anticè leviter sinuatâ; intensè violaceâ, apicem versus pallidiore.

HAB. Atlantic Ocean.

Chiefly distinguished by its narrow compressed mode of convolution, by which the spire is unusually depressed.

## 10. NERITACEA.

45. NATICA, *Lamarck*.

1. NATICA MACROTREMIS. Pl. XIII. Fig. 9. Nat. testâ subglobosâ, spirâ depressâ, perampliter umbilicatâ, umbilico patente, profundissimo, infundibuliformi, anfractibus convexis, lævibus, politis, aperturâ semiorbiculari; virescente-albâ.

HAB. Coast of Borneo.

The *Natica melanostoma* (Pl. XIX. Fig. 7) is furnished with a strong coriaceous foot, well developed in front, by means of which it perforates the sand, while its tentacles are protected; but when the tide rises and covers the sands, the large side lobes and dilated hind part of the foot are expanded, and the *Natica* flaps along above the sand. A great peculiarity in the animal of this family is the existence of an operculigerous lobe, which in the polished species nearly covers the shell, and is seen in our figure mounting up behind and partly covering the sides. In *Sigaretus* this lobe is extended entirely across, and covers the shell, while the operculum is rudimentary; in *Coriocella* it not only encloses the shell, but extends beyond it in front, and has been erroneously termed the mantle.

46. SIGARETUS, *Lamarck*.

1. SIGARETUS ACUMINATUS. Pl. XIII. Fig. 8. Sig. testâ oblongo-ovatâ, ventricosâ, subumbilicatâ,

spirâ acuminatâ, suturis impressis, anfractibus convexis, spiraliter latistriatis, striis planatis, undulatis, interstitiis plano-excavatis; intus extusque albâ.

HAB. Coast of Borneo.

Chiefly distinguished by its acuminate inflated form.

2. SIGARETUS INSCULPTUS. Pl. XIII. Fig. 10. Sig. testâ depresso-orbiculari, auriformi, spirâ ferè occultâ, spiraliter latistriatâ, striis planatis, leviter undulatis, interstitiis plano-excavatis; albâ, ferrugineo-luteo pallidissimè tinctâ, apice purpurascence-cinereâ.

HAB. Eastern Seas.

The sculpture of this species is similar to that of the preceding, although the shell differs so materially in form.

3. SIGARETUS LATIFASCIATUS. Pl. XIII. Fig. 11. Sig. testâ depresso-orbiculari, auriformi, spirâ brevissimâ, spiraliter tenuistriatâ, striis vix undulatis, subtus concavâ; albidâ, fasciâ latissimâ cinerascence, apice purpureo-cinereâ, aperturae fauce sub fasciâ castaneo-brunneâ.

HAB. Eastern Seas.

## 11. AURICULACEA.

The habits of this family are somewhat variable. *Marinula* affects salt-water only, and *Pedipes* lurks in the cavities of rocks and under stones exposed to the sea. *Cassidula* is amphibious, having been observed crawling on a sandy bottom in clear water at a depth of nearly two fathoms, as well as in mangrove-swamps and on the sea-beach. *Auricula* and *Melampus* live in damp situations near the sea, and on the muddy banks of rivers. *Scarabus* inhabits moist situations in woods near the sea, but is wholly of terrestrial habits, living on decayed vegetable matter, and crawling about actively after showers of rain. *Alexia* and *Carychium* abound in salt-water marshes.

### 47. AURICULA, *Lamarck*.

1. AURICULA SUBULA. Pl. XIV. Fig. 15. Quoy and Gaimard, Voy. de l'Astrol. pl. 13. f. 39, 40. The head of this species is broad, the muzzle produced and bilobed, the tentacles rather flattened and tapering, and the eyes sessile on their inner bases. Colour of a uniform light grey-brown.

HAB. Celebes, on the muddy banks of rivers out of the reach of the water.

The *A. subula* crawls but slowly. In young individuals the columella is truncate and the outer lip thin.

2. MELAMPUS LEUCODON. Pl. XIV. Fig. 17. Beck? In this species, which is of a uniform dull pale black, the eyes are small and placed at the inner base of the tentacles, which are flattened, the muzzle is slightly produced and longitudinally cleft, and the end of the foot is slightly bifid.

HAB. Island of Mayo, from the damp margins of a water-course, crawling over the moist rocks.

48. SCARABUS, *De Montford*.

1. SCARABUS TRIGONUS. Pl. XIV. Fig. 12. Troschel, Reeve Conch. Syst. vol. ii. pl. 183. f. 2. Head and lower part of the tentacles blackish-brown, rest of the animal pale brown, whitish towards the end of the foot. The tentacles are annulated, with a swelling at the base, on the inner side of which are the sessile black eyes surrounded by a light areola; the tentacles are comparatively long and cylindrical in this species.

HAB. Borneo, under dead leaves.

2. SCARABUS IMBRIUM. Pl. XIV. Fig. 13. De Montford, Conch. Syst. The animal of this species varies in colour according to the shell: when the latter is dark, the animal has a blackish head and neck, growing gradually paler towards the hind part of the foot; the animals of the light-coloured shells are of a uniform pale brown.

HAB. Celebes and Borneo, under dead leaves and decayed vegetable matter in the forests near the sea-coast.

3. SCARABUS CUMINGIANUS. Pl. XIV. Fig. 16. Petit, Pro. Zool. Soc. 1843, p. 3. Animal of a light chestnut-brown, the muzzle rather produced, the tentacles subulate and annulated, with the eyes sessile at their inner bases, surrounded by a light-coloured areola.

HAB. Koo-Kien-San, one of the Meiacoshima group of islands, near Formosa, in the Blue Sea.

## 12. CYCLOSTOMACEA.

The subgeneric types of this extensive and interesting group vary also in their habits, for while *Leptopoma* invariably lives among the foliage of the trees, *Cyclophorus* inhabits the decayed vegetable matter at their roots. *Pterocyclos* is found in moss among loose stones. *Nematura* and many of the *Cyclostoma* proper are semi-aquatic; the former inhabiting ponds, attached to the under surface of floating leaves, and the latter being found among loose stones near the sea-shore.

49. CYCLOSTOMA, *Lamarck*.

1. CYCLOSTOMA SPIRACELLUM. Pl. XIV. Fig. 1. Cyclost. testâ suborbiculari, planorbulâ, spirâ depressâ, pallidâ, anfractibus quatuor, rotundatis, transversim striatis, suturâ distinctâ, ultimo dorso inflato, demum coarctato et quasi strangulato, varice fornicato prope aperturam, aperturâ circulari, peritremate duplici, internè posticè emarginato, externè reflexo, posticè in canalem desinente, anfractu ultimo spiraculum tubulosum prope aperturam gerente, umbilico patulo, anfractibus intus conspicuis. Operculo circulari, spirali, intus corneo, concavo, extus testaceo, margine sulcato.

HAB. Borneo, under decayed vegetable matter in the forests.

A small species, largely umbilicated, belonging to the division *Pterocyclos*.



2. *CYCLOSTOMA LÆVE*. Pl. XIV. Fig. 3. Gray, Wood Ind. Test. Supp. pl. 6. f. 5. In this species, which is a good typical example of *Leptopoma* of Troschel, the eyes are on short peduncles at the outer base of the tentacles, which are long and setaceous, the muzzle is produced and bilobed, and the foot is elongated and tapering beyond the large, circular, subtransparent, multispiral, horny operculum. Pale straw-colour.

HAB. Manado, Island of Celebes, upon the leaves of the Screw-pine (*Pandanus*).

All of this group of *Cyclostomata* have light ventricose shells, and live upon the foliage of the trees, among which they move actively in the rainy season, and hibernate during the dry months by adhering to the under surface of the leaves.

3. *CYCLOSTOMA TENEBRICOSUM*. Pl. XIV. Fig. 6 *a, b*. Cyclost. testâ globoso-conicâ, subpellucidâ, fuscâ, intensè fusco variegatâ, fasciâ pallidâ circumcinctâ, spirâ acuminatâ, apice obtusâ, anfractibus quatuor, rotundatis, ultimo subventricosos, aperturâ subcirculari, peritremate prope ultimum anfractum interrupto, umbilico parvo. Operculum?

HAB. Balambangan, Borneo, on the leaves of the *Pandanus*.

The pale central band coming in the place of the sutures is seen only on the last whorl.

4. *CYCLOSTOMA RETICULATUM*. Pl. XIV. Fig. 8 *a, b*. Cyclost. testâ globoso-conicâ, subpellucidâ, spirâ subconoidali, apice obtuso, anfractibus quinque, ventricosis, brunneis, albo conspicuè reticulatis, spiraliter carinatis, carinis ferè obsoletis, multis, confertiusculis, aperturâ ferè circulari, peritremate reflexo, supernè acuminato, ad ultimum anfractum subinterrupto, umbilico magno, spiraliter sulcato. Operculo testaceo, spirali, extus in medio concavo, anfractibus 4-5, margine sulcato.

HAB. Island of Madagascar.

Remarkably characterized by its striking white reticulated marbling.

## 50. PUPINA, *Vignard*.

1. *PUPINA MINDORENSIS*. Pl. XIV. Fig. 2. Pup. testâ subcylindræo-turritâ, crassiusculâ, fuscâ, tenuissimè striatâ, anfractibus sex, subrotundatis, aperturâ circulari, peritremate discontinuo, labio externo reflexo, incrassato, pallido, ad basin columellarem canali angusto, et posticè in canalem spiralem desinente.

HAB. Island of Mindoro, Philippines.

This species has not the polished surface of the *P. Nunczii* and others; it is of a dull rust-brown, with the lip very much thickened.

## 13. COLIMACEA.

The *Arions* and *Limaces* of temperate climates are represented in the East by the *Onchidium*, *Veronicella*, and *Peronia*, as they are in the western hemisphere by the *Vaginula*. The *Veronicella* lives upon the trees in the forests, and is active after showers; the *Onchidia* live

on aquatic plants in ditches ; while *Peronia*, like *Onchidoris*, lives among the stones on beaches, but, unlike the latter genus, above high-water mark, a little beyond the influence of the tide.

### 51. BULIMUS, *Lamarck*.

1. BULIMUS GREGARIUS. Pl. XIV. Fig. 4. Bul. testâ cylindræco-turritâ, compressè umbilicatâ, anfractibus octo, obliquè impresso-striatis, suturis impressis, columellâ verticaliter dilatâtâ, aperturâ parvâ, subquadrato-ovatâ, labro subreflexo ; pellucido-corneâ.

HAB. Sarawak, Borneo.

The oblique striæ arc extremely superficial, and the shell is of a thin horny substance.

2. BULIMUS MEIACOSHIMENSIS. Pl. XIV. Fig. 5. Bul. testâ subpyramidal-oblongâ, vix umbilicatâ, anfractibus decem, subangustis, columellâ verticaliter reflexâ, aperturâ rotundâ ; pellucido-corneâ.

HAB. Islands Ty-pin-san and Koo-Kien-san, Meiacoshima group, Yellow Sea.

A small thin horny species, collected among the loose stones and leaves about the tombs.

3. BULIMUS CHLORIS. Pl. XIV. Fig. 10. Reeve, Conch. Icon. *Bul.* pl. 37. f. 223.

The animal of *B. chloris* is of a pale brown colour, always differing in this respect from that of *B. citrinus*, and of extremely vivacious habits. A bushel of them, collected on the mountains of Mindanao, soon dispersed themselves all over the cabin in which the basket was deposited. The shell was of the same elongated form and deep yellow colour throughout, with no indication of bands or marking.

4. BULIMUS CITRINUS. Pl. XIV. Fig. 11. Bruguière, Reeve Conch. Icon. *Bul.* pl. 31: f. 187 *a*.

The animal of this variety of *B. citrinus* is marked with dark colour, especially about the head and neck, corresponding in a manner to the pattern of the shell. It inhabits in comparative plenty the low trees and bushes of Rhio and other small islands in the vicinity of Singapore ; the specimen figured is from a little islet off Biliton.

5. BULIMUS ADAMSII. Pl. XV. Fig. 1 *a, b*. Reeve, Conch. Icon. *Bul.* pl. 13. f. 73 *a, b, c, d*.

HAB. Eastern coast of Borneo, on a tall tree in an islet between Banguay and Balambangan.

Two varieties of this beautiful species were described in the 'Conchologia Iconica,' on the return of the Samarang, about two years since. A tree which was being cut down in the above-mentioned islet, fell upon one of the carpenters, depriving him for a time of sensation. What proved a misfortune to the man was a gain to science, for a number of this delicately-painted *Bulimus* were found adhering to the tree.

Dr. Gould, of Boston, United States, communicated to us his opinion that it might be

his *B. monilifer* from Tavoy, in Siam; he has, however, very kindly forwarded specimens of that species, which proves to be clearly distinct, and will be figured in a supplementary plate to the monograph of the genus in Conch. Icon.

## 52. HELIX, *Linnaeus*.

1. HELIX CALLIOSTOMA. Pl. XIV. Fig. 7 *a, b*. H. testâ obconicâ, obtectè perforatâ, valdè carinatâ, albâ, supernè planiusculâ, transversim obliquè striatâ, striis interruptis, longitudinaliter lineis impressis obsitâ, cingulis angustis et maculis rufo-violascentibus circumdatâ, anfractibus quatuor ad quinque, planiusculis, basi convexâ, infra carinam concavâ, reticulato-striatâ, fasciis rufescentibus multis circumdatâ, aperturâ angulatâ, depressâ, intus purpurco-violascente, peristomate intus incrassato, rubicundo.

HAB. — — ?

A solid depressed sharply-angled species, encircled throughout with irregular brown and purple-brown linear bands, whilst the aperture is deeply stained with violet-red.

2. HELIX CURVILABRUM. Pl. XIV. Fig. 9 *a, b*. H. testâ conicâ, perforatâ, basi acutè carinatâ, lævi, flavicante, prope suturam cingulâ latâ rufo-castaneâ, basi planiusculâ, omninè castaneâ, aperturâ subangulatâ, depressâ, obliquâ, margine superiore dilatato, inflexo, peristomate incrassato.

HAB. Philippine Islands.

A flattened conical shell, conspicuously umbilicated, with the lip peculiarly curved at the edge. The base is of a dark reddish chestnut, the spire yellowish, spirally banded with the chestnut colouring against the sutures.

3. HELIX TROPIDOPHORA. Pl. XIV. Fig. 14. H. testâ subdiscoideâ, imperforatâ, valdè carinatâ, carinâ acutâ, prominulâ, brunneâ, striis minutis confertis reticulatâ, anfractibus quinque, convexiusculis, aperturâ lunato-transversâ, angulatâ, peristomate simplici, acuto.

HAB. Borneo.

A comparatively thin shell, with simple lip, very sharply keeled, of which the base has a shining horny aspect.

4. HELIX OBSCURATA. Pl. XIV. Fig. 18. H. testâ discoideâ, latè et profundè umbilicatâ, olivaceâ, obliquè striatâ, striis transversis distinctis decussatis, spirâ depressâ, anfractibus ad quinque, rotundatis, aperturâ lunato-rotundatâ, labio simplici, acuto.

HAB. Borneo, under decayed leaves in the forests.

A small rounded species, composed of rounded whorls, broadly umbilicated, after the manner of the large *H. Banksii*.

5. HELIX TAYLORIANA. Pl. XV. Fig. 2 *a, b*. H. testâ conicâ, trochiformi, lævi, imperforatâ, subpellucidâ, basi acutè carinatâ, fulvâ, ad apicem carneolâ et reticulatâ, maculis sparsis perlucidis fuscis obsitâ, obliquè striatâ et transversim subtilissimè rugulosâ, spirâ acutâ, basi convexiusculâ, fulvâ, circa



regionem umbilicalem carneolâ, aperturâ triangulari, anticè valdè productâ et coarctatâ, peristomate atro-purpureo, incrassato, reflexo.

HAB. — ?

An extremely delicate and characteristic species, remarkable for the spouted angular construction of the lip.

6. *HELIX TYPINSANA*. Pl. XV. Fig. 3 *a, b*. H. testâ discoideâ, depressiusculâ, subcarinatâ, latè et profundè umbilicatâ, striis obliquis, confertis, corrugatis, olivaceo-fuscâ, fasciâ pallidâ cingulatâ, spirâ obtusâ, anfractibus septem ad octo, rotundatis, aperturâ rotundâ, peristomate intus carneolo, margine acuto, reflexo.

HAB. Island of Ty-pin-san, Meiacoshima; found under decayed leaves in the pine-woods.

The whorls of this species are coiled round a broad axis, forming a large and deep umbilicus, as in *H. polygyrata*; they are, however, less in number and not so depressed.

7. *HELIX BROOKEL*. Pl. XV. Fig. 4 *a, b*. H. testâ magnâ, sinistrorsâ, subdiscoideâ, obesâ, imperforatâ, obtusâ, carinatâ, obliquè strigillatâ, corneo-fuscâ, epidermide crassâ indutâ, castaneâ, carinâ purpurascente, suprâ pallidulâ, basi convexâ, radiatim striatâ, anfractibus quatuor ad quinque, aperturâ obliquâ, peristomate incrassato, intus cærulescente-albâ.

HAB. Mountains of Borneo.

This fine species, which has very much the appearance of a sinistral *H. Otaheitana*, was brought by the Borneo Dyaks to his Excellency, the Rajah Sir James Brooke, to whom we have the pleasure of dedicating it.

8. *HELIX BATANICA*. Pl. XV. Fig. 5 *a, b*. H. testâ depresso-globosâ, sinistrorsâ, angustè perforatâ, albidâ, fasciis fusco-rubris circumdatâ, epidermide olivaceo-luteâ indutâ, anfractibus quinque, convexusculis, transversim obliquè striatis, ultimo rotundato, aperturâ transverso-lunatâ, peristomate incrassato, subreflexo.

HAB. Island of Batan (Bashee group), under weeds and low plants on the ground.

A small globular reversed species, reminding one somewhat of the British *H. nemoralis*, though of more solid structure.

9. *HELIX MACKENSII*. Pl. XV. Fig. 6 *a, b*. Valenciennes, Voy. de la Bonite, pl. 25. f. 14.

HAB. Island of Ty-pin-san, Meiacoshimas.

Several examples of this interesting species were collected at the above-named island. The hairs which grow from the epidermis at the periphery of the whorls, are most conspicuous in young specimens.

10. *HELIX VITATA*. Pl. XV. Fig. 7 *a, b, c*. H. testâ subdiscoideâ, sinistrorsâ, umbilicatâ, pellucidâ, acutè carinatâ, supernè depressâ, suturâ indistinctâ, carneolâ, fasciis quatuor ad quinque fulvicantibus

cingulatâ, striis undulatis granulosis obliquis et lineis concentricis decussatâ, anfractibus sex, planiusculis, ultimo basi convexo, fasciis duabus fulvicantibus circumdato, carinâ et regione umbilicali opaco-albis, aperturâ depressâ, angulatâ, obliquâ, peristomate simplici, acuto.

Animal of a delicate subtransparent pinkish colour, the free lobes of the mantle movable, and often extended from the fore part of the shell; eye-peduncles long, the truncatures for the eyes very broad, tentacles rather long and clavate; foot compressed, finely crossed with oblique lines, and margined inferiorly, the end with a large hollow muciparous follicle, ending below in a sharp, moveable, rather recurved process.

HAB. Balambangan, Borneo.

This beautiful and singular species lives among the foliage of the low trees, about which it crawls with surprising rapidity, reminding one of the movements of the *Vitrinæ* more than those of the *Helicidæ*.

11. *HELIX ANTIQUA*. Pl. XVI. Fig. 1. H. testâ globoso-acuminatâ, solidâ, obtectè perforatâ, albâ, obliquè striatâ, anfractibus quatuor ad quinque, subrotundatis, ultimo inflato, aperturâ obliquè orbiculari, labro latè effuso-reflexo, umbilicam ferè tegente.

HAB. Borneo.

A shell of antique elegance of form, found in a dead state among loose stones in the province of Unsang, Borneo.

12. *HELIX COREANICA*. Pl. XVI. Fig. 2. H. testâ depresso-globosâ, perforatâ, rufo-spadiceâ, rugulosâ, obliquè striatâ, fasciâ pallidâ cingulatâ, apicem versus albicante, aperturâ lunato-ovali, peristomate simplici, acuto.

HAB. Corean Archipelago.

This is the common snail of the islands of the Corean Archipelago, where it is used as an article of food.

13. *HELIX LEUCOSTOMA*. Pl. XVI. Fig. 3. H. testâ orbiculari-conoideâ, umbilicatâ, glabrâ, obliquè striatâ, apud suturam opaco-albâ, anfractibus quinque, convexis, flavescens, fasciis rufo-spadiceis circumdatis, aperturâ lunato-transversâ, intus albâ, nitidâ, peristomate albo, valdè reflexo, margine inferiore calloso.

HAB. Philippine Islands.

Very like *H. sepulchralis*, but differing slightly in form, and distinguished by a marked peculiarity of colouring.

14. *HELIX ORIENTALIS*. Pl. XVI. Fig. 4. H. testâ depresso-globosâ, profundè umbilicatâ, fusco-aurantiâ, obliquè striatâ, lineis numerosis elevatis minutis concentricis decussatâ, anfractibus quinque, subrotundatis, fasciis duabus castaneis cingulatis, aperturâ lunato-ellipticâ, peristomate reflexo, intus violaceo-corneo.

HAB. Borneo.

The lip of this species is reflected with a characteristic violet-flesh tinge.

15. *HELIX IMMACULATA*. Pl. XVI. Fig. 5. H. testâ pyramidali-globosâ, vix umbilicatâ, albâ, semi-pellucidâ, nitidulâ, striis incrementi distinctis, anfractibus quinque, convexiusculis, ultimo subcarinato, aperturâ lunato-orbiculari, peristomate parum reflexo.

HAB. Philippine Islands.

Of a shining semitransparent blue-white substance, with the remains of a slight epidermis about the sutures.

16. *HELIX CALIGINOSA*. Pl. XVI. Fig. 6. H. testâ subglobosâ, perforatâ, strigis obliquis elevatiusculis concentricè notatâ, lutescente-albâ, anfractibus sex, ultimo spadiceo-fusco, fasciâ angustâ rufâ circumdatâ, aperturâ depresso-lunatâ, peristomate reflexo.

HAB. Island of Mindanao, Philippines.

A striking new species, approaching the form of *H. unguilina*.

17. *HELIX DECORA*. Pl. XVI. Fig. 7. H. testâ conoideo-globosâ, imperforatâ, pallidè stramineâ, epidermide spadiceâ obtectâ, obliquè striatâ, anfractibus quatuor, planiusculis, ultimo subcarinato, aperturâ lunato-orbiculari, intus albâ, peristomate reflexo, intus albo, nitente.

HAB. Island of Mindoro, Philippines.

A smooth solid shell, of a delicate shining straw-colour beneath, whilst the upper surface is covered with a fawn epidermis.

18. *HELIX Densa*. Pl. XVI. Fig. 8. H. testâ subdiscoideâ, perforatâ, densâ, obtusè carinatâ, supernè depressiusculâ, obliquè plicato-striatâ, undique eximiè corrugatâ, fulvescente, infra carinam fasciâ latâ castaneâ circumdatâ, anfractibus quinque, aperturâ transversè lunatâ, intus albâ, peristomate simplici, intus subincrassato.

HAB. Philippine Islands.

Approaching the form of *H. citrina*, from which it differs in being of stouter growth, and having the surface delicately corrugate throughout.

19. *HELIX PLURIZONATA*. Pl. XVI. Fig. 9. H. testâ subglobosâ, obtectè perforatâ, albâ, maculis pallidè fuscis nubeculatâ, striato-rugosâ, fasciis plurimis spadiceis et purpurascensibus cinctâ, anfractibus quatuor, convexis, ultimo rotundato, aperturâ lunato-transversâ, intus fuscâ, peristomate valdè reflexo, albo, margine inferiore subcalloso.

HAB. Island of Mindanao, Philippines.

The stripe-bands which encircle this very characteristic species are mingled irregularly fawn and purple-black.

20. *HELIX CANESCENS*. Pl. XVI. Fig. 10. H. testâ globosâ, subobtectè perforatâ, opaco-albâ, strigis obliquis lineisque plurimis concentricis nigricantibus interruptis fasciâque conspicuâ centrali ornatâ,



anfractibus quinque, ultimo rotundato-inflato, aperturâ lunato-rotundatâ, peristomate intus incrassato, in margine columellari calloso.

HAB. Africa. *Lower Calan = areolata* *Sby. var.*

A white globose shell, with simple lip banded and minutely sprinkled with black.

21. *HELIX CONOIDALIS*. Pl. XVI. Fig. 11. H. testâ orbiculato-conoideâ, subobtectè perforatâ, supernè elevatâ, basi convexâ, radiatim striatâ, pallidè rufescente, anfractibus quinque, supernè marginatis, reticulato-striatis aut corrugatis, rufo-violescentibus, ultimo fasciâ angustâ castaneâ circumdato, peristomate simplici, vix incrassato.

HAB. Island of Mindoro, Philippines.

Distinguished chiefly in form by its concave base and conoid manner of convolution above.

### NUCLEOBRANCHIATA.

#### 53. *CARINARIA*, Lamarck.

1. *CARINARIA ATLANTICA*. Pl. XIII. Fig. 12. Body elongated, subcylindrical, smooth; head tumid, rather elevated in front; eyes behind the tentacles on the upper part of the head; tentacles small, aciculate; proboscis rather large, furnished at the extremity with curved hooks; fin sharply triangular, sucker linear. Shell small, compressed, with the keel broad and prominent.

HAB. North Atlantic Ocean.

Numbers of this species were taken at twilight in the trawl, swimming in company with *Firolæ*. They were observed to progress with their body straightened, darting through the water with great rapidity.

### PLEUROBRANCHIATA.

#### 54. *APLYSIA*, Linnæus.

1. *APLYSIA LINEOLATA*. Pl. XVII. Fig. 1. Aplys. dorso convexo, posticè acuminato, pallidè viridi, lineis nigricantibus anastomotice oculisque compluribus ornato, oculis pupillo nigro, iride vividè violaceâ.

HAB. Mauritius.

This elegant species is remarkable for the acuminate form of its caudal extremity, and for the slenderness of the posterior tentacles.

2. *APLYSIA FIMBRIATA*. Pl. XVII. Fig. 2. Aplys. tentaculis anterioribus fimbriâ latâ margine sinuatâ ab exteriori tentaculi parte ad capitis latus pertinet, tentaculis posterioribus ad apicem inclinatis et in margine acuto inclinato altè incisis, obscure subviridi, ocellis permultis pupillo minuto albo, iride fuscâ, lineis nigris anastomotice ornatâ, punctis minutis opacis albis pictâ.

HAB. Ty-pin-san, Meiacoshima Islands.

Inner surface of foot, when seen expanded, marbled with black and white.

This large and handsome species is remarkable for the dilated and fringed anterior tentacles, and for the peculiar notched and inflexed character of the posterior tentacles. It was found crawling among the *Fuci*, in small pools left by the receding tide, on the flat coral shores of Ty-pin-san, one of the Meiacoshima group.

3. *APLYSIA OCULIFERA*. Pl. XVII. Fig. 3. *Aplys. sordidè viridì, ocellis pupillo lutescente, iride fuscâ, punctis lutescentibus albisque in nubeculis dispositis ornatâ.*

HAB. Mauritius.

The beautiful eye-like spots render the appearance of this species very elegant; the posterior tentacles are subulate and acutely pointed.

The *Aplysia punctata* of Philippi is marked with congregated dots in the same manner, but it wants the ocelli; the *Aplysia Argus* of Rüppell has the body covered with numerous ocelli, without the clusters of dots.

4. *APLYSIA NODIFERA*. Pl. XVIII. Fig. 7. *Aplys. sordidè olivaceâ, tuberculis elevatis compluribus subdistantibus obtectâ, maculis pallidè violaceis sparsis pictâ, pede maculis fuscis ornatâ, margine serie macularum albarum circumdatâ.*

HAB. Mauritius.

The row of white spots round the margin and numerous pale violet spots on the sides are striking characters of this species.

## 55. SIPHONOTUS, n. g.

Corpus elongatum. Branchiæ pallio testâque tectæ. Pes lateribus in lobos natantes dilatatis. Orificium respiratorium in siphonem prolongatum. Testa submembranacea.

Body elongated. Gills covered by the mantle and shell. Foot with the sides dilated into swimming lobes. Respiratory orifice prolonged into a siphon. Shell nearly membranaceous.

1. *SIPHONOTUS GEOGRAPHICUS*. Pl. XVIII. Fig. 1. Siphon. albo-fusco, punctis multis nigris et maculis magnis reticulatis viridibus albo-marginatis, superficie inferiore pedis vividè flavâ, pallii siphone longo, cylindrico, pyramidato.

HAB. Java Sea, among masses of floating *Fuci*.

Whitish-brown, covered with minute dark specks, and large, irregular, green, reticulated patches, margined with opaque white; under surface of foot of a bright yellow, left side of foot with a projecting lobe which overlaps that of the opposite side; siphon of the mantle prolonged into a tapering, subcylindrical tube.

This form of *Aplysiadæ* belongs to a group indicated, but not named, by M. Rang, in which the margin of the mantle is posteriorly produced into a more or less elongated siphonal tube, instead of forming a simple aperture as in other species.

The species figured was captured off Java, among a mass of floating sea-weed, and, from being in a languid state, the tentacles are not fully extended.

### 56. DOLABELLA, *Lamarck*.

1. DOLABELLA RUMPHII. Pl. XVIII. Fig. 4. Lamarck, Anim. sans vert. (Deshayes' edit.) vol. vii. p. 699.

This fine species of *Dolabella* was collected at Mauritius, feeding in groups of eight or nine in a small muddy inlet of the sea. The colour of the specimens varied from dark green to dirty yellow.

### 57. BULLA, *Klein*.

1. BULLA COREANICA. Pl. XVIII. Fig. 3. Adams, Sowerby Thesaurus Conch. *Bull.* pl. 125. f. 166.

HAB. Corean Archipelago.

This species belongs to that division in which the shell is internal, and, when alive, presents a quadrilobate fleshy mass without any great amount of vivacity. There are no visible eyes or tentacles, and its elongated head probes with its extremity the mud-flats on which the species abounds, for the small bivalves which seem to constitute its food. Some of the large mud-flats among the Corean islands were covered with these shapeless mollusks, and offered tempting morsels to the Gallatorial birds seen striding over the mud.

2. BULLA VEXILLUM. Pl. XIX. Fig. 4. Chemnitz, Conch. Cab. vol. x. pl. 146. f. 1348, 9. *Bulla fasciata*, Bruguière.

HAB. Mindoro Sea, Philippine Islands.

The animal of *Bulla vexillum* is of a delicate pink colour, with the head, lobes, and margins of the foot edged with white, with an intramarginal dark chocolate-red border. The foot is thin, nearly membranous, and very voluminous, and, when not dilated for swimming, folded up around the shell; the inner margin of the mantle forms a thick fleshy lobe, which partially fills up the hind part of the aperture of the shell; the outer margin is thin and lines the outer lip. This *Bulla*, so beautiful in the living state, was found in grass-like sea-weed, in about a fathom water, near Ambolan, Mindoro.

3. BULLA SOLUTA. Pl. XVIII. Fig. 2. Chemnitz, Conch. Cab. vol. x. pl. 146. f. 1359, 1361. *Bulla Ceylanica*, Bruguière.

HAB. Borneo.

The *Bulla soluta*, Chemn., appears to be blind, while the head is very elongated, and the side lobes of the foot well developed for swimming,—which faculty, indeed, this form enjoys in great perfection. The inner or thickened edge of the mantle sends off



from the hind margin numerous horny setæ, or fine bristles, which are protruded through the fissured suture of the shell, the use of which, however, I have been unable to ascertain.

4. *BULLA VOLUTA*, Pl. XVIII. Fig. 5. Quoy and Gaimard, Voy. de l'Astrolabe, pl. 26. f. 33-35.

HAB. China Sea, in mud and debris at ten fathoms.

In *Bulla Voluta* the eyes are visible at the sides of the head, but the foot is narrow, and without the usually swimming side lobes. It is extremely slow in its movements, and is an inhabitant of deep water. Most of the specimens procured by us were dead shells, being bored by some carnivorous mollusk, showing the number of its enemies.

#### 58. PLEUROBRANCHUS, Cuvier.

1. *PLEUROBRANCHUS LUNICEPS*, Pl. XVIII. Fig. 6 *a, b*. Cuvier, Règne Anim. *Pleur.* f. 6 *a, b*.

We have given a coloured figure of this beautiful species, which is very remarkable for its depressed, almost foliaceous body, and broad semilunar head. The proboscis is retractile when the animal is lively, but is protruded to its full extent before death. The dorsal tentacles are abruptly truncate at the ends, and the hind part of the mantle is produced into a siphonal inflexion, which guides the water into the marginal groove between the dilated foot and mantle, where the branchial plume is situated.

#### NUDIBRANCHIATA.

Among the naked-gilled Gasteropods with which the equatorial seas abound, there are very many forms which are not referable to any hitherto recognized genera, but which the industry of future years will demonstrate: the two types here named *Bornella* and *Ceratosoma* are of this class, and drawings were made of some others; the species of *Scyllæa* and two species of *Goniodoris* we have likewise regarded as new.

#### 59. BORNELLA, Gray.

Corpus elongatum, compressum, semipellucidum, posticè acuminatum, ventriculo ramoso in appendicibus dorsalibus extendens. Caput appendicibus duabus stellatis aut fimbriatis. Tentacula dorsalia retractilia in vaginulibus ramosis. Appendices dorsales in serie unicâ ad utrumque latus corporis dispositæ, cylindricæ, curvatæ, conicæ, bifidæ, trifidæ, aut simplices; branchiæ bipinnatæ, appendicibus dorsalibus exeuntes. Pes linearis, sulcatus.

The authors proposed to found a genus for these mollusks and had them figured for that purpose, but were anticipated by Mr. Gray, into whose possession the drawings had previously passed in their way from the Admiralty.

1. *BORNELLA DIGITATA*. Pl. XIX. Fig. 1. Born. corpore carneolo, lineis carmineis infra reticulatis transversim striato, appendicibus dorsalibus elongatis, bifidis aut trifidis, in apicibus conicis carmineis terminatis, branchiis ab parte superiore appendicibus dorsalibus exsertis, pede albo.

HAB. Straits of Sunda.

This species was found adhering to floating *Fuci*: it crawls briskly, and when detached swims by lateral inflexions of the body.

2. *BORNELLA ADAMSII*. Pl. XIX. Fig. 3. Gray, Mrs. Gray's Figures of Molluscous Animals, p. 107. Born. corpore carneolo, lineis carmineis infra reticulatis transversim striato, appendicibus dorsalibus elongatis, simplicibus aut bifidis, in apicibus carmineis terminatis, branchiis ab parte inferiore appendicibus dorsalibus exsertis, pede stramineo.

HAB. Coast of Borneo.

Like the preceding species, this also was found adhering to the stems of a mass of floating *Fuci*, clinging to them by its narrow grooved foot.

These handsome Nudibranchs, which are figured of the natural size and colour, resemble *Dendronotus* of Alder and Hancock in their dorsal tentacles being branched at the ends, in their ramifying digestive apparatus, and in their back being furnished with cylindrical branching processes arranged in a single row on each side; but the existence of distinct gills, arising, as in *Scyllæa*, from the dorsal appendages, at once distinguishes them. They seem to form a connecting link between the *Tritoniadæ* and the *Eolididæ*.

#### 60. SCYLLÆA, *Linnaeus*.

1. *SCYLLÆA GRAYÆ*. Pl. XIX. Fig. 2. Scyl. corpore flaveolo, punctis compluribus parvis fuscis et maculis majoribus fulvis, in lateribus notis ovalibus albis serie curvatâ ornato, lineâ latâ turbidè viridi maculis viridioribus in parte inferiore, in utroque laterè unâ notâ ultramarinâ, tentaculis luteolis, marginibus flavis et roseis, appendicibus dorsalibus liberis, extremitatibus vividè flavo-marginatis, lateribus notis parvis viridibus pictis.

HAB. North Atlantic Ocean.

We have dedicated this species of *Scyllæa* to Mrs. Gray, a lady to whom all who desire to study the nature of Molluscous animals are highly indebted for having presented them with outlines of the figures of this class, hitherto contained in expensive and generally inaccessible works.

#### 61. CERATOSOMA, n. g.

Caput magnum, anticè rotundatum, proboscide retractili, appendicibus lateralibus cylindricis, truncatis; velum nullum. Tentacula dorsalia claviformia, non retractilia, apicibus laminatis, e tuberculis rotundatis orientia. Corpus oblongum, angustatum, posticè acuminatum: appendices dorsales duæ, conicæ, anteriores ante aperturam branchialem, breves, rotundatæ, posteriores post aperturam branchialem, elevatiore,

permagnæ, curvæ, cornutæ. Branchiæ ramosæ, e stirpe communi orientes, in ramos quinque bipinnatos divisæ. Pes angustus, linearis.

1. CERATOSOMA CORNIGERUM. Pl. XIX. Fig. 5. Cerat. testâ stramincâ, carmineo vividè marmoratâ, infrâ evanidâ, margine inferiore albâ, maculis cæruleis in serie longitudinali dispositis, appendice dorsali anteriore maculis cæruleis ornatâ, vertice capitis maculis cæruleis in serie transversâ dispositis ornato.

HAB. Sooloo Sea.

This genus differs from *Polycera*, as defined by Cuvier, in wanting the frontal veil, in the surface of the body being smooth, in the possession of but two simple horn-like tubercles, and in the dorsal tentacles being swollen at the base; the two cylindrical, truncate labial appendages are also peculiar. In the figure the proboscis is represented as exerted, giving a peculiar character to the head, which it does not possess in the ordinary passive condition.

## 62. GONIODORIS, *Forbes.*

1. GONIODORIS TRILINEATA. Pl. XVII. Fig. 4 and 4 a. Gon. capite sub fronte pallii celato, sub-roseo, tentaculis dorsalibus vividè luteis; corpore pallidè roseo, margine cyaneo, in medio signo triangulari et notis duabus rotundis in utroque latere superficiei superioris ad partem posteriorem quæ ultra pallium pertinet; pallio roseo-purpureo, margine pallidè ultramarino, lineis tribus flavis, mediâ anticè claviformi, posticè bifurcatâ ut anum includat, lateralibus ad annulum branchialem curvaturâ desinentibus; branchiis septem, parvis, acuminatis, vividè flavis, circum anum dispositis, simpliciter pinnatis; pede lato, pallidè roseo.

HAB. China Sea.

This, though a small species, is very elegantly coloured, and is among the most beautiful of a group which contributes, by its variety of form and colour, to enliven the solitudes of the ocean.

2. GONIODORIS WHITEI. Pl. XIX. Fig. 6. Gon. corpore luteo, margine ultramarino, pallidis notis ovalibus distinctis, duabus longis paulo curvatis roseis lineis in utroque latere, lincis septem roseis retro et infra pedem pertinentibus, lineâ roseâ unâ ad superiorem partem corporis quæ ultra pallium pertinet; pallio anticè longissimè producto atque dilatato, margine libero, rotundato, vividè luteo, compluribus notis ovalibus pallidè luteis, tæniis quatuor pulehris liliaceis in dorso paribus intervallis dispositis, margine vivide ultramarino, lunulâ roseâ inter tentacula; tentaculis dorsalibus luteis, summo axe productis, acuminatis, albis; branchiis quatuordecim, simpliciter pinnatis.

HAB. Caramata Passage, near Biliton.

The figures that most nearly resemble this beautiful species, which we have dedicated to our zealous friend Mr. Adam White, are the *Doris magnifica* of Quoy and Gaimard (Voy. Astrol. t. 20. f. 1) and an unnamed *Doris*, marked "Banks, Icon. ined. 25, Endeavour River," represented in Mrs. Gray's work on Molluscous Animals.



## CERVICOBRANCHIATA.

63. HALIOTIS, *Linn.*

1. HALIOTIS VENUSTA. Pl. XIII. Fig. 5 *a, b*. Hal. testâ ovatâ, depresso-planâ, spiraliter tenuicostatâ et striatâ, costis distantibus nodulosis, foraminibus subprominentibus; lactcâ, vividè coccineo variegatâ, intus argenteâ.

HAB. Eastern Seas.

Richly variegated with bright vermilion scarlet, upon a white ground, and faintly tinged at the apex with purple.

64. SIPHONARIA, *Sowerby.*

1. SIPHONARIA COREENSIS. Pl. XIII. Fig. 1 *a, b*. Siph. testâ ovatâ, valdè depressâ, apice centrali, cinereâ, lineis undulatis rufescentibus radiatim dispositis, costis prominentibus, interstitiis plicatis, margine acutè dentato; intus flavescente, radiis albis pictâ, centro margineque castaneis.

HAB. Korean Archipelago.

A prettily-coloured species, with the siphonal impression strongly marked.

2. SIPHONARIA RADIATA. Pl. XIII. Fig. 2 *a, b*. Siph. testâ convexo-depressâ, apice centrali, oblongo-ovatâ, flavescente, costis lineisque rugoso-radiatis, margine crenato; intus brumeâ, radiis numerosis nigris et albis prope marginem tinctâ.

HAB. China Sea.

The black and white rays around the internal margin are frequent and the crenulations fine.

65. EMARGINULA, *Lamarck.*

1. EMARGINULA CLATHRATA. Pl. XI. Fig. 6. Emar. testâ ovato-oblongâ, conicâ, costis longitudinalibus lineisque transversis clathratâ, vertice elato, postico, uncinato; intus intensè viridi, margine crenulato.

HAB. Mindoro Sea.

A deeply-latticed high conical shell, of a peculiar blue-green colour in the interior.

66. PILEOPSIS, *Lamarck.*

1. PILEOPSIS ASTERICOLA. Pl. XI. Fig. 1. Pil. testâ acuminato-conicâ, curvatâ, vertice minutè convolutâ, radiatim creberrimè sulcatâ, margine crenulato; albâ.

HAB. Sooloo Sea, on the tubercle of a Star-fish.

This very interesting species, of which only a single example was collected, is very neatly sculptured throughout with fine close-set grooves radiating from the apex.

67. FISSURELLA, *Lamarck*.

1. FISSURELLA EXCELSA. Pl. XI. Fig. 5. Fiss. testâ elevato-conicâ, costis grandibus inæqualibus subsquamatis rudè elathratis, margine crenulato, orificio parvo, subrotundato, posticè inclinato; albidâ aut virescente.

HAB. China Sea.

Mainly distinguished by its high conical form.

68. CALYPTRÆA, *Lamarck*.

1. CALYPTRÆA TRIGONALIS. Pl. IX. Fig. 7 *a, b*. Calyp. testâ trigono-ovatâ, profundè convexâ, apice uncinatâ, radiatim subtiliter plicato-corrugatâ, cyatho amplo; albidâ, lincis fuscis peculiariter reticulatâ.

HAB. China Sea.

The principal distinguishing features of this species are its triangular compression, which is alike in all the specimens and not occasioned by any circumstances of attachment. There is, also, a peculiarity in the reticulated marking which shows more or less distinctly a radiate series of uncoloured patches, ranging like a frill around the apex.

2. CALYPTRÆA DEPRESSA. Pl. XI. Fig. 2 *a, b*. Calyp. testâ suborbiculari, depresso-conicâ, albâ, semipellucidâ, trilaminatâ, apice subcentrali, obtuso, radiatim corrugato-striatâ, cyatho crescentiformi, acuto, prominente.

HAB. China Sea.

This species is composed of three laminæ lying one upon the other after the manner of *C. tectum-Sinense*, but compressed closely one upon the other.

3. CALYPTRÆA PLANA. Pl. XI. Fig. 3. Calyp. testâ suboblongâ, depresso-convexâ, sellæformi, albâ, concentricè subtilissimè lineatâ, apice laterali, cyatho amplo, plano-laminato, ad latus emarginato.

HAB. China Sea, adhering to the interior of dead shells.

A flattened species, turned as it were inside outwards, and well characterized by the term saddle-shaped. *Type of Ergacea N. & A. Vde, 1854*

4. CALYPTRÆA CANCELLATA. Pl. XI. Fig. 4. Calyp. testâ orbiculari, irregulari, conicâ, apice sub-laterali, retrorsum curvato, radiatim longitudinaliter costatâ, costis rugosis, medio sulcatis, interstitiis cancellatis, cyatho crescentiformi, prominulo.

HAB. China Sea.

Sculptured throughout with radiating ribs, down the middle of which there is for the most part a fine groove.

## CIRROBRANCHIATA.

## 69. DENTALIUM.

1. *DENTALIUM FORMOSUM*. Pl. V. Fig. 1 *a, b*. Dent. testâ arcuatâ, tumidiusculâ, tredecim-costatâ, costis rotuudatis, interstitiis latiusculis, extremitate posticâ dorsali fissuratâ, fissurâ apicem versus latiore; roseo, olivaceo-viridi et albo pulcherrimè variegatâ.

HAB. Sooloo Archipelago (outside a coral reef near the city of Sooloo, in about sixteen to twenty fathoms, sandy mud).

A beautiful addition to a genus rarely distinguished by any brilliancy of colour beyond the well-known green of the *D. elephantinum* and *aprinum*. It is of rather lighter and more tumid growth than the former, richly variegated with rose, olive-green, and a little white.

## III. BRACHIOPODA. 1850

## 70. TEREBRATULA.

1. *TEREBRATULA JAPONICA*. Pl. XXI. Fig. 1. Ter. testâ elongato-ovali, tumidâ, lævi, fragili, pellucido-albâ, anticè semicostatâ, costis posticè evanidis, valvis subæqualiter convexis, margine ventrali vix sinuato, crenulato, foramine parviusculo, rotundato.

HAB. Seas of Japan.

A semitransparent-white species, radiately finely ribbed towards the beaks, the ribs soon fading away.

2. *TEREBRATULA ANGUSTA*. Pl. XXI. Fig. 2. Ter. testâ elongato-ovali, subcompressâ, pellucido-albâ, longitudinaliter densè et subtilissimè costellatâ, costellis rugulosis, rostro truncato, valvis ferè æqualibus, medio leviter sulcato-depressis, margine ventrali, subsinuato.

HAB. Seas of Japan.

An extremely delicately-sculptured oblong species, allied to *T. caput-serpentis*.

3. *TEREBRATULA COREANICA*. Pl. XXI. Fig. 3. Ter. testâ rotundato-triangulari, lævi, carneolâ, radiatim carmineo fasciatâ, fasciis irregularibus, interruptis, valvâ dorsali convexâ, medio subcarinatâ, ventrali planiore, latera versus subcompressâ, foramine amplo ovali, utroque latere subangulato.

HAB. Corean Archipelago.

A smooth species, delicately painted with irregular crimson-scarlet rays.

4. *TEREBRATULA CAPENSIS*. Pl. XXI. Fig. 4. Ter. testâ subtriangulari, longitudinaliter costatâ, crassiusculâ, coccineo vividè radiatâ, valvis conspicuè sinuatis et sulcatis, foramiue subamplo.

HAB. Cape of Good Hope.

An interesting small species, dredged off the Cape of Good Hope at a depth of 120 fathoms.



5. *TEREBRATULA ABYSSICOLA*. Pl. XXI. Fig. 5. Ter. testâ trigono-ovali, pellucido-carneolâ, læviusculâ, radiatim planicostatâ et striatâ, costis striisque ferè obsoletis, valvis ferè æqualiter convexas, medio leviter sinuato-sulcatis.

HAB. Cape of Good Hope, 120 fathoms.

Dredged with the preceding species, but very different in character, and belonging more to the type of *T. caput-serpentis*.

#### IV. LAMELLIBRANCHIATA.

##### 1. OSTRACEA.

###### 71. OSTREA, *Linnaeus*.

1. *OSTRÆA PYXIDATA*. Pl. XXI. Fig. 19. Ostr. testâ orbiculari, inæquivalvi, valvâ sinistrâ planâ, radiatim costatâ, costis nodulosis, dextrâ convexâ, radiatim valdè costatâ, costis nodulosis sæpè duplicatis, margine ventrali crenulato; sordidè fuscâ.

HAB. Philippine Islands.

This singular species appears to be characterized by having the right valve extremely convex, and the left one flat.

##### 2. PECTINACEA.

###### 72. HEMIPECTEN, n. g.

Testa adhærens, inæquivalvis, irregularis, hyalina, valvâ superiore anticè simplici, posticè vix auriculatâ, valvâ inferiore anticè simplici, posticè conspicuè auriculatâ, infra auriculam profundè sinuatâ et denticulatâ; cardine edentulo, ligamento leviter marginali, cartilagine parvo in cavitatem centalem.

This interesting shell is intermediate in its characters between *Pecten* and *Anomia*. Like *Anomia* it is a thin hyaline substance, adhering to some foreign body, and of an irregular growth, according to the inequalities of its place of attachment. Like *Pecten* the hinge consists of a slight marginal ligament, intersected in the middle by a small triangular cartilage, situated in the hollow of a superficial cavity in each valve. The under valve is distinguished by a conspicuous auricle on the posterior side, and beneath this is a sinus so deeply cut in the direction of the hinge-margin as to remind one of *Pedum*, especially when presented with the under valve closed upon the hollow of the upper one, as in Fig. 1 *b*, 2 *b*; and the margin of this sinus, as indicated in some of the *Pectens*, is furnished with a row of sharp erect denticles. The shell bears some resemblance to *Pedum*, from the circumstance of there being no corresponding sinus in the upper valve; but it is apparently only a character of resemblance, not one of affinity. The shell has no umbonal area; nor are the sides of either valve reflected.

The observations to be derived from the microscopic structure of *Hemipecten*, which has been kindly exhibited to us by Dr. Carpenter, are, however, singularly contradictory to the views presented by its external characters. Of the two specimens collected, the texture and composition of both valves consist of a hyaline semi-pearlaceous lamina, presenting a series of closely-packed concentric lines, the interstices of which are minutely rayed with much finer lines. Submitted to the microscope, the flat valve in both specimens (Fig. 1 *a*, 2 *d*) is permeated by copious tubuli, a character in which the genus agrees with *Pedum* and with some species of *Lima*, and differs from *Pecten*. This tubularity Dr. Carpenter observed to exist also in the upper valve of the colourless specimen (Fig. 1 *c*), but not in the other (Fig. 2 *c*), so far as the Bryozoon upon its surface allows of an examination.

The upper valve of the coloured specimen (Fig. 2 *c*) possesses a rudimental sculpturing over its entire surface; but as it may have received this from the parasite, and exhibits no other appreciable point of difference, we have not ventured to distinguish it specifically from the white specimen.

1. HEMIPECTEN FORBESIANUS. Pl. XX. Hemip. testâ orbiculari, Anomiaeformi, tenuissimâ, hyalinâ, concentricè lineatâ, linearum interstitiis eximiè reticulatis, valvâ inferiore planulatâ, auriculâ longitudinaliter radiatâ, sinn profundo, valvâ superiore convexâ, vix auriculatâ; pellucido-albâ, valvâ superiore interdum rufo-aurantio radiatâ.

HAB. Sooloo Archipelago, Eastern Seas (dredged from a coral and stony bottom at a depth of about fourteen fathoms); Belcher.

Two specimens of this interesting new form were collected during the voyage, one smooth and white, the other slightly sculptured in a decussately corrugated style, probably from the effect of the Bryozoon which covers it, and rayed with orange-red. The under valve is smooth in both specimens, showing it to have been attached; the upper valve is more or less covered in both with various parasitic objects.

We have the pleasure to name the species in honour of Professor Edward Forbes, who notices the genus, in his valuable work on the British Mollusca, as affording a curious intermediate link between *Pecten* and *Anomia*.

PLATE XX. Fig. 1 represents the smooth colourless specimen; *a*, interior of the under valve; *b*, the valves closed, presenting the exterior of the under valve; *c*, the valves closed, presenting the exterior of the upper valve. Fig. 2 represents the coloured and slightly corrugated specimen; *a*, interior of the upper valve, which is not shown of the former specimen; *b*, the valves closed, presenting the exterior of the under valve; *c*, the valves closed, presenting the exterior of the upper valve; *d*, interior of the under valve:—*all of the natural size.*

### 73. PECTEN, *Bruguère*.

1. PECTEN REEVEI. Pl. XXI. Fig. 10 *a*, *b*. Pect. testâ æquivalvi, subæquilaterâ, suborbiculari, paululum longiore quam altâ, albâ, carmineo vividè variegatâ et radiatâ et violaceo maculatâ; costatâ, costis

ad viginti, latiusculis, lincis concentricis elevatis minutè et densissimè decussatis, auriculis subæqualibus, intus vividè carmineâ et albâ. ADAMS, MS.

HAB. China Sea.

Several specimens of this magnificent new *Peeten* were collected in the China Sea, all more or less brilliantly coloured in the manner described.

2. PECTEN FULVICOSTATUS. Pl. XXI. Fig. 11. Pect. testâ subobliquâ, multò altiore quam longâ, inæquilaterâ, albidâ, rubro sparsim maculatâ, costis fulvis, valvis subæqualibus, tenuibus, compressis, decem-costatis, costis interstitiisque marginem versus elevato-striatis, auriculis valdè inæqualibus.

HAB. Sooloo Archipelago.

A very thin shell, rayed with ten broad yellowish ribs, very sparingly red-spotted.

3. PECTEN AURANTIACUS. Pl. XXI. Fig. 12. Pect. testâ oblongo-orbiculari, subæquilaterâ, peculiariter compressâ, valvâ superiore planatâ, inferiore subconvexâ, ambabus radiatim costatis, costis quatuordecim, rotundatis, sulcosi, squamis minimis per quatuor series longitudinales in costis dispositis, costarum interstitiis profundè excavatis, transversim striatis, vix auriculis inæqualibus; intensè aurantiâ, luteo et violaceo maculatâ.

HAB. China Sea.

A truly beautiful species, characterized by the most elaborate and delicate sculpture, with brilliant colouring.

4. PECTEN ASPERULATUS. Pl. XXI. Fig. 13. Pect. testâ inæquivalvi, æquilaterâ, carneolâ, aureo variegatâ, rostris vividè rufis, liris numerosis, irregularibus, obsoletè squamulosis, asperulatis, auriculis valdè inæqualibus.

HAB. Corean Archipelago.

The auricles are remarkably unequal in this species, whilst the under valve has a row of denticles almost as strongly developed as in *Hemipeeten*.

5. PECTEN DENTICULATUS. Pl. XXI. Fig. 14. Pect. testâ elongato-ovatâ, subæquivalvi, æquilaterâ, tenui, compressâ, radiatim lirâtâ, liris valvæ superioris ad quindecim, alternatim minoribus, angustis, squamulis dentiformibus ornatis, valvæ inferioris permultis, squamulis aculeatis, scabris, auriculis inæqualibus, margine cardinali valvæ inferioris dentato, alterius simplici; pellucido-lutescente, rosaceo obsoletè tinctâ.

HAB. Shores of Borneo.

Rayed with narrow elevated ridges, surmounted with fine scales.

6. PECTEN CRISTULARIS. Pl. XXI. Fig. 15. Pect. testâ subæquivalvi, suborbiculari, paululum altiore quam longâ, pallidè carneâ, rubro variegatâ, costis quatuor et viginti, rotundatis, hic illic subtiliter squamatis, interstitiis lævibus, margine cardinali valvæ superioris simplici, inferioris cristato-crenato.

HAB. Eastern Seas.

Of very simple character, though not exactly agreeing with any hitherto described species.



74. LIMA, *Bruguère*.

1. LIMA BASILANICA. Pl. XXI. Fig. 6. L. testâ obliquè ovatâ, fragili, tumidâ, utroque latere subhiante, radiatim subtiliter costellatâ, transversim tenuissimè striatâ, cardinis areâ subobliquè lanceolatâ.

HAB. Island of Basilan.

A very delicately ribbed species, the ribs being devoid of any squamate sculpture.

2. LIMA ORIENTALIS. Pl. XXI. Fig. 7. L. testâ obliquè ovatâ, subangustâ, fragili, tumidâ, utroque latere hiante, radiatim subtiliter costellatâ, costellis numerosis, rugulosis, auriculis minimis, cardinis areâ obliquè lanceolatâ, margine ventrali dentato.

HAB. Philippine Archipelago.

Somewhat like the preceding species in general aspect, but of narrower form, whilst the ribs are finer, more numerous, and delicately rugose.

## 3. CHAMACEA.

75. CHAMA, *Linnæus*.

1. CHAMA LACINIATA. Pl. XXI. Fig. 20. Ch. testâ angustè ovatâ, albidâ, rufo variegatâ, longitudinaliter plicatâ, plicis conspicuè irregulariter squamatis, liris brevibus corrugatis obliquè decussatâ.

HAB. China Sea.

A rather compressed species, armed with bunches of vaulted scales, and fine transverse wrinkled ridges.

## 4. ARCACEA.

76. NUCULA, *Lamarck*.

1. NUCULA MIRABILIS. Pl. XXI. Fig. 8. Nuc. testâ transversè oblongâ, subtriangulari, anticè brevissimâ, concavo-truncatâ, epidermide virescente-luteâ indutâ, longitudinaliter utrinque costatâ, costis corrugatis, medio divaricatis.

HAB. Kieu-sieu, Nangasaki Bay, Japan.

This remarkable species partakes of the character of a very interesting type, only known hitherto in a fossil state.

2. NUCULA JAPONICA. Pl. XXI. Fig. 9. Nuc. testâ elongato-oblongâ, anticè longiore, subrostratâ, posticè tumidâ, rotundatâ, lævi, albidâ, epidermide lutescente-corneâ indutâ.

HAB. Kieu-sieu, Nangasaki Bay, Japan.

In this species, which more resembles the ordinary form of the genus, the anterior side is much the longer, produced, as it were, into a beak.

77. PECTUNCULUS, *Lamarck*.

1. PECTUNCULUS BELCHERI. Pl. XXII. Fig. 5. Pect. testâ obliquè ovatâ, depressâ, decussatim striatâ, latere antico brevi, postico multò longiore, dilatato, epidermide fuscâ, densè pilosâ, pilis in fimbriis concentricis dispositis.

HAB. Cape of Good Hope, 120 fathoms.

Remarkable for an epidermis of festoons of fringes.

2. PECTUNCULUS ASPERSUS. Pl. XXII. Fig. 8. Pect. testâ magnâ, orbiculari, subæquilaterâ, radiatim subtilissimè sulcatâ et striatâ, striis concentricis decussatâ, albidâ, rubro-fusco adpersâ, epidermide fusco-pilosâ partim obtectâ.

HAB. Sooloo Archipelago.

A fine new species, belonging to the same type of the genus as the well-known *P. pilosus*.

## 5. CARDIACEA.

78. CARDITA, *Bruguère*.

1. CARDITA FERRUGINOSA. Pl. XXI. Fig. 21. Card. testâ subcordatâ, compressâ, anticè truncatâ, albo et ferrugineo-rufo variegatâ, radiatim costatâ, costis ad quatuordecim, convexis, nodoso-striatis, interstitiis latiusculis.

HAB. Philippine Archipelago.

Of an unusually compressed growth, prettily variegated with light rust-colour.

79. HIPPIAGUS, *Lea*.

1. HIPPIAGUS NOVMCOSTATUS. Pl. XXIV. Fig. 1. Hip. testâ suborbiculari, cordatâ, radiatim fortiter costatâ, costis septem ad octo, distantibus, sub lente granulosis; sordidè fuscâ, intus argenteo-margaritaceâ.

HAB. China Sea.

A single valve of this remarkable genus, apparently recent, was dredged from among the debris of the China Sea. It is rayed with about seven to eight elevated ribs, covered with a very dark brown epidermis, bright silver-pearled within, and quite distinct from the fossil species, the only *Hippiagi* known, *H. Isocardioides*, Lea, and *H. acuticostatus*, Philippi.

80. ISOCARDIA, *Lamarck*.

1. ISOCARDIA TETRAGONA. Pl. XXII. Fig. 1. Isoc. testâ elongato-cordatâ, compressiusculâ, lacteâ, hic illic obsoletè rufescente, longitudinaliter plicatâ, plicis angulatis, latere postico acuminato-producto, carinâ acutâ, umbonibus confertis, minutis.

HAB. Japanese Seas.

A species of rather slight structure, distinguished by its remarkably elongated form, the posterior extremity being sharply acuminate.

2. *ISOCARDIA MOLTKIANA*. Pl. XXII. Fig. 3.

Two specimens of this beautiful red-spotted variety of the true *Chama Moltkiana* of Chemnitz were collected at Corea, both amply distinguished from the common species, *I. vulgaris*, by their solid cordate form and bold development of the ribs.

81. *CARDIUM*, *Linnaeus*.

1. *CARDIUM ADAMSI*. Pl. XXII. Fig. 2. Card. testâ subquadrato-cordatâ, posticè obliquè truncatâ, angulatâ, subæquilaterâ, albâ, rubro variegatâ, costis ad sex et triginta, elevatis, squamulis aculeatis confertis regularibus undique densè armatis. REEVE, MSS.

HAB. Shores of Borneo.

Several examples of this most exquisitely sculptured species were collected on the coast of Borneo.

2. *CARDIUM AURANTIACUM*. Pl. XXII. Fig. 4. Card. testâ subcordatâ, gibbâ, glabrâ, nitidâ, albo aurantiaco rubroque variegatâ, longitudinaliter striatâ, latere postico lævi, antico striis transversis concentricis elevatis subdistantibus exsculpto.

HAB. China Sea.

A fine species, allied to *C. pectinatum*.

3. *CARDIUM MODESTUM*. Pl. XXII. Fig. 6. Card. testâ subquadrato-cordatâ, tenuiculâ, flaveolâ, radiis tribus rufescentibus subobsoletè pictâ, radiatim subtilissimè et creberrimè costellatâ et concentricè striatâ, areâ posticâ subclathratâ, margine crenulato.

HAB. Eastern Seas.

A thin and minutely-sculptured species, comparatively smooth except on the posterior area.

4. *CARDIUM KALAMANTANUM*. Pl. XXII. Fig. 7. Card. testâ subcordatâ, gibbosâ, glabrâ, nitidâ, luteo-aurantiacâ, umbonibus rosaceo-albis, radiatim substriatâ, latere antico liris obliquis distantibus exsculpto, postico lævi, margine dentato.

HAB. Shores of Borneo.

Another species of the *C. pectinatum* type, apparently distinct from *C. aurantiacum*.

5. *CARDIUM SPECIOSUM*. Pl. XXII. Fig. 9. Card. testâ subcordatâ, crassiusculâ, tumidâ, posticè peculiariter concavo-truncatâ, albo rufoque tessellatâ, radiatim costatâ, costis ad sex et viginti, convexis, squamato-granulatis, interstitiis transversim striatis.

HAB. China Sea.

Very distinctly characterized from any species known hitherto.



6. *CARDIUM BECHEL*. Pl. XXII. Fig. 12. Card. testâ subcordato-ovatâ, medio et anticè lævigatâ, striis minutis superficialiis radiantibus et concentricis sub lente decussatâ, epidermide tenui cornèa nitente in funiculis fibrise concentricis creberrimè dispositâ, areâ posticâ, epidermide nullâ, radiatim costatâ, costis tenuibus, confertis, quinque et viginti ad triginta, spinis brevibus compressis densissimè seriatim ornatis; undique pulcherrimè roseâ, intus albâ.

HAB. Sooloo and Yellow Seas.

We have much pleasure in dedicating this species, at the desire of Capt. Sir Edward Belcher, to Sir Henry de la Beche, Director of the Ordnance Survey and President of the Geological Society. It forms a most interesting addition to the genus *Cardium*, and is, without exception, the most striking and distinct from any hitherto known that can well be imagined. In colour it is of a fine rose-tint, with the following singular contrast of character. The middle and anterior portion of the shell is smooth, presenting a peculiar soft velvety appearance, the effect of its being minutely decussated with concentric and radiating striæ, and covered with an exquisite thin shining horny epidermis, disposed in fine concentric cords, abruptly terminating at the posterior area. The posterior portion, accordingly destitute of epidermis, is very thickly rayed with ribs of short compressed spines, as if the delicately-clad surface of the shell had been thus far ploughed up, as it were, into furrows.

Only two odd valves of this pre-eminently beautiful shell were obtained, and, singularly, in localities very remote from each other: one was dredged at the depth of forty fathoms in the Sooloo Seas, between the islands of Borneo and Mindanao; the other in the Yellow Sea, thirty degrees north, at one of the islands of the Corean Archipelago.

## 6. CONCHACEA.

### 82. CYTHEREA, *Lamarck*.

1. *CYTHEREA VIRGINEA*. Pl. XXIV. Fig. 10. Cyth. testâ oblongo-triangulari, æquivalvi, crassiusculâ, cinerascete-albâ, nitente, radiatim obscure fasciatâ, latere postico lineâ impresso, areâ posticâ violascente. = *Tivela stultorum* *Mawe*. Cf. *Nautilus*, xxxv. p. 134, 1922.

HAB. ~~Eastern Seas.~~ *California*.

A very delicate and characteristic species, equivalve and of rather an oblong-triangular form.

### 83. ARTEMIS, *Poli*.

1. *ARTEMIS DUNKERI*. Pl. XXI. Fig. 17. Reeve, *Conch. Icon. Artem.* pl. 6. f. 34. *Cytherea Dunkeri*, Philippi, *Abbild. und Besch. Conch. Cyth.* p. 4. pl. 2. f. 5.

HAB. Eastern Seas.

We are anticipated in the publication of this fine species of *Artemis* by Dr. Philippi, who had already named it after Dr. Dunker of Cassel.

S4. VENUS, *Linnæus*.

1. VENUS PHILIPPINARUM. Pl. XXII. Fig. 10. V. testâ oblongo-ovatâ, anticè truncatâ, fulvâ, fusco variegatâ, obscure radiatâ, radiatim liratâ, liris numerosis, subundatis, ad latera decussatim nodulosis; intus partim violaceâ.

HAB. Philippine Archipelago.

This and the following species belong to that section of the genus which partakes of the character of *Pullastra*.

2. VENUS TESSELLATA. Pl. XXII. Fig. 11. V. testâ oblongo-ovatâ, anticè truncatâ, crassiusculâ, fusco alboque strigatâ et tessellatâ, radiatim multiliratâ, transversim tenuissimè striatâ, lunulâ lauceolato-ovatâ.

HAB. Philippine Archipelago.

A dark ash-rust shell, beautifully mottled and streaked throughout with white.

3. VENUS LABUANA. Pl. XXI. Fig. 16. V. testâ subtriangulari, gibbosâ, anticè truncatâ, posticè flexuosâ, acuminato-rostratâ, albidâ, liueis nigricantibus acutè angulatis ornatâ, concentricè valdè sulcatâ, sulcis irregularibus, margine ventrali posticè sinuato.

HAB. Island of Labuan.

This fine species, though not apparently new, does not seem to have been described.

4. VENUS COSTELLIFERA. Pl. XXI. Fig. 18. V. testâ oblongo-ovatâ, subtrigonâ, subæquilaterâ, albâ, rubro sparsim variegatâ, longitudinaliter costatâ, costis confertis, decussatim plicatis, plicis semilunariibus, confertis, posticis squamulosis.

HAB. Philippine Archipelago.

Very closely ribbed, the ribs being densely sculptured throughout with close-set semilunar folds.

5. VENUS QUADRANGULARIS. Pl. XXIV. Fig. 7. V. testâ quadrato-ovatâ, subcompressâ, crassiusculâ, concentricè tenuiter et irregulariter striatâ, pallidè stramineâ, nitidâ, umbonibus roseis, latere antico brevi, postico multò longiore, lunulâ parum distinctâ.

HAB. Corean Archipelago.

Peculiarly square-formed, of a light shining straw-colour, with pink umboes.

6. VENUS ELEGANS. Pl. XXIV. Fig. 13. V. testâ oblongo-ovatâ, calcareo-albâ, lamellis concentricis subirregularibus ad latus posticum majoribus ornatâ, lunulâ cordatâ, parvâ.

HAB. Eastern Seas.

An elegantly-formed species, delicately sculptured with irregular concentric lamellæ.

## 7. NYMPHACEA.

85. LUCINA, *Bruguière*.

1. LUCINA FIBULA. Pl. XXIV. Fig. 5. Reeve, Conch. Icon. *Luc.* pl. 7. f. 33, 37, and 38.

HAB. China Sea.

There are two or three varieties of this species from very remote localities; in addition to that under consideration from China, Mr. Cuming possesses specimens from the Philippine Islands and from New Zealand.

2. LUCINA SERICATA. Pl. XXIV. Fig. 6. Reeve, Conch. Icon. *Luc.* pl. 9. f. 55.

HAB. Philippine Archipelago.

This and the preceding species were incidentally described and figured in the *Conchologia Iconica* whilst the accompanying plate was in the hands of the engraver.

86. CYRENOIDA, *Joannis*.

1. CYRENOIDA ALATA. Pl. XXIV. Fig. 12. Cyren. testâ rotundatâ, oblongâ, subæquilaterâ, utrinque productâ, tumidâ, sordidè albâ, epidermide luteâ partim indutâ, striis rugosis concentricè sculptâ, latere antico subangustato, rotundato, postico dilatato, subtruncato.

HAB. Corean Archipelago.

Remarkable for its produced growth at the sides.

2. CYRENOIDA COREENSIS. Pl. XXIV. Fig. 14. Cyren. testâ subquadrato-ovatâ, valdè æquilaterâ, subcompressâ, sordidè albâ, epidermide tenui indutâ, concentricè irregulariter rugoso-striatâ, latere antico brevi, lunulâ oblongâ, postico rotundato.

HAB. Corean Archipelago.

This species partakes more of the form and general character of *Lucina*.

87. PSAMMOBIA, *Lamarck*.

1. PSAMMOBIA DENTICULATA. Pl. XXIV. Fig. 2. Psam. testâ oblongâ, tenui, albâ, posticè angulatâ, ad angulum costatâ, costis muricato-squamatis, medio et latere antico peculiariter obliquè plicato-liratis, liris subindatis, per summitatem sulcatis.

HAB. China Sea.

Only a single valve of this remarkable species was collected.

2. PSAMMOBIA FLEXUOSA. Pl. XXIV. Fig. 3. Psam. testâ elongato-ovatâ, posticè rostratâ, albâ, obliquè



plicatâ, plicis undulato-corrugatis, hic illic duplicatis, latere postico rostrato, flexuoso, acuto, antico rotundato, umbonibus subacuminatis.

HAB. Shores of Borneo.

Strongly plicated obliquely, somewhat after the manner of the preceding species, but wanting the radiately-ribbed posterior area.

1. PSAMMOBIA RUGULOSA. Pl. XXIV. Fig. 4 *a, b*. Psam. testâ oblongâ, albâ, anticè rotundatâ, obliquè plicatâ, plicis tenuibus, confertis, undulatis, posticè vix angulatâ, costis radiantibus squamuliferis exsculptâ.

HAB. China Sea.

The oblique plaits are finer in this species, whilst the radiating ribs of the posterior side are rather strongly developed.

### 88. AMPHIDESMA, *Lamarck*.

1. AMPHIDESMA EXARATA. Pl. XXIV. Fig. 9. Amph. testâ oblongo-ovatâ, albâ, maculis perpaucis roseis pallidè adpersâ, concentricè costatâ, costis tenuibus, acutis, subrecurvis, interstitiis profundè excavatis, lineis pulcherrimè decussatis.

HAB. Sooloo Sea.

Well distinguished by its numerous delicately recurved concentric ribs.

2. AMPHIDESMA SIMPLEX. Pl. XXIV. Fig. 11. Amph. testâ ovatâ, crassiusculâ, subtrigonâ, concentricè tenuissimè striatâ, rosaceo-albâ, apicibus roseis, intus aureâ, latere postico breviorè, subflexuoso.

HAB. China Sea.

This species has very much the aspect of a small *Tellina*.

## 8. MACTRACEA.

### 89. MACTRA, *Linnaeus*.

1. MACTRA THRACIOIDES. Pl. XXIII. Fig. 8. Mac. testâ ovato-oblongâ, inæquilaterâ, tenui, opaco-albâ, concentricè plicatâ, plicis rotundatis, undulatis, corrugatis, obliquè striatis, latere postico longiore, subattenuato, latè hiante.

HAB. Eastern Seas.

This very curious species is quite an abnormal form of *Maetra*, having much the appearance of a *Thracia*.

### 90. CRASSATELLA, *Lamarck*.

1. CRASSATELLA NANA. Pl. XXIII. Fig. 2. C. testâ subtrigono-ovatâ, compressâ, concentricè sulcosâ, latere postico longiore, angulato, subflexuoso; brunneâ, rufescente obscure trifasciatâ.

HAB. Eastern Seas.

Several examples of this small species were collected at various localities in the Eastern Seas.

2. *CRASSATELLA PICTA*. Pl. XXIII. Fig. 6. Cras. testâ trigono-ovatâ, crassâ, gibbosâ, concentricè rudè plicatâ, plicis crassis rotundatis, virescente-albâ, radiis aut maculis duabus rufo-castaneis conspicuè pictâ.

HAB. Philippine Archipelago.

A stout solid shell characterized by two blotched red-chestnut rays on each valve.

3. *CRASSATELLA CORRUGATA*. Pl. XXIII. Fig. 7. Cras. testâ subtriangulâri, crassâ, gibbosâ, anticè declivi, rotundatâ, posticè angulatâ, rubro-castaneâ, obscurè radiatâ, concentricè peculiariter undato-plicatâ, plicis corrugatis.

HAB. Sooloo Sea.

Very distinctly characterized by the waved corrugated folds with which it is sculptured.

4. *CRASSATELLA PALLIDA*. Pl. XXIII. Fig. 9. Cras. testâ oblongâ, subtrigonâ, crassâ, latere postico multò longiore, obtusè angulatâ, antico brevi, concentricè profundè sulcatâ, sordide albâ, umbonibus rufescentibus.

HAB. China Sea.

The absence of dark colouring is very unusual in this genus.

5. *CRASSATELLA COMPRESSA*. Pl. XXIII. Fig. 10. Cras. testâ oblongo-ovali, valdè compressâ, latere antico rotundato, postico vix angulato, castaneo-brunneâ, concentricè plicato-sulcatâ.

HAB. Corcan Archipelago.

Remarkably compressed, with very simple sculpture.

## 9. MYARIA.

### 91. MYA, *Linnaeus*.

1. *MYA MINDORENSIS*. Pl. XXIII. Fig. 13. M. testâ ovato-oblongâ, subcompressâ, albâ, epidermide subfuscâ partim indutâ, latere antico rotundato, postico subtruncato.

HAB. Mindoro Sea.

This little shell appears to be a true adult *Mya*, though apparently young.

### 92. THRACIA, *Leach*.

1. *THRACIA GRANULOSA*. Pl. XXIII. Fig. 16. Thr. testâ ovato-oblongâ, subæquilatâ, albâ, undique minutè granulatâ, transversim obliquè plicatâ, plicis grandibus undulatis, ad latus posticum valvæ superioris obsoletis, latere postico subtruncato.

HAB. China Sea.

An extremely interesting addition to this very limited genus.

2. *THRACIA TRIGONALIS*. Pl. XXIV. Fig. 8. Thr. testâ trigono-ovatâ, subæquivalvi, irregulari, pellucido-albâ, concentricè elevato-striatâ, anticè rotundatâ, posticè angulato-flexuosâ, margine ventrali posticè sinuato.

HAB. Sooloo Archipelago.

We have some doubt of this being a true *Thracia*, but know not any genus to which it could be better referred.

### 93. CORBULA, *Lamarck*.

1. *CORBULA VENTRICOSA*. Pl. XXIII. Fig. 12. Cor. testâ subtrigono-ovatâ, ventricosâ, anticè rotundatâ, posticè paulum longiore, angulatâ, subtruncatâ, sordide albâ, epidermide fuscâ partim indutâ.

HAB. China Sea.

A very dull simple species, peculiar in form.

2. *CORBULA VARIEGATA*. Pl. XXIII. Fig. 14. Cor. testâ trigono-oblongâ, latere postico multò longiore, attenuato, rostrato, valdè angulato, concentricè plicato-costatâ, albâ, croceo et rufo-spadiceo variegatâ, margine ventrali incrassato, roseo maculato.

HAB. China Sea.

A very conspicuously painted species, of quite a different type from the preceding.

### 94. LYONSIA, *Turton*.

1. *LYONSIA NAVICULA*. Pl. XXIII. Fig. 11. Lyon. testâ oblongâ, gibbâ, tenui, fragili, anticè rotundatâ, posticè compressiusculâ, subtruncatâ, hiantè, radiatim striatâ et obscure lirâtâ, liris distantibus, epidermide flaveolâ, margine ventrali flexuoso.

HAB. Shores of Borneo (dredged from a depth of about eleven fathoms).

A fine characteristic species, of which only a single specimen was collected.

### 95. POROMYA, *Forbes*.

1. *POROMYA PULCHELLA*. Pl. XXIII. Fig. 1. Por. testâ oblongo-ovatâ, tenui, fragili, albâ, pellucidâ, nitente, concentricè plicatâ, plicis obtusis, subdistantibus, anticè rotundatâ, posticè attenuatâ, rostratâ.

HAB. Shores of Borneo.

A very delicate transparent species, of which many were collected on the coast of Borneo.

2. *POROMYA NITIDA*. Pl. XXIII. Fig. 3. Por. testâ subgloboso-trigonalis, albâ, semipellucidâ, lævi, nitidâ, latere antico rotundato, postico acutè acuminato-rostrato, concentricè sulcato, radiatim impresso, ad marginem angulato, umbonibus plicato-sulcatis.



HAB. Shores of Borneo.

A smooth species, very sharply beaked on the posterior side.

#### 96. NEÆRA, *Gray*.

1. NEÆRA MOLUCCANA. Pl. XXIII. Fig. 4. N. testâ tenui, ovatâ, posticè in rostrum angustum elongatum productâ, albâ, concentricè obliquè plicatâ, plicis undulatis.

HAB. Islands of the Molucca, Gillolo.

An interesting elongately-beaked species, oblique wave-plaited across, after the manner of the *Psammobiæ*.

### 10. SOLENACEA.

#### 97. SOLEN, *Linnæus*.

1. SOLEN ALBIDA. Pl. XXIII. Fig. 15. Sol. testâ oblongâ, utrinque rotundatâ, tenui, fragili, albidâ, striis confertis concentricis, posticè latè hiante.

HAB. Corean Archipelago.

Very simply characterized, white, with a very light horny epidermis.

### 11. PHOLADARIA.

#### 98. PHOLAS, *Linnæus*.

1. PHOLAS RIVICOLA. Pl. XXIII. Fig. 5. (Sow. Thes. pl. cviii. f. 90, 91.) Phol. testâ clausâ, cunei-formi, canali transversè divisâ, parte anticâ obliquè dimidiatâ, latere dorsali striato, latere ventrali lævi, subangulato, parte posticâ subelongatâ, lævi, epidermide laminis angulatis marginibus serratis ornatâ, laminâ dorsali subquadratâ, in medio longitudinaliter divisâ.

HAB. Found burrowing in floating logs used as landing places at Gunung Taboor, twelve miles up the Pantai river, where the water was perfectly fresh.

This species of *Pholas*, of which several specimens were collected, is chiefly interesting from the circumstance of its inhabiting a river, in a situation where the water was not brackish.

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1



2c



2d



2e



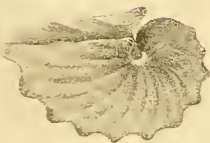
2f



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2h



2i



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2l



2m



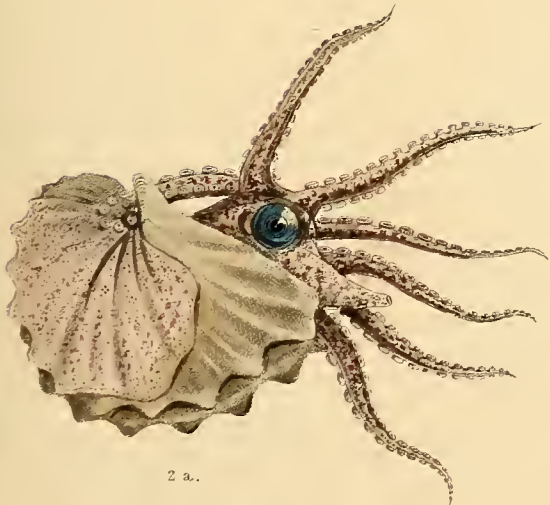
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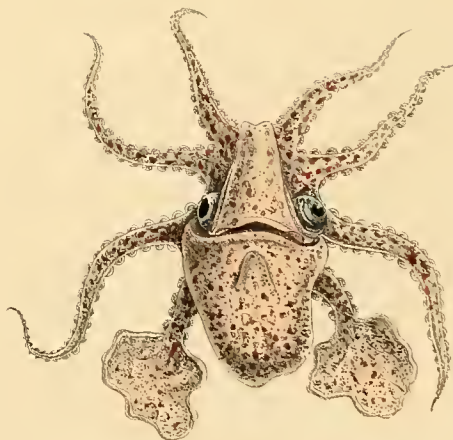
2o



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2a.



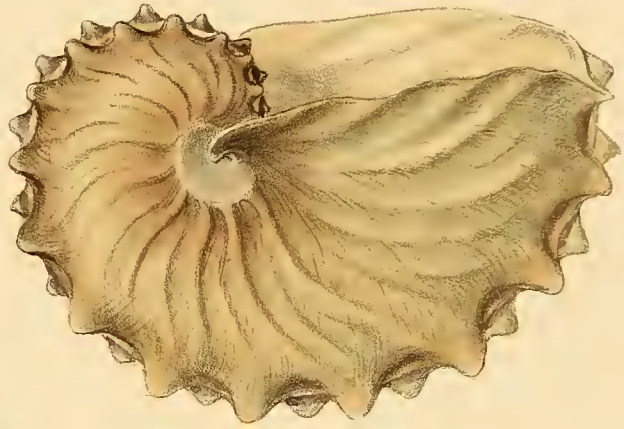
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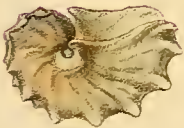




2.9.



2.8.



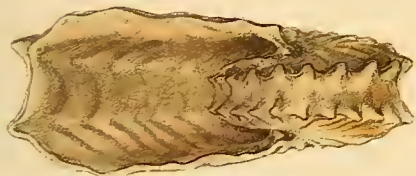
2.7.



2.7.







1. a.



1. b.



1. c.



1. d.



2. a.



2. b.



2. c.











1a.



1b.



2a.



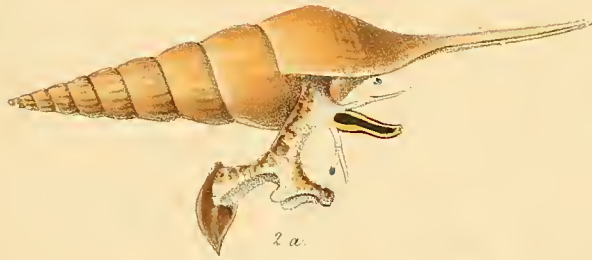
2b.



3a.



3b.



2a.



8a.



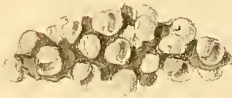
8b.



4b.



4c.



4a.



7a.



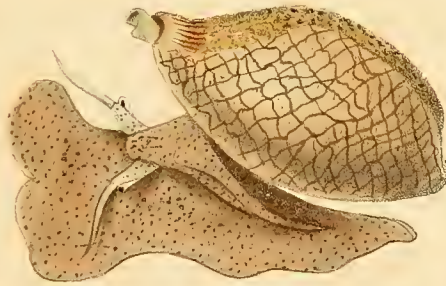
7b.



8c.



8d.



5.



9a.



9b.



10a.



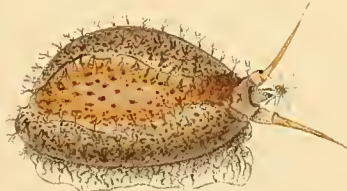
10b.



11a.



11b.



6.



10c.



10d.

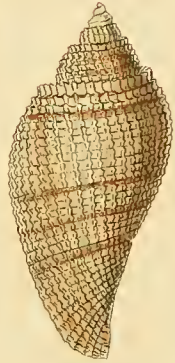
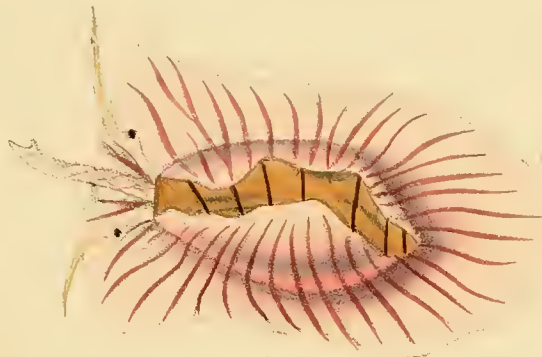




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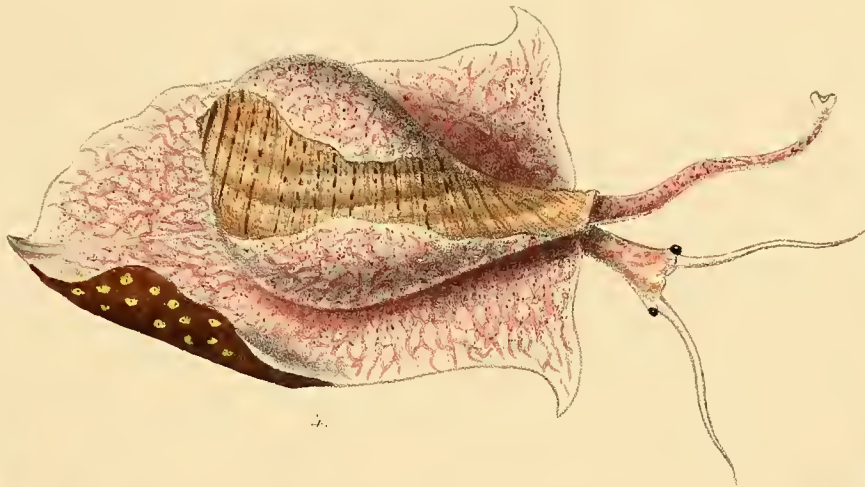








1a.



4.



1b.



3a.



6.



3b.



5.



2a.



7a.



7b.



2b.



MOLLUSCA.







MOLLUSCA.

Plate I



































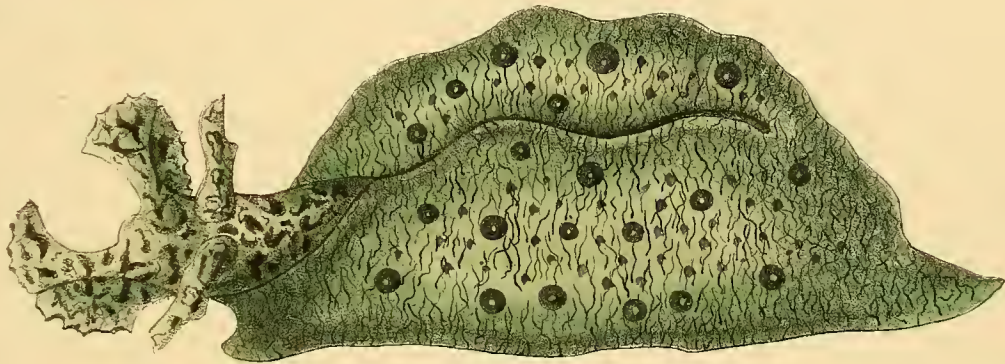
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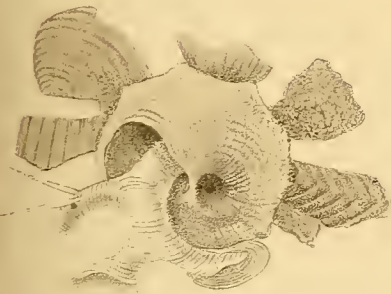
4a.



5.



2.



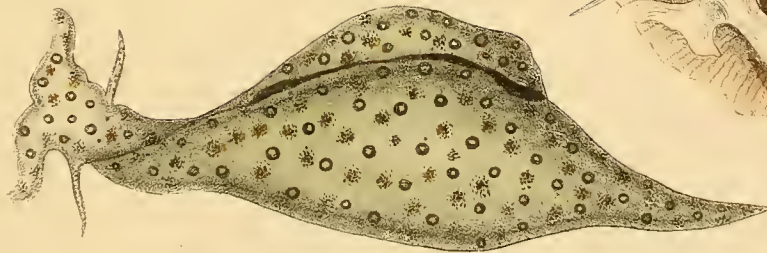
6.



8.



7.



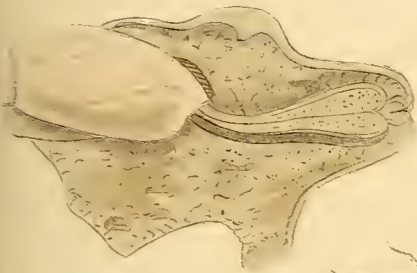
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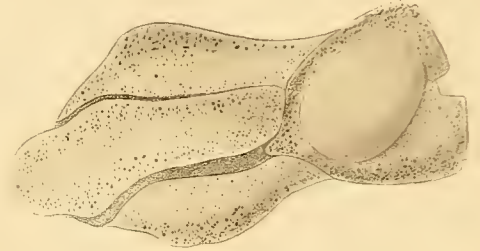




1.



2.



3.



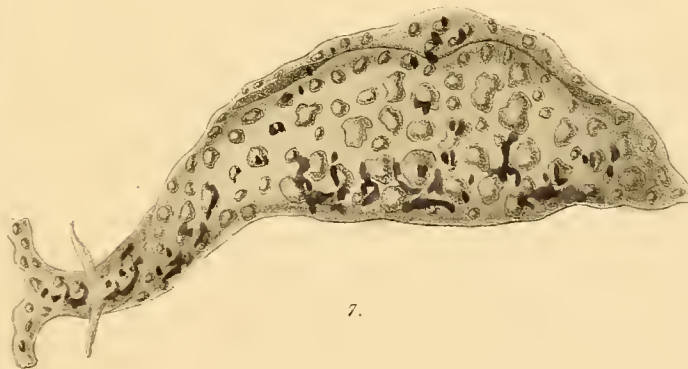
4.



6. a.



5.



7.



6. b.





1.



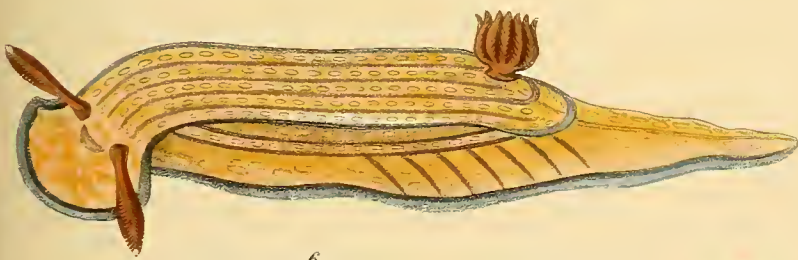
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5.



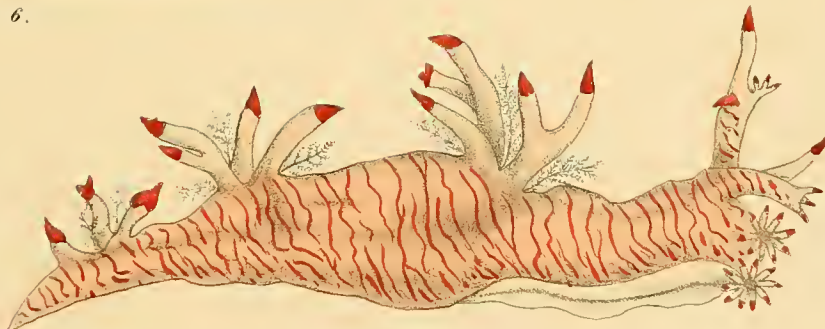
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6.



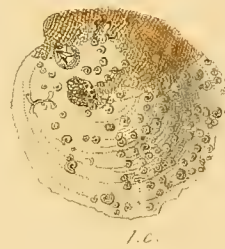
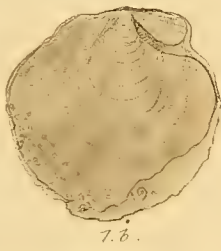
7.



3.













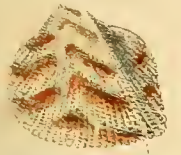




1.



3.



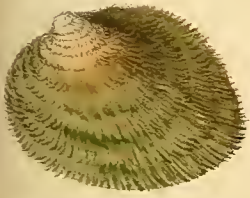
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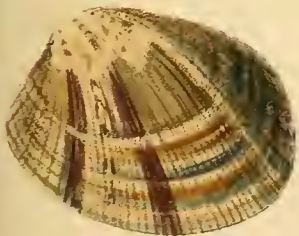
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9.



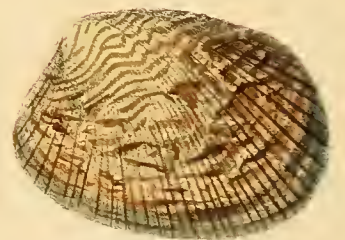
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10.



12.



11.

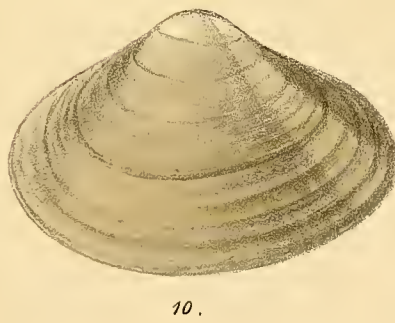














## INTRODUCTION.

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THE first indication of the Crustacea which presented itself during the late Voyage of H.M.S. Samarang, occurred on the 10th of June, 1843, as we slowly sailed through the Straits of Sunda, the surface of which being nearly calm, was swarming with myriads of Stomapodons, such as the transparent *Erichthus* and *Alima*, together with several other genera, as *Phronima*, *Nerocila*, and *Sphæroma*. These were swimming apparently in dense masses near the surface, carried bodily on by the current setting through the Straits, and darting about among themselves. The *Nerocila* and *Sphæroma* rapidly revolve in the water and swim in every direction, while *Erichthus*, *Alima*, and *Phronima* propel themselves more steadily onwards by repeated flexion and extension of the abdomen.

While the trawl supplied us with specimens of these, the employment of the dredge furnished us with several forms of Podosomatous spider-like Crustaceans, which occur, however, most frequently and in the greatest number among coral barriers surrounding islands, where they are found concealed among the coral branches and in the holes of madrepores. I have also taken them from tubular sponges and even from among the spines of the larger Echinoderms. We found them in large numbers in the Mindoro Sea, in twenty fathoms water and sandy bottom, on which occasion they were found entangled in huge bunches of a species of pinnatifid keratophyte. Mr. Adam White, in the Proceedings of the Zoological Society, has described two new species of the genus *Nymphon* obtained in this manner, under the names of *Nymphon Johnstonianum* and *Nymphon Phasma*.<sup>1</sup> These Crustaceans are very slow and languid in their progression, moving their slender articulations but feebly. In the Straits, we likewise obtained by the dredge several fine specimens of the

<sup>1</sup> Ann. and Mag. Nat. Hist., 2nd Ser. vol. i. p. 227.



beautifully marked *Galathea elegans*, a figure of which we have given; it is very active in its movements, darting backwards by sudden powerful jerks, snapping its fore-legs quickly together and producing a clicking noise; when at rest the fore-legs are extended in the same line as the body, perfectly straight; when swimming, the tail is first bent under the body and again forcibly reflexed backwards. Near the same spot a specimen of our very rare *Tlos muriger* was dredged at a depth of ten fathoms, with other species of Crustaceans, chiefly belonging to the genus *Philyra* and *Leucosia*. The *Tlos*, like *Oreophorus* and *Leucosia*, is apathetic and inert, slow in its progressive movements, and relying for security upon its stone-like form. Arrived among the islands of the China Sea, crustaceous animals were observed in all their prolific variety, for in these organisms, as in others, the existence of a high temperature seems to increase their numerical importance, and invest them with more singular modifications of form and with greater brilliancy of colour.

Two of the most remarkable Crustaceans to be met with among the group of islands next visited, namely, that of the Meïa-co-shimah, are the *Scopimera globosa* of De Haan, and the *Mycteris deflexifrons* of the same naturalist. The former burrows in the muddy banks and sandflats, just above low-water mark, perforating the surface in every direction. In some parts of Koo-kien-san (one of this group) they are so numerous as to impart a peculiar colour to the shores, when seen at a distance. They walk but slowly and are very inactive in their habits; when disturbed they make awkward scrambling habits to get out of sight, by burying themselves in the mud in the manner of certain *Macrophthalmi*. The latter genus (*Mycteris*), although somewhat resembling the genus *Ocypode* in many particulars, yet differs considerably in regard to vivacity and locomotion; like their swift-footed consimilars, they form superficial burrows in the sandy mudflats, into which they retreat in the same clumsy scrambling manner as do the *Scopimeræ* on the approach of danger. In some parts of the Meïa-co-shimahs I have ridden over many acres of sandy mud covered with these bright blue crabs, and on looking behind could perceive a dark straight line made by the passage of the horse, as he caused them to conceal themselves in the soil in his progress onwards. They delight to bask at the mouth of their apertures in the sun, just after the receding tide has left the flats partially dry, and appear then to be most on the alert in procuring food. Here likewise we met with a species of *Gelasimus* allied to *G. Chlorophthalmus* of Professor Milne Edwards, with bright orange fore-legs, the left one being bigger than its carapace or, indeed, than the entire body, which inhabits burrows, formed obliquely among

the grass in muddy places near the sea. The *Ocypode ceratophthalma* and other species are collected by the poorer classes as food; they dig them out of their deep sandy burrows with great eagerness and diligence, by means simply of their hands. I have seen the natives sometimes drive them out by insinuating a long pliant twig into the aperture, and have known them also pour water into the hole and so force its occupant to appear; by minutely examining the foot-prints near the burrow, they are able to say with certainty whether it is vacated or occupied by an *Ocypode*. On the flat sandy beaches of this group, if the stones which the tide has left dry are turned over, hundreds of *Porcellanæ* are perceived shuffling along, with their bodies closely applied to the under surface of the stones, seeking protection by quickly gliding to the opposite side. Our species, *P. pulchripes*, is active and bustling in its habits, but another new species (*P. versimana*), found among the coral-reefs of Koo-kien-san, is apathetic and indolent, and the *P. obesula*, A. and W., which was dredged from twenty-four fathoms in the Sooloo Sea, was very sluggish in its movements. The *Elamena unguiformis* of De Haan was found here also; slow in its movements, it lurks concealed in holes of the under surface of stones below high-water mark. A species of *Calappa*, allied to *C. spinosissima*, is found in the shallow bays, which covers itself with sand, and when captured feigns death, folding the fore-legs close against the front and retracting the hind-legs under the carapace. All the species of *Calappa* that I have seen alive are timid and slow-moving. A species of *Alpheus*, probably new, inhabits pools under stones on the sandy beaches, and when disturbed makes a loud clicking noise by snapping together the claws of the fore-legs; and in the padi-fields, a *Gecarcinus*, allied to *G. lateralis*, is very common, running about in all directions, feeding on the larvæ of *Libellulidæ* and other insects.

The *Paguridæ*, or Pirate-Crabs, are very numerous throughout the shores of the Indian Islands, taking refuge, some in the prostrate bodies of decayed trees that usually lie upon the strand, some among the loose stones and in the dead leaves and underwood, and some even penetrating the verge of the forest and ascending the trees that border upon the sea. These are almost entirely terrestrial; some, however, are quite littoral in their habits, while others again live at great depths. We obtained one species of *Pagurus* off the Cape of Good Hope, living in 230 fathoms water, which was remarkable for having fabricated a dwelling in the form of a univalve turbinated shell out of the dead *Ancillaridæ* which abound there, and which are covered with masses of alcyonoid sponge. In the Bashee Group, numerous fine



specimens of the large *Birgus latro* were obtained. Respecting this species, which lives high up among the mountains, the natives of Batan (one of the islands of this group) tell very remarkable stories, maintaining that it utters a sharp cry when caught, that it bites most severely and defends itself with desperation, that it carries its eyes in its tail, runs with surprising celerity backwards, feigning death when alarmed, and does much mischief in the cocoa-nut plantations by cutting down the young trees with its powerful fore-legs. From my own observation I may safely affirm that it runs swiftly backwards, feigns death when disturbed, feeds on fruits, and is of immense strength. They are esteemed, especially the female in spawn, great delicacies in these islands, and from experience I can say that the partiality for them seems well bestowed. We found the same species at the Meïa-co-shimah Group of Islands, where they inhabit holes in the banks among the pine woods, and frequent the cemeteries, where they feed on the bodies of the dead, several being caught in the act by one of our officers. We obtained several live specimens, as large as a common Lobster, also from the Cocos or Keeling Islands, where they are said to be very destructive to the young cocoa-nut trees, and where their principal food consists of the pulp of the cocoa-nut, which they obtain through a round hole made by tearing away the fibres and breaking through the shell. On the flat, weedy, sandy beach of the island of Ibugos (another island of the Bashee Group) I observed a species of *Callianassa*, which digs pits in the sand in which it conceals itself until its prey is in the vicinity, when it seizes upon it and drags it below the surface.

In many parts these islands are over-run with various kinds of *Sesarma*, the species of which differ very much in their habits. Among those I detected as belonging to the fauna of this group, one was found under stones, on sandy flats just below high-water mark; another inhabited the coral reefs; a third, fresh-water rivulets and pools, hiding under stones and logs, and climbing the roots of trees with great facility. Another species, allied to *S. affinis* of De Haan, has the same habits, but running more about upon the dry land among the roots of grass, &c. One, of a marbled light sandy colour, with pale grey blotches, lives in holes in the sand; another, with a hairy carapace, dark brown and purple, inhabits holes in the sandy beach above high-water mark; while in Mindanao I found a species living in fresh-water rivulets among weeds, and in the forests of Celebes, another under damp stones and logs, at some considerable distance from any water. On the summits of the hills near the sea coast, particularly on those of Koo-kien-san, I procured numerous *Talitri* and *Gammari*, from among the roots of the long damp grass in the society of *Tropidinoti* and



other orthopterous insects, and on one occasion observed the natives employing the *Eriocheir Japonicus*, De Haan, as food, throwing them alive upon the embers of their fire, and, when burnt crisp, consuming them, shell and all.

In the course of our dredgings in the China Sea, numerous new species of *Leucosiæ* were collected, generally affecting a sandy bottom, and living among the corallines and madrepores at considerable depths. They are seldom found in muddy places, but prefer deep sandy banks, where they move in a sluggish manner, and seem destitute of acute perceptions. Sufficiently protected by their hard porcellanous shells, they want the rapid progression and threatening attitudes assumed by many other genera. We have figured one of the most beautiful of these new discoveries, which is of a dead white colour covered with numerous round crimson spots. The genus *Dorippe* is another form very common in the China Sea, living in deep water, from twenty to thirty fathoms, on a muddy bottom. The Chinese fishermen often bring them up in their nets, and among large numbers which I have observed in their boats, I have found nearly every individual with an adventitious body (I believe an alcyonoid sponge) attached to the upper surface of the carapace, and retained in its position by the hooked claws of the two small posterior dorsal pairs of legs. This body is divisible into a thin brown layer, with concentric fibres, and an external white lamina with radiating fibres and a dark central nucleus. I have frequently noticed the same peculiarity in *Dromia verrucosipes*, and in many specimens both of *Dorippe* and *Dromia* which I examined in this condition, the carapaces were perfectly soft, as if this foreign body served them as a protection during the period of their moulting. The *Caphyrea pectinicola*, White, which was dredged by us in the Sunda Straits from thirteen fathoms, bears a small pecten shell in a similar manner, hooking itself on to the ears of the shell by the claws of its hinder legs, its soft carapace being thus secured from harm by this adventitious covering. Sir E. Belcher informs me that he discovered another species in the Gulf of Papagaya inhabiting the single valve of a *Terebratula*, which he states was in a partially softened condition. Many other genera, as *Hyas*, *Maia*, *Arctopsis*, *Mithrax*, and *Pericera*, are known to have similar propensities, loading their backs with foreign bodies, such as sponges, algæ, and other phytozoic and vegetable productions.

Near Manado, in the island of Celebes, I visited a woody tract which harboured numbers of *Gelasimi* of several species, many of them of the most beautifully varied markings and colour. Among them were varieties of our *G. bellator*, of a green colour with black

markings; another was black, with two bright ultramarine spots in the middle of the carapace; while another species was grey, marbled with white, with an enormous light yellow chela. These *Gelasimi* cover the ground by thousands, stalking about in a deliberate manner, and holding up and occasionally snapping the claws of their huge fore-legs. Notwithstanding that they appear to be over-burdened with this unwieldy member, they are by no means easy to capture, but run quickly to the mouths of their burrows, where they remain stationary, holding up their fore-claws as organs of defence, and, if further pursued, retreat backwards into their holes, their bodies protected by the same member. In the pools of fresh water and under damp stones, a dark olive-green *Sesarma* with bright yellow blotches was obtained, and on the coast numbers of the elegant and agile *Thelphusa grapsoides*, which is found on the coral flats left dry by the receding tide. The *Chasmagnathus convexus* of De Haan is another crab which appears to be rather common among the Philippine Islands. I have found it in the company of *Xenophthalmus pinnotherides*, in the firm black mud of Manila Bay, where it forms oblique cylindrical holes.

Near the Dyak village of Samahratan, not far from the mouth of the Lundu River in Borneo, there are certain mud-banks left dry at low-water, and which are perfectly cribriform with the cylindric holes of *Gelasimi*, *Ocypode*, and other genera. When their communities are no longer flooded by the water, these Crustaceans make their appearance in large numbers, but retreat on the slightest alarm into their subterranean burrows. They are of every variety of colour, some of them being milk-white, some purple, others reddish and mottled, while many are perfectly black. So numerous are these crabs, that seen at a little distance they give the surface a variegated appearance, nearly obscuring the original colour of the mud.

In many parts of Borneo, as soon as the water recedes from the shore on the ebbing of the tide, and the large firm mud-flats are left exposed, numbers of Crustaceans of different genera and species issue from their various holes and hiding-places. The males of many species, after looking cautiously around them, stalk a few paces with their huge fore-legs raised, the claws of which they snap frequently together, producing a slight clicking sound, then rushing eagerly towards the females they embrace them with their fore-legs. The salute is very brief, and is immediately followed by the swift retreat of the females into their different burrows. Other species are seen feeding on worms and shell-fish, feeding alternately first with one hand and then with the other. The common species of *Grapsus varius* is



found running over the rocks near the sea, feeding on the Blennies and *Periophthalmi* that quit the water occasionally; they feed also on the different Cirripedes. There is one species (*G. latifrons*, White) that I have found inhabiting fresh-water rivulets and ponds, which, however, has all the quick and wary habits of the other species, and when pursued hides under weeds and stones. Among numerous other forms observed along the Bornean coast, I may allude to the *Sicyonia* of Edwards, which swims in a slow and deliberate manner forwards, and occasionally propels itself backwards with a sudden jerk; it keeps at a considerable distance from the shore, and appears to love deep still water.

The *Spheromæ* are generally obtained in company with *Cymodoceæ*, *Cypridinæ*, *Amphipodeæ*, and others, among dense masses of floating sea-weeds, where they appear to lead an active predatory life amid the populous mazes of the *Sargassum*, &c. They are constantly spinning and darting about, rolling up their bodies into a ball, then straightening them, and crawling among the algæ and keratophytes, with a great deal of vivacity. Among the collection brought home in the Samarang, are several species not before known to Crustaceologists. Like the genera *Thenus* and *Ibacus*, the *Scyllarus* lives at some distance from the shore, and in tolerably deep water. It swims in the manner of *Crangon*, by rapid inflexions of the abdomen, occasionally springing through the water with the greatest velocity in a backward direction, and, when caught, wounds the hands with its tail, throwing it about with violent jerks. At Unsang in Borneo, which was the next place visited, I discovered a new species of *Alope*, (White,) an active restless Crustacean, darting and whirling forwards and backwards, and frequently producing a loud clicking noise by snapping the claws of their fore-legs, in the manner of *Callinassa* and *Squilla*. Specimens were found under nearly every stone which I turned on the beach at low water. The *Gonodactyli* appear to differ slightly from the *Squillæ* in their habits, inasmuch as they are generally found in deeper water, whereas the *Squillæ* affect the shallow, weedy, and sandy bottoms, within coral-reefs and on flat beaches, where they hide in holes of the banks of pools, across which they dart occasionally in straight lines, leaving a turbid track behind them. Both genera have, however, the same power of producing a loud clicking noise with the claws of their fore-legs, and of inflicting very severe wounds with their chelæ, using them in a scythe-like manner, like the *Mantis* which they resemble. The *Trapeziæ* are tolerably lively in their habits, with the same manner of hiding and shuffling under stones as the *Porcellanæ*, but unlike them they inhabit the coral branches and madrepores of deep sunken reefs.



Many species of *Idotea* and *Iura* would appear to inhabit the sea-weed along the shores, as well as that found floating on the high seas. At the island of Quelpart, I found a large and singular species in considerable numbers in the former situation, and in the Sea of Celebes I met with several new forms among algæ far from land. Off Tampassook in Borneo, to which island we again returned, several *Ixæ* were obtained by the dredge, one of which (our *I. megaspis*) was new to science; they inhabit very deep water, and are inactive and feeble. Near the same part of the coast several specimens of *Parthenope*, which simulated death when taken, and species of *Lambrus* and *Arcania*, which have similar habits, likewise were obtained from a rocky bottom by means of the dredge. Off Balambangan, our new genus *Ceratocarcinus* was procured from twelve fathoms water; and at Unsang, on the east coast, another new genus, our *Cosmonotus*, was dredged among the clear sandy pools within the reef-barrier, which extends along a part of the coast; and near the mouth of the Pantai River a third new genus, our *Zebrida*, rewarded our research, the habits of which Crustaceans are alluded to in the following pages. On the return of the Samarang across the Atlantic, at which we have now arrived, *Erichthi* and *Alimæ*, with their spiny carapaces and elongated abdomens, were obtained, by trawling, in large numbers, swimming in an erratic manner on the surface when the water was calm. Among the vast quantities of *Acalephæ* which became entangled in the trawls, were several containing living *Phronimæ*, which, on being extricated, swam freely about. Here also was obtained, at the same time as *Nemichthys* of Richardson,<sup>1</sup> our new genus *Rhabdosoma*, which swims by suddenly straightening its body when in a bent position, moving either backwards or forwards; it is sluggish in its movements compared with other *Hyperiadæ*. The *Phyllosomata*, diaphanous and sluggish of movement, were frequently assembled during this calm by many thousands on the surface of the Atlantic, and, together with numbers of anomalous *Zoææ*, afforded ample amusement during the protracted passage. Among the Entomostracous Crustacea, several specimens of *Cypridinæ* of large size (*C. Adamsii*, Baird<sup>2</sup>) were obtained, as they were revolving and darting about the surface. The specimens described and figured in the following pages are deposited in the British Museum. *A. A.*

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<sup>1</sup> *Vide* Fishes, Pl. X. Fig. 1.

<sup>2</sup> Ann. and Mag. Nat. Hist., 2nd Ser., vol. i. p. 21.

# C R U S T A C E A,

BY

ARTHUR ADAMS, F.L.S., & ADAM WHITE, F.L.S.

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## I. INACHIDÆ.

In the family *Inachidæ* we have been fortunate enough to discover a new species of *Inachus*, and a remarkable form of *Oncinopus*, both from the Eastern Seas; species of *Doclea*, *Camposcia*, and *Egeria* were collected, those genera appearing to be principally exotic, while but few species of *Inachus*, *Leptopodia*, or *Stenorynchus* were noticed among the islands of the Eastern Archipelago, they being chiefly confined, in their geographic distribution, to other zoological regions. All the members of this small, though singular, group are passive in defence, having a tendency either to conceal themselves in sponges and among the tangles of Keratophytes and Algæ, or, as is the case with *Camposcia*, to cover themselves with foreign bodies, so as to be almost undistinguishable from the marine objects that surround them. They are feeble in their articulations, and extremely inert and slow-moving when disturbed in their lurking places.

### 1. ONCINOPUS, *De Haan*.

#### 1. ONCINOPUS NEPTUNUS, *Adams & White*. Tab. II. Fig. 1.

Fronte profunde incisâ; lobis frontis angularibus; secundo et tertio paribus pedum admodum gracilibus; vix ter et dimidio longioribus thorace; quarto et quinto paribus thorace vix ter longioribus.

*Thorace* longitudine septem linearum, latitudine quinque; trigonali, postice lato, ad frontem paullatim angustiore, tomentoso, compluribus, brevibus, acutis, aculeatis processibus præsertim ad partem posteriorem circumdato; regionibus mediis et branchialibus depressione haud admodum profundâ separatis; posteriore parte sulco transverso inter thoracem et post-abdomen: corpore excavato inter quintum par pedum;

thorace subdilatato lateraliter supra insertiones secundi, tertii, et quarti pedum parium, sed inde ad frontis apicem omnino integro.

*Fronte* ad extremitatem anteriorem declinatâ, a thorace haud plane distinctâ, ultra medium emarginatâ, atque incisâ antice, efficiente duos lobos qui ad extremitates rotundati sunt.

*Chelis* æqualibus, subgracilibus, brevibus densis tenuibus setis coopertis; brachio subcylindrico ad oculos introrsum curvato, longis, fortibus, paululum curvatis setis utrimque fimbriato; carpo convexo et extrorsum inclinato; manu lateraliter compressâ, convexâ externe, concavâ interne, infra rotundatâ, supra subangulari; digito brevior, lævi, curvato, et minutim denticulato.

Secundo et tertio paribus pedum thorace vix ter dimidioque longioribus; multo crassioribus, majoribus et longioribus quarto et quinto paribus; tertio articulo cylindrico et antice paulo latiore; quarto articulo elongato, conicali, longis setis utrimque fimbriato; quinto articulo tertio longiore tertiâ parte, margine anteriore leniter curvato, posteriore dilatato, arcuato, longis, bene dispositis, ciliatis processibus retro directis utrimque fimbriato, supra leniter sulcato, infra profundis caualibus; chelis dilatatis, admodum curvatis, supra sulcatis, setis longis fortibusque utrimque fimbriatis; apice curvato et acuto.

Quarto et quinto pedum paribus thoracem fere ter longitudine superantibus; secundo et tertio paribus multo gracilioribus atque minoribus; tertio et quarto articulo fere simili longitudine; quinto articulo brevi, lato, depresso incurvato; chelis dilatatis, acutis, et chelis reliquorum pedum crassioribus.

HAB. Mare Mindorum.

Front deeply incised, lobes of the front angular; second and third pairs of legs very slender, nearly three times and a half the length of the carapace; fourth and fifth pairs nearly three times as long as the carapace.

*Carapace* about seven lines long and five wide, trigonal, broad behind, gradually becoming narrower towards the front, tomentose, and beset with numerous short, sharp, sting-shaped processes, particularly towards the hinder part; middle and branchial regions separated by a rather superficial impression, posteriorly a transverse groove between the carapace and abdomen; body hollowed out between the fifth pair of legs, carapace a little dilated laterally above the insertions of the second, third, and fourth pairs of legs, but perfectly entire from this to the apex of the front.

*Front* bent down towards the anterior extremity, not distinctly separated from the carapace, emarginate beyond the middle, and deeply notched anteriorly, forming two lobes which are rounded at the ends.

*Fore-legs* equal in size, rather slender, covered with short, close-set, fine hairs; third joint subcylindrical, curved inwards towards the eyes, fringed on each side with long, stiff, slightly-curved hairs; fourth joint convex and bent outwards; fifth joint somewhat laterally compressed, convex externally, concave internally, rounded below, rather angular above; claws rather short, smooth, curved, and finely denticulated.

Second and third pairs of legs nearly three times and a half longer than the carapace, much stouter, larger and longer than the fourth and fifth pairs; third joint cylindrical, and a little wider anteriorly; fourth joint elongated, conical, fringed on each side with long hairs; fifth joint a third longer than the third joint, the anterior margin slightly curved, the posterior dilated, arched, fringed with long, regular, ciliated processes on each side, directed back-



wards, slightly grooved above, and deeply channelled below; claws dilated, much curved, grooved above, fringed on each side with long, stout hairs, curved and sharp at the ends.

Fourth and fifth pairs of legs nearly three times as long as the carapace, much smaller and more slender than the second and third pairs; third and fourth joints about equal in length: fifth joint short, broad, flattened, incurved; claws dilated, sharp and stouter than the claws of the other feet.

HAB. Sea of Mindoro; fifteen fathoms.

This species comes very near the *Oncinopus aranea* of De Haan, Faun. Japon. (tab. xxix. f. 2), but its carapace is much smaller in comparison with the length and slenderness of the legs. The fore-legs are much slenderer and of greater length; the fourth and fifth pairs of legs are nearly three times as long as the carapace; whereas in *O. aranea* they are only twice the length of the carapace; the second and third pairs of legs are nearly three and a half times longer than the carapace, the front is more deeply incised, and the lobes are very angular.

The *Oncinopi*, like the *Inachi*, live in rather deep water, more particularly in coral bottoms, and where Keratophytes and other zoophytic forms abound. Among the branches of these, like aquatic spiders in their webs, these apathetic crustaceans entangle their elongated limbs; they are, like the *Pholci* among Arachnidans, very inert and feeble, and excessively slow and languid in their movements.

## 2. ONCINOPUS ARANEA, *De Haan*.

Pedibus quartis et quintis anterioribus brevioribus, tarsis curvatis; thoracis lateribus integris.

HAB. Maria Orientalia (M. Mindorum); Adams.

Fourth and fifth pairs of legs shorter than the anterior pairs, tarsi curved, sides of the thorax entire.

HAB. Eastern Seas (Sea of Mindoro).

## 2. INACHUS, *Fabricius*.

### 1. INACHUS LORINA, *Adams & White*. Tab. II. f. 2.

Regionibus ventricularibus et cardiacis convexis, bitubercularibus; oculorum pedunculis uni-spinosis.

*Thorace* trigono, supra convexo, regionibus lateralibus paullo latioribus intermediâ regione; thorace ad latera post oculos attenuato: spinâ tuberculari paullo prominente ad antelateralem thoracis partem; duobus validis magnis tuberculis in lineâ intermediâ in superiore thoracis superficie, quæ tuberculis minutis granularibus et setis longis, tenuibus, sparsisque distinguitur.

*Fronte* vix ad finem brachii antenarum exteriorum pertinente, profunde sulcato inter canthos in lineâ secundâ, et valido jugo longitudinali in utroque latere; apice truncato, horizontali, in medio paululum emarginato, duobus terminalibus grandiusculis lobis adornatis compluribus, rectis et crassis setis. Canthis integris ad partem superiorem arcuatis et paululum protendentibus; oculorum pedunculis lateraliter directis extra canthos spinâ longiore et præacutâ in parte anteriore positâ; antennis exterioribus thorace fere dimidio brevioribus.

*Chelis* thorace dimidio longioribus, marginibus exteriore et interiore fimbriatis; longis, validis, curvatis

setis, ex ordine dispositis; brachio trigono; carpo supra convexo et extrorsum curvato; manu extra convexâ, intra concavâ, introrsum curvatâ, supra et infra obtusâ; unguibus introrsum inclinatis, deorsum curvatis, longioribus, compressis, margine inferiore ad basin sinuato; marginibus utrisque minutim denticulatis; uno majore dente ad utriusque basin.

Primo pari pedum posteriorum admodum gracili et elongato, quintuplo et dimidio thorace longiore; secundo pari vix tantâ longitudine; femoribus cylindricis paululum tomentosus, serie setarum curvarum in parte posteriore; tibiis tertiâ parte longitudinis femorum, parte anteriore setis incurvatis obsitâ; tarsi femora longitudine æquantibus compluribus breviusculis setis, inter quas setæ majores sparsæ inveniuntur; unguibus setis perlongis, tenuibus, gracilibus coopertis. Abdomine in feminâ sex-articulato.

HAB. Maria Orientalia (littus Mindanaum).

Ventricular and cardiac region convex, bitubercular, peduncles of the eyes with one spine.

*Carapace* trigonal, convex above, lateral regions rather wider than that of the middle region, carapace narrowed at the sides behind the eyes, a tubercular, rather prominent spine on the antero-lateral part of the carapace, two strong and large tubercles, in the middle line, on the upper surface of the carapace, which is, moreover, covered with minute granular tubercles, and long, thin, scattered hairs.

*Front* not quite extending as far as the end of the second joint of the external antennæ, deeply grooved between the orbits, in the middle line, and with a strong longitudinal ridge on each side: apex truncated, horizontal, slightly emarginated in the middle, with the two lateral, terminal, slightly-developed lobes, tufted with numerous straight and stiff setæ; orbits entire, arched at the upper part, and slightly projecting; peduncles of the eyes protruding laterally considerably beyond the orbits, with a rather long and sharpened spine situated on the anterior part; external antennæ scarcely half as long as the carapace.

*Fore-legs* one and a half times the length of the thorax, with the outer and inner edges fringed with long, stiff, curved hairs very regularly disposed; third joint trigonal; fourth joint convex above, and bent outwards; fifth joint convex externally, concave internally, curved inwards, obtuse above and below, claws bent inwards, curved downwards, rather long, compressed, inferior edge sinuated near the base, both edges finely denticulated, each with one larger tooth near the base.

First pair of hinder legs very slender, much elongated, five times and a half the length of the carapace, second pair of posterior legs hardly as long, femora cylindrical, slightly tomentose, with a row of curved hairs on the posterior part; tibiæ a third of the length of the femora, the anterior part beset with incurved hairs, tarsi as long as the femora, with numerous rather short hairs, and having longer hairs scattered among them; claws covered with very long, fine, slender hairs. Abdomen, in the female, six-jointed.

HAB. Eastern Seas (Shores of Mindanao).

This species comes very near *Inachus (Achaëus) Japonicus* of De Haan, Faun. Japon. p. 99. t. xxix. f. 3, but the middle region has two strongly-marked tubercles, and the peduncles of the eyes have but one spine instead of four. The legs are also much longer in proportion than in *A. Japonicus*.

3. ACHÆUS, *Leach.*1. ACHÆUS JAPONICUS, *De Haan.*

Regione ventriculi et cordis convexâ; oculorum pedunculis 4-spinulosis.

HAB. Japoniam.

Ventricular and cardiac regions, convex; peduncles of the eyes with four small spines.

HAB. Japan.

*Inachus (Achæus) Japonicus*, De Haan, F. J. p. 99. t. 29. f. 3 (femina).

4. LATREILLIA, *Rouv.*1. LATREILLIA VALIDA, *De Haan.*

Major, thoracis regione ventriculi unispinosâ; pedibus postremis anteriorum pedum femoribus longioribus; abdominis feminae articulo quarto medio non spinoso; spinis frontalibus in utroque sexu integris, tertiâ parte thoracis brevioribus.

Japonice *Midsu hiki gani*, i. e., Cancer in formam Polygoni filiformis.

HAB. Japoniam.

Rather large, thorax with one spine in the ventricular region; the hind feet longer than the femora of the anterior feet; the fourth joint of the abdomen, in the female, not spiny in the middle; the frontal spines, in both sexes, entire, shorter than a third part of the thorax.

Called in Japanese *Midsu hiki gani*, or Crab of the shape of a filiform Polygonum.

HAB. Japan.

*Latreillia valida*, De Haan, F. J. p. 107. t. 30. f. 1 (femina).

2. LATREILLIA PHALANGIUM, *De Haan.*

Minor, thorace in regione ventriculi unispinoso, pedibus postremis femoribus præcedentium brevioribus; abdomine femineo medio bispinoso; spinis frontalibus tertiâ parte longitudinis thoracis brevioribus, in feminis bispinulosis.

HAB. Japoniam.

Rather small, thorax with one spine in the ventricular region, the hind feet shorter than the femora of the preceding; abdomen, in the female, with two spines in the middle line; frontal spines one third shorter in length than the thorax, in the female, bispinulose.

HAB. Japan.

*Latreillia Phalangium*, De Haan, F. J. p. 108. t. 30.

5. MACROCHEIRA, *De Haan.*1. MACROCHEIRA KÆMPFERI, *De Haan.*

Cornibus frontis extrorsum inflexis; canthis parte superiore 4-spinosis.

Japonice *Sima-Gani*, i. e., Cancer insularis.

HAB. Littus orientale Nipponense (*Mus. Brit.*).



Horns of the front bent outwards, the upper part of the orbits four-spined.

In Japanese *Sima-Gani*, or insular Crab.

HAB. The eastern shores of Nippon ; Japan.

*Inachus (Macrocheira) Kämpferi*, De Haan, F. J. p. 100. t. 25. (mas.) t. 27 et 28 (femina) ; Kämpfer, Besch. von Japan. 1. p. 158. tom. 14. A. (*Brachium maris adulti*).

## 6. CAMPOSCIA, *Latreille*.

### 1. CAMPOSCIA RETUSA, *Latreille*.

*Thorace* fere dimidio longiore quam latiore, fronte latissimâ, truncatâ, desinente in duobus parvis tuberculis quæ ad basilarem articulum antennarum exteriorum fere pertinent ; dente validissimo ad partem lateralem thoracis, spatio satis magno post oculos ; pedibus prioribus cylindricis, digito parum valido desinentibus, paululum introrsum curvatis, ad margines denticulatis, cavis punctis in sulco, tertio pedum pari ferme dimidio longiore quam corpus.

HAB. Insulas Philippinas.

*Carapace* about as long again as wide, front very wide, truncated, and terminating in two little tubercles which nearly extend as far as the basilar joint of the external antennæ ; a very strong tooth on the lateral part of the carapace at some distance behind the eyes.

*Fore-legs* cylindrical, terminated by a weak pincer, slightly curved inwards, denticulated at the edges with hollow puncta in the groove, the third pair of legs nearly twice as long as the body.

HAB. Philippine Islands (Guimaras) ; Cuming.

*Camposcia retusa*, Latr. R. Anim. t. 4. f. 61 ; Guerin. Icon. t. 9. f. 1 ; Edw. Crust. t. 1. p. 283. t. 15. f. 16.

The *Camposcia retusa*, in its young state, has the carapace smooth and shining, and the legs, which appear rather slender, are but slightly tomentose ; as it advances in life, the carapace and legs become covered with a thick, woolly, yellowish-brown tomentum, and, in advanced age, the entire animal is concealed by a covering of Sponges, Corallines, Algæ, Actiniæ, and Alcyonia, beneath which it is impossible to recognise the species. The dissimilar aspect presented by this species, under these various conditions, is splendidly illustrated by a suite of specimens in the collection of the British Museum.

The species is widely distributed, and the materials with which their bodies are covered appear to depend upon the localities in which they are found. Specimens from the Mauritius are covered with fine corallines and algæ, while those from the Philippines are concealed altogether by stones and sponges.

## 7. EGERIA, *Latreille*.

### 1. EGERIA INDICA, *Latreille*.

Intiorem marginem tertii articuli maxillarum exteriorum recto, et ad angulum prominente.

HAB. Oceanum Indicum.

Inner edge of the third joint of the external maxillæ straight and prominent at its angle.

HAB. Indian Ocean.

*Egeria indica*, Leach, Zool. Misc. vol. 2. t. 73. Edw. Crust. vol. 1. p. 292.

2. EGERIA LONGIPES, (E. Herbstii,) *Edwards*.

Fronte permagnâ, longitudine ter ampliore quam latitudine; cætera Egeriæ Arachnoidi similibus.

HAB. Insulas Philippinas (Zebu); Cuming.

Front very large, three times as wide as long; in other respects like *Egeria Arachnoides*.

HAB. Philippine Islands.

8. DOCLEA, *Leach*.

1. DOCLEA CALCITRAPA, *White*. (t. 1. f. 2.)

*Thorace* septemdecim magnis spinis in latere lateribusque, et sedecim tuberculis minoribus in superficie superiore; septem magnis spinis in medio thorace, sex erectis quarum sexta e basi spinæ admodum elongatæ horizontalis terminalis exoritur; postremâ spinarum in latere reliquis tribus multo longiore. Tota superficies setis obsita fuisse videtur. Quatuor paria pedum posteriorum perlonga atque gracilia sunt.

*Thoracis* latitudo unum pollicem, quatuor lineas; longitudo unum pollicem, decem lineas.

HAB. Insulas Philippinas (Zebu); Cuming.

*Carapace* with seventeen large spines on the back and sides, and sixteen smaller tubercles on the upper surface; seven of the large spines down the middle of carapace, six of them erect, the sixth springing from the base of the much-elongated, horizontal, terminal spine; the last of the spines of the side much longer than the other three. The whole surface seems to have been covered with hairs. The four hind pairs of legs are very long and slender.

Breadth of carapace, one inch, four lines; length, one inch, ten lines.

HAB. Philippine Islands (Zebu); Cuming.

A species distinguishable at first sight from the four species hitherto described, of all of which there are specimens in the British Museum.

2. DOCLEA OVIS, *Edwards*.

Nulla spina mediana in posteriore thoracis margine.

HAB. Chinam.

No median spine on the posterior border of the carapace.

HAB. China.

*Doclea ovis*, Edw. Crust. vol. i. p. 294. *Cancer ovis*, Herbst. vol. i. p. 210. t. 20. f. 82. *Inachus ovis*, Fabr. Ent. Syst. Suppl. 355. *Maia ovis*, Bosc. t. 1. p. 256. Latr. Hist. Nat. des Crust. t. 4. p. 100.

3. DOCLEA HYBRIDA, *Edwards*.

Posteriore thoracis margine in lineâ medianâ parvâ spinâ armato; marginibus latero-anterioribus thoracis quatuor brevibus spinis armatis posteriore non reliquis majore; secundo pedum pari fere dimidio longiore thorace.

HAB. Indiam.

Posterior margin of the carapace armed on the median line with a small spine : latero-anterior borders of the carapace armed with four short spines, the posterior of which is not larger than the others : second pair of legs not quite twice the length of the carapace.

HAB. India.

*Doclea hybrida*, Edw. Crust. 1. 294 ; *Inachus hybridus*, Fabr. Suppl. p. 355 ; *Maia hybrida*, Bose. t. 1. p. 256 ; Latr. Hist. Nat. des Crust. t. 6, p. 99.

#### 4. DOCLEA MURICATA, *Edwards*.

Posteriore thoracis margine magnâ medianâ spinâ armato ; latero-anterioribus marginibus quatuor spinis armatis, posteriore reliquis multo majore.

HAB. Indiam.

Posterior margin of the carapace armed with a large median spine ; latero-anterior margins armed with four spines, the posterior of which is much larger than the others.

HAB. India.

*Doclea muricata*, Edw. Crust. 1. 295 ; *Cancer muricatus*, Herbst. 1. 211. t. 14. f. 83. ; Fabr. Ent. Syst. Suppl. 355.

## II. MAIADÆ.

In the family of the *Maidæ*, many new and interesting forms, hitherto unknown, are here, for the first time, indicated, including two new genera and seventeen new species. In their habits, these Crustacea resemble the *Inachidæ*, being very inert and apathetic, not using their chelæ in self-defence, and covering themselves very frequently with foreign bodies. They appear to be diffused pretty equally over the globe, *Chorinus* being found both in the east and west : *Mithrax* and *Libinia* seem to be confined to the New World ; *Micippe* and *Pericera* are tropical genera, as are also *Huenia* and *Menæthius* ; while *Maia*, *Hyas*, *Arctopsis*, and *Pisa*, are found in the countries of Europe.

### 1. PISA, *Leach*.

#### 1. PISA SINOPE, *Adams & White*.

*Thorace* serie tuberculorum magnitudine diversâ in lineâ intermediâ, serie septem tuberculorum in quâque regione laterali ; proprius lineam intermediam quinque aliis tuberculis seriatim dispositis ; lateribus quinque spinis, postremâ reliquis rigidiore et eminentiore ; tota superficies thoracis, tuberculis admodum minutis et tenuibus, curvatis, sparsis setis obsita est. *Fronte* duobus spinis rigidis, divaricantibus, curvatis setis circumdatis ; superiore canthorum margine plano spinâ unâ antice et spinâ rigidâ angulari projectâ profundâ incisione in fronte. *Chelis* lævibus, postfrontalem thoracis partem longitudine exæquantibus ; *pedes posterioribus* fuscis tuberculis admodum minutis obsitis, et tenuibus sparsis setis circumdatis.

HAB. Insulas Philippinas.

*Carapace* with a row of tubercles varying in size in the middle line, a row of seven tubercles in each lateral region, internal to these, nearer the middle line, five other tubercles in a linear series ; sides with five spines, the hind one stronger and more prominent than the



rest; entire surface of carapace covered with very minute tubercles and fine, curved, scattered setæ. *Front* with two strong, divaricating spines, beset with curved setæ; upper margin of orbits plane, with a single spine anteriorly, and a strong, angular spine directed forwards, with a deep notch in front. *Fore-legs* smooth, as long as the postfrontal portion of the carapace; hindlegs covered with very minute, brown tubercles, and beset with thin scattered hairs.

HAB. Philippine Islands.

2. PISA PLANASIA, *Adams & White*. Tab. II. Fig. 4 & 5.

*Thorace* majore longitudine quam latitudine, ovato-trigonal, superficie lævi quasi denudatâ, sparsis cristulis setarum fuscæ atque villosarum, ad partem posteriorem minutim granulosa; parvâ spiâ tuberculari paululum eminente in medio tuberculo ventriculari; parvâ eminente spinâ in mediâ quâque laterali vel branchiali regione ad partem posteriorem positâ; tribus, parvis tuberculis supra eam seriatim dispositis in partem anteriorem thoracis pertinentibus; marginibus lateralibus postice integris, tribus obtusis paululum eminentibus spinis ad partem anteriorem, quam ad partem thorax angustus subito fit.

*Fronte* duabus, robustis, eminentibus, breviusculis, parallelis spinis, ad apices paululum incurvatis, et crassis, validis, curvatis setis obsitis; canthis antice integris, postice profunde incisiss, eminente, obtuso, angulari, tuberculo post incisionem.

*Chelis* lævibus, parvis, gracilibus, paribus, raris, longis, crassis setis obsitis; carpo subcylindrico introrsum curvato et antice majore; manibus brevibus rotundatis, atque curvatis, duobus parvis tuberculis in superficie exteriori et superiore; digitis subgracilibus, subcylindricis lateraliter compressis, et longis, crassis, raris setis obsitis; unguibus in medio paululum hiantibus, introrsum curvatis et minutim denticulatis.

*Secundis et tertiis paribus pedum*, toto atque dimidio thorace longioribus, denso, fusco tomento adopertis, carpis subcylindricis antice dilatatis; manibus elongate conicalibus; quartis et quintis paribus pedum secundis et tertiis brevioribus; unguibus acutis, validis, atque curvatis.

*Abdomine maris* sex articulis, serie tuberculorum eminentium in lineâ intermediâ; articulo secundo latissimo tuberculo papilliformi ad utrumque latus tuberculi intermedii; reliquis segmentis paulatim angustioribus, postremo triangulari et acuminato. *Abdomine feminae* ovato admodum convexo atque dilatato, quinque articulis, prostremo articulo late trigonali.

HAB. Mare Sinense.

*Carapace* longer than wide, ovately trigonal, surface smooth, as if denuded, with scattered tufts of brown, villose hairs, and finely granulate towards the hinder part; a small, slightly prominent tubercular spine in the centre of the ventricular prominence; a small prominent spine in the middle of each lateral or branchial region, situated towards the posterior part, and three small tubercles arranged above this, in a linear series, extending towards the fore part of the carapace; lateral margins entire, posteriorly, with three obtuse, slightly prominent spines towards the anterior part, at which situation the carapace becomes suddenly contracted.

*Front* with two strong, prominent, rather short, parallel spines, somewhat incurved towards their apices, and covered with thick, strong, curved hairs. Orbit, anteriorly, entire, deeply incised posteriorly, with a prominent, obtuse, angular tubercle behind the notch.

*Fore-legs* smooth, small, slender, equal in size, covered with scattered, long, stout hairs; the third joint subcylindrical, curved inwards and enlarged anteriorly; fourth joint short, rounded, and curved with two small tubercles on the outer and upper surface; fifth joint

rather slender, subcylindrical, laterally compressed, and covered with long, stout, scattered hairs, claws slightly gaping in the middle, curved inwards, and finely denticulated.

*Second and third pairs of legs* one and a half times longer than the carapace, covered with a close, dense, brown tomentum; third joints subcylindrical, dilated anteriorly; fourth joint elongately conical. Fourth and fifth pairs of legs shorter than the second and third pairs. Claws sharp, strong, and curved.

*Abdomen of male* six-jointed, with a row of prominent tubercles in the middle line, the second joint the widest, with a nipple-shaped tubercle on each side of the central tubercle, the remaining segments becoming gradually narrower, the last being triangular and pointed.

*Abdomen of female* ovate, very convex and dilated, five-jointed, the last joint broadly trigonal.

HAB. Chinese Sea.

This species comes nearest *Naxia diacantha* of De Haan (Tab. 34. Fig. 1), but in that species the frontal spines are very long, straight, and diverging; the fore-legs very large, thick, and strong; and the carapace is armed on each side with a stout, strong, and prominent spine; *N. diacantha* wants, moreover, the three tubercles on the lateral regions, the form of the carapace is more trigonal, and the legs are much shorter in comparison with the carapace than in *Pisa Sinope*.

## 2. ARCTOPSIS, *Lamarck*.

### 1. ARCTOPSIS STYX.

Haud multum a *Pisa tetradonte* differt, thorace tamen longiore, et marginibus latero-anterioribus crassis spinis in medio armatis; superiore canthi margine fissura perangusta.

HAB. Mauritium.

Does not differ much from *Pisa tetradon*, but the carapace is more elongated, and the latero-anterior margins are armed in the middle with thick spines, while the superior edge of the orbit has a very narrow fissure.

HAB. Mauritius.

*Pisa Styx*, Latr. Enc. Méth. 10. 141. Edw. Crust. vol. i. p. 308; *Cancer Styx*, Herbst. vol. i. p. 243. t. 17. f. 96;

## 3. NAXIA, *Edwards*.

### 1. NAXIA DIACANTHA, *De Haan*.

*Thorace* parte posticâ lateribus utrimque unispinoso, spinâ productâ, fronte bicornutâ, cornibus acutis simplicibus, regione ventriculi mediâ unituberculatâ.

Lateral margins of the carapace armed at the posterior part with a single spine on each side, spine produced, front with two horns; horns acute, simple, a single tubercle on the middle of the ventricular region.

*Pisa (Naxia) diacantha*, De Haan, Faun. Japon. t. 24. f. 1.

4. HYASTENUS, *White*.

*Thorax* suboblongus, ad latera rotundatus, ante et pone oculos directus; parvo, transverso sulco in superiore cantho. *Frons* duobus cornibus thoracem longitudine æquantibus, primo parallelis, posterius divergentibus et paululum deorsum directis; antennis exterioribus omnibus articulis cylindricis; insertione articuli basalis cornu frontali occultatâ.

*Chelæ* graciles, secundo pari pedum majori longitudine, gracillimo; articulo terminali acie spinosâ.

*Carapace* rather oblong, rounded on the sides behind, before and behind the edges straight; a slight transverse groove in the upper orbit; front with two horns as long as the carapace, at first parallel, and then diverging, and directed slightly downwards; outer antennæ with all the joints cylindrical; the insertion of the basal joint concealed by the frontal horn.

*Fore-legs* slender; second pair of legs the longest, and very slender; terminal joint with the edge spined.

A genus allied to *Hyas* and *Chorinus*, the only species of which was long ago figured in the large work of Seba.

1. HYASTENUS SEBÆ, *White*.

Superficie superiore subaspersâ et pube velatâ.

HAB. Philippine Islands.

Upper surface somewhat roughish, and covered with a delicate down.

HAB. Philippine Islands.

*Hyastenus Sebæ*, White, List of sp. of Crust. in Brit. Museum; *Cancer araneus, cornutus alter*, Seba, Thes. 3. 4. 5. t. 18. f. 12.

5. CHORINUS, *Leach*.1. CHORINUS ACANTHONOTUS, *Adams & White*. Tab. I. Fig. 1.

*Thorace* quatuor longis spinis armato duabus anterioribus ad basin sese adpropinquantibus atque paululum projectis, posterioribus bifidis; furcis anterioris spinarum posteriorum lateraliter divergentibus, posterioris longitudinaliter; tribus spinis in utrâque brachiali regione; anteriore projectâ, horizontaliter depressâ; mediâ gracili retrorsum, sursum et extrorsum projectâ duobus acutis tuberculis ad basin deorsum spectantibus; posteriore duâbus divaricantibus gracilibus spinis retrorsum et sursum directis.

*Rostro* cornibus longis depressis, ad basin conjunctis, paulatim divergentibus et deorsum curvatis. Canthorum marginibus ad partem superiorem longâ bifidâ spinâ armatis, ad anteriorem brevi bifidâ spinâ, et ad posteriorem, brevi spinâ prorsum curvatâ finitis; canthorum margine inferiore fere obsoleto, angulo externo in acuto dentali processu desinente.

*Chelis* et supra et infra cristâ acutâ denticulatâ armatis; pedibus cylindricis, duobus spinis longis præacutis instructis, unâ in utroque latere superioris partis extremitatis articulorum dispositâ, sursum et extrorsum tertiorum divergente. Tarsis longis curvatis, infra lævibus. Corpore longis tenuibus setis coperto.

HAB. Maria Orientalia; Borneo (Unsang).

*Carapace* armed with four long spines, the two front ones rather close together at their



bases, and directed a little forwards; the two hinder bifid; the forks of the anterior hinder spines diverging laterally, and those of the posterior divaricating longitudinally, three spines on each branchial region, the *anterior* pointed forwards, flattened horizontally, the *middle* slender, curved backwards, upwards, and outwards, with two divaricating, slender spines, directed backwards, outwards, and upwards. Horns of the rostrum long, flattened, close together at the base, gradually diverging and curved downwards. Orbital margin armed at its superior part with a long bifid spine, on the *anterior* part having a short bifid spine, and on the *posterior* part bounded by a short spine, curved forwards. Inferior margin of the orbit nearly wanting, and its external angle ending in a short, sharp, tooth-like process. The first pair of legs armed both above and below with a trenchant, denticulated crest, the other legs cylindrical and furnished with two long, sharp-pointed spines, situated one on each side of the upper part of the extremity of the *third joints*, and diverging upwards and outwards; tarsi long, curved, and smooth below. Body covered with long, thin hairs.

HAB. Eastern Seas; Borneo (Unsang).

This species differs from *Chorinus aculeatus* (Edwards, *Hist. Nat. des Crust.*, vol. i. p. 316, and De Haan's species, *Fauna Japonica*, Plate 23. fig. 2.), in the length and position of the spines, which are not tipped with a knob, but sharp-pointed, and in the thin joints of the posterior pairs of legs being armed with two spines. The peculiarity of the long bifid spine above the old orbit must also be regarded as a singular characteristic, the front legs are more slender, the horns of the rostrum are longer and less divaricating than in *C. aculeatus*.

The species described above enters into *Chorinus* of Professor Edwards and Dr. De Haan, but it seems to be very different from *Chorinus* of Leach, founded on a West Indian and South American type.

The *Chorinus*, like the species of *Mithrax*, inhabit deep water, and always seem to prefer those localities where the bottom is covered with weeds; they are very inactive in their movements, and become rigid in all their limbs when first captured, but make no defence with their forelegs. One specimen was obtained by the dredge, entangled in a mass of corallines, and the *C. longispina* was procured from a coral bottom near the great Loo-Choo.

## 2. CHORINUS LONGISPINA, De Haan.

Canthorum margine superiore spinis elongatis armato, thorace in lineâ mediâ spinis 6, tertiis et quartis basi transversim conjunctis; spinis duabus in regionibus branchialibus; omnibus cylindricis valde elongatis, apice incrassatis, femoribus apice unispinosi, tarsis apice integris.

HAB. Maria Orientalia.

*Chorinus longispina*, De Haan, Faun. Japon. p. 94. t. 23. f. 2.

The superior margin of the orbits armed with elongated spines, six spines in the middle line of the thorax, the third and fourth transversely joined at the base, two spines on the

branchial regions, cylindrical and greatly elongated, with the apex thickened, femora with one spine at the end, tarsi entire at the apex.

HAB. Eastern Seas.

3. CHORINUS ACULEATUS, Edwards.

Thorace quinque admodum longis spinis in medianâ lineâ armato, et duabus ad utramque regionem branchialem.

HAB. Maria Orientalia.

Carapace armed with five very long spines on the median line, and with two on each branchial region.

*Chorinus aculeata*, Milne-Edwards, Crust. vol. i. p. 316.

HAB. Indian Seas.

4. CHORINUS VERRUCOSIPES, Adams & White. TAB. II. Fig. 3.

Thorace sex, acutis elevatis tuberculis, quinto permagno et conspicuo, parva spina ad basin utroque latere; duobus tuberculis eminentibus et angularibus in utraque regione laterali, uno minore in medio alteroque in parte inferiore atque exteriore; thoracis superficie minutis, depressis, punctis et curvatis setis sparsim aggregatis obsita; lateribus pone oculos quinque rotundatis tuberculis.

*Fronte* desinente in duabus, crassis, divergentibus spinis setis curvatis obsitis superiore canthorum parte tribus spinosis processibus armata; anteriore obtuso, sursum et prorsum directo; medio reliquis minore, a posteriore profunda incisione separato, posteriore longo, dente in margine posteriore.

*Chelis* levibus, longitudine thoracem fere exæquantibus; secundo pari pedum longissimo; pedibus tenuibus, cylindricis, tuberculis verrucosiformibus et setis crassis atque sparsis obsitis.

HAB. Maria Orientalia.

*Carapace* with six, sharp, elevated tubercles, the fifth being very large and conspicuous, with a small spine at each side at the base; two prominent angular tubercles on each lateral region, with a smaller one between them, and another on the lower and outer part; surface of carapace covered with minute, depressed dots, and scattered tufts of curved setæ; sides, behind the eyes, with five rounded tubercles.

*Front* terminating in two stout diverging spines beset with curved setæ; upper part of orbit armed with three spiny processes, the anterior obtuse, directed upwards and forwards, the middle smaller than the others, and separated from the posterior by a deep incision, the posterior process long, with a tooth on the hind edge.

*Fore-legs* smooth, nearly equal in length to the carapace; the second pair of legs the longest; legs thin, cylindrical, covered with wart-like tubercles, and coarse scattered setæ.

HAB. Eastern Seas.

6. MITHRAX, Leach.

1. MITHRAX DICHOTOMUS Latreille.

Thorace granuloso, sine spinis in superficie superiore; cornibus rostri admodum divergentibus paullo longioribus quam latioribus, desinentibus in duobus dentibus qui fere æquales sunt.

HAB. Insulas Philippinas.

7. PARAMITHRAX, *Edwards*.1. PARAMITHRAX EDWARDSII, *De Haan*.

Canthis infra emarginatis; oculis usque ad angulos canthorum externos productis; thorace lateribus 5-spinosis; manibus levissimis utrinque convexis margine superiore et interiore obtusis.

HAB. Japoniam.

*Carapace* granulose, and without spines on the upper surface; horns of the rostrum very diverging, not much longer than wide, and terminated by two teeth, which are nearly equal.

HAB. Philippine Islands; Cuming.

*Mithrax dichotomus*, Latr. Desm. Cons. 150; Edw. in Guer. Mag. de Zool. 1832. t. 1. Crust. 1. 319. t. 15. f. 1-4. *Maja dichotoma*, De Haan, Faun. Japou. t. 22. f. 4.

Orbits emarginate below, eyes prolonged as far as the external angles of the orbits, thorax with five spines on the sides; hands very smooth, convex on both sides, obtuse on the upper and lower edges.

HAB. Japan.

*Maja (Paramithrax) Edwardsii*, De Haan, F. J. p. 92. Tab. 21. fig. 2. (*Peronii*. Edw.)

8. TELMESSUS, *White*.

*Thorace* depresso, pentagonali, latero-anterioribus lateribus reliquis longioribus; latero-posterioribus lateribus duobus dentibus in medio; latero-anterioribus lateribus duobus latis dentatis dentibus inter exteriorem canthorum angulum et maguam, latam dentatam divisionem, cujus finis unum ex eminentibus angulis thoracis efficit. Rostrum latissimum, ex tribus latis dentibus consistens, quorum lateralis interiore canthorum angulum efficit.

*Pedes* longissimi, compressi.

*Carapace* depressed, somewhat pentagonal, the latero-posterior sides being the longest, the latero-posterior sides have two teeth in the middle; the latero-anterior sides have two broad, dentated teeth, between the external angle of the orbit and the strongly developed, wide, dentated division, the end of which forms one of the prominent angles of the carapace; the beak is very wide, and is formed of three broad teeth, the lateral forming the internal angle of the orbit.

Legs very long, compressed.

This genus, described in the Proceedings of the Entomological Society, was, by mistake, referred to as coming near *Plagusia*. It, however, enters into the family *Maidia*; near it and probably placed in the same genus is the *Cancer cheirogonus*, described and figured by Dr. Tilesius, in the Mémoires de l'Académie Impériale des Sciences de St. Petersbourg (tome V. 1812. p. 347. Tab. VII. f. 1.), which species he tells us is taken abundantly in Kamschatka, at Arvatchsa, in a bay which derives its name from the abundance of the Crabs: the sailors of the Niva eagerly sought after the species, finding it to be very delicious as food.

1. TELMESSUS SERRATUS, *White*. Tab. III.

Superficie obsita parvis verrucis nonnunquam seriatim dispositis, setis e fronte extantibus.



Surface covered with small warts, arranged in some places in lines, with hairs proceeding from the front of them.

The specimen is a male.

## 9. MAIA, *Lamarck*.

### 1. MAIA SPINIGERA, *De Haan*.

Spinis lateribus et frontalibus quartam partem longitudinis postfrontalis emetientibus, acuminatis; spinis quinque dimidio brevioribus, pone medium transversim dispositis; verrucis in spatio intermedio minutis, æqualibus.

HAB. Japoniam.

Lateral and frontal spines pointed, measuring a fourth part of the length of the post-frontal part of the carapace; five spines, half the size, arranged transversely behind the middle, with minute, equal-sized warts in the intermediate space.

HAB. Japan.

*Maja (Maja) spinigera*, De Haan, Faun. Japon. p. 93. Tab. 24. fig. 4.

## 10. DIONE, *De Haan*.

### 1. DIONE AFFINIS, *De Haan*.

Thorace granulato, et acute spinuloso; cornubus rostri ter longioribus quam latis, apice acutis; lateribus spina dimidio brevioribus armatis; digitis superioribus parte media unispinis.

HAB. Japoniam.

*Carapace* granulated and acutely spinulose, horns of the front three times as long as wide, and with the points sharp, sides armed with a spine, half as large, one spine in the middle of the upper finger of the fore-legs.

HAB. Japan.

*Maja (Dione) affinis*, De Haan, F. J. p. 94. t. 22. f. 4.

## 11. MICIPPA, *Leach*.

### 1. MICIPPA THALIA, *Herbst*.

Pedibus posterioribus thoracem postfrontalem vix superantibus; fronte ultra medium in cornua duo extrorsum versa divisâ.

HAB. Japoniam.

The hinder legs scarcely extending beyond the post-frontal thorax; front beyond the middle, divided into two horns turned outwards.

HAB. Japan.

*Pisa (Micippa) Thalia*, De Haan, F. J. p. 98. t. 23. f. 3. (mas); *Cancer Thalia*, Herbst. t. 58. f. 3.

### 2. MICIPPA PHILYRA, *Leach*.

*Thorace* tuberculis granulosis obsito: haud tamen in superficie superiore spinoso.

*Carapace* covered with granular tubercles, but not spiny on the upper surface.

HAB. Philippine Islands (Guimaras).

3. MICIPPA CRISTATA, *Leach*.

Thorace compluribus longis acutis spinis in superficie superiore.

HAB. Insulas Philippinas (Siquijor, Zebu.) Javam.

*Carapace* bristling on the upper surface, with a great number of long, sharp spines.

HAB. Philippine Islands (Siquijor, Zebu). Java.

*Micippa cristata*, Leach, Zool. Misc. vol. 3. t. 128. Edw. Crust. vol. 1. p. 330. Cuv. R. Anim. (Croch) t. 31. f. 2.

*Cancer cristatus*, Linn. Syst. Nat. vol. 2. p. 1047. t. 44.

*Cancer bilobus*, Herbst. vol. 1. p. 245. t. 18. f. 98. Rumph. t. 8. f. 1.

4. MICIPPA BICARINATA, *Adams & White*.

Thorace flaveolo, rubro intersperso. Fronte duabus longitudinalibus carinis, tuberculis, ex quibus complures setae oriuntur. Pedibus depressis.

HAB. Insulas Philippinas (Zebu, Luzon).

*Carapace* pale-yellow, sprinkled with red; front with two longitudinal keels, bearing tubercles, from which spring many hairs; legs depressed.

HAB. Philippine Islands (Zebu, Luzon); Adams and Cuming.

12. SCHIZOPHRYS, *Adams & White*.

Thorax ovalis, depressus, postice paululum attenuatus. Rostrum profunde incisum; superiore canthorum parte alte incisâ, valido dente in mediâ incisione; inferiore canthorum parte appendice elongato intus, duobus dentibus ad extremitatem. Chelæ reliquis pedibus breviores; digiti sine dentibus. Cauda maris septem articulis; latera fere parallela.

*Carapace* oval, depressed, somewhat attenuated behind; beak deeply cloven, upper part of orbit deeply cloven with a strong tooth in the middle of the cleft; under part of orbit with an elongated appendage on the inside, with two teeth at the end. Fore-legs shortest; fingers without teeth. Tail of male with seven joints, the sides nearly parallel.

1. SCHIZOPHRYS SERRATUS, *Adams & White*.

Duo articula basalia chelarum minutis acuminatis tuberculis; latera thoracis sex validioribus dentibus, exteriore canthorum dente adnumerato; duobus validis dentibus frontalibus, denticulo in utroque dente, ad exteriorem basis partem. (Mas.)

HAB. Mauritium.

The two basal joints of fore-legs with numerous pointed tubercles; sides of carapace with six rather strong teeth, including outer tooth of orbit; two strong teeth of front, with a tooth on each at the outside. (Male.)

HAB. Mauritius.

2. SCHIZOPHRYS SPINIGER, *Adams & White*.

Articulis basalibus chelarum lævibus; in quoque thoracis latere octo dentibus; secundo et tertio a canthis ad basin conjunctis; postice, in medio, duobus parvis dentibus simul dispositis. *Thorax* supra compluribus minutis tuberculis, inter quæ sunt undeviginti paullo majora, plerumque transverse disposita. Thorax flavus est, hic illic rubro tinctus.

HAB. Insulas Philippinas. Siquijor, Ins. Bohol; Cuming.

Basal joints of fore-legs smooth, sides of carapace with eight teeth on each, the second and third from the orbit united at the base; behind in the middle, close to each other, are two small teeth. Carapace above with numerous minute tubercles, amongst which are nineteen of larger size, arranged mostly transversely; carapace yellow, tinged here and there with red.

HAB. Philippine Islands, Siquijor, Island of Bohol; Cuming. Coll. Brit. Museum.

13. PERICERA, *Latreille*.1. PERICERA TIARATA, *Adams & White*.

*Frontis* cornibus styliformibus, gracilibus, sine spinis, parallelis, ad apices paululum divergentibus, fimbriatis, ut antennæ exteriores, ad utrumque latus rigidis curvatis setis; spinâ robustissimâ ante, alterâ post canthos.

Lateribus et superiore superficie thoracis obsitis tuberculis conicis, obtusis, diversâ magnitudine, cum minoribus, depressioribus, verrucosiformibus tuberculis mixtis; superficie tamen non granulatâ; unâ eminentiore spinâ ad latera in parte posteriore, inter quas tiara e magnis rotundatis tuberculis conficta extenditur. In parte posteriore valido intermedio tuberculo, et duobus lateralibus, infra quæ series est quinque minorum tuberculorum. Superficie thoracis inter tuberculos sparsis lanosis setis.

Pedibus in superiore superficie lævibus, lateribus tuberculatis et fimbriatis longis, densis, furvis, lanosis setis.

Horns of the front styliform, slender, not armed with spines, parallel, slightly diverging at their points, and fringed, as well as the external antennæ, on each side, with stiff curved hairs; a very strong spine before, and another after, the orbits.

Sides and upper surface of carapace covered with conical, obtuse tubercles, varying in size, mixed with smaller, flatter, wart-like tubercles, but the surface is not granulated; one rather prominent spine on each side, on the hinder part, between which extends a tiara of large rounded tubercles; at the posterior part a strong central, and two lateral tubercles, with a row of five smaller tubercles beneath them. Surface of carapace, between the tubercles, with scattered woolly hairs.

Legs smooth on the upper surface, with the sides tuberculated and fringed with long, thick, reddish-brown, woolly hair.

HAB. Philippine Islands; Cuming.

2. PERICERA SETIGERA, *Adams & White*.

Cornibus frontis styliformibus parallelis, et per totam longitudinem contiguous; rigidis, curvatis, setis ciliatis, neque tamen spinigeris vel ad fines divergentibus.

Thoracis superiore superficie compluribus rotundatis tuberculis obsitâ; cristâ setarum in cujusque medio; totâ superficie et tuberculorum et spatiorum intermediorum minutim granulatâ; tribus tuberculis eâdem magnitudine in parte posteriore, et duobus infra ea minoribus.



Pedibus minutim granulosis præcipue in superficiebus superiore et exteriore, secundis ceteris longioribus. Unguibus minutim denticulatis, longis tenuibus setis inter denticulationes quæ paullo curvatæ et spiniformes sunt.

HAB. Insulas Philippinas.

Horns of the front styliform, parallel, and contiguous throughout their length, ciliated with stiff curved hairs, but not spinigerous nor diverging at their ends.

Upper surface of carapace covered with numerous rounded tubercles, each with a tuft of hairs proceeding from its centre; the entire surface, both of the tubercles and the spaces between them, very finely granulated; three equal-sized tubercles on the hinder part with two smaller ones beneath them.

Legs minutely granulose, more particularly on their upper and outer surface; the second pair longer than the others. Claws finely denticulated, with long, slender hairs between the denticulations, which latter are slightly curved and spiniform.

HAB. Philippine Islands.

### 3. PERICERA CORNIGERA, *Edwards*.

Cornibus rostri styliformibus, parallelis, et per totam longitudinem contiguous.

HAB. Insulas Philippinas.

Horns of the rostrum styliform, parallel, and contiguous throughout their length.

HAB. Philippine Islands; Cuming.

*Pericera cornigera*, Edw. Crust. 1. 335; *Pisa cornigera*, Latr. Enc. Méth. 10. 141.

## 14. MENÆTHIUS, *Edwards*.

### 1. MENÆTHIUS SUBSERRATUS, *Adams & White*. Tab. IV. Fig. 1, 2.

*Thorace* trapæziformi angulo anteriore in tres spinas ex eadem planitie surgentes divisio, angulo posteriore truncato; superficie superiore compluribus prominentibus tuberculis obsitâ, lateribus validâ, breviusculâ spinâ, quatuor obtusis, depressis dentibus ante spinam, sinu inter duos anteriores et duos posteriores dentes.

*Fronte* spinâ angustâ, longâ, inclinatâ, paullo bilobatâ ad finem, et setis curvatis utroque latere fimbriatâ.

*Chelis* brachio cylindrico, paucis tuberculis in superficie superiore et exteriore ad basin; carpo gibboso; manu compressâ, lævi, supra et infra obtusâ; digitis hiantibus, inferiore curvato, dentibus ad unum finem dense dispositis, nullis tamen ad basin; superiore compluribus dentibus ad finem, dente magno et crasso ad basin, et alto inter eos sinu; brachio pedum posteriorum duobus tuberculis in superficie superiore ad basin; secundo pedum pari ceteris longiore.

HAB. Insulas Philippinas.

*Carapace* diamond-shaped, with the front-angle divided into three spines, arising from the same plane, and with the hind angle truncated; upper surface covered with numerous, raised, prominent tubercles; side-margins with a rather short, strong spine, with four blunt, flattened teeth before it, and a sinus between the two front ones and the two hinder ones.

*Front* with a narrow spine, long, bent down, slightly bilobate at the end, and fringed on each side with curved setæ.

*Fore-legs* with the third joint cylindrical, with a few tubercles on the upper and outer surface near the base; fourth joint gibbose, fifth joint compressed, smooth, obtuse above and

below, fingers gaping, the lower one curved, with closely-set teeth at one end, but without teeth at the base; upper one with several teeth at the end, a large, thick tooth near the base, and a deep sinus between them; third joint of the hind-legs with two tubercles on the upper surface near the base; second pair of legs longer than the others.

HAB. Philippine Islands.

In this species the sides are armed with four broad, rounded teeth placed before the lateral spine, while in *M. porcellus* there is but one tooth anterior to the spine, and in *M. tuberculatus* there are two large, prominent teeth; the carapace is more elongated in the males than in *M. porcellus* or *M. tuberculatus*, the frontal spine is much longer, and the tubercles on the back are smaller and less rounded. The young female of this species appears to be the *M. diadema*, Leach, MSS., where the carapace is subtetragonal, nearly as wide as long, strongly embossed with numerous tubercles of different sizes, and with the frontal spine short compared with the male and adult females.

### 2. MENÆTHIUS PORCELLUS, *Adams & White.*

*Thorace* trigonali, longiore quam latiore, antice producto, postice rotundato; parte superiore compluribus, magnis, rotundatis tuberculis obsitâ; lateris margine unâ, validâ spinâ, magno, obtuso, conspicuo dente ante spinam; lateribus post canthos angustatis.

*Fronte* tribus dentibus ex eâdem planitie surgentibus; medio admodum elongato, acuminato, ad finem inclinato, longitudine fere tertiâ parte thoracis, setis curvatis ad utrumque latus ciliato, velut in *Hueniâ*; spinis lateralibus admodum validis et acutis, ad utrumque latus prorsum directis; basi pedum duobus vel tribus tuberculis in latere exteriori; secundo pari ceteris longiore.

HAB. Mauritium.

*Carapace* trigonal, longer than wide, produced anteriorly, rounded behind, upper part very irregular, and covered with numerous large, rounded tubercles; side-margin with one strong spine, with a large, blunt, conspicuous tooth before it; sides narrowed behind the orbits.

*Front* with three teeth arising from the same plane, the middle one very much elongated, pointed, bent down at the end, about a third the length of the carapace, ciliated on both sides with curved setæ, as in *Huenia*; the lateral spines very strong and sharp, directed forwards on either side, base of legs with two or three tubercles on the outer side, second pair longer than the others.

HAB. Mauritius.

The existence of a single well-formed, strong tooth, situated anterior to the lateral spine, serves to characterize this species.

### 3. MENÆTHIUS TUBERCULATUS, *Adams & White.*

*Thorace* subtrigonalis; lateribus duobus, depressis, angularibus dentibus ante spinam lateralem, quæ obtusa est. Regione cardiacâ et ventriculari duobus antice tuberculis, uno ad utrumque latus lineæ mediæ; cristâ verticali tuberculo minuto, altero post admodum prominente et rotundato, et tertio post alterum paullo minore; posteriore thoracis margine duobus, erectis, angularibus dentibus.

*Fronte* tribus spinis ex eâdem planitie surgentibus; mediâ longâ, gracili, inclinatâ atque in medio sulcatâ; spinis lateralibus altioribus validis, triangularibus, duobus inter eas parvis tuberculis.

HAB. Mauritium.

*Carapace* subtrigonal, sides with two large, flattened, angular teeth before the lateral spine, which is obtuse; cardiac and ventricular region with two tubercles anteriorly, one on each side of the middle line; a vertical crest with a minute tubercle; and behind that, a very prominent, rounded tubercle, with another, rather smaller, behind it; posterior edge of carapace with two erect angular teeth.

*Front* with three spines arising from the same plane, the middle one long, slender, bent down, and grooved in the middle; lateral spines rather elevated, strong, triangular, with two small tubercles between them.

HAB. Mauritius.

*M. tuberculatus*, Leach, MSS.

4. MENÆTHIUS INCISUS, *De Haan*.

Fronte bicornutâ, cornibus divergentibus acutis; regionibus ventriculi et cordis medio acute unispinosi; lateribus ante medium in laciniam truncatam dilatatis.

HAB. Japoniam.

Front with two horns; horns sharp, diverging, a single sharp spine in the ventricular and cardiac regions, the sides anteriorly dilated into a truncated border.

HAB. Japan.

*Pisa (Menæthius) incisus*, De Haan, F. J. p. 98. t. 24. f. 3. (femina).

5. MENÆTHIUS QUADRIDENS, *De Haan*.

Fronte bicornutâ, cornibus divergentibus acutis; regionibus ventriculi et cordis convexis; thoracis lateribus bispinosi, spinis anterioribus ab spinulis canthorum posticis sinu separatis.

HAB. Japoniam.

Front with two horns: horns sharp, diverging, ventricular and cardiac regions convex; sides of the carapace with two spines, the anterior spines separated from the posterior spines of the orbits by a sinus.

HAB. Japan.

*Pisa (Menæthius) quadridens*, De Haan, F. J. p. 97. t. 24. f. 2. (mas.)

15. HUENIA, *De Haan*.

1. HUENIA FRONTALIS, *Adams & White*. Tab. IV. Fig. 3.

*Thorace* æque lato atque longo, subquadrilaterali, lævi, sine tuberculis in mediâ lineâ, producto et postice rotundato; lateribus acutis, uno lato lobo, postice paululum emarginato, horizontaliter undulato, antice arcuato, in medio depresso et postice elevato.

*Fronte* latissimâ, lateraliter dilatâtâ, obtusâ et antice rotundâtâ, admodum depressâ, supra planâ et infra in mediâ lineâ alte sulcatâ.

*Chelis* minimis, thoracem fere longitudine adæquantibus, pedibus posterioribus non crassioribus; brachio trigonali, apice in parte superiore validâ conicâ spinâ et postice duabus minoribus, verticalibus, conicis spinis in carinâ; carpo supra carinato, spinâ tuberculari in superficie superiore et minore; manu supra carinatâ; carinâ unâ in medio spinâ et infra in valido angulari dente desinente; tertio et quarto paribus



pedum ceteris brevioribus; unguibus paululum curvatis, subelongatis, infra minutim serratis et inter serrationes setis circumdati.

*Carapace* as broad as long, subquadrilateral, smooth, without tubercles in the middle line, and produced and rounded posteriorly; sides acute, with a single broad lobe, slightly emarginated posteriorly, horizontally undulated, arched anteriorly, depressed in the middle and raised behind.

*Front* very wide, laterally dilated, obtuse and rounded anteriorly, considerably depressed, plane above, and inferiorly deeply channelled in the middle line.

*Fore-legs* very small, about the length of the carapace, not thicker than the posterior pairs, third joint trigonal, the end, on the upper part, with a strong conical spine, and posteriorly, two smaller, vertical, conical spines on the keel, fourth joint keeled above, with a tubercular spine on the upper and inner surface; fifth joint keeled above; claws slightly gaping, the upper one with a single spine a little behind the middle.

Second pair of legs longer than the others, third joint trigonal, carinated above, with a single, strong, compressed spine at the end, and two smaller ones posteriorly, fourth joint winged above, carinated externally, and rounded below; fifth joint very much compressed, carinated above, keel with a single spine in the middle, and ending below in a strong, angular tooth; third and fourth pairs of legs shorter than the others; claws slightly curved, rather elongated, finely serrated below, and beset with hairs among the serrations.

In the peculiar and characteristic form of the front and carapace, this species differs in a very remarkable manner from those varieties of *Huenia proteus*, which are named var. *elongata*, *heraldica*, and *tenuipes*. The locality of the specimen described above, which is in the collection of Crustacea in the British Museum, is unknown, but as all the others are natives of the Eastern Seas, the present species is most likely from the same part of the globe. The description is from a female.

2. HUENIA PROTEUS, *De Haan*. Tab. IV. Fig. 4-7.

Frontis margine inferiore acuto, pedibus posterioribus margine anteriore valde carinatis.

a. *Mas.* Thorace elongato, lateribus uni- vel bi-laciniato; fronte valde productâ; thorace longiore. (Var. *elongata*.)

b. *Fem.* Thorace dilatato, lateribus bi-laciniato; fronte dimidium thoracem vix superante. (Var. *heraldica*.)

c. Anteriore margine pedum posteriorum paululum carinato; thorace subelongato; chelis gracilibus; inferiore margine frontis non tam producto quam in reliquis varietatibus. (Var. *tenuipes*.)

HAB. Maria Orientalia.

Lower edge of front sharp, posterior legs with the anterior margin strongly carinated.

a. *Male.* Thorax elongated, sides with one or two lobes; front greatly produced, carapace rather long. (Var. *elongata*.)

b. *Female.* Carapace dilated, sides with dilated lobes, front scarcely extending beyond half the length of the carapace. (Var. *heraldica*.)

c. Anterior margin of hinder legs but slightly keeled; carapace rather elongated; forelegs slender; inferior margin of front not so much produced as in the other varieties. (Var. *tenuipes*.)

HAB. Eastern Seas; Mindanao, China, Japan.

*Maja* (*Huenia*) *Proteus*, De Haan, Faun. Japon. p. 95. t. 23. f. 4-5 mas. (*elongata*) f. 6. a, b, femina (*heraldica*.)

M. De Haan appears to have had considerable difficulty in defining the varieties of this curious species, nor are we able to do more than add another variety to the two already indicated. Whether at any time these varieties will be elevated to the rank of species, on the discovery of a more extensive suite of specimens of different sexes and ages, remains for future observers; and, in the meantime, we furnish a more extended description of the variety we have named *tenuipes*.

3. HUENIA PROTEUS, *De Haan*. Var. *tenuipes*. Tab. IV. Fig. 5.

*Thorace* longiore quam latiore, oblongo, trigonali, superficie superiore depressâ et lævi, duobus tuberculis in mediâ lineâ paululum inter se distantibus; lateribus duobus compressis lamellaribus lobis; anteriore antice rotundato, posterioribus ad margines liberos truncatis.

*Fronte* valde elongatâ, thoracem longitudine fere adæquante, ad latera ciliatâ rigidis incurvatis setis; lamellâ inferiore non tam deorsum productâ quam in *H. proteo*; canthis productis in validam spinam ad utrumque latus frontis antice directam.

*Chelis* gracilibus, thoracem longitudine fere adæquantibus, secundo pari paulo crassioribus; brachio subtrigonalî, uno tantum parvo tuberculo in superficie superiore, duobus in inferiore; spinâ ad finem partis superioris parvâ; in *H. proteo* autem duo sunt tuberculi supra et tria infra; et spina supra ad apicem pervalida et maxima est; carpo supra obtuso; manu in superficie superiore carinatâ; unguibus denticulatis; secundo pari pedum thoracem longitudine superante; brachio cylindrico nullâ ad finem spinâ; carpo paululum compresso; manu dilatâtâ infra in spinam validam ad apicem positam, cristâ setarum adornatam; unguibus longis, marginibus inferioribus minutim denticulatis, setis intermediis; brachio quinti paris unâ spinâ in mediâ anteriore parte.

*Abdomine* quinque articulis; quarto valde convexo in medio longitudinaliter impresso; primo et secundo rotundato in medio tuberculo. Femina adulta.

HAB. Maria Orientalia.

*Carapace* longer than wide, oblong, trigonal, upper surface flat and smooth, with two tubercles in the median line a little distance apart; sides with two compressed lamellar lobes, the front lobes rounded anteriorly, the hinder lobes truncated at their free edges.

*Front* very much elongated, nearly as long as the carapace; ciliated at the sides with stiff, incurved hairs, inferior lamella not so much produced downwards as in *H. proteus*; orbits produced into a strong spine on each side of the front, directed forwards.

*Fore-legs* slender, nearly as long as the carapace, rather thicker than the second pair, third joint less trigonal, with but one slight tubercle on the upper surface, and but two tubercles on the under surface, the spine at the end of the upper part very small, whereas in *H. proteus* there are two tubercles above and three below, and the spine at the apex above is



very strong and large; the fourth joint obtuse, superiorly; the fifth joint carinated on the upper surface. Claws denticulated. Second pair of legs longer than the carapace, the third joint cylindrical, without a spine at the end; the fourth joint slightly compressed; the fifth joint dilated below into a strong spine situated near the apex, surmounted by a tuft of hairs; third and fourth pairs of legs with the third joint slightly keeled, with two spines in the middle, the fourth joint carinated: the fifth with a slight tooth tufted with hair; claws long, with the lower edges finely denticulated, and having intermediate setæ; the third joint of the fifth pair with one spine in the middle of the fore-part.

*Abdomen* five-jointed, the fourth joint very convex, impressed longitudinally in the middle; the first and second joints with a rounded tubercle in the middle. Adult female.

HAB. Eastern Seas, Island of Mindoro.

## 17. HALIMUS, *Latr.*

### 1. HALIMUS AURITUS, *Edwards.*

Nullâ spinâ in margine posteriore thoracis, neque in regione ventriculari.

HAB. Oceanum Indicum.

No spine on the posterior border of the carapace, nor on the ventricular region.

HAB. Indian Ocean.

*Halimus auritus*, Edw. Crust. 1. 341; Cuv. R. Anim. (Croch.) t. 28. f. 3; *Pisa aurita*, Latr. Enc. Méth. 10. 140.

## 18. ZEBRIDA, *Adams & White.*

*Thorax* depressus, æque longus atque latus.

*Frons* horizontalis, paululum declinata, conficta ex duabus spinis depressis, conicalibus, antice directis ad apices paululum divergentibus; canthis circularibus; pedunculo oculorum permagno et crasso, latiore ab latere ad latus quam de supra deorsum; corneâ oculorum ultra anteriorem frontis marginem protendente, fere complente canthorum hiatus, quorum margines superiores salientes sunt; marginibus thoracis latero-anterioribus uno, valido, depresso processu armatis, conicalibus, acutis, ad basin latis, aciebus exterioribus paululum elevatis, cacuminibus prorsum curvatis; primo articulo antennarum exteriorum permagno, longo, cylindrico, antennis rostro tectis; epistomate ei *Acanthonycis* simillimo.

*Chelæ* breviores iis *Acanthonycis*, spinis depressis, conicalibus, subobtusis armatæ; brachio triangulari, spinâ conicali exteriori et interiori; exteriori perlongâ, sursum et prorsum directâ; carpo tribus spinis armato; unâ superiore, posteriore prorsum directâ; duabus anterioribus lateralibus extrorsum directis, ad extremitates rotundatis; manu spinâ acutâ, depressâ cristatâ.

*Pedes posteriores* breves, crassi, admodum compressi; tertio articulo duabus magnis, depressis, conicis spinis in fronte, prorsum directis; quarto articulo uno depresso, spinoso processu in parte anteriore; quinto articulo ampliâ et postice instructo spinâ acutâ, depressâ, curvatâ, retrorsum directâ.

*Carapace* flattened, about as broad as long. Front horizontal, slightly bent down, formed of two flattened spines, conical, directed forwards, and slightly diverging at their tips. The orbits circular; the peduncle of the eyes very large and thick, broader from side to side



than from above downwards; the cornea of the eyes projecting beyond the outer margin of the front, nearly filling up the orbital cavities, the upper margins of which are salient. The latero-anterior borders of the carapace armed with a single, strong, flattened process; conical, trenchant, broad at the base, the outer edge slightly elevated, with the point curving forwards. The first joint of the external antennæ very large, long, and cylindrical, antennæ covered by the rostrum. Epistome very nearly similar to that of *Acanthonyx*. The chelæ, shorter than in that genus, are armed with flattened, conical, slightly obtuse spines. The second joint triangular, with an external and internal conical spine, the external very long, and directed upwards and forwards; the third joint armed with three spines; one superior-posterior, and directed forwards; two anterior-lateral, directed outwards and rounded at their extremities; the fourth joint crested with a sharp, flattened spine. The legs short, thick, very much compressed; the third joint with two large, flattened conical spines on the front, directed forwards; the fourth joint with but one flat, spinous process on its anterior part; the fifth joint enlarged and furnished posteriorly with a sharp, flat, curved spine, directed backwards.

This beautiful genus is very apathetic when alive; in that respect resembling *Lambrus*. In the system it is not far removed from *Acanthonyx* and *Huonia*. The description is from a female.

1. ZEBRIDA ADAMSII, *White*. Tab. VII. Fig. 1.

Colore subearneolo, fasciis rufo-fuscis; lineâ intermediâ antice bifurcatâ, deinde in basin interiore cornuum rostri obsoletâ, postice ad ultimum abdominis articulum pertinente, lineâ utrinque tenui duplici paululum undulatâ; duabus latis lineis pertinentibus ab apice spinarum rostri, in ultimo abdominis segmento concurrentibus, in medio thorace angustatis; lineâ extra tenui, duplici; extra hanc lineam fasciâ latâ, paululum curvatâ, ad postero-exteriorem thoracis angulum subito desinente; latiore fasciâ rufo-fuscâ ad basin spinarum antero-lateralium. Duabus latis, rubro-fuscis fasciis in omnibus pedum articulis, subdiagonaliter trans articulum directis; unâ latâ fasciâ eodem colore in quarto et quinto articulis. Superficie inferiore colore paullo intensiore. Exteriore parte abdominis segmentorum puncto circulari subnigro. Totâ animalis superficie lævi, sine setis, durâ, politâ et porcellanâ; oculis nigris.

HAB. Borneo.

In colour this species is of a light, delicate pink, with dark liver-coloured markings. There is a central line bifurcated anteriorly, where it is lost on the inner bases of the horns of the rostrum, reaching posteriorly to the last joint of the abdomen, and having external to it a fine, double, somewhat waved line; extending from the apex of the rostral spines, and meeting at the last abdominal segment, are two broad lines, narrowed in the middle of the carapace; external to these is a fine double line, and on the outside of this is a broad, somewhat curved stripe, ending abruptly at the postero-external angle of the carapace; and at the base of the antero-lateral spines is another rather broad linear mark of the same dark liver-colour. The third joint of all the legs has two broad, dark, red-brown bands, directed somewhat diagonally across the joint; the fourth and fifth joints have one broad mark of the same colour. The under surface is of a somewhat darker colour. On the outer part of the

abdominal segments is a round, dark spot. The entire surface of the animal is smooth, hairless, hard, polished, and porcellanous. Eyes black.

HAB. Borneo.

*Zebrida Adamsii*, White. Pro. Zool. Soc., 1847.

A very distinct variety, from about twelve fathoms, in the Sooloo Seas, had the carapace of a light green, with deep, red-brown stripes, and the legs and chelæ of a pearly semi-opaque white, very distinctly banded with deep red-brown.

The specimen from which the foregoing description is taken, was dredged from a sandy bottom, at about six fathoms water, near the mouth of the Pantai river, on the coast of Borneo. The description, it ought to have been remarked, was from a living specimen; but even the dried individual in the Museum collection is very distinctly marked.

### III. PARTHENOPIDÆ.

In the family of *Parthenopidæ*, the results of the Expedition furnish us with forms highly interesting to the Crustaceologist, including two new genera and ten new species. The genus *Cryptopodia* has been strengthened and confirmed by the discovery of a new and well-marked species, and several peculiar forms of *Parthenope* and *Lambrus* are here for the first time indicated. In their habits, the members of this group are feeble and inactive, feigning death when captured, and living generally in deep water, seeming to prefer a stony or gravelly bottom; some specimens of *Parthenope* were obtained by the dredge on the coast of Borneo, in thirty fathoms water, from a clear sandy floor; and the sandy mud of the China Sea, in many parts, abounds in *Lambri*.

#### 1. LAMBRUS, *Leach*.

##### 1. LAMBRUS HARPAX, *Adams & White*. Tab. VI. Fig. 3.

*Thorace* subtrigonalis, lævi, in fronte rotundato, in medio carinato, carinatâ tribus rotundatis tuberculis armatâ, antice furcatâ, intervallum depressum triangulare exhibente, marginibus lateralibus valde crenatis, crenationibus depressis et rotundatis; angulis latero-posterioribus in depresso, triangulâ, subobtusâ, spinosâ, processu desinentibus; posteriore thoracis parte validâ spinâ retrorsum et extrorsum directâ, paululum tuberculiferâ, et validâ carinâ in posteriore parte regionis branchialis continuatâ; alterâ minore spinâ, propius mediam lineam positâ, valde carinatâ, spatio depresso inter se spinamque priorem; tribus parvis tuberculis in lineâ intermediâ, unâ centrali, et unâ ad utrumque latus.

*Fronte* paululum productâ, antice rotundatâ, margine paululum denticulatâ.

*Chelis* vix duplici longitudine thoracis; brachio et carpo, marginibus tuberculis rotundatis armatis; manu lævi, superiore angulari margine tuberculiferâ.

HAB. Oram Brunensem, (Mare Sinense.)

*Carapace* subtrigonal, smooth, rounded in front, carinated in the middle, the keel armed



with three rounded tubercles, and forked anteriorly, leaving a depressed, triangular interval; lateral edges rather conspicuously crenated, the crenations flattened and rounded; latero-posterior angles ending in a flattened, triangular, rather obtuse, spiny process; hind part of carapace with a strong spine, directed backwards and outwards, slightly tuberculiferous, and continued in a strong ridge upon the posterior portion of the branchial region; another smaller spine, situated nearer the middle line, likewise strongly carinated, leaving a depressed space between it and the former spine; three small tubercles in the median line, one central, and one on each side.

*Front* but little produced, rounded anteriorly, with the margin slightly denticulated.

*Fore-legs* about twice the length of the carapace, third and fourth joints with the edges armed with rounded tubercles; fifth joint smooth, with the upper angular edge tuberculiferous.

HAB. China Sea; coast of Borneo.

In the living state, this singular species is of an olive-green colour, with the fore-legs of a light pinkish-brown, and the under surface of a slate colour.

2. LAMBRUS LAMELLIFRONS, *Adams & White*. (Tab. V. Fig. 1.)

*Thorace* longiore quam latiore, tribus majusculis tuberculis in parte posteriore superficiei superioris; unâ in medio et unâ ad utrumque latus; lateribus thoracis in medio crenatis; latitudine thoracis  $4\frac{1}{2}$  lin., longitudine  $5\frac{3}{4}$  lin.

*Chelis* longissimis.

HAB. Insulas Philippinas.

*Carapace* longer than wide, with three rather large protuberances on the hinder part of the upper surface, one in the middle, and one on each side; sides of carapace, about the middle, crenated. Breadth of carapace four lines and a half; length five lines and three quarters.

*Fore-legs* very long.

HAB. Philippine Islands.

3. LAMBRUS TURRIGER, *Adams & White*. (Tab. V. Fig. 2.)

*Thorace* longiore quam latiore pentagono paululum producto, in fronte acuminato. Superficie superiore quatuor spinis elevatis, crassulis et ad extremitates obtusis; primâ inter anteriorem et posteriorem partem thoracis, sursum et paululum retrorsum directâ; alterâ post multo longiore; tertiâ ad utrumque latus alterius in posteriore thoracis margine; in medio duabus spinis retrorsum et paululum sursum directis; primâ et alterâ spinis anterioribus sublongis; tertiâ in medio thorace longâ, verticali, et subacuminatâ; spinis in elevato tuberculo regionis branchialis positâ, longis, crassis, erectis et paululum extrorsum retrorsumque directis; totâ superficiei thoracis obtusis subconicis tuberculis obsitâ. Latitudine thoracis vix 4 linearum; longitudine vix  $4\frac{1}{2}$  linearum.

*Fronte* parvâ, valde depressâ, breviusculâ, subobtusâ; in medio profunde concavâ, parvo dente ad utrumque latus.

*Chelis* longissimis pro magnitudine corporis, tuberculis verrucosis, lævibus, ad latera rotundatis, in cristis angularibus spinosioribus.

*Pedibus posterioribus* gracillimis, lævibus, supra et infra rotundatis, unguibus longis, tenuibus, paululum depressis et acutissimis.

HAB. Insulas Philippinas.



*Carapace* longer than wide, five-sided, rather produced and acuminate in front. Upper surface with four elevated spines, rather thickened and blunt at the ends, the first about midway between the fore and hind part of carapace, directed upwards and slightly backwards; behind it, another spine much longer, and one on each side of this, on the hind margin of carapace; in the middle, two spines directed backwards and slightly upwards; the first and second spines from before backwards, moderate in length; the third placed in the centre of the carapace, long, vertical, and rather sharp-pointed; the spines situated in the raised prominent tuberosity of the branchial region, long, stout, erect, and directed a little outwards and backwards; entire surface of the carapace covered with blunt, subconical tubercles. Breadth of carapace about four lines; length about four lines and a half.

*Front* small, depressed very considerably, rather short, somewhat obtuse, deeply concave in the middle, with a slight tooth on each side.

*Fore-legs* very long in comparison with the size of the body, verrucose or covered with warty tubercles, which latter are smooth, rounded on the sides, and more spinous on the angular crests.

*Hind-legs* very slender and smooth, rounded above and below, with the claws long, fine, slightly flattened, and very sharp.

HAB. Philippine Islands.

This species comes very near *Lambrus lamellifrons* (Adams & White), but the legs are smooth, and not spiny like those of the latter, which, moreover, has tubercles on the carapace, instead of long, erect spines.

#### 4. LAMBRUS CARINATUS, *Milne-Edwards*. (Tab. V. Fig. 3.)

Latero-posterioribus marginibus thoracis ad utrumque latus duobus parvis dentibus armatis et validissimo triangulari dente quo margo latero-anterior desinit. Superiore superficie chelarum lævi et marginatâ dentibus nullum inter se intervallum habentibus.

*Thorace* admodum inæquali, ad regiones branchiales carinato, et tribus dentibus cristæ formâ in lineâ intermediâ armato.

*Fronte* magnâ, triangulari, non denticulatâ; latero-anterioribus marginibus minutim denticulatis; brachio quatuor posteriorum pedum spinoso.

Longitudine 8 linearum.

HAB. Oram Brunensem, (Mare Sinense.)

Latero-posterior edges of the carapace armed on each side with two small teeth, and with a very strong triangular tooth, similar to that which terminates the latero-anterior edge. Upper surface of the fore-legs smooth, and bordered by close-set teeth. Carapace very unequal, carinated on the branchial regions, and armed with three teeth in the form of a crest in the median line; front large, triangular, and not denticulated, latero-anterior margins finely denticulated. Third joint of the four hind pairs of legs spiny. Length eight lines.

HAB. Coast of Borneo; China Sea.

*Lambrus carinatus*, Edw. Crust. 1. 358.

5. LAMBRUS PISOIDES, *Adams & White*. (Tab. V. Fig. 4.)

*Thorace* æque longo ac lato, triangulari, marginibus lateralibus spinis depressis, rotundatis, tuberculiformibus armatis; mediâ et branchiali regionibus valde eminentibus et convexis; regione branchiali productâ ad utrumque latus in longam, validam, acuminatam spinam retrorsum et extrorsum directam, et paululum prorsum inclinatam; totâ superficie thoracis obsitâ depressis, lævibus circularibus, verrucosiformibus tuberculis, aliis alios magnitudine longe superantibus; serie elevatorum tuberculorum in posteriore parte longitudinalis lateralis sulci, medium a branchiali regione dividens, carinam efficientis elevatam desinentem in spinam subobtusam, brevem, retrorsum, extrorsum, et paululum deorsum directam.

*Fronte* acutâ, productiore, utrinque dentatâ, angustiore, profunde sulcatâ in medio, in spinam valde depressam triangularem desinente.

*Chelis* longissimis pro magnitudine thoracis, pari longitudine et crassitudine; brachio lævibus, depressis tuberculis supra obsito; marginibus antice et postice armatis compluribus longis et brevibus spinis alternatim dispositis; superficie inferiore angulo obtuso, externe lævi, interne granulatâ; carpo tuberculis verrucosis supra obsito, et externe armato tribus, validis, obtusis, recurvatis spinis; manu triangulari, in superficie superiore lævibus, rotundis tuberculis obsitâ, interne et in superficie inferiore minutim granulatâ; margine externo valde carinato, et quinque eminentibus subcurvatis spinis armato, serie parvorum, obtusorum, tuberculiformium processuum alternatim dispositâ; in superficie interiore serie parvarum, obtusarum proxime appropinquantium spinarum.

*Pedibus* posterioribus parvis, tenuibus, infirmis, lævibus marginibus superioribus obtusis; unguibus longis, acutis, depressis, villis lanosis fimbriatis; corpore et chelis subfuscis, majusculis subrubris maculis distinctis.

HAB. Insulas Philippinas.

*Carapace* about as long as wide, triangular, lateral borders armed with flattened, rounded, tubercle-shaped spines; middle and branchial regions very prominent and convex, branchial region produced, on each side, into a long, strong, and pointed spine, directed backwards and outwards, and inclined slightly upwards; entire surface of carapace covered with flattened, smooth, circular, wart-like tubercles, varying in size, some being considerably larger than others; a row of elevated tubercles on the posterior portion of the longitudinal lateral groove which divides the middle from the branchial region, forming an elevated ridge which terminates in a somewhat obtuse, short spine, directed backwards, outwards, and a little downwards.

*Front* acute, rather produced, toothed on each side, somewhat narrowed, deeply channelled in the middle, and ending in a considerably-depressed triangular spine.

*Fore-legs* very long in proportion to the size of the carapace, and equal in length and thickness; third joint covered above with smooth, flattened tubercles, the margins before and behind armed with numerous, long and short spines arranged alternately, lower surface bluntly angled, smooth externally, granulated internally; fourth joint covered above with warty tubercles, and armed externally with three strong, obtuse, recurved spines; fifth joint triangular, covered with smooth, round tubercles on the upper surface, finely granulated internally, and on the under surface, with the external margin strongly keeled and armed with five prominent, slightly-curved spines, finely denticulated on their edges, and alternating with a row of small, blunt tubercle-shaped processes; on the inner surface a row of small, blunt, closely-approximated spines.



*Hind-legs* small, thin, feeble, smooth, the upper edges obtuse; claws long, sharp, flattened, and fringed with woolly hair. The body and fore-legs of a light brown colour, marked with rather large, faint-red blotches.

HAB. Philippine Islands.

This species is very closely allied to *Parthenope (Lambrus) diacantha*, De Haan (F. J. Tab. xxiii. Fig. 1.), but it differs from that crustacean in the greater comparative length of the fore-legs; in the fifth joint having intermediate small spines between the five larger ones, which latter, moreover, are different in form; and in having but two spines on either side, extending from the postero-lateral margins of the carapace, whereas in *Parthenope (Lambrus) diacantha*, there are three on either side.

The *Lambri* are extremely sluggish in their movements, relying for safety not in muscular force, but in the disguised nature of their bodies, which, owing to their similarity to the gravelly floor on which they are generally found, must afford a protection from their enemies. Many species appear, indeed, at first sight to be made up of a conglomerated mass of small stones and sand. The *Lambri* are very numerous throughout the China Sea, where they live in about twelve or twenty fathoms, upon the submerged beds of broken shells and muddy gravel which constitute the floor of that sea.

#### 6. LAMBRUS LACINIATUS, De Haan.

*Thorace* multo latiore quam longo, margine laciniato, manibus carinâ externâ et mediâ 15-17 spinis, conicis validis granulatis armatis, carinâ internâ tuberculatis; fronte in spinam basi dilatam productâ, pedum posteriorum tibiis tarsisque margine superiore acuto-carinatis.

HAB. Japoniam.

*Carapace* much wider than long, the margin lacinated; fifth joint of fore-legs with the external and middle keels armed with from fifteen to seventeen strongly-granulated conical spines; internal keel tuberculated; front produced into a spine dilated at the base; fourth and fifth joints of hind legs acutely carinated on the upper margin.

HAB. Japan.

*Lambrus laciniatus*, De Haan, Faun. Japon.

#### 7. LAMBRUS VALIDUS, De Haan.

*Thorace* multo latiore quam longo, tuberculis fragiformibus echinato, margine laciniato; manibus carinâ externâ et mediâ spinis 11-12 conicis validis granulatis armatis, interiore vix tuberculatis; fronte in spinam angustam productâ; manibus carinâ mediâ tuberculis 12 armatis; pedum posteriorum tibiis tarsisque margine superiore obtusis.

HAB. Japoniam.

*Carapace* much wider than long, covered with fragiform tubercles, margin lacinated, external and middle keel of the hands armed with eleven or twelve strongly granulated conical spines, inner keel scarcely tuberculated, front produced into a narrow spine; the



middle keel of the hands armed with twelve tubercles, tibiæ and tarsi of the hinder legs obtuse on the upper edge.

HAB. Japan.

*Parthenope (Lambrus) valida*, De Haan, Faun. Japon. t. 22. f. 1. (mas.) t. 22. f. 2. (femina.)

#### 8. LAMBRUS LONGIMANUS.

Fronte externè parvâ subeminente, horizontali, tribus dentibus.

HAB. Oram Brunensem, Insulas Philippinas.

*Front* extremely small, slightly prominent, horizontal, and formed of three teeth.

HAB. Coast of Borneo, Philippine Islands.

When alive, this curious species is of a stone colour, with the under surface pinkish. Numerous specimens were dredged by us from a gravelly bottom, in about thirty-five fathoms water.

*Lambrus longimanus*, Leach, Lin. Trans. t. 12. p. 310; *Cancer longimanus*, Linn. Mus. Lud. Ulr. p. 441. Syst. Nat. 2. 1047, 42; *Lambrus pelagicus*, Rüppell, t. 4. f. 1? Rumph. pl. 8. f. 2.

#### 9. LAMBRUS DIACANTHA, *De Haan*.

Thorace trigono vix æque lato ac longo, verrucoso, postice utrinque in spinam acutam dilatato; chelis æqualibus; pedibus levissimis.

HAB. Maria Orientalia.

Minute, with a trigonal carapace hardly as long as wide, warty, dilated posteriorly on both sides into a sharp spine, fore-legs equal, hinder legs very smooth.

HAB. Eastern Seas.

*Parthenope (Lambrus) diacantha*, De Haan, Faun. Japon. t. 23. f. 1.

#### 10. LAMBRUS SERRATUS, *Edwards*.

Marginibus latero-posterioribus thoracis seric trium parvarum, æqualium spinarum armatis.

HAB. Insulas Philippinas.

Latero-posterior margins of the carapace armed with a row of three, small, equal spines.

HAB. Philippine Islands (Corregidor); Cuming.

*Lambrus serratus*, Edw. Crust. 1. 357. Seba. 3. t. 20. f. 12.

## 2. CRYPTOPODIA, *Edwards*.

### 1. CRYPTOPODIA DORSALIS, *Adams & White*. Tab. 5. Fig. 6.

*Thorace* depresso, permagno, triangulari, in medio paululum elevato, bis latiore quam longo, postice paululum sinuato; ad margines magnis rotundatis crenationibus valde distinctis; majore parte tergi parvis pustularibus elevationibus obsitâ; duobus profundis sulcis in posteriore parte thoracis, longitudinaliter dispositis, et paululum inclinatis ita ut formam lyræ exhibeant.

*Fronte* horizontali, valdè productâ, antiè rotundatâ, tribus subæutis crenationibus in utroque latere; oculis parvis, retractilibus.

*Chelis* longissimis et maximis, prismaticis, jugis angularibus, tuberculis rotundis, subobtusis, ex ordine dispositis, armatis; quatuor posteribus pedum paribus gracillimis parvis, pari longitudine, et omnino celatis sub lateralibus lamellaribus extensionibus thoracis.

*Abdomine* lævi, septem articulis, serie parvorum tuberculorum ad utrumque latus submementis intermediæ lineæ: articulo penultimo ceteris latiore.

Vivus colore turbide-carneolo, fuscis distinctionibus, et minutis nigris punctis; in utràque chelâ croceâ lineari maculâ; superficie inferiore albâ, subrubro colore in pectore. Siccatus obscuro, turbido, albo colore est.

HAB. Mare Suluense; fundo seruposo.

*Carapace* flattened, very large, triangular, slightly elevated in the middle, nearly twice as wide as long, slightly sinuated posteriorly, strongly marked round the edges with coarse, rounded crenations; the greater part of the back covered with slight pustular elevations; on the posterior part of the carapace two deep grooves, placed longitudinally, and slightly bent, so as to have a lyre-shaped form.

*Front* horizontal, much produced, rounded anteriorly, and having three rather sharp crenulations on either side, eyes small, retractile.

*Fore-legs* very long and large, prismatic in form, with the angular ridges armed with regular, round, rather blunt tubercles; the four hind pairs of legs very slender, small, equal in length, and entirely concealed beneath the lateral lamellar extension of the carapace.

*Abdomen* smooth, seven jointed, with a row of small tubercles on either side of the slightly prominent, middle line; penultimate joint wider than the rest. When alive it is of a dirty flesh-colour, with brown markings, and minute black specks; on each chela there is an orange, linear spot; the under surface is of a dead white, with a reddish tinge on the breast. In the dried state it is of a dull, dirty white.

HAB. Sooloo Sea; twenty fathoms, stony bottom.

The species of this genus resemble those of *Calappa*, in their habit of simulating death when disturbed, folding the chelæ close to the front of the carapace, and concealing their legs under the dilated sides of the carapace. They are always found in deep water, while the *Calappidæ* are observed on sandy flats, under the shelter of stones, or even sometimes buried in the sands.

In the distinct and beautiful species of the singular genus described above, the lyre-shaped grooves on the carapace at once distinguish it from the other two known species; it, however, differs from the *Cryptopodia fornicata* of Herbst, and the *C. angulata* of Edwards and Lucas, in other and minor particulars. The carapace is narrower and wider than the same part in *C. fornicata*, and the posterior edge is furnished with coarser and rounder crenations, the ridges on the chelæ have blunter tubercles; the front, moreover, is longer, more rounded in outline, and more deeply crenulated. From *C. angulata*, Edwards and Lucas, (Archives du Muséum, vol. ii. t. 28. f. 15-19,) described in 1841, it differs in the rounded form of the posterior portion of the carapace, which, in that species, is sharply angulated and spiniferous, and also in the

minute incisions, instead of crenatures, on the posterior edge of the carapace. Their species, the locality of which is unknown to Messrs. Edwards and Lucas, is probably a native of the Eastern Archipelago, and with our new *C. dorsalis* forms a very interesting addition to a genus which has been hitherto limited to but one species.

2. CRYPTOPODIA FORNICATA, Junr. *Herbst.* t. 6. f. 4.

In juniore thorax multo triangularior, ad angulos rotundior, postice directior, et superficies dorsalis pluribus pustulis obsita est, quam in animalibus adultis; chelæ etiam breviores et crassiores sunt, frons latior, rotundatior et distinctius crenulata, oculi majores, juga dorsalia eminentiora.

HAB. Mare Sinense; vadis submersis concharum mortuarum et lapidum.

Our figure represents, most probably, the young of this species; the carapace is more decidedly triangular, more rounded at the angles, straighter behind, and the dorsal surface more covered with pustules than in the adult individuals; the chelæ, moreover, are shorter and comparatively thicker, and the front is wider, more rounded and distinctly crenulated, the eyes are of comparatively greater size and the dorsal ridges more prominent.

HAB. China Sea; submerged banks of dead shells and stones.

3. GONATONOTUS, *Adams & White.*

*Thorax* pentagonalis, depressus; anguli laterales acutissimi.

*Frons* latissima, lamelliformis, dilatata, rotundata, ad fines subnictata; oculi magni, eminentes, pedunculi breves in nictu profundiore ad latus inserti; antennæ exteriores, appendice terminali elongatâ.

*Chelæ* subcrassæ; carpus rotundatus et interne spinosus; ungues in margine serrati.

*Pedes* tertii et quarti paullo longiores secundus et quintis; articuli tarsales secundi, tertii, quarti et quinti parium, æquali magnitudine et crassitudine; quinto pedum pari supra quartum inserto.

*Abdomen* femine septem articulis, tribus vel quatuor articulorum basium supra conspiciendis. Mas ignotus.

*Carapace* pentagonal, depressed; lateral angles very sharp.

*Front* very wide, lamelliform, dilated, rounded, slightly notched at the end; eyes large, prominent, peduncles short, inserted in a rather deep notch on the side. Outer antennæ with the terminal appendage elongated.

*Fore-legs* rather thick; fourth joint or wrist, rounded and spined on the inside, claws serrated on the edge.

Third and fourth pairs of legs rather longer than the second and fifth, tarsal joints of second, third, fourth and fifth pairs of equal size and thickness; fifth pair of legs inserted above the fourth pair.

*Abdomen* of female, seven-jointed, three or four of the basal joints seen from above. Male unknown.

This genus is allied to *Eumedonus*.



1. GONATONOTUS PENTAGONUS, *Adams & White*. (Tab. VI. Fig. 7.)

*Thorace* supra confertim verrucoso, verrucis depressis; robustâ carinâ dorsali, ab uno laterali angulo ad alterum pertinente, duobus tuberculis in medio.

*Fronte* medio sulcatâ, medio dorsi duabus longitudinalibus impressionibus; ultimo articulo abdominis in feminâ verrucoso. Primo pedum pari verrucoso, digitis sulcatis.

HAB. Oram Brunensem.

*Gonatonotus pentagonus*, Adams and White, Proc. Zool. Soc.

*Carapace* above closely verrucose, the warts depressed; a rather strong ridge across the back, extending from one lateral angle to the other, with two tubercles in the middle; the front grooved down the middle; the centre of the back with two longitudinal impressions; terminal joint of abdomen, in the female, verrucose.

HAB. Coast of Borneo.

When alive, this species is of a brick-red colour, with the chelæ crimson, and the under surface rufous.

4. CERATOCARCINUS, *Adams & White*.

*Thorax* subpentagonalis; latera supra insertionem chelarum in magnam spinam paululum prorsum directam producta.

*Frons* lata et prominens, cornibus conicis inter se valde distantibus utrinque eminens; oculi parvuli, pedunculis brevibus, sulcis in lateribus rostri aptatis. Exteriores antennæ permagnæ, terminales appendices certe dimidiâ longitudine antennarum, et ultra cornua rostri prominentes.

*Chelæ* valde elongatæ; latera fere parallela, carpus subpyriformis, sine spinis in parte interiore; acies digitorum convenientes et serratæ. Secundum par pedum longius et gracilius quam postrema tria paria; articulus tarsalis gracilis et elongatus; quartum et quintum æqualia longitudine; quintum par, ut in *Eumedono*, tam alte positum ut quarti paris insertionem fere celet; tarsales articuli horum pedum crassi; unguis ad extremitatem translucidus.

Abdomen maris ut in *Eumedono*: femina incognita.

HAB. Maria Orientalia.

*Carapace* somewhat pentagonal; the sides, over the insertion of the first pair of legs, produced into a large spine directed slightly forwards.

*Front* wide and prominent, projecting on each side in the form of conical horns, widely separate from each other. Eyes rather small, peduncles short, the eye fitting into a groove on the side of the front; outer antennæ considerably developed, the terminal appendages at least half the length of the whole antennæ, and projecting beyond the horns of the front.

*First pair of legs* much elongated, the sides nearly parallel, the wrist somewhat pear-shaped, without spines on the inside, the edges of the pincers meeting and serrated. Second pair of legs longer and more slender than the last three pairs; the tarsal joint slender and elongated; fourth and fifth pairs of legs of equal length; the fifth pair, as in *Eumedonus*, placed so high as nearly to conceal the insertion of the fourth pair; the tarsal joints of these legs thick; the claw at the end translucent.

Abdomen of male, as in *Eumedonus*; that of female unknown.

This genus is closely allied to *Eumedonus* of Professor Milne Edwards (Crust. vol. i. p. 349), and, like it, comes from the Eastern Seas.

1. CERATOCARCINUS LONGIMANUS, *Adams & White*. (Tab. VI. Fig. 6.)

Duobus acuminatis transversis tuberculis, ad extremitatem pilis cristatis, in dorso thoracis, post oculos; primo pedum pari minutis verrucis obsito compluribus altis longitudinalibus sulcis; digitis basi exceptâ nigro-fuscis.

HAB. Oram Brunensem (Balambangan).

*Cerotocarcinus longimanus*, Proc. Zool. Soc.

Two pointed transverse tubercles, tufted with hair at the end, on the back of the carapace, behind the eyes; the first pair of legs covered with minute warts and with several deep longitudinal grooves; the pincers blackish brown, except at the base.

HAB. North coast of Borneo (Balambangan).

When alive, the colour of this species is blood-red, with five light bands across the carapace.

5. PARTHENOPE, *Fabricius*.

1. PARTHENOPE CALAPPOIDES, *Adams & White*. (Tab. V. Fig. 5.)

*Thorace* subtrigono postice truncato, antice rotundato, dorso verrucosiformibus subdepressis tuberculis obsito; lateribus in parte anteriore obtuso rotundato lobo; alto sinu post lobum; branchialibus regionibus permagnis, compluribus tuberculis, jugo majorum tuberculorum ad angulos latero-posteriores pertinentium et brevibus æquis intervallis circum margines alte incis. Medianâ regione serie magnorum rotundatorum tuberculorum, anterioribus tuberculis proxime appropinquantibus, posterioribus distantibus; duabus caveis inter laterales et medianas regiones, et post caveas duabus altis foveis.

*Fronte* latâ, obtusâ, antice rotundatâ, ad extremitatem submarginatâ, denticulis in lateribus, tuberculiferâ in dorso.

*Chelis* breviusculis et crassis; brachio verrucoso, validâ anteriore spiniferâ cristâ; carpo externe lævi, serie tuberculorum in superficie interiore; manu serie magnorum tuberculorum pertinentium a digito superiore intus ad basin articuli, exteriori carinâ lævi et sine spinis; digitis magnis et validis, inferiore tribus magnis dentibus.

Abdomine in feminâ septem articulis, depressis tuberculis obsito.

HAB. Maria Orientalia.

*Carapace* subtrigonal, truncate behind, rounded in front, upper surface covered with wart-like, rather depressed tubercles; sides at the forepart with an obtuse rounded lobe, behind which is a deep notch; branchial regions very much developed, covered with tubercles, with a ridge of larger tubercles extending to the latero-posterior angles, and deeply incised at short regular intervals round the edges; the middle region with a row of large rounded tubercles, the anterior of which are close together, and the posterior isolated; two hollows between the lateral and middle regions, and two deep pits behind the hollows.



*Front* wide, obtuse, rounded anteriorly, slightly emarginate at the end, faintly dentated on the sides, and tuberculiferous on the upper surface.

*Fore-legs* rather short and stout; third joint verrucose, with a strong anterior spiniferous crest; fourth joint smooth externally, with a row of tubercles on the inner surface; fifth joint with a row of large tubercles, extending from the upper claw to the base of the joint, on the inner surface, outer keel smooth and without spines; claws large and strong, the lower one with three large teeth.

*Abdomen*, in the female, seven jointed, and covered with flattened tubercles.

HAB. Eastern Seas.

2. PARTHENOPE TARPEIUS, *Adams & White*. (Tab. VII. Fig. 2.)

*Thorace* subtrigono, compluribus lævibus depressis rotundatis tuberculis, in regionibus medianâ et laterali majoribus obsito: lobo rotundato integro, in margine latero-anteriore; alto sinu lobum a lateralibus regionibus dividente; lateralibus regionibus dilatatis, rotundatis, postice angustatis, magnis superficialibus crenationibus circum margines; posteriore margine serie validorum obtusorum subconicalium tuberculorum extrorsum et retrorsum directis.

*Fronte* latâ obtusâ rotundatâ subcrenulatâ, alte sulcatâ, vix lævi in superiore superficie.

*Chelis* validis tuberculiferis, brachiis uno magno et compluribus minoribus tuberculis in acie anteriore; carpo lævi, externe noduloso; manu subtuberculifero latere in interiore superficie; pedibus posterioribus depressis, marginatis depressis subtriangularibus obtusioribus processibus.

*Abdomine* in feminâ septem-articulato, obsito tuberculis, fimbriato crebris setis.

HAB. Maria Orientalia.

*Carapace* subtrigonal, covered with numerous smooth, depressed tubercles, larger in the middle and lateral regions; a rounded entire lobe on the latero-anterior margin, and a deep notch, which separates it from the lateral regions, which are dilated, rounded, narrowed posteriorly, with large superficial crenations round the edges; the hind margin with a row of strong, obtuse, sub-conic tubercles, directed outwards and backwards.

*Front* wide, obtuse, rounded, subcrenulate, deeply channelled, and nearly smooth on the upper surface.

*Fore-legs* strong, tuberculiferous; third joint with one large and several smaller tubercles on the front edge; fourth joint smooth, externally nodulous; fifth joint with a rather faint tuberculiferous ridge on the inner surface; hind-legs flattened, edged with flattened, sub-triangular, bluntish processes.

*Abdomen*, in the female, seven-jointed, covered with tubercles, fringed with close-set setæ.

HAB. Eastern Seas (Caramatta Passage).

LAMBRUS, *Leach*.

[*Additional Species.*]

11. LAMBRUS HOPLONOTUS, *Adams & White*. (Tab. VII. Fig. 3.)

*Thorace* subpentagono, antice acuminato, ad latera subangulato, postice lato, obsito rotundis æquis tuberculis, majoribus et crebrioribus in regionibus medianâ et branchiali; lateribus crenatis autice, armatis



in medio crassis obtusis tuberculiformibus processibus, postice desinentibus in longâ prominente acuminatâ spinâ extrorsum et paululum retrorsum directâ ; acie posteriore octo validis spinis instructâ, marginibus thoracis, cum tuberculis et spinis, fimbriatis longis rigidis subcurvatis setis.

*Fronte* acuminata triangulari, aciebus subcrenulatis et validâ spinâ supra canthum.

*Chelis* ter thorace longioribus ; brachiis serie crebrorum æquorum tuberculorum antice ; quatuor vel quinque magnis rotundatis tuberculis, paululum inter se distantibus in latere exteriori, quinque validis spinosis processibus a margine posteriore retrorsum et extrorsum tendentibus ; carpo serie tuberculorum supra, et tribus validis spinis externe ; manu cristâ octo validarum spinarum supra, serie tuberculorum interne, et serie fere duodecim crassarum obtusarum spinarum in acie inferiore.

Pedibus posterioribus gracilibus minoribus, duobus posterioribus paribus longis subcurvatis setis fimbriatis.

*Abdomine* (in mare) quinquarticulato, crebris setis circum margines.

HAB. Maria Orientalia.

*Carapace* subtriangular, anteriorly acuminate, somewhat angulated at the sides, wide behind, covered with rounded equal-sized tubercles, larger in the middle and branchial regions, the sides anteriorly crenated, armed in the middle with thick, obtuse, tuberculiform processes, and ending posteriorly in a long, prominent, acuminated spine, directed outwards and a little backwards ; posterior edge with eight strong spines and tubercles, the spines fringed with long, rigid, slightly curved hairs.

*Front* acuminately triangular, the edges subcrenulated, and with a strong spine above the orbit.

*Fore-legs* three times longer than the carapace, the third joint with a row of equal-sized tubercles anteriorly ; four or five large rounded tubercles slightly separated from each other on the outer surface ; five strong spiny processes, extending backwards and outwards from the hinder margin ; the third joint with a row of tubercles above and three strong spines externally ; the fifth joint with a crest of strong spines above, a row of tubercles internally, and a row of about twelve thick, obtuse spines on the lower sharp edge.

Hind-legs slender, rather small, the two posterior fringed with long slightly curved setæ.

*Abdomen* (in the male) five-jointed, the crenated margins beset with short hairs.

HAB. Eastern Seas.

#### IV. CANCERIDÆ.

In their habits, the *Canceridæ* are evasive and prone to concealment, passive in defence, and though voracious and predatory, they do not exhibit the same activity, intelligence, and cunning as the *Ocypodidæ*, the *Gonoplacidæ*, or the *Grapsidæ*. The *Æthra* inhabit deep water, living in sandy mud, among shells and coral débris, while such genera as *Carpilius*, *Atergatis*, *Xantho*, and *Chlorodius*, select shallow waters along the shores, preferring weedy and rocky bottoms, where they hide among the stones, and prey on shrimps and small fishes. *Pilumnus* and *Trapezia* are tolerably lively in their movements ; the latter genus having the

same habit of hiding and shuffling under stones as *Porcellana*, but unlike that genus it inhabits the coral branches of deep sunken reefs and the cavities of madrepores.

At the island of Koo-kien-san a species of *Eriphia* was common, hiding under stones below high-water mark, having the carapace, legs, and chelæ covered with stiff red hairs, the colour of the shell itself being dark greenish brown, the legs lighter and banded with dark brown, while the under surface of the body was ultramarine blue, and the terminal joint of the abdomen the same colour.

The *Zozymus* lives among rocks, hiding in holes, while *Pilumnus* is sluggish in its movements, hiding in the crevices and cavities of the under surface of stones below high-water mark.

## 1. CARPILIUS, *Leach*.

### 1. CARPILIUS CINCTIMANUS, *White*. (Tab. VII. Fig. 4.)

*Thorace* sine dente laterali, latissimo; lateribus in quatuor lobos divisus; digitis nigris, subalbis ad extremitatem; manu in medio latâ nigrâ fasciâ cum nigro digiti immobilis commixtâ; thorace et pedibus lævibus, intense rubris.

HAB. Insulas Philippinas.

*Carapace* without lateral tooth; very wide; the side divided into four lobes; claws of fore-legs black, whitish at the tip; fifth joint of fore-legs with a broad black band in the middle which runs into the black of the immovable claw.

Carapace and legs smooth, of a rich red colour.

HAB. Philippine Islands.

### 2. CARPILIUS SIGNATUS, *Adams & White*. (Tab. X. Fig. 1.)

*Thorace* valde convexo, supra punctis carinisque latiusculis impresso, aurantiaco, signaturis pallide-citrinis variegato.

HAB. In littore Mauritiano.

*Carapace* very convex, the upper surface distinctly punctulated and beautifully marked, in the dried specimen, with symmetrical figures of a pale yellow on an orange ground, which are well expressed in our figure; the several regions are separated from each other by shallow grooves, rendering them much more prominent than in other species of the genus; the anterior convex margin is furnished with long crenulations, the crenulation in front being longer than the one behind.

*Front* slightly projecting, deeply notched in the middle line with an obtuse tubercle before, and a smaller one behind the eyes.

*Fore-legs* large, with the claws very black, the under claw with four obtuse tubercles, the hind-legs as in *C. corallinus*, but the fifth pair are unfortunately wanting.

HAB. Isle of France.

2. ATERGATIS, *De Haan*.1. ATERGATIS SINUATIFRONS, *Adams & White*.

*Thorace* marginali membro integerrimo, crassiore, omnino subfusco-rubro colore.

*Fronte* tribus lobis, unoquoque in medio nictato; digitis chelarum cristis pilorum, nigris, summâ extremitate albâ.

*Thorace* quatuor digitorum latitudine.

HAB. Mauritium.

*Carapace* with the marginal limb very entire, rather thick, and of a uniform brownish red.

*Front* with three lobes, each notched in the middle; claws of fore-legs with tufts of hair; claws of a black colour, with the extreme tip white.

Width of carapace four inches.

HAB. Mauritius.

2. ATERGATIS SUBDIVISUS, *Adams & White*. (Tab. VIII. Fig. 3.)

*Thorace* membro marginali quatuor lobis valde indistinctis diviso; majore parte summi thoracis intense rubrâ, postice subrubrâ; digitis nigris, basi digitorum mobilium flavâ.

*Fronte* thoracis duobus rectis lobis, proxime oculum sinuatâ.

*Thorace* trium digitorum octo linearum latitudine.

HAB. Insulas Philippinas.

*Carapace* with the marginal limb divided into four very indistinct lobes; the greater part of upper surface of carapace deep red with yellowish spots, behind paler. Claws of fore-legs black, base of movable one yellow; front of carapace with two rather straight lobes, sinuated close to the eye.

Width of carapace three inches, eight lines.

HAB. Philippine Islands.

This species comes near *A. marginatus*.

3. ATERGATIS INSULARIS, *Adams & White*. (Tab. VIII. Fig. 2.)

*Thorace* anterioribus lateribus acie incisore; parte thoracis post hanc punctatâ; reliquâ superiore superficie fere levi, tribus vel quatuor lineis impressis antice.

*Manibus* rugosis præsertim supra; digitis et mobilibus et fixis profunde sulcatis. Flaveolo rubro, pedibus colore intensiore; digitis chelarum pallidis; cornu colorato.

HAB. Insulas Philippinas.

Latero-anterior sides of carapace with a cutting edge; part of carapace behind this punctate, the rest of upper surface very nearly smooth, with three or four impressed lines in front; fifth joint of fore-legs rugose, especially above; claws, both movable and fixed, deeply channelled. Pale yellowish-red; legs darker; claws of fore-legs pale horn-colour.

HAB. Philippine Islands. Cuming.



4. ATERGATIS LATERALIS, *Adams & White*. (Tab. VIII. Fig. 1.)

*Thorace* lævi irregulari, lineis impressis, lateribus latero-anterioribus in tres dentes latos divisis.

*Fronte* latâ, denticulatâ, iu medio subemarginatâ.

HAB. Maria Orientalia.

*Carapace* smooth, irregular, with numerous impressed lines; latero-anterior margins divided into three broad teeth.

*Front* wide, denticulated, subemarginate in the middle; fifth joint of fore-legs rugose, claws tipped with dark brown.

HAB. Eastern Seas.

3. ACTÆA, *De Haan*.1. ACTÆA NODULOSA, *Adams & White*. (Tab. VIII. Fig. 4.)

*Thorace* et pedibus supra dense obsitis rotundatis tuberculis maximis in chelis et anterioribus marginibus; tuberculo in cantho inferiore; thorace in medio longitudinaliter impresso; acie posteriore rectâ et duabus lineis transversis parvorum tuberculorum instructâ. Chelis et superiore et inferiore carinis longitudinalibus; cornu colorato.

HAB. Mauritium.

*Carapace* and legs, above, thickly covered with rounded tubercles, largest on fore-legs and fore-margins of carapace; a tubercle on the under orbit; carapace, in the middle, longitudinally impressed; the posterior edge straight and furnished with two transverse lines of small tubercles; claws, both upper and under, with longitudinal keels, and horn coloured.

HAB. Mauritius.

4. XANTHO, *Leach*.1. XANTHO DEPRESSA, *Adams & White*.

*Thorace* valde depresso, antice tuberculato, compluribus tuberculorum acuminatis.

*Fronte* in medio profunde nictatâ; lateribus tribus dentibus. Manibus extra tuberculatis, tribus posterioribus articulis pedum parvis tuberculis, paucis capillis.

HAB. Insulas Philippinas.

*Carapace* much depressed; in front tuberculated, many of the tubercles sharp-pointed.

*Front* deeply notched in the middle; sides with three teeth; fifth joint of fore-legs tuberculated on the outside; the three last joints of legs slightly tuberculated, and with a few hairs.

HAB. Philippine Islands.

2. XANTHO CULTRIMANUS, *Adams & White*.

*Thorace* supra convexiore; fronte nictatâ; lateribus quatuor dentibus; parte anteriore et lateribus parvulis tuberculis; thorace post oculos impressis lineis quæ in medio conveniunt; manibus quatuor longitudinalibus impressis lineis in superficie exteriori quæ parvis subasperis tuberculis exornatur; thorace et pedibus flaveolis rubro commixtis.

HAB. Insulas Philippinas.

*Carapace* slightly convex above, front notched, sides with four teeth; front part and sides with very slight tubercles; carapace, behind the eyes, with impressed lines, which meet in the middle; fifth joint of fore-legs with four longitudinal impressed lines on the outside, which is covered with small roughish tubercles; carapace and legs pale yellowish varied with red.

HAB. Philippine Islands. Cuming.

3. XANTHO LAMELLIGERA, *Adams & White*.

*Thorace* supra convexiore, quatuor dentibus in utroque latere; superiore parte ad latera subsuberculari. Manibus extra asperis; acie carpi superiore margine dentato; acie manuum et supra et infra margine lamellari; pedibus posterioribus in acie superiore lamellaribus.

HAB. Mauritium.

*Carapace* rather convex above, with four teeth on each side, upper part on the sides slightly tubercular, fifth joint of fore-legs rough on the outside, edge of fourth joint, above, with a toothed margin; edge of fifth joint, both above and below, with a lamellar border; hind-legs, on the upper part, lamellar.

HAB. Mauritius.

5. CHLORODIUS, *Edwards*.

1. CHLORODIUS HIRTIPES, *Adams & White*. (Tab. XI. Fig. 4.)

*Thorace* levi.

*Fronte* latissimâ, vix in medio nictatâ; lateribus quatuor dentibus obtusis.

*Chelis* longis, brachio crassissimo; acie superiore ad basin uno crasso dente; pedibus posterioribus multis fuscis capillis.

HAB. Insulas Philippinas.

*Carapace* smooth.

*Front* very broad, scarcely notched in the middle; the sides with four blunt teeth.

*Fore-legs* long; fourth joint very thick, upper edge, at the base, with one thick tooth; hind-legs with many brownish hairs.

HAB. Philippine Islands.

2. CHLORODIUS FRAGIFER, *Adams & White*. (Tab. XI. Fig. 2.)

*Thorace* obsito tuberculis rotundatis bacciformibus gregatim dispositis, definitis impressis lineis separatis; pediculo oculi duabus spinis prope oculum dispositis; pedibus tuberculis oryziformibus obsitis, albis, latâ earmineâ longitudinali lineâ per medium in fronte; quinque carmineis notis in posteriore thoracis parte.

HAB. Insulas Philippinas.

*Carapace* covered with roundish berry-like tubercles, arranged in groups and separated by definite impressed lines; pedicel of eye with two spines close to the eye; legs covered with rice-like tubercles; white, with a broad pinkish longitudinal line down the middle in front; five pink marks on hind part of carapace.

HAB. Philippine Islands.

3. CHLORODIUS PILUMNOIDES, *Adams & White*. (Tab. IX. Fig. 3.)

*Thorace* et pedibus fuscis pilis obsitis; thorace depressiore; lateribus tribus dentibus, spinis exornatis, priore parte thoracis compluribus eminentiis et spinosis tuberculis asperâ. *Manibus* magnis; acie superiore serratâ extra et supra tuberculis majoribus; digitis extra et supra sulcatis compluribus tuberculis ad basin digiti mobilis; digitis nigris; concavis extremitatibus albis; pedibus posterioribus supra serratis.

HAB. Singhapuram et Insulas Philippinas.

*Carapace* and legs covered with brown hair; carapace somewhat depressed; sides with three teeth covered with spines; fore part of carapace with several bosses, and rough with spiny tubercles; four transverse raised lines on hind part; the inmost the shortest; fifth joint of fore-legs large, upper edge serrated on the outside and top with rather large tubercles. *Claws* on the outside and top channelled; several tubercles at the base of the movable claw: claws black, the hollowed ends white; hind-legs serrated above; second and third joints with three rows of serratures.

HAB. Singapore. Philippine Islands.

4. CHLORODIUS AREOLATUS, *Milne Edwards*. (Tab. XI. Fig. 3.)

*Thorace* tuberculis et granulis multis obsitis.

*Fronte* latâ, in lobos quatuor distinctos incisâ; margine latero-anteriori in quatuor dentes triangulares diviso, hiatu anguli canthi interno angusto.

*Chelis* granulosis, pedibus posterioribus sublævibus.

*Abdomen* (feminæ) articulis septem.

HAB. Insulas Philippinas.

*Chlorodius areolatus*, Milne Edwards, Crust. vol. i. p. 400.

*Carapace* covered with tubercles and granules.

*Front* wide, divided into four distinct lobes; latero-anterior margins short, nearly straight, and divided into four triangular teeth; fissure of orbital angle internal, narrow, lodging the movable joint of the outer antennæ.

*Fore-legs* granular; hind-legs and lower surface of body nearly smooth.

*Abdomen* (of female) seven-jointed, fringed with setæ.

HAB. Philippine Islands.

6. PANOPEUS, *Edwards*.1. PANOPEUS DENTATUS, *White*. (Tab. XI. Fig. 1.)

*Thorace* rotundato, lævi, postice coarctato, lateribus productis tuberculis postfrontalibus transversis irregularibus; margine latero-anteriore lobis quinque magnis dentiformibus, lineis elevatiusculis duabus ab angulo latero-anteriore porrectis.

*Fronte* in lobos quatuor divisâ; angulo externo canthi acuto.

*Chelis* in carpo dentibus duobus conicis, manu externe granulâtâ, interne valde reticulâtâ, ad basin lineâ tuberculâtâ; digito superiore inermi, digito inferiore tuberculis quinque depressis.



*Abdomine* (maris et feminæ) articulis septem.

HAB. Insulas Philippinas.

*Carapace* rounded in front, produced at the latero-anterior angles, and contracted behind, upper surface smooth, marbled with a row of irregular transverse tubercles extending across the postfrontal portion; latero-anterior margin with five large, prominent, dentiform lobes, the anterior three obtuse, the two posterior acute; two curved, slightly elevated lines proceeding inwards from the latero-anterior angle.

*Front* divided into four lobes, the two inner wide and obtuse, the two outer narrower and more prominent, upper surface slightly concave, outer angle of orbit acute.

*Fore-legs* with two strong teeth on the inner and upper part of the fourth joint, the fifth joint slightly granulated externally, coarsely reticulated internally, and with a tubercular ridge at the base; upper claw unarmed, under claw with five round depressed tubercles.

*Hind-legs* transversely rugose, fringed with short, stiff setæ.

*Abdomen* (both of male and female) seven-jointed, the former fringed with long, the latter with short, setæ.

HAB. Philippine Islands.

2. PANOPEUS CAYSTRUS, *Adams & White*. (Tab. IX. Fig. 2.)

*Thorace* subtrigonal, antice convexo, marginibus rotundatis lineis impressis obsitis; margine latero-anteriore serratulis tribus subdistantibus.

*Fronte*, in medio, emarginatâ, supra sulcatâ, angulo externo canthi obtuso.

*Chelis* lævibus, digito superiore arcuato inermi, digito inferiore tuberculis quatuor parvis acutis.

*Abdomine* (feminæ) articulis septem.

HAB. Maria Orientalia.

*Carapace* subtrigonal, rounded in front and at the sides, surface smooth, marked with faintly impressed lines; latero-anterior margin with three rather distant sharp serrations.

*Front* emarginate in the middle, without lobes, a trifold groove on the upper surface; outer angle of orbit rather obtuse.

*Fore-legs* smooth, upper claw strong, arched, unarmed; lower claw with three or four small acute tubercles.

*Hind-legs* smooth, fringed on the last and penultimate joints with long hairs.

*Abdomen* (of female) seven-jointed, the second joint narrower than the rest, fringed with short stiff setæ.

HAB. Eastern Seas.

3. PANOPEUS FORMIO, *Adams & White*. (Tab. IX. Fig. 1.)

*Thorace* latiore quam longiore, lateribus rotundatis, lineâ valde distinctâ ab angulo latero-anteriore projectâ; margine latero-anteriore lobis quatuor longis rotundatis, dente parvo ad angulum latero-anteriorem.

*Fronte* lobis quinque subobsoletis, supra sulcatâ, angulo externo canthi fissurâ parvâ.

*Chelis* manu subtuberculatâ, digito inferiore tuberculo magno cum multis tuberculis parvis.

*Abdomine* (maris) articulis septem, articulo tertio ad latera dilatato.

HAB. Maria Orientalia.

*Carapace* transversely oval, the sides rounded, surface smooth, marked with faintly impressed lines, a strongly marked line extending across the middle from the latero-anterior angle, and a fainter line posteriorly; latero-anterior margin with four long, rounded crenulations, and a small tooth at the latero-anterior angle.

*Front* with four slightly developed lobes, a bifurcate groove on the upper surface, outer angle of orbit slightly fissured.

*Fore-legs* smooth, with the upper and outer surface of fifth joint faintly tuberculated, upper claw unarmed, lower claw with one large and several small tubercles.

*Hind-legs* transversely rugose and slightly granulated, not fringed with hairs.

*Abdomen* (of male) seven-jointed, the third joint dilated at the sides; fringed with short stiff setæ.

HAB. Eastern Seas.

#### 7. *ÆGLE, De Haan.*

##### 1. *ÆGLE RUGATA* (sp.), *Milne Edwards.* (Tab. VIII. Fig. 5.)

*Thorace* granulis minutis dense dispositis; margine latero-anteriore lobis quatuor rotundatis distinctis.

*Chelis* sublævibus.

*Abdomine* (feminæ) articulis septem.

HAB. Insulas Philippinas.

*Zozymus rugatus*, Edw. Crust. vol. i. p. 385.

*Carapace* covered with small close-set granulations; latero-anterior margins divided into four rounded very distinct lobes.

Surface of body and fore-legs comparatively smooth.

*Abdomen* (of female) seven-jointed, and fringed with long, close-set, coarse setæ.

HAB. Philippine Islands.

#### 8. *GALENE, De Haan.*

##### 1. *GALENE OCHTODES* (*junior*), *Herbst.* (Tab. X. Fig. 2.)

*Cancer* thorace lævi, lateribus verrucosis.

*Fronte* bilobâ, brachiis, carpis, manibus, digitisque verrucosis.

HAB. Maria Orientalia.

*Galene ochtodes*, Mus. Cat. p. 18. *Cancer ochtodes*, Herbst. vol. 1. p. 158. t. 8. f. 54.

*Carapace* smooth, sides verrucose.

*Front* bilobed, second, third, and fourth joints of chelæ, and the claws, verrucose.

HAB. Indian Ocean.

We have figured a young specimen of this species, which does not seem to be common in collections.

## 9. PILUMNUS, *Leach*.

### 1. PILUMNUS DILATIPES, *Adams & White*. (Tab. IX. Fig. 4.)

*Thorace* latiore quam longiore, granulis multis distinctis setigeris obsito; regionibus lineis depressis distinctis separatis; margine latero-anteriore dentibus quatuor, magnis denticulatis.

*Fronte* emarginatâ, antice crenulatâ fasciculis duobus pilosis; margine superiore canthi multidentato.

*Chelis* externe tuberculis multis rotundatis obsitis, margine superiore setifero.<sup>1</sup>

Pedibus posterioribus valde dilatatis, tuberculis lineisque setigeris instructis.

*Abdomine* (maris) articulis septem, lævi.

HAB. Maria Orientalia.

*Pilumnus dilatipes*, White, Pro. Zool. Soc.

*Carapace* wider than long, covered with coarse granulations, each beset with several short setæ; the different regions divided by distinct shallow grooves; latero-anterior margin with four prominent denticulated teeth, the first small, the second wide, and the two posterior equal and triangular.

*Front* emarginate, with numerous serrations and with two tufts of straight setæ; upper margin of orbit with numerous dentations.

*Fore-legs* covered with granules and short stiff hairs on the outer and upper surface, smooth internally.

*Hind-legs* considerably dilated, beset with fine granulations and numerous rows of short bristles, the edges fringed with long hairs.

*Abdomen* (of male) seven-jointed and smooth.

HAB. Eastern Seas.

### 2. PILUMNUS SCABRIUSCULUS, *Adams & White*. (Tab. IX. Fig. 5.)

*Thorace* vix longiore quam latiore, granulis multis parvis setigeris obsito, regionibus lineis depressis vix distinctis separatis; marginibus latero-anterioribus dentibus tribus denticulatis.

*Fronte* prominente triangulari crenulatâ, margine superiore canthi unidentato.

*Chelis* tuberculis granulosis distinctis obsitis, parte superiore setis brevibus rigidis fimbriatâ.

Pedibus posterioribus scabriusculis, pilosis.

*Abdomine* (feminæ) lateribus subparallelis, septem articulis.

HAB. Maria Orientalia.

*Carapace* nearly as long as wide, covered with numerous granulations, each beset with several short setæ; the regions of carapace separated by several faintly impressed grooves, antero-lateral margins with three wide denticulated teeth fringed with stiff hairs.

*Front* subtriangular, slightly produced, finely crenulated on the margin, which is furnished with a single fringe of stiff setæ; upper edge of orbit with a single rounded dentation.



*Fore-legs* covered with numerous distinct granular tubercles on the upper and outer surface, and fringed with short hairs.

*Hind-legs* rough with granules and short hairs, arranged in transverse rows.

*Abdomen* (of female) villose, seven-jointed, the sides subparallel.

HAB. Eastern Seas.

3. PILUMNUS URSULUS, *Adams & White*. (Tab. IX. Fig. 6.)

*Thorace* vix longiore quam latiore, dense tomentoso, granulis multis rotundatis setigeris obsito, marginibus latero-anterioribus dentatis.

*Fronte* denticulatâ, fasciculis quinque pilosis longis instructâ.

*Chelis* granulosis, pilis longis dense coopertis.

*Abdomine* (maris) dense tomentoso, articulis septem.

HAB. Maria Orientalia.

*Carapace* nearly as long as wide, densely tomentose, covered with numerous large close-set granules beset with very long coarse hairs, latero-anterior margins dentated.

*Front* toothed, with five tufts of long straight hairs.

*Fore-legs* covered with coarse granulations, and very long, coarse, slightly curved hairs.

*Hind-legs* granular, thickly beset with numerous, long, coarse hairs.

*Abdomen* (of male) densely tomentose, seven-jointed.

HAB. Eastern Seas.

## V. PORTUNIDÆ.

The large species of this family are much esteemed as food among the poor islanders of the Meia-co-shimahs, and in the markets of China large species of *Neptunus* (*N. pelagicus*), are frequently offered for sale. Two well-marked genera have been added to this group by our researches in the Eastern Seas, besides numerous species. The island of Balambangan, at the north end of Borneo, harbours the *Lupocyclus*, which is very active in its habits, keeping close in shore like *Lupa*, *Oceanus*, and other swimming crabs; it swims by rapid jerks along the bottom, and, when caught, will wound the fingers by striking side-ways with its spiny fore-legs. The other new genus, *Lissocarcinus*, was obtained at some considerable distance from land, concealed in the internode of a fragment of floating bamboo, and is a powerful swimmer. The *Cancer* (*Thalamita*) *admete* of Herbst, and the *Cancer* (*Thalamita*) *prymna* of the same Crustaceologist, besides three new species of *Amphitrite*, and a new species of *Neptunus*, were likewise procured.

1. LISSOCARCINUS, *Adams & White*.

*Pedipalpi externi* articulo tertio, ad basin, latiore quam longiore, ad marginem anteriorem non incisum prope angulum.

*Thorax* trapezoidalis, postice coarctatus.

*Frons* prominens, lamellaris, in medio valde incisa. Antennæ internæ articulo secundo elongato, usque ad fissuram porrecto.

*Pedes posteriores* pedibus *Portuno* simillimi.

*Abdomen* (feminæ) articulis septem lateribus subparallelis. Mas adhuc latet.

*External pedipalps* with the third joint broader at the base than long, and not notched at its anterior margin near the angle.

*Carapace* trapezoidal, considerably contracted posteriorly.

*Front* projecting, lamellar, deeply cleft in the middle. Inner antennæ with the second joint elongated and reaching to the commencement of the notch.

*Legs* very much as in *Portunus*.

*Abdomen* (of female) seven-jointed, the sides nearly parallel.

This generic group, described from a female, will be found an interesting connecting link between the genera *Portunus*, *Platyonychus*, and *Polybius*. We have named it *Polybioides* from its resemblance to the genus of Leach, which, as Professor Bell remarks, is of a more decided natatory character than any other Brachyurous form found on the British coast.

#### 1. LISSOCARCINUS POLYBIOIDES, *Adams & White*. (Tab. XI. Fig. 5.)

*Thorace* pentagonali, in fronte producto, postice coarctato, lævissimo, multis parvis rotundatis maculis, lineâ distinctâ ab angulo latero-anteriore projectâ; margine latero-anteriore valde dentato, dentibus prorsum inclinatis.

*Fronte* lamellari, prominente, antice bifidâ, antennis lateralibus fronte occultis.

*Chelis* articulo quinto bicarinato; carinâ antice valde dentatâ. Pedibus posterioribus depressis, pari ultimo unguibus valde dilatatis.

HAB. Maria Orientalia.

*Carapace* five-sided, produced in front, narrowed behind, very smooth on the upper surface, and covered with numerous small round markings, a strong line extending from the latero-anterior angle across the carapace towards the middle line; latero-anterior margin strongly toothed, the teeth directed forwards.

*Front* lamellar, projecting, bifid anteriorly, covering and concealing the lateral antennæ, a wide space between the eyes.

*Fore-legs* with the fourth joint doubly keeled, the keels strongly toothed anteriorly.

*Hind-legs* flattened, the fifth pair with the penultimate joint more flattened than the corresponding joint of the other pairs, and with a greatly dilated flattened claw.

HAB. Eastern Seas.

#### 2. LUPOCYCLUS, *Adams & White*.

*Pedipalpi externi* articulo secundo ad apicem tenuiore (quam in *Lupâ*—*L. forceps*), articulo tertio minore (quam in *Lupâ*).

*Thorax* suborbicularis, postice coarctatus, margine latero-anteriore spinis acutis conicis prorsum inclinatis.

*Frons* semicircularis, in lobos quinque equales divisa; canthi margine superiore subfisso postice, dente magno, conico, curvato.

*Chelæ* longæ, spiniferæ, pedes posteriores graciles, compressæ, pari quinto valde dilatato.

*Abdomen* (maris) triangulare, articulis quinque; femina adhuc latet.

*External pedipalps* with the second joint rather more slender towards the tip (than in *Lupa forceps*), the third joint considerably smaller.

*Carapace* suborbicular, contracted posteriorly, latero-anterior margin with sharp conical spines directed forwards.

*Front* divided into five equal dentiform lobes, orbit with the upper margin slightly notched, a large curved conical tooth behind it.

*Fore-legs* long and spiniferous.

*Hind-legs* slender and compressed, the fifth pair greatly dilated.

*Abdomen* (of male) triangular, five-jointed.

#### 1. LUPOCYCLUS ROTUNDATUS, *Adams & White*. (Tab. XII. Fig. 4.)

*Thorace* minutissime punctulato, tuberculis parvis aggregatis lineisque granulosis adperso, marginibus latero-anterioribus spinis quinque magnis, spinis quinque parvis interpositis; regionibus lateralibus pallidulo-luteo, corneo-fusco discoloratis; in medio thoracis tæniâ latâ rubrâ.

HAB. Balambangan.

*Carapace* subcircular, slightly narrowed behind, surface irregular, very finely punctulated, and covered with isolated clusters of minute tubercles and transverse granulated lines; the latero-anterior margin with five large, sharp, conical spines directed forwards, and an equal number of small intermediate spines.

*Front* semicircular, divided into five equal dentiform lobes; orbit with a slight notch at the upper margin, and bounded behind by a strong, curved, conical tooth, directed forwards.

*Fore-legs* with the third joint furnished with a row of five sharp, curved, conical spines on the anterior margin, numerous transverse ridges of small tubercles on the upper surface, and a longitudinal granulated line ending externally in a sharp spine; fourth joint with a strong spine on the upper edge; upper surface of fifth joint with a large spine at the base, and two ridges each ending anteriorly in a prominent spine; claws long, slender, grooved, and slightly curved.

*Hind-legs* slender, compressed, finely punctulated and granulated, the last pair with all the joints horizontally flattened, the last and penultimate joint greatly dilated and fringed with close-set stiff hairs.

*Abdomen* (of male) triangular, five-jointed.

HAB. Island of Balambangan, north end of Borneo.



In colour this pretty and curious genus is of a pale yellow, marbled with light pinkish brown on the lateral regions of the carapace, and a broad scarlet longitudinal stripe extending from the front to the hind margin, narrowed opposite the orbits and in the middle of the back. The fore-legs are marbled with scarlet and yellow, with a broad scarlet band in the middle of the fifth joint, and two broad bands of the same colour on each claw. The hind-legs are light pinkish yellow, with broad transverse scarlet bands.

### 3. CHARYBDIS, *De Haan*.

#### 1. CHARYBDIS DURA, *Adams & White*.

*Thorace* valde duro, lævi, marginibus lateralibus quinque-dentatis, primo et secundo dentibus ad basin denticulo minuto instructo.

*Fronte* sex dentibus obtusis, dente externo prominentiore quam in speciebus aliis.

*Chelis* carpo externe scabro, tuberculato, interne spinâ longâ crassâ in medio, manu margine superiore spinis sex in serie duplicatâ parallelâ dispositis, externe carinis tribus longitudinalibus.

*Pedibus* posterioribus externe spinâ magnâ prope extremitatem.

HAB. Mauritium.

*Carapace* very hard and smooth, lateral margin five-toothed, the first and second teeth with a minute tooth at the base.

*Front* with six large bluntish teeth, the external tooth rather more prominent than in the other species.

*Fore-legs* with the fourth joint rough and tubercular on the outside, with a very long thick spine on the middle of the inside, the fifth joint with six spines, in two parallel rows, on the upper edge, and three longitudinal keels on the outside.

*Hind-legs* with a large spine on the outside near the end.

HAB. Mauritius.

## VI. OCYPODIDÆ.

Species of *Ocypode* and *Gelasimus* are extremely numerous throughout the islands of the China Sea. Every sandy shore is perforated above high-water mark with the holes of the former, and the banks of the rivers, the mangrove swamps, damp forest margins, and muddy places near the sea, are peopled with the latter, which form oblique burrows frequently penetrating to a considerable depth. The *Ocypodes* appear to be chiefly crepuscular in their habits, remaining concealed in their holes during the heat of the day, but as evening approaches running side-ways in a curvilinear manner at the edge of the sea, where the waves break along the sandy shores. The *Gelasimi* remain concealed in their burrows during the high tide or in the dry hot part of the day, but delight to come out of their holes after a shower, or when the tide has receded and left their mud banks moist, but they never

venture very far from their habitations. The clicking noise produced by snapping the claws of their larger fore-leg together, when made by many hundreds at a time, may be heard at some considerable distance. On the least alarm they retreat precipitately to their burrows.

## 1. GELASIMUS, *Latreille*.

### 1. GELASIMUS CULTRIMANUS, *Adams & White*.

*Thorace* lævi; marginibus lateralibus rotundatis, sine carinâ acutâ ab angulo cantli externo.

*Fronte*, inter oculos, lobo parvo rotundato, dilatato; margine canthi inferiore distincte crenulato; chelâ majore digitis latis, finibus extrorsum curvatis; digito inferiore in medio profunde sinuato, lobo lato, prope extremitatem margine serrato-crenulato; digito superiore margine inferiore fere recto.

HAB. Insulas Philippinas.

*Carapace* with the upper surface smooth; the lateral edges rounded, without any sharp keel from the outer orbital angle.

*Front*, between the eyes, with a small dilated rounded lobe; edge of lower orbit very distinctly crenated; fifth joint of fore-legs with the claws wide, both slightly curved outwards at the ends; the lower claw with a very wide sinus in the middle, a wide serrato-crenated lobe on the edge near the end; upper claw with the lower edge very nearly straight.

HAB. Philippine Islands.

### 2. GELASIMUS CRASSIPES, *Adams & White*.

*Thorace* valde arcuato, postice subito coarctato.

*Fronte* lobo sine pedunculo angusto.

Pedibus posterioribus crassioribus et robustioribus quam in speciebus aliis.

HAB. Insulas Philippinas.

*Carapace* very much arched, suddenly narrowed behind.

*Front* with a lobe, without narrow stalk.

Four hind pairs of legs thicker and stronger than in the other species.

HAB. Philippine Islands.

### 3. GELASIMUS BELLATOR, *Adams & White*.

*Thorace* antice (prope insertionem canthorum pedunculorum) sinuato.

*Fronte* in lobum rotundatum subdilatatâ; chelis manu digitis perlongis; digito superiore lateribus subparallelis, margine prope ad basin tuberculis duobus vel tribus; digito inferiore infra marginato, acie ad basin sinus superficiali tuberculari, dente robusto lato ad extremitatem.

HAB. Insulas Philippinas.

*Carapace*, in front, just behind the insertion of eye-peduncles, sinuated.

*Front* slightly dilated into a rounded lobe; fifth joint of the larger fore-leg, with the claws very long; the upper, or movable claw, with the sides nearly parallel, two or three larger

tubercles on the edge near the base ; fixed or lower claw margined on the under side ; the cutting edge with a very wide shallow tubercular sinus at the base ; at the end of the sinus, beyond the middle, a strong wide tooth, gradually sloping down to the end, which curves upwards.

HAB Philippine Islands.

4. GELASIMUS PORCELLANUS, *Adams & White.*

*Oculorum pedunculis* perlongis.

*Thorace* parte frontali non coarctatâ ad basin ; parte posteriore longiore quam latera.

*Chelis* digito inferiore ad finem incrassato, marginibus internis digitorum amborum tuberculis magnis quatuor inter parvos crenulos.

HAB. Borneonem.

*Eye-pedicels* very long.

*Frontal* portion of carapace not narrowed at the base ; hind part of carapace much longer than the sides.

*Fore-legs* with the lower claws thickened at the end, the inner margins of both elaws with four larger tubercles amongst the small crenules.

HAB. Borneo.

5. GELASIMUS FORCIPATUS, *Adams & White.*

*Thorace* valde postice coarctato.

*Fronte*, inter oculos, lobo dilatato, lineâ acuto-marginatâ, ab angulo canthi externo porrectâ.

*Chelâ* majore digitis æqualibus, dente prope medium, et prope extremitatem, lobo truncato.

HAB. Borneonem.

*Carapace* much narrowed behind.

*Front* with a dilated lobe between the eyes ; from the outer orbital angle a sharp-edged line continued beyond the middle of carapace.

*Fore-legs* with the larger elaw nearly equal in size, with a tooth near the middle, and a truncated lobe towards the end ; a rather broad impressed line along the middle of each claw ; upper edge of palmar portion with a slight ridge ; outer side of palm covered with very slight tubercles.

HAB. Borneo.

## VII. GONOPLACIDÆ.

The *Macrophthalmi* inhabit muddy flats along the sea-shores, and, when disturbed, bury themselves quickly in the yielding soil, leaving the ends, however, of their long telescope-eyes above the surface. When taken, they are quite defenceless, not using their fore-legs as organs of aggression, or erecting and snapping them as do the *Gelasimi*. They are numerous distributed throughout the Philippine Archipelago and the islands in the China Sea.



1. MACROPHTHALMUS, *Latreille*.1. MACROPHTHALMUS JAPONICUS, *De Haan*.

*Thorace* lato-quadrato, ad latera obtuse dentato; manibus (marium) latere exteriori lævibus et inermibus, interiore glaberrimis, carinâ superiore granulatis; digitis (in maribus) deorsum inflexis.

Japonice *Suna gani*, i. e., Cancer arenarius, quod se in arenâ abscondere solet.

*Ocypode* (*Macrophthalmus*) *Japonicus*, De Haan, F. I. p. 54. t. 15. f. 2. (mas) t. 7. f. 1. (femina.)

HAB. Insulas Mëia-co-shimahi et Japoniam.

*Carapace* widely-quadrate, sides obtusely toothed; the fifth joint of fore-legs, in the male, smooth and unarmed on the outer side, very smooth on the inner side, granulated on the upper keel; claws in the male bent downwards.

In Japanese *Suna gani*, i. e., Sand Crab, because it is in the habit of burying itself in the sand.

HAB. Mëia-co-shimah Islands; Adams. Japan; De Haan.

2. MACROPHTHALMUS DEFINITUS, *White*.

*Thorace* anguste-quadrato, lateribus dentibus tribus, angulo canthi incluso, dente secundo latiore, dente tertio parvo.

*Chelis* articulis perlongis vix supra marginatis, digito superiore dente parvo prope basin; digito inferiore sinu valde profundo, manu infra tuberculatâ, interne pilosâ.

HAB. Insulas Philippinas.

*Carapace* narrowly-quadrate; sides with three teeth, including the orbital angle; the second widest, turned up considerably, the third very small.

*Fore-legs* with the joints very long, scarcely margined above; movable or upper claw with a very slight tooth near the base; fixed or under claw with a very deep sinus; fifth joint tuberculated on the under side, hairy on the inside.

HAB. Philippine Islands.

3. MACROPHTHALMUS SERRATUS, *White*.

*Thorace* anguste-quadrato, lateribus antice dentibus tribus robustis, postice carinâ subcrenulatâ.

*Chelis*, manu ab basin interne dilatatâ, longitudinaliter excavatâ; digitis pilis longis densis obsitis; digito superiore, in medio, dente truncato.

Pedibus posterioribus, parte superiore, spinâ prope extremitatem.

HAB. Insulas Philippinas.

*Carapace* narrowly-quadrate, with three strong teeth on the sides in front, succeeded by a slight somewhat crenated keel which margins the rest of the carapace.

*Fore-legs* with the fifth joint dilated on the inside from the base, and longitudinally hollowed out; inside of both claws densely clothed with long hairs; upper or movable claw with a large truncated tooth in the middle.

Hind-legs with a spine on the upper side near the end.

HAB. Philippine Islands.

2. CHASMAGNATHUS, *De Haan*.1. CHASMAGNATHUS CONVEXUS, *De Haan*.

*Thorace* gibbo, granulato, brevi-setoso, dorso subtetragono, lateribus arcuato.

*Fronte* arcuatâ, medio sinuatâ.

HAB. Maria orientalia.

*Octypode* (*Chasmagnathus*) *convexa*, De Haan, F. 1. p. 56. t. 7. f. 5.

*Carapace* gibbose, granulated, shortly-setose, subtetragonal on the back, arched at the sides.

*Front* arcuated, sinuated in the middle.

HAB. Eastern Seas.

## VIII. GRAPSIDÆ.

The *Sesarmæ* are found in various localities, sometimes in fresh-water rivulets, among weeds; sometimes under damp logs and stones at a considerable distance from any water, and most frequently among the roots of mangroves in salt-water swamps. They are active and extremely wary in their habits, and, like the *Grapsi*, very predacious. The *Grapsus plicatus* is a very common species in Borneo, and appears to vary greatly in colour according to the localities in which it is found. The *Grapsi* are fond of rocks, over which they run with surprising agility; they frequently remain stationary for hours, basking in the sun, when the tide has just left the high rocks.

1. UTICA, *White*.

*Pedipalpi externi* articulo tertio externe recto non dilatato.

*Thorace* 8-angulato, depresso, post-medium carinâ transversâ valde distinctâ; margine latero-anteriore dentibus tribus; parte latero-posteriore obliquâ, parte posteriore rectâ.

*Chelis* parvis.

Pedibus posterioribus perlongis, tarso vix dilatato subelongato, pilis fimbriato.

Outer *jaw-feet* with the third joint, on the outside, straight, not dilated.

*Carapace* somewhat eight-angled, tabular, a very strong transverse ridge behind the middle; latero-anterior margin with three teeth; latero-posterior part oblique, posteriorly very straight.

*Fore-legs* small.

Hind-legs very long, tarsus not particularly dilated, somewhat elongated, fringed with hairs as is the preceding joint.

This genus is nearly allied to *Trichopus*, De Haan, which is synonymous with *Varuna*, M. Edwards.

1. UTICA GRACILIPES, *White*. (Pl. XIII. Fig. 6.)

*Fronte* latâ, anteriore margine valde recto, post-frontem ad medium thoracem pertinente, eminentiâ magnâ latâ subtriangulari, a transversâ carinâ separatâ per altam lunatam depressionem, lineâ subimpressâ a finibus ad latus carinæ porrectâ. *Pedibus* gracillimis, pilis fimbriatis.

HAB. Insulas Philippinas.

*Utica gracilipes*, White, Pro. Zool. Soc., May, 1847.

*Front* wide, fore-edge very straight; behind it and extending to the middle of the carapace, a considerable, wide, somewhat three-sided elevation, separated from the transverse ridge by a deep lunated depression, from the ends of which a slight impressed line proceeds to the side of the ridge, where it deepens.

*Hind-legs* very slender, and fringed with hair.

HAB. Philippine Islands.

Mr. Cuming found this species in a fresh-water rivulet among the mountains of the Island of Negros. It was also obtained during the Expedition of the Samarang in the Island of Mindanao, in the deep still muddy fresh-water rivulets near Samboangan, hiding under weeds and rotten wood. When caught, it feigns death, contracting its limbs and rendering them perfectly rigid. Its colour, when alive, is dark-red brown, on the under-surface dark chocolate-brown, lighter on the legs and abdomen, which latter in the female has a yellowish line down the middle.

## IX. LEUCOSIDÆ.

Besides several species of *Leucosia* new to science, a few *Philyræ* were obtained in the Sooloo Sea, and on the coast of Borneo from a rocky stony bottom; among them was the *P. scabriuscula* of Leach, which, when alive, is of a chocolate colour, with red-brown legs; the *Philyra latifrons* (A. & W.), which is of a deep red brown, with orange fore-legs; and another with a dead-white polished carapace, marked with dark olive brown, and the fore-legs banded with the same. The *Philyræ* have much the same habits as the *Leucosia*, being slow-moving, torpid Crustaceans, never using their fore-legs for defence, and living in deep water on a clean rocky or stony floor. A pretty species of *Myra* was dredged in the Sooloo Sea of a delicate flesh colour, with two blood-red spots on the carapace. The *Myra fugax*, which is punctulated and dark liver-coloured on the carapace, and a new species with white carapace and pinkish legs, were also procured; they are found usually in about eight or ten fathoms on a muddy bottom; one species is common in the mud of Manila bay. The *Arcaniæ* are usually of a dead-white colour, variously marked with red, with the legs spotted or banded; they prefer deep water and a clear gravelly bottom; several were dredged on the coast of Borneo in twenty-four fathoms. The *Ivæ* inhabit very deep water, and are inert and feeble; when taken they contract their legs and remain perfectly immovable. The *Iphides* are usually found concealed in madrepores and sponges, and live in a coral bottom in from fifteen to twenty fathoms; they are numerous on the coast of China.



1. LEUCOSIA, *Fabricius*.1. LEUCOSIA HEMATOSTICTA, *Adams & White*. (Tab. XII. Fig. 2.)

*Thorace* trapezoidali supra valde convexo, post angulum latero-anteriorem in-scissurâ profundâ, maculis multis sanguineis rotundatis obsito.

HAB. Maria Orientalia.

*Carapace* trapezoidal, very convex, of a light yellow, covered with numerous small round blood-red spots, fewer posteriorly, and in the middle line a deep notch behind the latero-anterior angle.

*Front* obtuse.

*Fore-legs* with round, scattered, blood-red spots, and a large quadrate mark of the same colour on the outer surface of each claw.

*Hind-legs* with a blood-red band on the upper half of each joint.

HAB. Eastern Seas.

2. OREOPHORUS, *Ruppell*.1. OREOPHORUS RETICULATUS, *Adams & White*. (Tab. VI. Fig. 1.)

*Thorace* subtrigono, reticulato, fossis subdivisis duabus latero-anterioribus, postice fossâ profundâ, in medio tuberculo clypeoformi, regionibus lateralibus valde elevatis.

*Fronte* rotundatâ antice subemarginatâ supra exsculptâ.

*Chelis* reticulatis.

HAB. Maria Orientalia.

*Carapace* subtrigonal, covered with a net-work of beaded lines, the intermediate areas finely granulated; a long semilunar, irregularly-shaped cavity extending along the latero-anterior margin on each side, separated by a strong post-frontal septum, each lateral cavity divided in two portions by two over-arching processes, which unite above, leaving a round foramen of communication; the posterior sublongitudinal portion partially divided by a conical projecting process; a small hole in the floor of the hind portion of the latero-anterior fossa; a cavity at the hind part of carapace nearly divided in two by a granulated tongue-shaped tubercle, and bounded posteriorly by two-obtuse tubercles of the hind margin; a solid shield-shaped reticulated process arising out of the hind part of the cavity; a beaded line around the margins of both fossæ; lateral regions convex, elevated into large obtuse prominences; lateral edges coarsely tuberculated.

*Front* thick and rounded, slightly emarginate, rather deeply excavated on the upper surface.

*Fore-legs* covered with coarse reticulations, formed of granulated lines. Upper claw spatulate, slightly curved downwards, flattened above, narrow beneath, a row of pits on the outer and inner margins, under edge tuberculiferous; upper surface with several rows of beaded lines. Under claw horizontally inclined, slightly curved upwards, elongately conical;

upper surface sharp and granular; under surface thin and tuberculated; inner surface concave, with two finely granulated parallel lines; outer surface convex, with two rows of holes, and two series of tuberculated lines.

*Abdomen* (of female) convex, wide, divided into about six pits by strong reticulations formed of graniferous lines.

HAB. Straits of Sunda.

### 3. IXA, *Leach*.

#### 1. IXA MEGASPIS, *Adams & White*. (Tab. XII. Fig. 1.)

*Thorace* subgranuloso, canaliculis dorsalibus angustis valde profundis, postice lineâ impressâ profundâ transversâ; lateribus valde productis granulosis retrorsum inclinatis, finibus obtusis, dente terminali parvo curto.

HAB. Borneonem. Insulas Philippinas.

*Carapace* subgranular, the channelled grooves which separate the middle from the lateral regions very deep and narrow, a deep transverse posterior groove, the lateral prolongations granular, inclined backwards, long and slender, the ends obtuse, and slightly curved forwards, the stiliform tooth at their extremities very short and small.

HAB. Borneo (Tampasook); Philippines (Bohol).

The species, when alive, has the carapace of a light red colour, with dark crimson in the middle, the lateral prolongations of the carapace being purple, with orange tips: the legs are bright red. It differs from the *Ixa cylindrica* in the lateral prolongations being inclined backwards, more slender and longer, the ends more obtuse, and curving forwards, the terminal spine is much shorter and smaller, the surface of the carapace is less granular, the middle region is not so deeply notched on each side, the dorsal grooves are narrower and deeper, and the hind groove is more transverse.

#### 4. HARROVIA, *Adams & White*.

*Thorace* subpentagono, dense tomentoso, lineis duabus elevatis, tuberculisque quatuor obtusis; marginibus latero anterioribus dentibus tribus obtusis.

*Fronte* valde rectâ in medio emarginatâ, angulo canthi externe prominente dentiformi.

*Chelis* granulosis, brachio supra spinis duabus interne spinâ duplicatâ, carpo tuberculo unico, manu cylindricâ sulcatâ, digito ad basin tuberculo parvo externe.

*Carapace* subpentagonal, densely tomentose, with two transverse raised lines on the upper surface, each ending externally in a prominent blunt tubercle, and two faintly-impressed lines posteriorly; latero-anterior margins with three obtuse teeth, the anterior small and rounded, the middle large and more prominent, and the posterior strong and conical.

*Front* very straight, emarginate in the middle, the inner angle of the orbits forming a strong tooth in the same line as the front.

*Fore-legs* granulose, twice the length of the carapace; third joint with two spines on the upper edge, and a double spine on the inner edge; fourth joint with a single tubercle above, and an elongated simple lobe externally; fifth joint subcylindrical, with two longitudinal grooves externally, and a single groove internally.

*Claws* short; upper claw curved, with a single small tubercle, externally, near the base, lower edge with numerous teeth; lower claw triangular, grooved externally, the upper edge sharp and dentate.

*Abdomen* (of female) seven-jointed, tomentose, the edges fringed with coarse short hairs.

1. HARROVIA ALBO-LINEATA, *Adams & White*. (Tab. XII. Fig. 5.)

*Thorace* rubro, lineis pallidis.

*Chelis* carmineis, infra rufescente.

HAB. Borneonem et Insulas Philippinas.

*Carapace* of a red colour, with light transverse markings.

*Fore-legs* crimson; under surface of body rufous.

HAB. Borneo. Philippine Islands.

5. IPHIS, *Leach*.

1. IPHIS NOVEM-SPINOSA, *Adams & White*. (Tab. XIII. Fig. 1.)

*Thorace* lævi granuloso, granulis antice aggregatis, postice sparsis, marginibus latero-anterioribus spinis duabus subobtusis prorsum et extrorsum porrectis; marginibus latero-posterioribus spinis duabus retrorsum et extrorsum directis, infra has spinis duabus brevis conicis retrorsum et extrorsum porrectis; margine posteriore, spinâ longâ rectâ in medio retrorsum directâ.

*Fronte* in lobos duos conicales divergentes divisâ.

HAB. Insulas Philippinas.

*Carapace* polished, granular, granules close together in front, more sparsely disposed towards the hinder part; latero-anterior borders with two short, stout, somewhat obtuse spines directed forwards and outwards; latero-posterior borders with two long spines directed backwards and a little outwards, with their ends curving upwards, and below these, nearer the middle line, two short conical spines proceeding backwards and outwards; posterior border with a long straight spine in the middle, projecting directly backwards.

*Front* ending in two conical diverging lobes.

HAB. Philippine Islands (Mindoro).

This species differs from *Iphis septem-spinosa* of Leach, in the general form of the carapace, which is less triangular, more oval, covered with granules, and wants the sharp ridge which extends along the middle of the carapace of *I. septem-spinosa*; in the lateral spines being short and curved; in the possession of two additional spines placed anteriorly to these latter; in the greater comparative size of the upper posterior pair of spines; in the



stouter condition of the prehensile and ambulatory feet ; and in the well-marked peculiarity of the front.

## 6. IPHICULUS, *Adams & White.*

*Thorax* sublatisior quam longior, denso tomento spongioso obsitus ; marginibus latero-anterioribus spinis quatuor fimbriatis ; marginibus latero-posterioribus tuberculis duobus obtusis, parte coarctatâ lineis impressis duabus longitudinalibus, et sulco transverso, postice tuberculo subelevatiusculo.

*Frons* tuberculis duobus depressis, fissâ separatis.

*Chelæ*, manu gibbosâ, digitis perlongis, gracilibus, multis denticulis longis instructis.

*Abdomen* (maris) ad articulum basalem foveâ profundâ sublongitudinali.

*Carapace* rather wider than long, covered with a dense woolly tomentum, resembling fine sponge ; latero-anterior margins with four fringed spines, increasing in size from the front backwards, the fourth spine, forming the latero-anterior angle, being very strong and prominent ; latero-posterior margins with two obtuse tubercles, separated by a sinus ; the coarctate portion of carapace marked by two longitudinal and one transverse groove, and ending in a rounded slightly-elevated tubercle.

*Front* consisting of two very short depressed tubercles, separated by a notch, each tubercle rounded in front ; mouth extending beyond the front.

*Fore-legs* with the fifth joint gibbous ; the claws very long and slender, with numerous fine long sharp teeth.

*Abdomen* (of male) with its basal joint with a deep sublongitudinal fovea.

### 1. IPHICULUS SPONGIOSUS, *Adams & White.*

*Thorace* fusco, tomento denso spongioso oblecto ; lateribus, anteriore spinis quatuor fimbriatis, posteriore tuberculis duobus.

HAB. Insulas Philippinas.

*Carapace* brown, covered with a thick sponge-like woolly tomentum ; sides with four fringed spines anteriorly, and two tubercles posteriorly.

HAB. Philippine Islands.

This genus should properly follow *Ceratocarcinus*, with which it is closely allied, and should be placed in the same group as that Crustacean ; it appears, among the *Parthenopidæ*, to hold the same place as *Oreophorus* does among the *Leucosidæ*.

## 7. TLOS, *Adams & White.*

*Thorax* latior quam longior lævis ; regionibus lateralibus valde excavatis, marginibus lateralibus trilobatis, margine posteriore excavato, loliâ bicarinatâ ; multis tuberculis parvis ad basin circumdatis.

*Frons* integra rotundata deorsum reflexa.

*Chelæ* branchio triangulare, carpo supra bicarinato, manu carinâ tuberculiferâ, digitis ad fines curvatis.

*Abdomen* (feminæ) articulis septem, ovale tuberculosum.

*Carapace* much wider than long, smooth, the lateral regions cup-shaped, with raised edges, with an anterior and posterior groove; lateral edges divided into three lobes, the front lobe straight and reflexed backwards, the middle simple and rounded, the posterior elevated and wedge-shaped; the middle region with a strong vertical ridge ending behind in an obtuse tubercle, and on each side with two perpendicular three-sided elevations, truncated at their apices, with a small tubercle at their fore-bases; posterior margin of carapace excavated, with a large projecting lobe flattened above, with two ridges behind, a rounded elevation in front, and numerous small tubercles near the base.

*Front* entire, rounded, reflected backwards, showing a central groove on the under surface.

*Fore-legs* with the third joint triangular, the edges tuberculiferous; the fourth joint with two tubercular ridges on the upper surface; fifth joint with a tubercular keel above; claws slightly curved at the ends.

*Abdomen* (of female) oval, tuberculated, seven-jointed, surrounded by an elevated ridge.

It is interesting to see the analogous armature of the carapace with that of *Xanthasia murigera* (White) amongst the *Pinnotheridæ*. The name *Tlos* is from the town of that name in Lycia, so well described by Sir Charles Fellowes in his Asia Minor. It is distinct enough from *Tylos*, another genus of *Crustacea*, so as not to be confounded with it in sound.

1. TLOS MURIGER, *Adams & White*. (Tab. XIII. Fig. 2.)

*Thorace* lævi, regionibus lateralibus valde excavatis; marginibus lateralibus trilobatis; margine posteriore excavato, lobo bicarinato multis parvis tuberculis ad basin.

HAB. Borneonem.

*Carapace* smooth; lateral regions deeply excavated; side-margins with three lobes, hind margin excavated, a two-ridged lobe with numerous small tubercles at the base.

HAB. Borneo.

## X. CORYSTIDÆ.

The genus *Trichocera* is not uncommon among the islands of the Philippine Archipelago, where it is found among the reefs concealed in the coral, or hiding under stones; it has all the habits of the *Xantho* group; the *Corystes* inhabits rather deep water, preferring the same localities as the *Leucosia*, which it likewise resembles in its habits; a species of *Gomezia* was dredged by Mr. Cuming in the Philippines, but the other genera of this family do not appear to be found among the islands of the Eastern Seas.

1. TRICHOCERA, *De Haan*.

1. TRICHOCERA GIBBOSULA, *De Haan*.

Parva, pilosa, thorace dilatato, brevi, setoso, tuberculato, tuberculis mediis planis quinque transversim dispositis; lateribus 10-dentatis; fronte 5-dentatâ.

HAB. Japonian.

*Corystes (Trichocera) gibbosula*, De Haan, Faun. Japon. t. 2. f. 4; t. 13. f. 3.

Small, hairy, the carapace dilated, short, setose, tuberculated, the five middle plane tubercles disposed transversely; sides ten-toothed; front five-toothed.

HAB. China Sea. Japan.

## 2. TRICHOCERA PORCELLANA, *Adams & White*.

*Thorace* depresso lævi, lineis multis denticulatis transversis obsito; lateribus spinis quinque robustis acutis curvatis.

*Fronte* valde supra sulcatâ, lobis duobus obtusis dente magno externe.

*Chelis* lævibus, lineis transversis denticulatis obsitis; digito superiore supra dentato; digito inferiore tuberculis quatuor supra, lineis duabus longitudinalibus infra.

*Pedibus* posterioribus lævibus, pilis longis fimbriatis.

HAB. Insulas Philippinas.

*Carapace* depressed, polished, covered with numerous transverse finely-denticulated lines, some interrupted and some continued into the lateral spines; sides with five sharp strong curved spines, the first and last simple, the others with small spines at their bases.

*Front* deeply grooved above, with two obtuse denticulated lobes, each with a large tooth externally.

*Fore-legs* polished, covered with short finely-denticulated transverse lines; claws long, with the spatulate extremities abruptly curved, upper claw dentated above, with small tubercles below, lower claw with four tubercles above, and two longitudinal denticulated lines externally.

*Hind-legs* dilated, smooth, fringed with long hairs.

HAB. Philippine Islands.

By Professor De Haan, the most able of modern Crustaceologists, this species would be referred to the division which contains *Xantho*, and we must confess that in its general appearance it has some resemblance to the Chilian genus *Paraxanthus* of Lucas, of which there are specimens in the British Museum; with the genus *Thia* of the family *Corystidae* it has some considerable analogy, and may be said, in the group *Xantho*, to represent that family. Like the *Cancer (Xantho) integer* of M. De Haan, this species is of a bright yellow brown, with golden hairs (in the dried state), and both species are found in the Philippine Archipelago.

## XI. HIPPIDÆ.

The genera which compose this small but very natural group have, so far as I have observed, very nearly the same habits. They swim by sudden rapid jerks, like the *Galathea*, and appear to prefer the deep pools of the coral ledges; they are pre-eminently swimming Crustaceans, progressing but badly when taken from the water. An interesting addition to



our national collection in the form of *Notopus dorsipes*, De Haan, was obtained by us in the province of Unsang in Borneo, and a new genus (*Cosmonotus*) also rewarded our exertions while examining the same locality.

1. COSMONOTUS, *Adams & White*.

*Thorax* ovalis, antice acuminatus, lateribus valde compressis, in lineâ mediâ carinâ prominente, lateribus integris, angulo latero-anteriore spinâ brevi acutâ.

*Frons* profunde incisa, ad latera spina parva acuta.

*Chelæ* trigonales, interne planæ, externe convexæ.

*Abdomen* (maris) articulis septem, articulo ultimo trigonali.

*Carapace* oval, very much compressed laterally, especially in front, with a distinct prominent keel extending down the middle line, very strongly marked in front, but fainter posteriorly.

*Front* with a very small spine on each side of a deep angular notch, in which are placed the eyes.

*Fore-legs* strong, triangular, the upper claw arched, the lower claw small and dentated on the edge.

*Abdomen* (in the male) seven-jointed.

1. COSMONOTUS GRAYII, *Adams & White*. (Tab. XIII. Fig. 3.)

*Thorace* punctis multis depressis obsito.

*Fronte* valde incisâ externe spinâ parvâ acutâ.

*Chelis* trigonalibus brachio infra plano, externe convexo lineis multis transversis interruptis, supra carinato pilis fimbriato, interne concavo, carpo incurvato subcompresso, externe convexo, interne spinâ obtusâ; manu compressâ asperâ, margine superiore arcuato; digito inferiore angusto, elongato dente robusto prope extremitatem, digito inferiore brevissimo incurvato; pedibus posterioribus gracilibus brevibus.

HAB. Borneonem.

*Carapace* about an inch in length and half an inch wide, covered with numerous minute depressed punctures.

*Fore-legs* trigonal, the third joint plane on the under surface, the exterior convex with transverse, interrupted, engraved or impressed lines, the upper angle covered with long thick hairs, the inner surface concave; the fourth joint incurved, sub-compressed, convex externally, less convex internally, ending above and in front in a blunt spine; fifth joint compressed, elevated, with the upper edge arched, but not so sharp as in *Notopus*; the sides convex and covered with asperities or minutely denticulated ridges, interrupted and transverse; upper claw narrow, compressed, elongated, with a sharp apex, and a strong tooth near the distal extremity.

*Feet* short and weak as in *Notopus*; the first tibia bicarinated; the tarsus subquadrate, anteriorly bicarinate, with a scalpel-shaped claw; the second tibia one-keeled, with the tarsus

oblong, and a sharp elongated trigonal claw; the third tibia subtriangular, the tarsus short, flattened, trigonal, with a falcate claw; the fifth tibia triangular, very short, flattened; tarsus transversely ovate, with a small narrow claw.

*Abdomen* (of male) seven-jointed, the joints from the first to the sixth nearly of the same width as in *Notopus*, the last joint trigonal.

HAB. Borneo (Unsang).

*Cosmonotus* differs from *Notopus*, De Haan, in wanting the post-frontal, elevated denticulated ridge; in the dorsal keel ending abruptly in front, instead of terminating in a central frontal spine; in the front being notched, with a single spine on each side; in the carapace being much compressed, more especially in front, and in the produced and angular form, while in *Notopus* it is almost straight across the front; and in the sides being entire, with a short sharp spine at the antero-lateral angle. The species is named in compliment to J. E. Gray, Esq., F.R.S., Keeper of the Zoological department in the British Museum.

## XII. PENÆIDÆ.

A new species of *Sicyonia*, Edwards, of a scarlet colour, finely variegated with orange and yellow, with a greyish pubescence on the dorsal surface near the crest, was obtained in the Sooloo Sea together with a few *Zoææ*. The *Stenopus*, *Sicyonia*, and *Penæus*, usually swim in a slow and deliberate manner forwards, and occasionally with a sudden jerk propel themselves backwards. They keep at a considerable distance from the shore and seem to love deep still water, never appearing when the surface of the sea is ruffled.

### 1. STENOPUS, *Latreille*.

#### 1. STENOPUS HISPIDUS, *Latreille*. (Tab. XII. Fig. 6.)

*Thorace* spinis multis parvis pilisque sparsis obsito.

*Fronte* acuminatâ gracili sursum directâ, non ultra articulum basali antennarum superiorum pertinente; antennis perlongis filiformibus.

*Chelis* brevioribus quam paria pedum secuuda, longe ultra appendicem lamellarem antennarum inferiorum porrectis. Pari tertio pedum longiore quam totum corpus multis seriebus longitudinalibus dentium acutarum, tarsis duorum parium ultimarum pedum bifidis.

*Abdomine* laminâ mediâ pinnæ caudalis in centro sulcato, supra seriebus duabus spinarum.

HAB. Insulas Philippinas.

*Stenopus hispidus*, Latr. R. A. vol. iv. p. 93. Cuv. R. N. (Croch), t. 50. f. 2. Edw. Crust. vol. ii. p. 407. t. 25. f. 1. *Palæmon hispidus*, Oliv. Enc. vol. viii. p. 666. Seba, vol. iii. t. 21. f. 617.

*Carapace* covered with numerous small spines and scattered hairs.

*Front* pointed, slender, elevated, not extending beyond the basal joint of the upper antennæ; antennæ very long and filiform.

*Fore-legs* not so long as the second pair, but extending considerably beyond the lamellar appendage of the lower antennæ. Third pair of legs longer than the whole body, with many longitudinal rows of pointed teeth; tarsi of the two last pairs of legs bifid.

*Abdomen* with the middle lamina of the caudal fin grooved in the centre, and furnished above with two rows of spines.

HAB. Coast of Borneo, and Philippine Islands.

Our figure is coloured from a living specimen taken by me in the China Sea. *A. A.*

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[*Additional Species.*]

### CRYPTOSOMA, *Brullé.*

CRYPTOSOMA ORIENTIS, *Adams & White.* (Tab. XIII. Fig. 4.)

*Thorace* rotundato; marginibus latero-posterioribus rectiusculis. Thorace post frontem et oculos sine sulcis.

*Fronte* tribus lobis subacutis.

*Pedibus* gracilibus; articulo prætersali tenui, non incrassato.

HAB. Maria Orientalia.

*Carapace* subcircular, as broad as long, narrowed behind, covered with numerous small red tubercles, and five rows of larger tubercles; latero-anterior margins distinctly dentate; latero-anterior angle with a rather long and sharp spine.

*Front* with three subacute lobes; upper margin of orbit deeply notched in the middle.

*Fore-legs* with the third joint armed with two long spines on the outer side near the end, the fourth joint tubercular, the fifth joint compressed, with an elevated toothed crest above, and covered externally with tubercular spines.

*Hind-legs* smooth, slightly compressed, slender, with the pretarsal joints not thickened or dilated.

*Abdomen* (in the male) four-jointed.

HAB. Eastern Seas.

This species comes very near to *Cryptosoma cristatum*, figured by Brullé in Webb and Berthelot's Hist. des Iles Canaries (Tab. Crust. fig. 2). The *Mursia cristata*, Leach; *Cycloes granulosa*, De Haan, Faun. Jap. t. 19. f. 3; *Thealia acanthophora*, Lucas, Ann. Soc. Ent. Fr. 1839, p. 579. t. 21. f. 1 (*Mursia armata*, De Haan, Faun. Jap. p. 73. t. 19. f. 2); and this species, belong to a group of *Calappidæ* which seems very widely distributed.



XENOPHTHALMUS *White.*

XENOPHTHALMUS PINNOTHEROIDES, *White.* (Tab. XII. Fig. 3.)

*Thorace* punctulato, sulcis duobus longitudinalibus ab oculis porrectis, lateribus antice ciliatis.

*Pedibus* articulis ciliatis.

HAB. Insulas Philippinas.

*Xenopthalmus pinnotheroides*, White, Annals and Mag. Nat. Hist.

*Carapace* with the sides, in front, having a sharp ciliated edge; carapace punctured; two slight waved longitudinal grooves, one extending from each eye over the back of the carapace; most of the joints of the legs ciliated.

HAB. Philippine Islands.

We figure this curious genus on account of our being able to give a coloured representation from a drawing made from life in the Eastern Seas. *A. A.*

RHABDOSOMA, *Adams & White.*

*Oxycephalus*, M. Edwards.

We regret that the state of the only specimen in the British Museum is such that we cannot give the generic character with that detail which we should wish. It is founded on the third species of Professor Milne Edwards, indeed Mr. White has the authority of that eminent Crustaceologist that it is his very species: it is so different from the *Oxycephalus piscator*, M. Edwards (Crust. III. p. 100. t. 30. f. 10), that we have traced the figure of *O. piscator*, and added it below that of the *O. armatus*, to show the difference. Some day it may be proved to be a sexual character, when of course our name will sink, but *as yet* we know of no such discrepancies in the sexes of these Crustacea.

The head is as long as the rest of the body, and ends in a very long beak; from the state of our specimen we cannot describe this, but indicate it on the plate from a drawing made at the time of capture. The immense length of the body and the beak would sufficiently mark this generic form. The first two pairs of legs are shown in the figure, which must serve till we can procure further specimens, when we hope to give ample details of this very singular crustaceans and to analyse its characters at length. It forms a singularly interesting link between the *Amphipoda* and *Læmodipoda*, uniting, as it were, the two; we should like to have this form examined particularly by Prof. M. Edwards or Dr. Kroyer.

RHABDOSOMA ARMATUM, *Adams & White.* (Tab. XIII. Fig. 7.)

*Oxycephalus armatus*, M. Edw. Crust. III. p. 101. pl. 30. f. 10, copied. (Tab. XIII. Fig. 8.)

The specimen described by Professor Milne Edwards was found by MM. Quoy and Gaimard in the ocean between Amboina and Van Dieman's Land, and is now in the Paris Museum. Ours was taken during a calm, floating on the surface of the South Atlantic Ocean.

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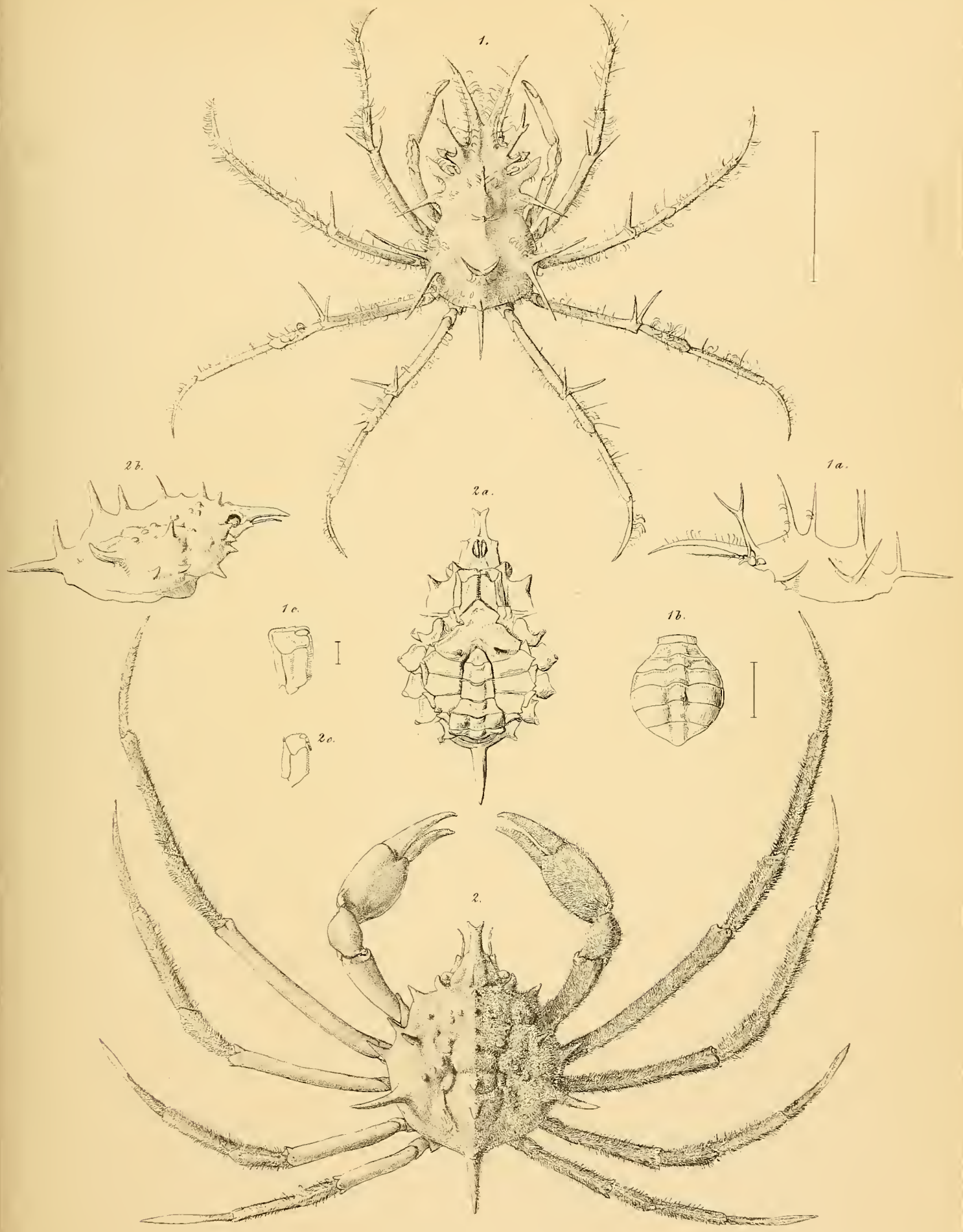
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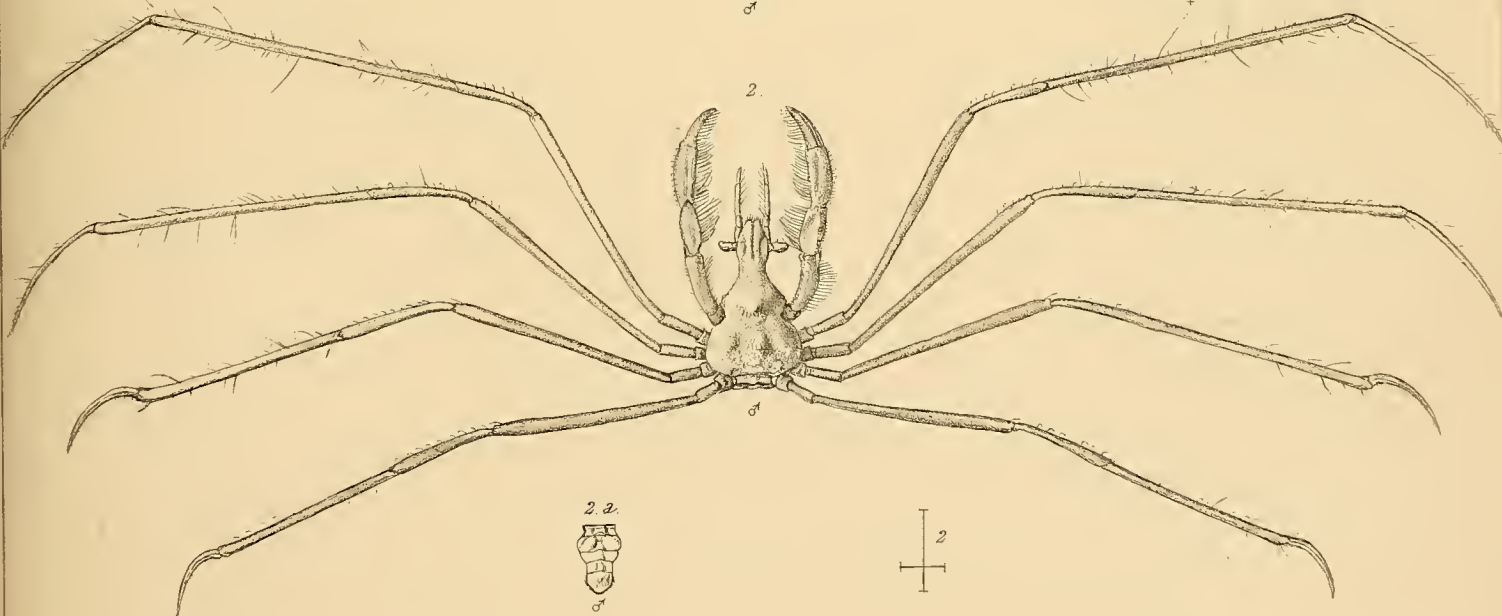
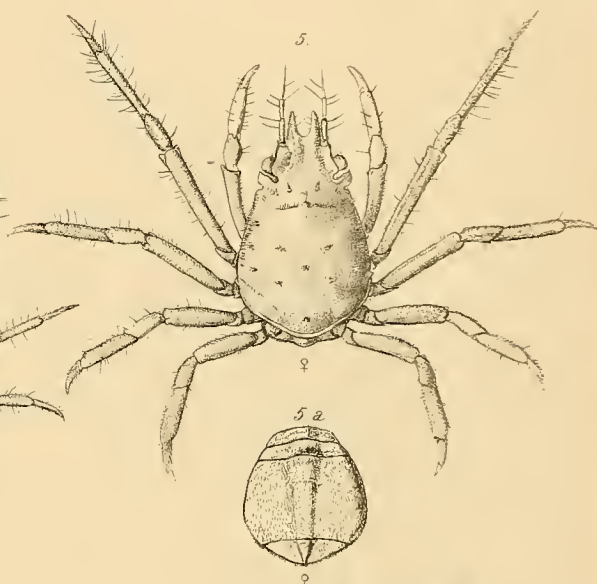
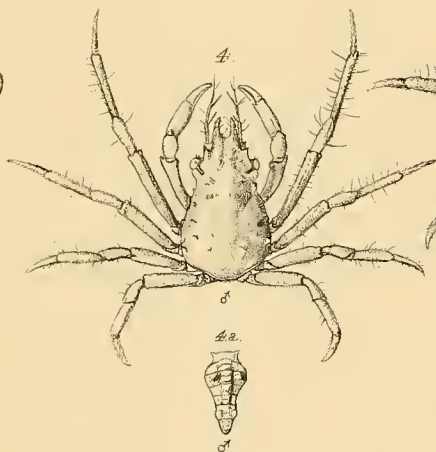
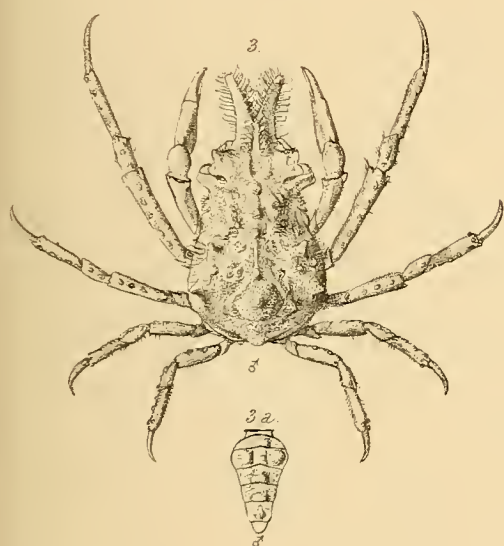
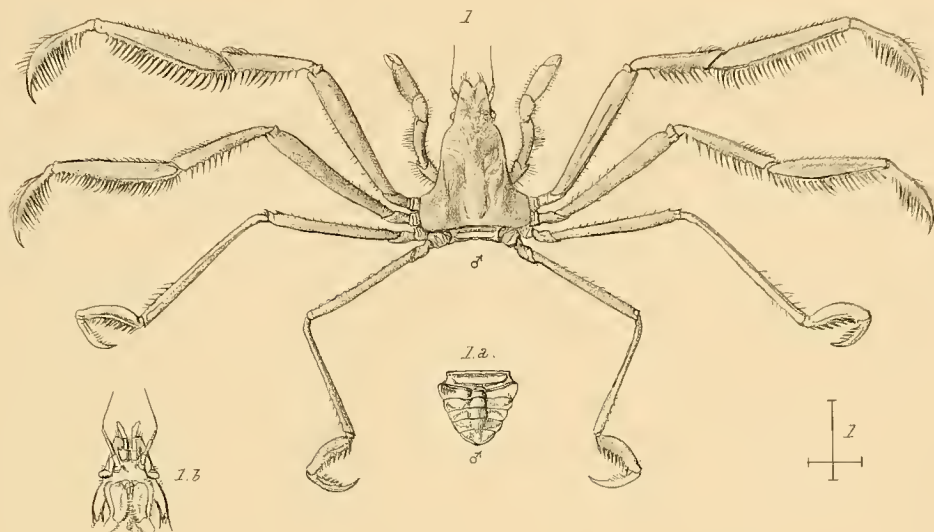
William Wang del. et lith.

on stone by Rees, Brothers.

1. CHORINUS ACANTHONOTUS, Adams & White. 2. DOGLEA CALCITRABA, White.







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Essex, Penham & Essee sculp.

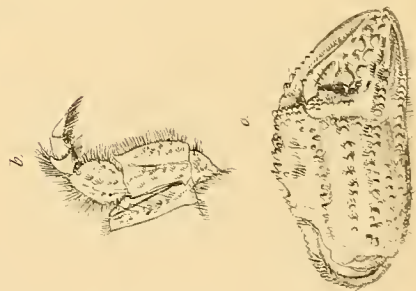
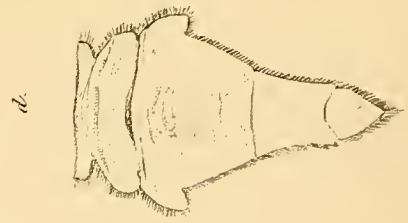
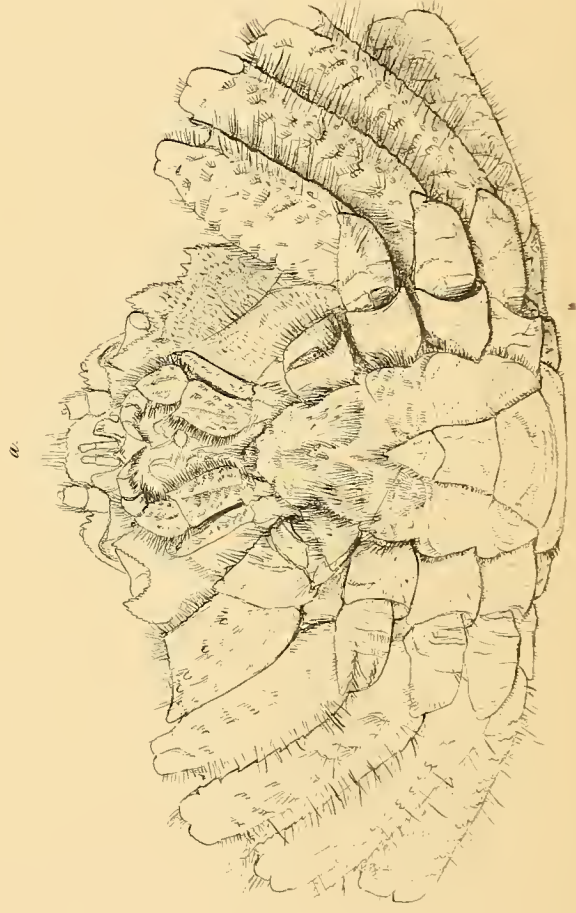
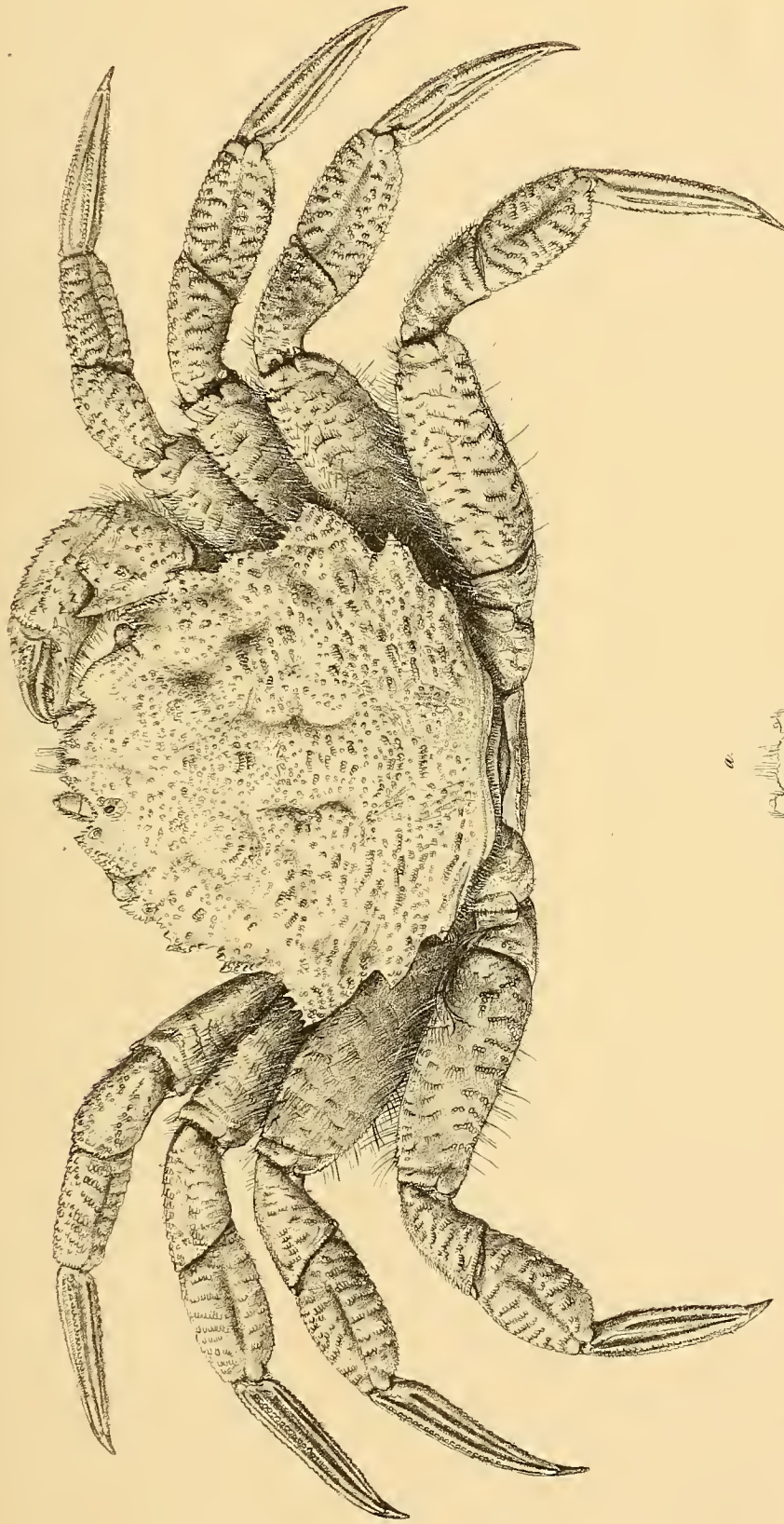
1. ONCINOPUS NEPTUNUS. Adams & White.

3. CHORINUS VERRUCOSIPES. Adams & White.

2. INACHUS LORINA. Adams & White.

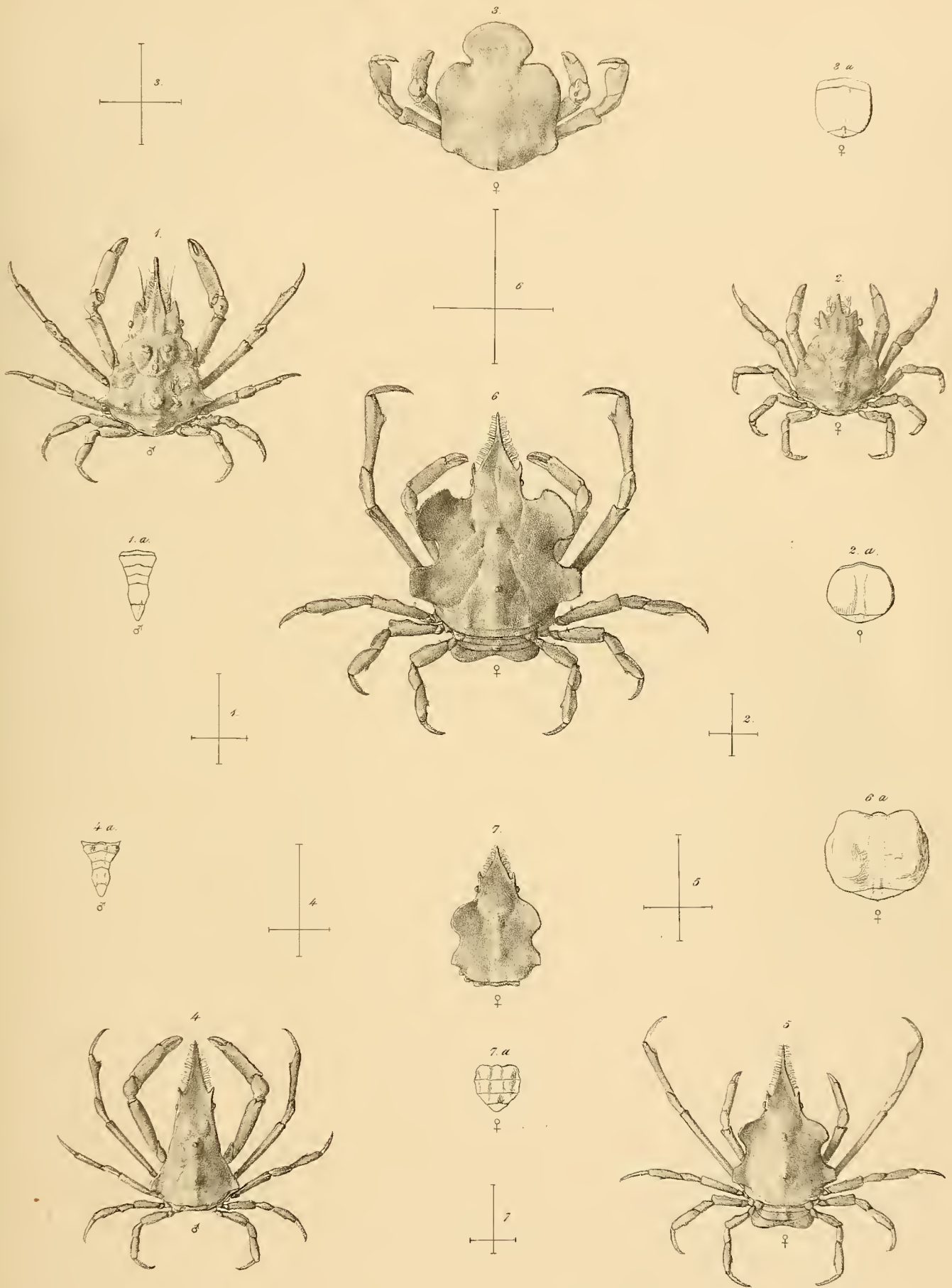
4 & 5. PISA PLANASIA. Adams & White.











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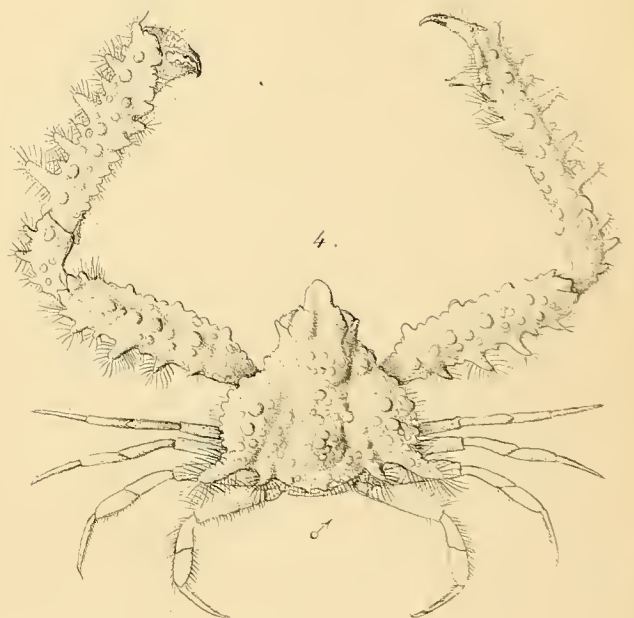
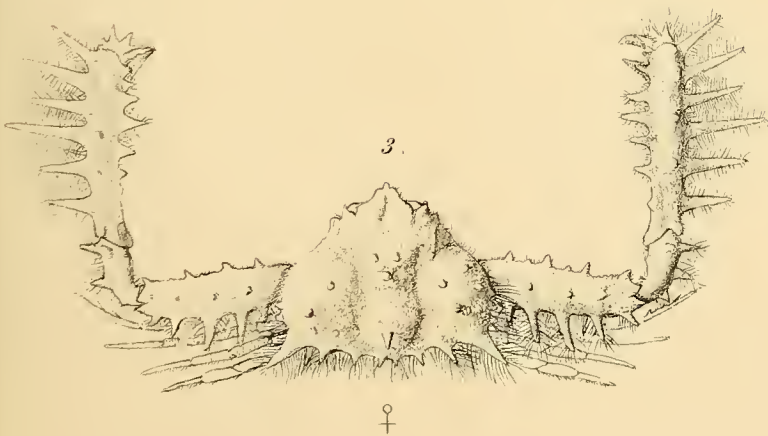
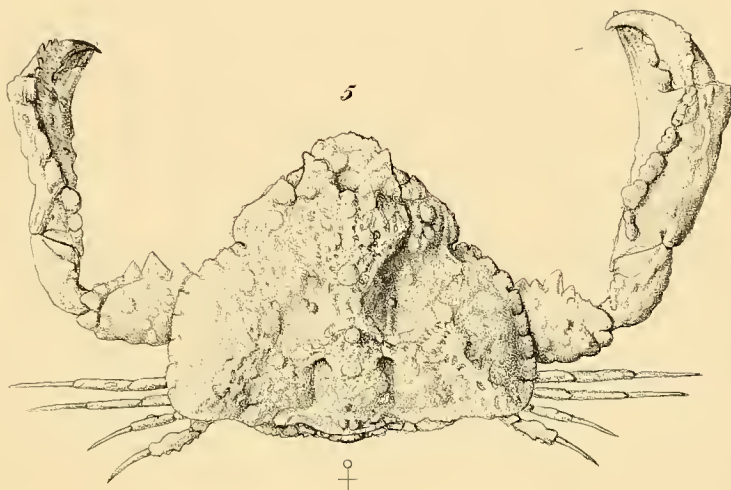
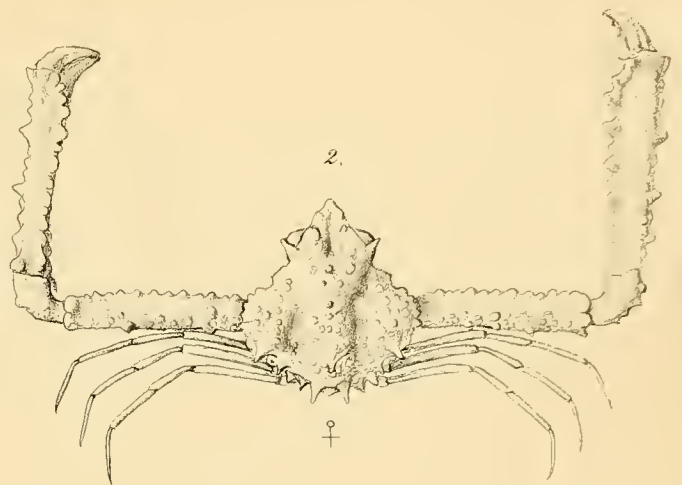
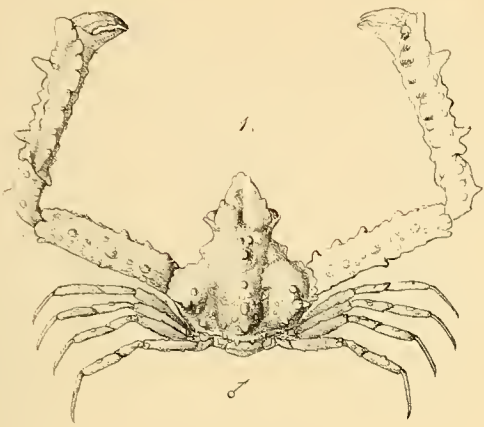
Reeve Benham & Esere, imp.

1 & 2. MENÆTHIUS SUBSERRATUS. ♂ & ♀ Adams & White. 3. HUENIA FRONTALIS, A & W.

4. 5. 6 & 7. HUENIA PROTEUS. De Haan.

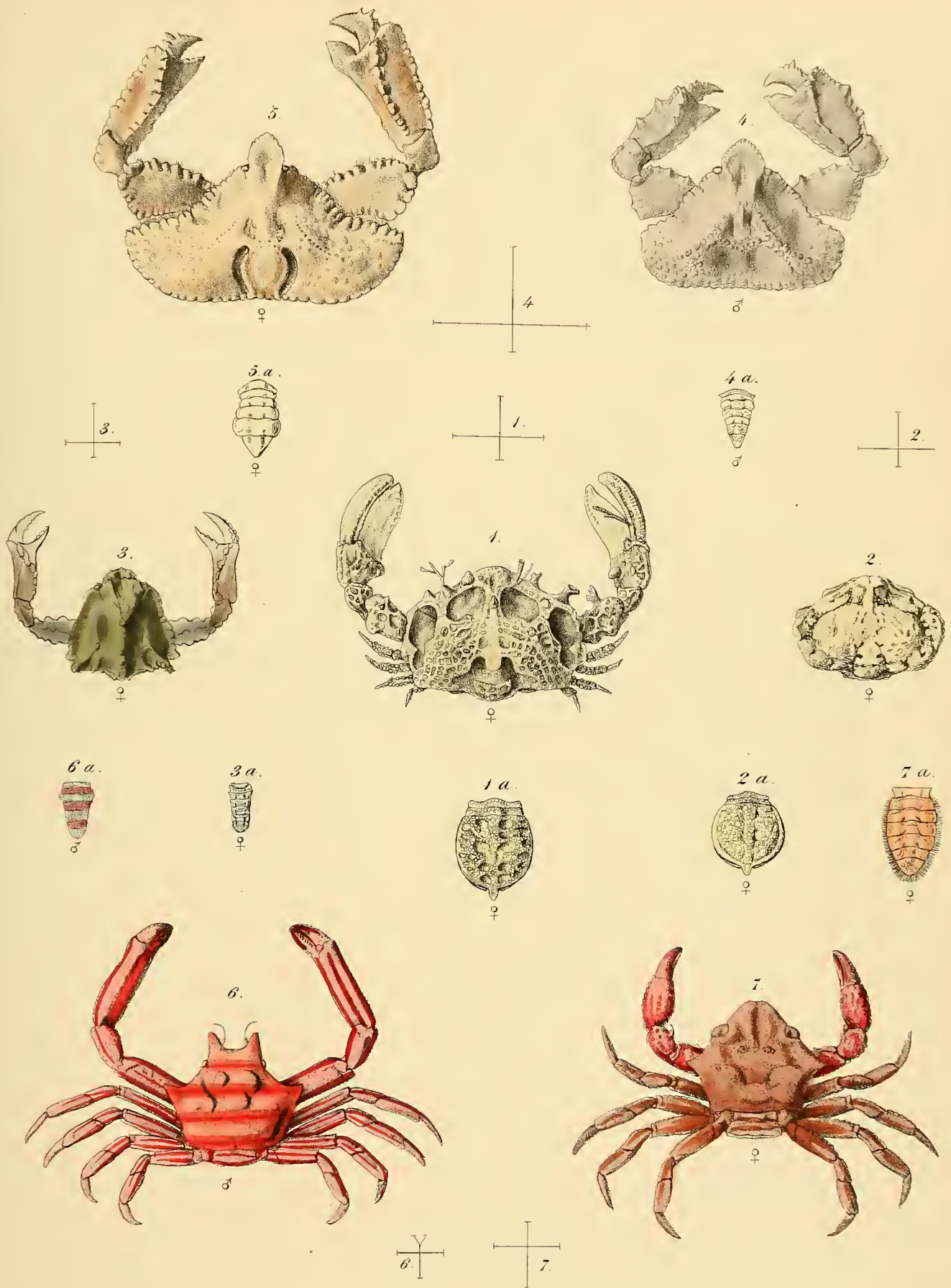






1. LAMBRUS LAMELLIFRONS, Adams & White.      3. LAMBRUS CARINATUS, Milne Edward.  
 2. LAMBRUS TURRIGER, Adams & White.      4. LAMBRUS PISCOIDES, Adams & White.  
 5. PARTHENOPE CALAPPOIDES, Adams & White.





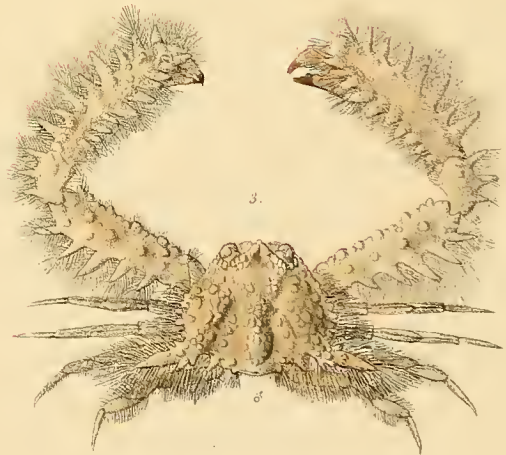
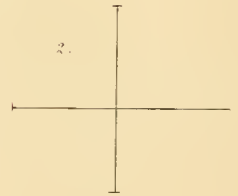
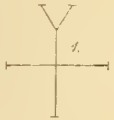
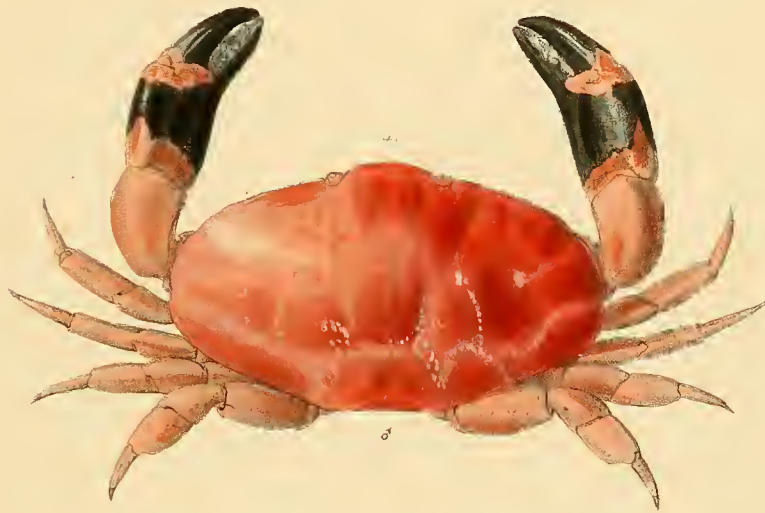
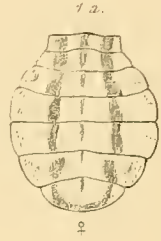
1. ORBOPHORUS RETICULATUS, Adams & White. | 4. CRYPTOPODIA FORNICATA, Herbst Jun<sup>r</sup>  
 2. ... JUN<sup>r</sup> | 5. CRYPTOPODIA DORSALIS, Adams & White  
 3. LEMBRUS HARPAX, Adams & White. | 6. CERATOCARCINUS LONGIMANUS, Adams & White.  
 7. GONATONOTUS PENTAGONUS, Adams & White.

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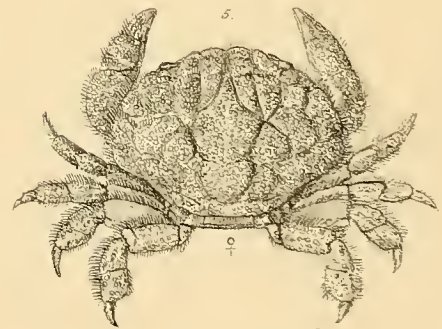
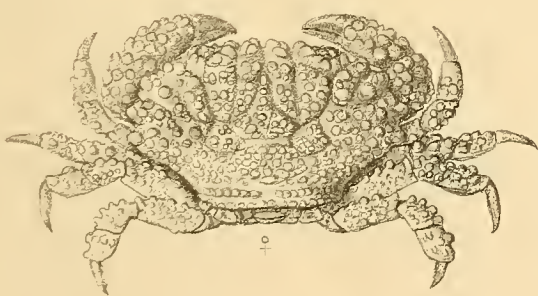
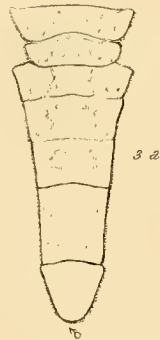
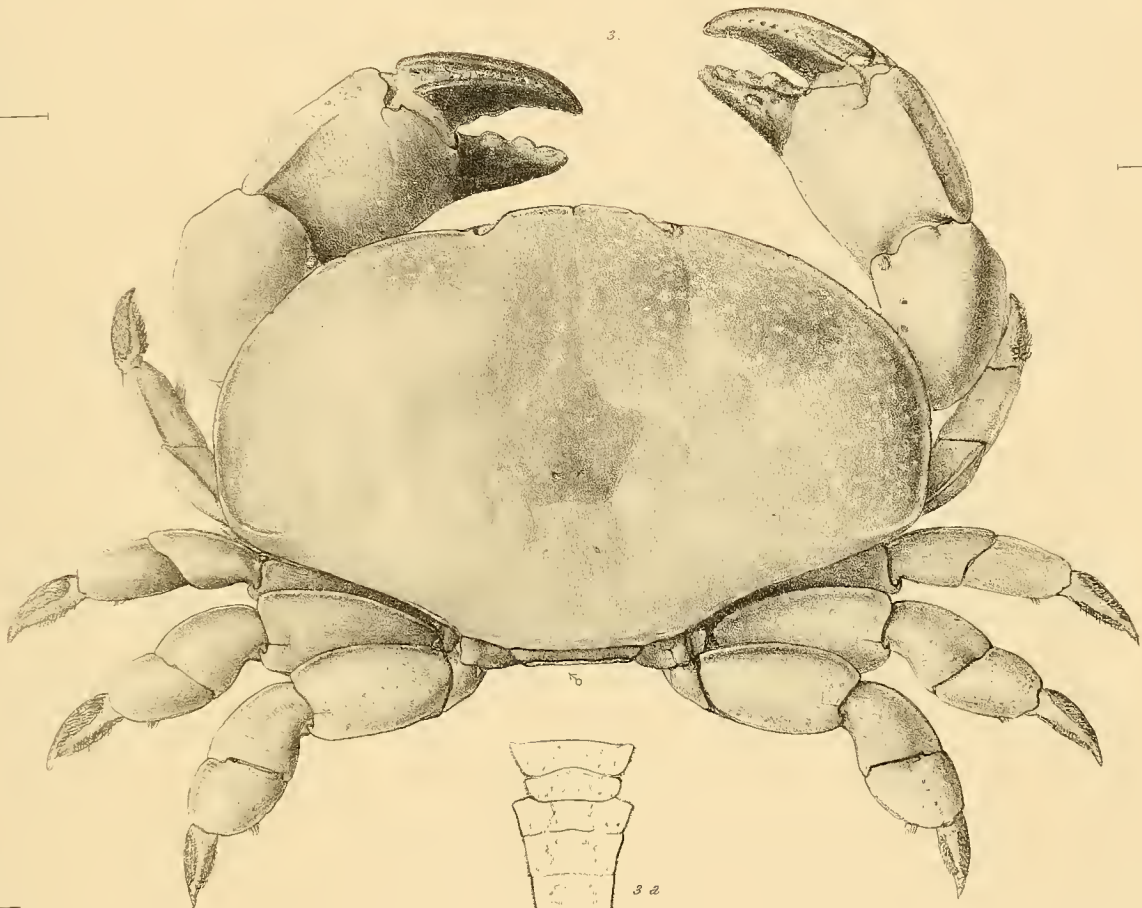
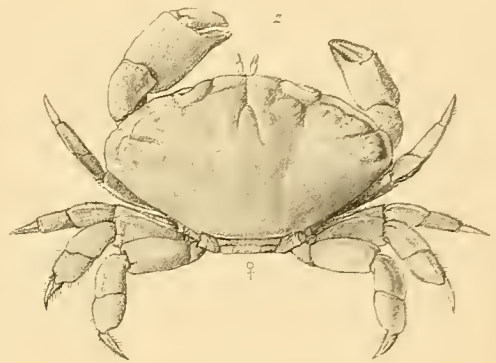
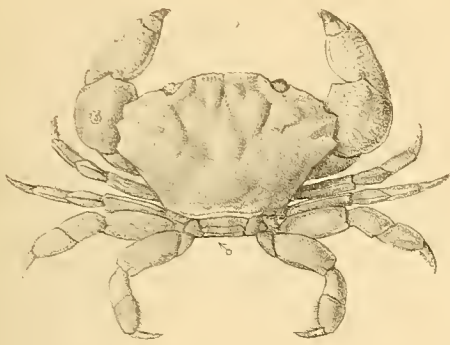




1 ZEBRIDA ADAMSI. White. 3 LAMBRUS HOPLONOTUS. Adams & White.  
2 PARTHENOPE TARPEIUS. Adams & White. 4 CARPILIUS CINCTIMANUS Adams & White.







1. ATERGATIS LATERALIS. Adams & White.

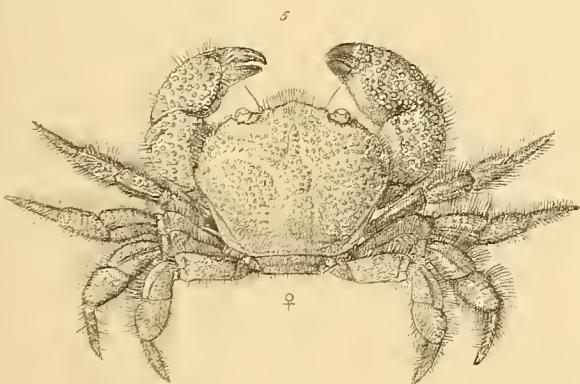
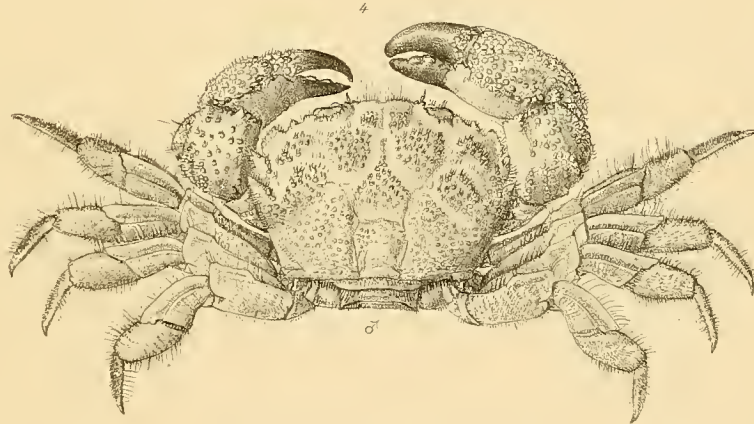
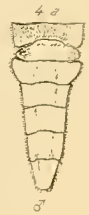
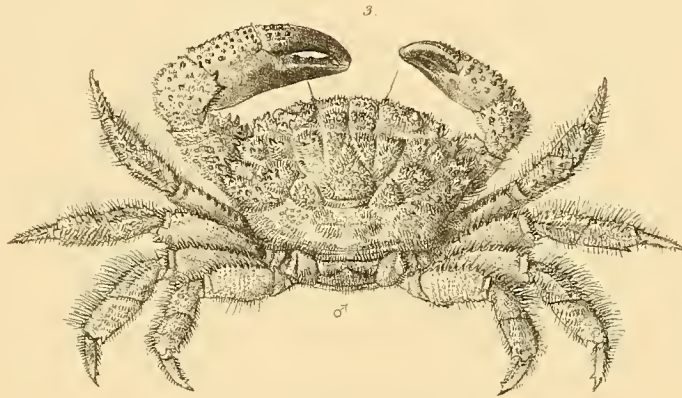
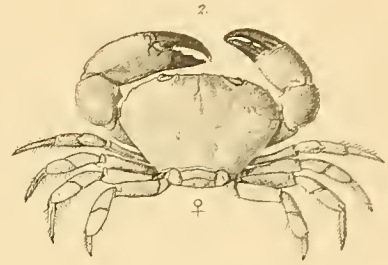
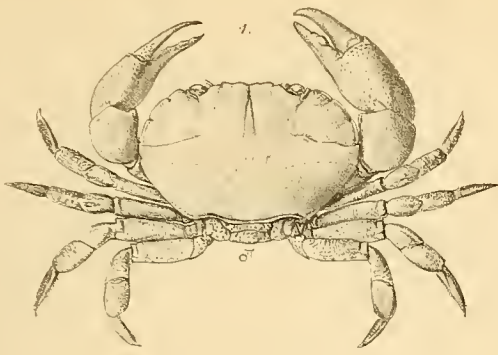
2. ATERGATIS INSULARIS. Adams & White.

3. ATERGATIS SUBDIVISUS. Adams & White.

4. ACTÆA NODULOSA. Adams & White.

5. ÆGLE RUGATA. Adams & White.





William. Wing, del. et lith.

Rees, Baskham & Trevering

1. PANOPEUS FORMIO, Adams & White.

4. PILUMNUS DILATIPES, Adams & White.

2. PANOPEUS CAYSTRUS, Adams & White.

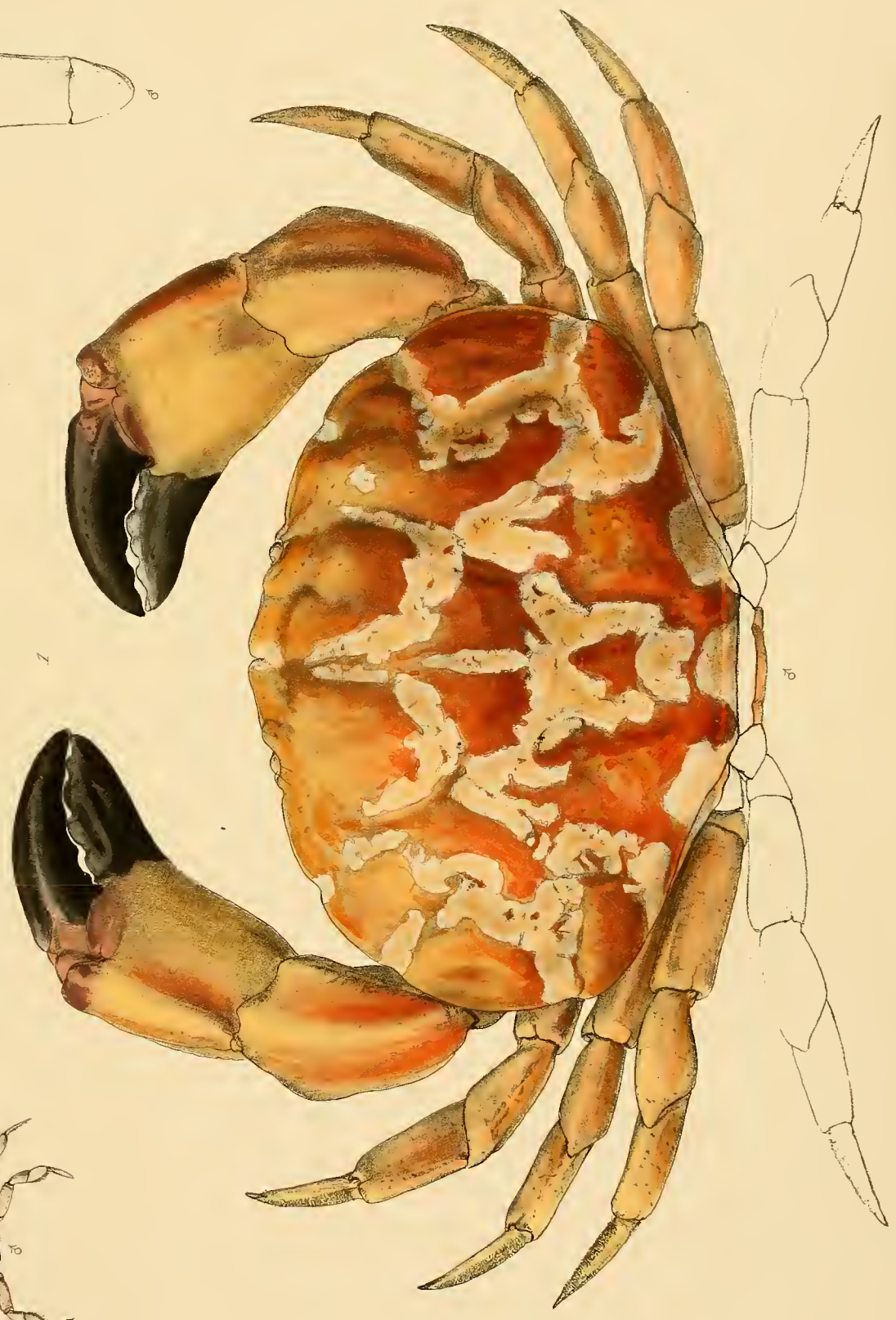
5. PILUMNUS SCABRIUSCULUS, Adams & White.

3. CHLORODIUS PILUMNOIDES, Adams & White.

6. PILUMNUS URSULUS, Adams & White.

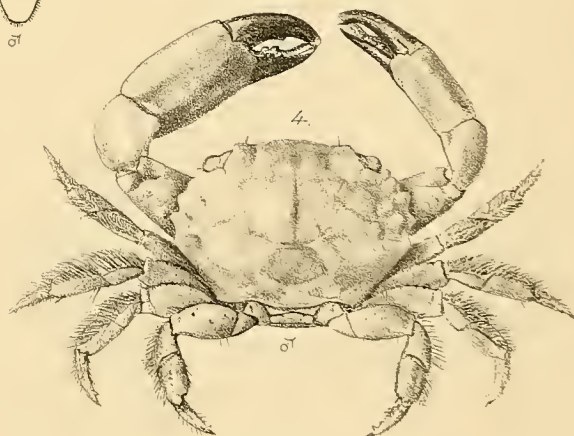
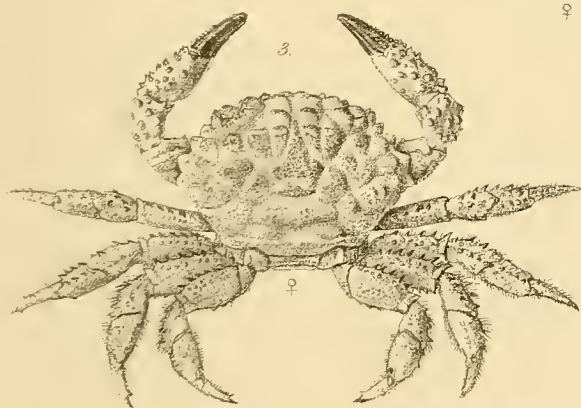
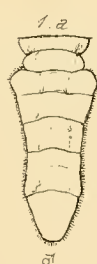
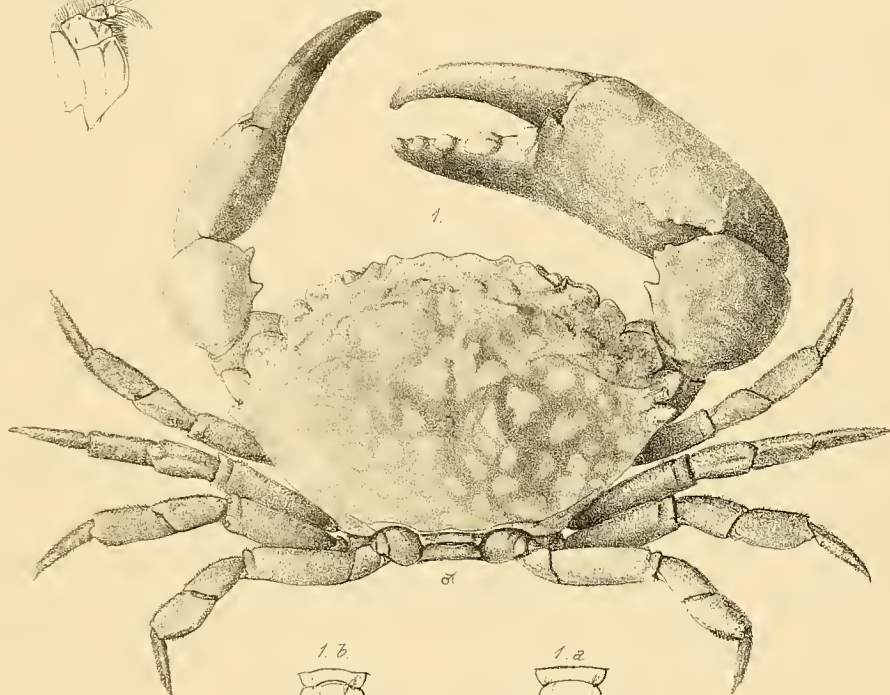
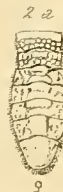
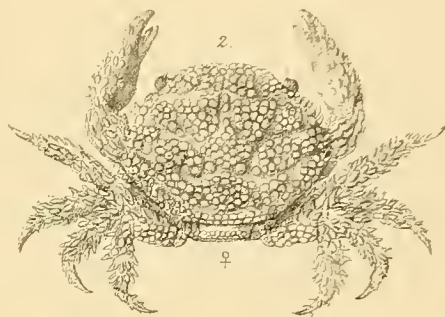












1. PANOPETS DENTATUS. White.

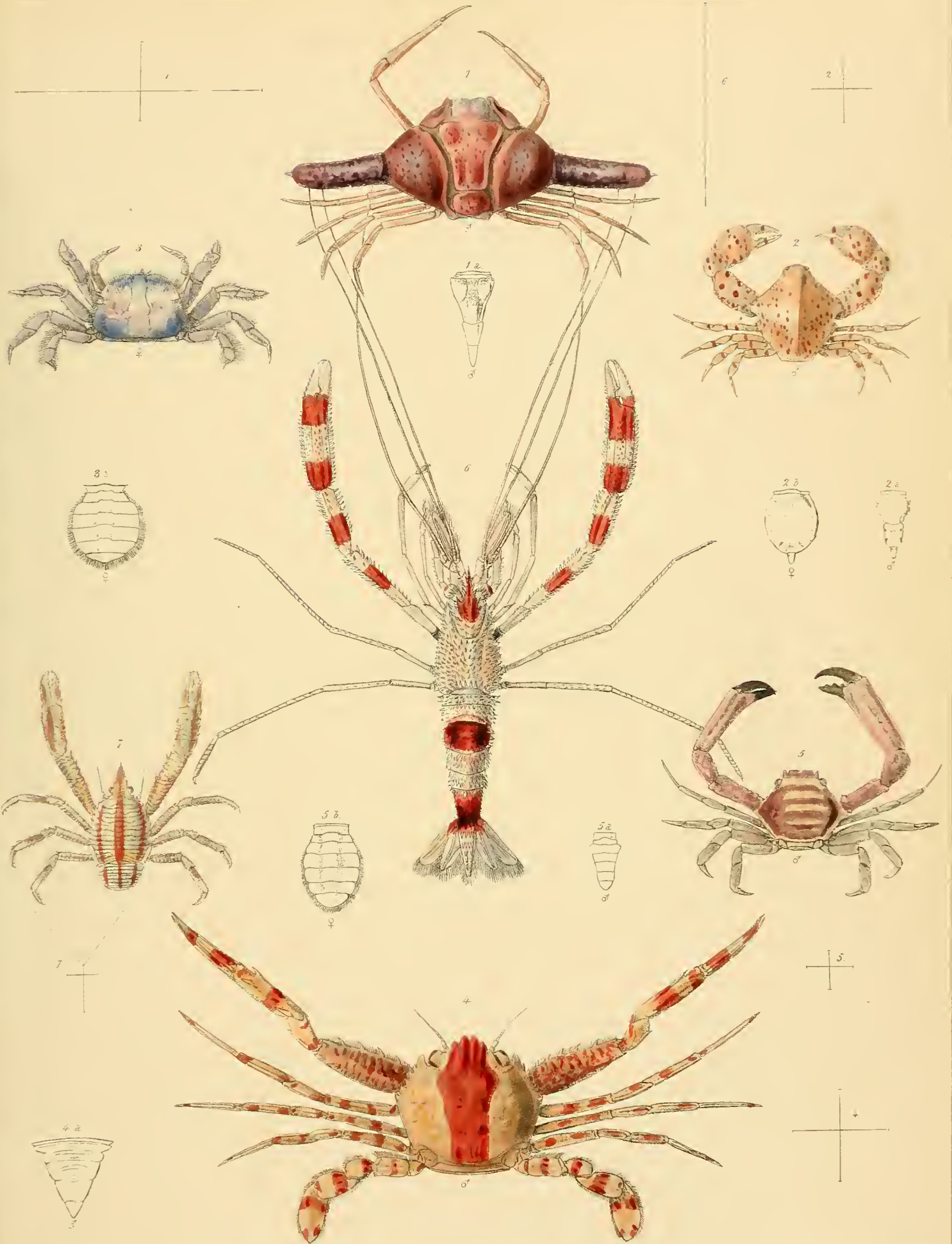
2. CHLORODIUS FRAGIFER. Adams & White.

5 LISSOCARCINUS POLYBIOIDES. Adams & White.

3. CHLORODIUS AREOLATUS. Milne Edwards.

4. CHLORODIUS LIRRIPES. Adams & White.



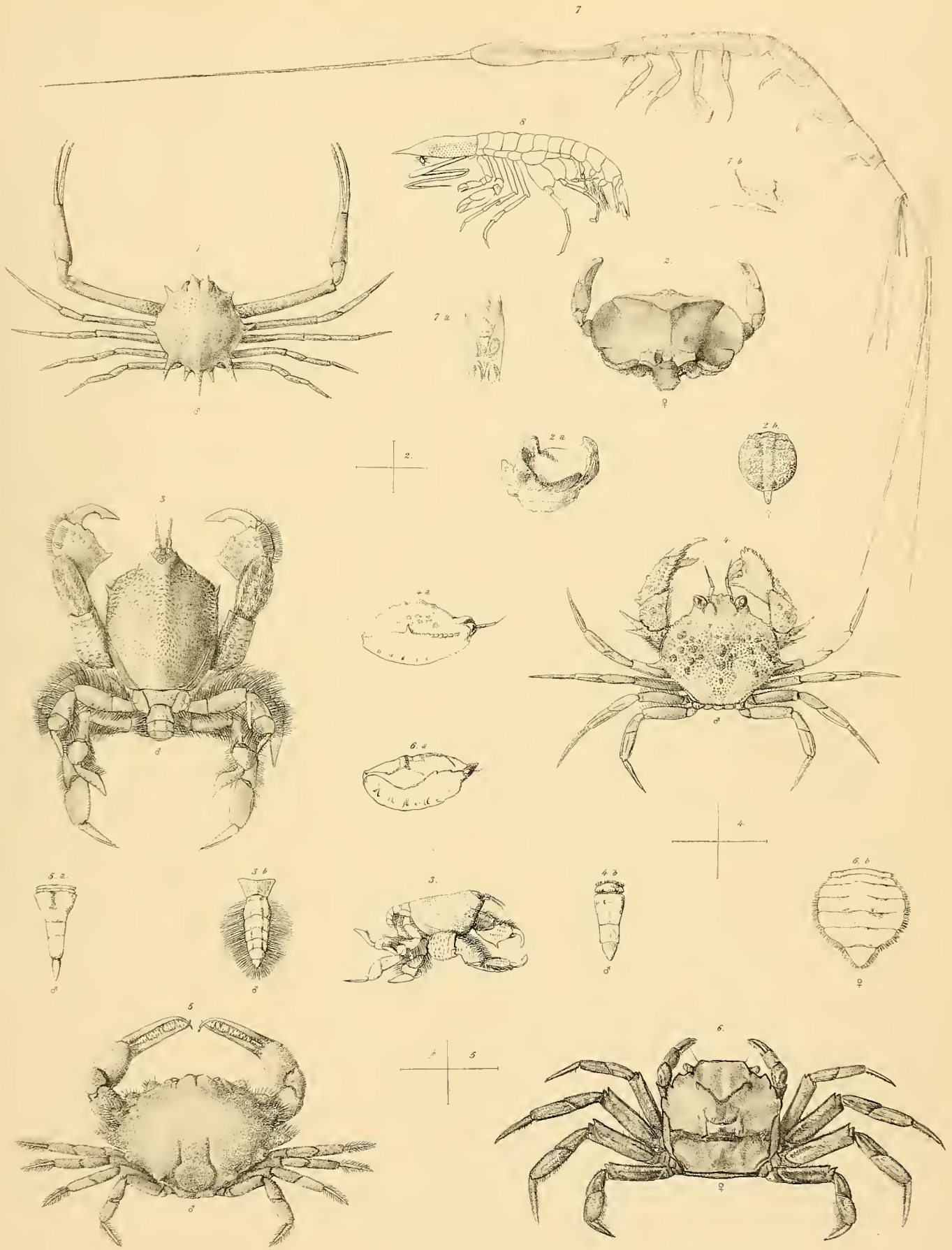


Deane, Seale, & Eschsch.

1 *IEA MECASPIS*. Adams & White  
 2 *LEUCOSIA HAEMATOSTICTA*. Adams & White.  
 3 *ZENOPHTHAIMUS PINNOTHEROIDES*. White  
 4 *LUPOCYCLUS ROTUNDATUS*. Adams & White  
 5 *HARROVIA ALBOLINEATA*. Adams & White  
 6 *STENOPUS HISPIDUS*. Latr.  
 7 *CALATHEA ELEGANS*. White







1 IPHIS NOVEM-SPINOSA. Adams & White. 5. IPHICULUS SPONGIOSUS. Adams & White. 2. TLOS MURIGER. White. 6. UTICA GRACILIPES White. 3. COSMONOTUS GRAYII. Adams & White. 7. RHABDOSOMA ARMATUM (M. Edw.) 4. CRYPTOSOMA ORIENTIS. Adams & White. 8. OXYCEPHALUS PISCATOR. Milne Edwards.

Reve Benham & Reesdrip



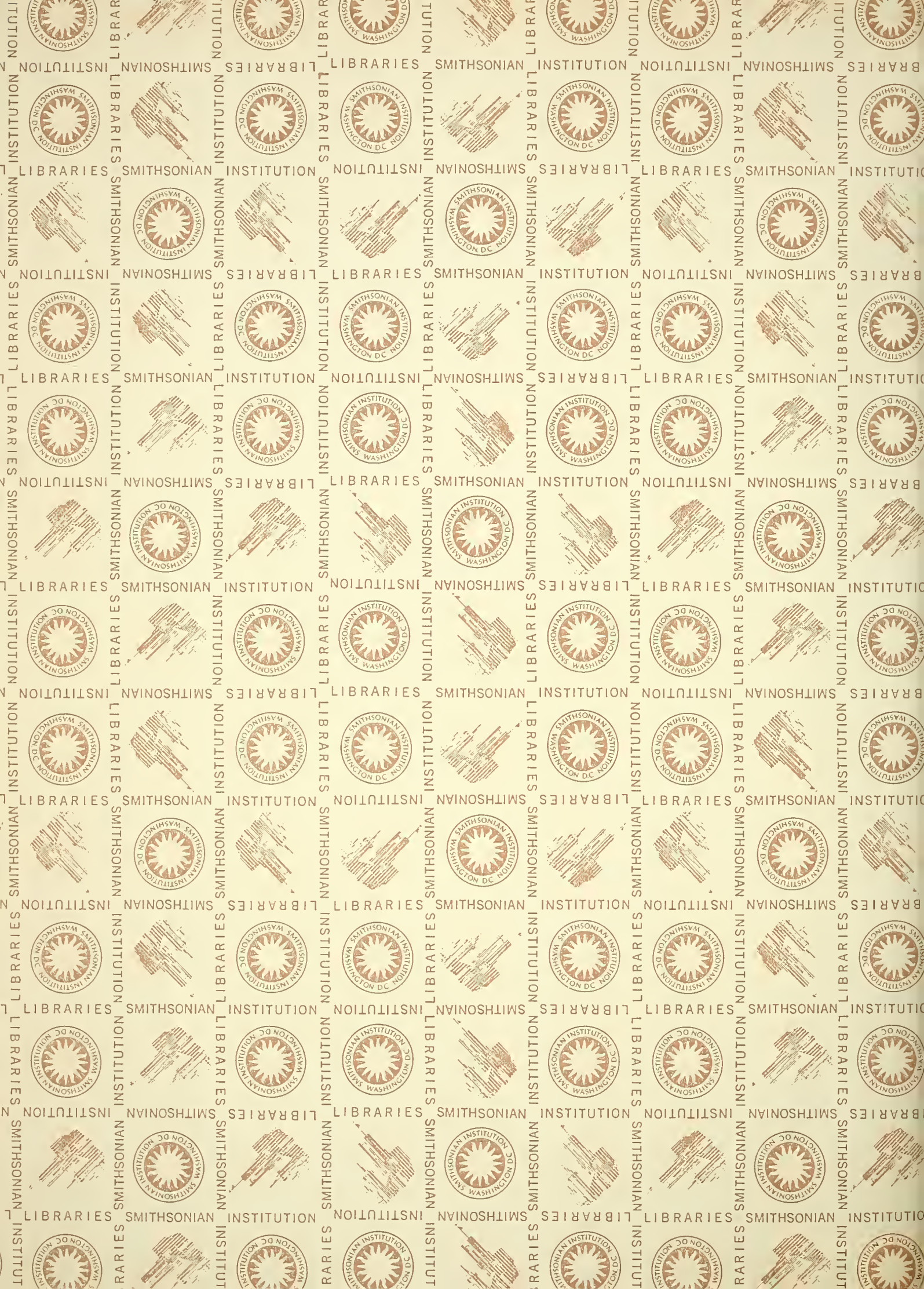


















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