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HISTORY  
OF THE  
MOLLUSCOUS ANIMALS  
OF  
ABERDEENSHIRE.

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MILLER

A HISTORY  
OF THE  
MOLLUSCOUS ANIMALS

OF THE COUNTIES OF  
ABERDEEN, KINCARDINE, AND BANFF;

TO WHICH IS APPENDED  
AN ACCOUNT OF THE  
CIRRIPEDAL ANIMALS  
OF THE SAME DISTRICT.

BY  
WILLIAM MACGILLIVRAY, A.M.,  
PROFESSOR OF NATURAL HISTORY,  
IN THE UNIVERSITY OF MARISCHAL COLLEGE, ABERDEEN;  
MEMBER OF THE WERNERIAN NATURAL HISTORY SOCIETY OF EDINBURGH,  
THE NATURAL HISTORY SOCIETY OF PHILADELPHIA,  
THE LYCEUM OF NEW YORK,  
THE LITERARY AND PHILOSOPHICAL SOCIETY OF SOUTH CAROLINA,  
THE NATURAL HISTORY SOCIETY OF BOSTON,  
AND THE MEDICAL AND PHILOSOPHICAL SOCIETIES  
OF ABERDEEN.

LONDON:  
CUNNINGHAM & MORTIMER, ADELAIDE STREET,  
TRAFALGAR SQUARE;  
AND SOLD BY  
LEWIS SMITH, UNION STREET, ABERDEEN.

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1843.

ABERDEEN:  
PRINTED BY D. CHALMERS AND CO.  
ADELPHI COURT.



TO

ALEXANDER BANNERMAN, ESQ., M.P.,

IN TESTIMONY

OF GRATITUDE FOR BENEFITS

CONFERRED ON THE UNIVERSITY

OF THE CITY WHICH HE SO WORTHILY REPRESENTS

IN PARLIAMENT,

THIS WORK

IS RESPECTFULLY DEDICATED,

BY

WILLIAM MACGILLIVRAY.

WISCONSIN

STATE OF WISCONSIN

IN SENATE

JANUARY 10, 1900

REPORT

OF THE

COMMISSIONERS OF

THE LAND OFFICE

FOR THE YEAR

ENDING DECEMBER 31,

1899

WISCONSIN

PRINTED BY THE

STATE PRINTING OFFICE

WISCONSIN

1900

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*LINNÆUS.*

## PREFACE.

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THE motives which induced me to collect the materials for this work, were such as, I think, may reasonably be approved of by those for whom it is intended. Having been recalled to my native place, in May, 1841, I naturally felt a desire of renewing my acquaintance with the productions of a district often traversed by me while prosecuting my studies at the Universities there, and not being aware of any very important investigations having been conducted in this much neglected, though not uninteresting, part of Scotland, with reference to its Zoology, I thought it might be useful to describe some or all of its numerous animals. I therefore at once commenced an examination of the Mammalia, Birds, Reptiles, Fishes, Mollusca, Insects, and Radiata, the results of which I intend, in due time, to lay before the public. Thinking, however, that the pupils whom I have to initiate in the Science to which my labours have, for many years, been directed, could not acquire much practical acquaintance with most of these tribes of animals, in the winter season, when engaged with their various academical studies, I selected a branch of Zoology which I thought capable of affording them greater facilities for observation than any other. I was further induced to undertake the work by remembering that a descriptive catalogue of the Mollusca of the district was a desideratum to the Zoologists of other parts of the kingdom.

My observations having been continued, as opportunity was afforded, until the number of species had increased to a much greater extent than, from the apparently unfavourable nature of the district, and the evil reports of the very few shell-gatherers known to me, I could have

anticipated, I revised my notes, compared my descriptions with those of others, and my specimens with similar objects procured from various parts of Britain, recomposed the whole, and succeeded in finding a person willing to undertake, chiefly from patriotic motives, the publication of a work of no consideration in a pecuniary point of view.

The labour required for such an investigation cannot be at all appreciated by those who have not directed their energies toward such an object. The rocky coasts and sandy beaches of the sea, the valleys and hills of the interior, the pastures, mossy banks, thickets, woods, rocks, ruins, walls, ditches, pools, canals, rills, and rivers, were all to be assiduously searched. No collections of Mollusca made in the district were known to me, nor do any of our libraries contain the works necessary to be consulted, although that of King's College supplies some of great value. In a situation so remote from the great centres of civilization, the solution of doubts is often difficult of attainment, and there is always a risk of describing as new what may already have been entered into the long catalogue of known objects. But the pleasure of continually adding to one's knowledge, the sympathy of friends, the invigorating influence of the many ramblings required, the delight of aiding others in the same pursuits, and many other circumstances, amply suffice to carry one through greater difficulties than those alluded to, even should the sneers of the ignorantly-wise, or the frowns of the pompously-grave, be directed toward the unconscious wight, who, immersed in mud, gropes with the keenness of a money-gatherer, for the to them insignificant objects, which have exercised the wisdom and providence of the glorious Creator.

Through life I have ever met with kind friends. On the present occasion, I have been most efficiently aided by them. With a zeal and energy, worthy of all praise and gratitude, Mr. Alexander Murray, of Nethermill, Cruden, an enlightened and sincere lover of nature, has collected for me whatever he could find in the district of

Buchan. His contributions have been most ample and important; and among the objects transmitted by him I have found several species hitherto unknown, many not previously observed in Scotland, and several minute or submicroscopic creatures which could hardly have been expected on our northern shores. Mr. Gray, of Peterhead, has sent me a great number of species collected in the neighbourhood of that place. My daughter Isabella has anxiously collected materials in part of Banffshire and the adjoining portions of Aberdeenshire. Her assistance has been most valuable, as has that of my daughters Marion and Anne, who have supplied many small species. My son John, at present on a natural-history expedition to New Holland and Papua, has also furnished a few. Mr. John Clark has collected for me the shells of Banff, Macduff, and Portsoy. Mr. Alexander Davidson, who obtained a class prize for the largest collection of Mollusca, Mr. William Fergusson, Mr. William Leslie, Mr. James Smith, Mr. James Duncan, Mr. William Mitchell, Mr. Alexander Beaton, Mr. William Robertson, and others of my pupils, have also contributed, whether, in a very few instances, by presenting specimens, or, generally, by bringing objects to be named. To Dr. Dyce, of Aberdeen, I am indebted for permission to examine two cuttle-fishes in his collection, and to Andrew Murray, Esq., Advocate, for many kind offices. I have especial pleasure also in acknowledging the friendly aid of Mr. James Leslie, of Old Aberdeen, who, enthusiastically devoted to the study of Zoology, has accompanied me on many of my excursions, freely permitted me to examine whatever objects he happened at any time to procure, and supplied several species first found by himself. But with all the assistance thus generally afforded, I should not have been able to reduce my observations to the state in which they now appear, without the further aid of a very distinguished naturalist, whose collection of Mollusca has enabled me to compare some of our shells with authentic specimens from other districts, and whose library has supplied several important works

to which reference was indispensable. To that gentleman, the Reverend Dr. Fleming, of King's College, whose generous interest in the progress of the work has been peculiarly encouraging to me, I feel most truly grateful. The naturalists of other places to whom I am indebted on this occasion are Mr. Gray, of the British Museum; Dr. Johnston, of Berwick-on-Tweed; Mr. Jenyns, of Cambridge; Mr. Thompson, of Belfast; Mr. Harley of Leicester; and Mr. Hepburn, of Haddingtonshire.

I believe that more than two-thirds of the species described were gathered by myself. The discoveries of my friends and pupils are mentioned in the proper places. I may here explain that I mean thus to record the aid I have received, and to indicate the progress of investigation, with reference solely to this work, and without the least intention of interfering with the labours of others, who may have found some of the same species years or hours before they occurred to me or my friends, and without alluding to those observed by myself in 1817, and 1818, when, having just commenced my Zoological studies, I collected about thirty species.

It may further be mentioned, that all the specific descriptions are taken from objects found in the district, and have reference to them only, not to the same species as occurring elsewhere; that I have admitted none that I have not seen and examined myself, with the exception of one species; that, in cases of doubt, I have compared the objects with others obtained from various quarters; that I have submitted some of them to the examination of one or other of the eminent Naturalists mentioned above; and that if, owing to my remoteness from museums and extensive libraries, I have, in some instances, failed in giving the objects their proper names, the authentic descriptions made will yet serve to shew what they are. The classic, ordinal, and generic characters, when not entirely original, which the latter usually are, have been taken from the works of Milne-Edwards, Blainville, Lamarck, Gray, Montagu, Turton,



Sander Rang, Muller, and other eminent Malacozoologists. For the arrangement I am indebted to these authors; but I have modified their views to suit my own notions, as every one, I believe, does, on such occasions. The synopses, specific descriptions and remarks, are entirely original.

The work being intended for the use of my pupils, and for persons commencing the study of the Mollusca, I have given a general account of the structure of those animals, together with their classification, and the principal characters of the classes and orders. Although descriptive of the county of Aberdeen, with the adjoining portions of those of Banff and Kincardine, it will be useful to persons residing in any part of Scotland, especially to those in the more northern districts. I present it with confidence to the public; because I am conscious of having prepared it with great care, and because I think it will be useful. The specific descriptions I have made fuller than usual, because I am anxious to induce my pupils, not to content themselves merely with learning the names of objects, as I have observed to be the prevailing practice both here and elsewhere. It is, in fact, a matter of no importance to an individual, by what name an object is known to him, provided he be acquainted with its structure and relations; although a fixed nomenclature is essential to the general progress of knowledge. For this reason, I have not withheld the various species, which have appeared to be new to science, although the want of access to all the works and essays published of late years, leaves it probable that some of them have already been named. It is but a pitiful manifestation of self-esteem to withhold the knowledge of an object, lest it should ultimately be found to have been already communicated in some work inaccessible to the student. Besides, if I have ignorantly given new names to objects already named, who of the most successful cultivators of Zoology, has not often committed similar errors?

In fine, such as it is, being the first Zoological work

that has emanated from the University of which I am a member, I cannot but look upon it as indicating the not distant dawn of an era, destined, I trust, to produce investigations, the importance of which will tend to give our city a rank, certainly not yet acquired, among those distinguished for the cultivation of Natural History, the most delightful of all sciences, the source of all knowledge, the study best adapted to refine our affections, and to bring us continually into the presence of our Creator, the maker and preserver of us, and all those wonderful objects that everywhere present themselves to our view. The time is almost gone when a little Latin, a little Greek, a little Mathematics, a little Natural Philosophy, and a little Moral Philosophy, in such spare quantities as "one small head could hold," made an accomplished scholar. The book of Nature has been opened to us, and whatever profit there may be in storing our minds with phrases, it would require some ingenuity to shew that the knowledge of things is not more useful than that of words. Some defend the system of wasting five or six years of a man's life in learning so much Latin as may barely suffice to enable him to read a page of a classical author without the aid of a Dictionary, on the ground of its being an exercise calculated to fix the attention, and to exercise the memory; but a more useful and far nobler study is that of Nature, which calls into action every faculty of the mind, engages the best affections, and has reference to the perfect works of a perfect Creator. "Ask now the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee; or speak to the earth, and it shall teach thee; and the fishes of the sea shall declare unto thee. Who knoweth not in all these that the hand of the Lord hath wrought this?" Let Latin and Greek have their due share of attention, but let not the incubus of classic lore be permitted to smother the mind, that, if unrestrained, would inhale with delight the pure air of heaven.

## INTRODUCTION.

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THE District of which the Mollusca are described in the following pages, constitutes the north-eastern portion of the middle Division of Scotland. Besides the extensive County of Aberdeen, it includes the smaller Counties of Kincardine and Banff, the former on its southern, the latter on its north-western side. Bounded toward the east and north by the German Ocean, it stretches inland toward the central ridges of the Grampians, in which are some of the highest summits in Britain, giving rise to the sources of the Dee and the Don, as well as tributaries of the Spey. The latter river bounds the district to the north-westward, while the southern boundary runs eastward from the western sources of the Dee to Mount Battock, and thence to the neighbourhood of Bervie. The upper part of the district is mountainous, with narrow valleys, partially wooded; but the land declines eastward and northward, although still hilly, and toward the coast becomes comparatively level. The rocks are

for the most part primary, chiefly of granite, gneiss, and slate, in all the higher tracts, and even in most of the lower, in which latter there is a thick covering of diluvial matters, consisting of the debris of primary rocks. Secondary strata, however, occupy considerable portions of the lower tracts, especially in Forfarshire, and in the northern parts of Aberdeenshire. Although not generally remarkable for fertility, and but scantily wooded, it presents all the varieties of situation fitted for the inhabitation of Molluscous Animals, which, however, are much more numerous toward the sea. From Bervie to a little north of Stonehaven the coast is rocky, and composed of conglomerate and red sandstone; from thence to Aberdeen, of gneiss rocks, intersected by granite and ignigenous veins. From Aberdeen to a little beyond the Ythan, is a sandy beach margined by hillocks of drifted sand. A rocky coast of gneiss succeeds, until we come to the sandy Bay of Cruden; from which to Peterhead the rocks are chiefly of granite and gneiss. From thence northward, and round the north-eastern extremity of the district, to Troup Head, are sandy beaches, gneiss cliffs, and latterly red sandstone and conglomerate. Grey-wacke, sandstone, and primary rocks succeed. The sea, generally shallow along the sandy coasts, and slowly deepening eastward, has its bed partly rocky, partly of sand, and sometimes of clay and other detritus.

The currents being strong, and the coast exposed to

the fury of frequent eastern gales, while very few inlets occur, our seas might be supposed not very favourable to the production of Mollusca. In fact, the entire district has generally been considered extremely barren in this respect. Thus, in the Statistical Report of Aberdeen, it is stated, that "in consequence of the sandy nature of the beach, it affords no resting-place or shelter for shell-fish; and the shells which are found on the beach, are, therefore brought by the sea from other situations, and generally the fish have decayed before the shells are washed ashore." Very few Mollusca are mentioned in the other reports of the parishes; and even in that of St. Fergus, of which the writer holds out some prospect of "a rich harvest of gratification," the number collected on the coast by Mr. Alexander Murray, a very acute observer of nature, amounts only to thirty-three, as named by Dr. Fleming.

These discouraging statements, the melancholy accounts given by the very few persons known to me who have gathered shells in the district, the bleak appearance of the coasts, and even of the greater part of the interior, together with the granitic nature of a great portion of the land, said to be peculiarly unfavourable to Mollusca, might naturally enough lead one to despair of much success. But this sterility is only seeming; for I have found the district as productive as any of equal extent in any part of Scotland, not except-

ing "the sunny south." Instead of searching the exposed beaches and rocky headlands only, if collectors had betaken themselves also to the fishing stations, and searched the boats and lines, they might have found a great variety of interesting species. The pastures, woods, marshes, lakes, ditches, streams, and estuaries, also, are far from being so unprolific as they might seem. The nature of the rock, it appears to me, makes little difference. The granite of the Bullers of Buchan, and the gneiss of the Cove, are not less productive than the conglomerate of Stonehaven, or the greywacke and sandstone of the Northern coasts. The only difference seems to be, that individuals are more numerous in the secondary than in the primary tracts; for the same species occur in both; and I am not aware of any geological deposit in the district, or any particular kind of rock, fostering any peculiar species, with the exception of *Helix hispida*, and *Bulimus obscurus*, which have been found among sandstone near Stonehaven, but as yet nowhere else.

A search continued at intervals, for twenty-two months only, has produced three hundred and forty species—a number greater than might reasonably be expected; and there can be little doubt that many species remain to be added, insomuch that, I think, the entire number will ultimately exceed four hundred. When the bays are dredged, and the rocky coasts more mi-

nutely explored, numerous Nudibranchiate Gasteropoda will reward the collector. The land will probably supply few additional species. Many years may be required to complete the series. Let a few other individuals meet with equal success, and our Molluscous Fauna will make as respectable an appearance as that of any in Britain. In the meantime, it is hoped, the present work will prove of considerable utility both to students, and to more advanced malacologists.

It will be found to present a general view of the subject, as well as sufficiently full descriptions of the species hitherto met with. After the general characters of each class, will be found a Synopsis of the Aberdeenshire species, in which are given the generic and specific characters, and etymologies. The genera and species are then more fully described. The measurements are given in twelfths of an inch. References are made, under each species, to various authors who have described it: for example, "Linn. Syst. Nat. i. 1232," that is Linnæus, *Systema Naturæ*, vol. i. page 1232; "Mont. Test. Brit. 335, pl. 11, f. 12," Montagu, *Testacea Britannica*, page 335, plate 11, figure 12. Subjoined is a List of the principal works to which reference is thus made.

As to the Nomenclature—I have adopted the usual method of giving to the genera and species the names imposed upon them by the persons who first described them.

Specimens of many exotic species have been brought to me ; but these I have considered it prudent to suppress. One species, however, is deserving of notice, although it has come too late for insertion. It is the beautiful *Spirula australis*, of which fourteen specimens were gathered by myself on the sands to the north of Don-mouth, on the 4th and 6th of March, 1843, but of which the first example was found by one of my pupils, Mr. William Robertson, and the second by Mr. Leslie.

Several species supposed to be new to science are described. Respecting these it is proper to apprise the student, that, although apparently not mentioned in any of the works to which I have access, some of them have probably been already noticed. They amount to about thirty, and are named as follows:—*Polystomella Guelminæ*, *P. crenulata*, *P. nautilina*; *Discorbis pulchellus*; *Vermiculum disciforme*, *V. planatum*; *Textularia oblonga*, *T. obtusa*; *Dentalina Davidsonii*; *Lagenula reticulata*; *Natica rutila*, *N. squalida*; *Rissoa gracilis*; *Odostomia scalaris*, *O. plicatula*, *O. Marionæ*, *O. Annæ*, *O. oblonga*; *Tornatella pellucida*, *T. oblonga*; *Fusus Buchanensis*; *Bullæa catenulifera*; *Halia Flemingiana*; *Æolis Murrayana*, *Æ. Lesleiana*; *Sphærosoma Jamesonii*; *Pecten Isabellæ*; *Cyclas flavescens*; *Pisidium Joannis*; *Ascidia opalina*; *Tritonia atrofusca*.



## WORKS TO WHICH REFERENCE IS MADE.

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### *Alder, Mag. Zool. and Bot.*

Notes on the Land and Fresh-water Mollusca of Great Britain. By Joshua Alder. In Magazine of Zoology and Botany. Vol. ii. p. 101.

In King's College Library.

### *Blainv. Man.*

Manuel de Malacologie et de Conchyliologie ; contenant: 1° Une Histoire abrégée de cette partie de zoologie; 2° Des principes de Conchyliologie; 3° Un systeme general de Malacologie. Par. H. M. Ducrotay De Blainville. Paris, 1825. 2 vols. ri. 8vo., with numerous plates.

### *Brown, Illustr.*

Illustrations of the Conchology of Great Britain and Ireland, Drawn from Nature, by Captain Thomas Brown, F. R. S. E., &c. Edinburgh, 1827.

No descriptions. The figures generally good, often beautiful, sometimes incorrect; the colouring bad; the nomenclature frequently strange.

### *Delle Chiaje, Anim. di Nap.*

Memorie sulla Storia e Notomia degli Animali senza Vertebre del Regno di Napoli; scritte da Stefano Delle Chiaje, Professore, &c. Naples, 1829. Quarto, four volumes, with numerous plates.

In King's College Library.

*Drap. Moll. Terr. et Fluv.*

Histoire Naturelle des Mollusques Terrestres et Fluviatiles de la France, ouvrage posthume de Jacques-Philippe-Raymond Draparnaud, Professeur d'Histoire Naturelle à l'Ecole de Médecine de Montpellier, &c. A Paris, an. xiii. 4to. avec xiii. Planches.

The descriptions and figures most accurate.

*Flem. Brit. Anim.*

A History of British Animals, exhibiting the Descriptive Characters and Systematic Arrangement of the Genera and Species of Quadrupeds, Birds, Reptiles, Fishes, Mollusca, and Radiata of the United Kingdom, &c. By John Fleming, D.D., F.R.S.E., M.W.S., &c. Edinburgh, 1828. 8vo.

In King's College Library.

*Forbes, Malac. Mon.*

Malacologia Monensis. A Catalogue of the Mollusca inhabiting the Isle of Man and the neighbouring sea. By Edward Forbes, For. Sec. B. S., &c. Edinburgh, 1838.

*Gray's Turton.*

A Manual of the Land and Fresh-water Shells of the British Islands, by William Turton, M.D. New Edition, by John Edward Gray, F.R.S., &c. Post 8vo., with 12 Plates.

*Jenyns, Monogr.*

Monograph of the Genus *Pisidium*, in the Cambridge Philosophical Transactions. Not seen by me.

*Johnst. Berw. Trans., and Ann. Nat. Hist.*

Description of the Mollusca of Berwickshire, in the third volume of the Transactions of the Berwickshire Natural History Society.

Descriptions of Scottish Mollusca, in the first volume of the Annals of Natural History.

In King's College Library.

*Lamk. Syst.*

Histoire Naturelle des Animaux sans Vertèbres, présentant les caractères générales et particuliers de ces animaux, leur distribu-

tion, leurs classes, leurs familles, leurs genres, et la citation des principales espèces qui s'y rapportent, &c. Par M. le Chevalier De Lamarck, Member de l'Institut. Royal de France, &c. Paris, 1815-1822. 6 vols. 8vo.

*Lamk. Syst. Ed. 2.*

Deuxième Edition. Revue et augmentée de notes présentant les faits nouveaux dont la science s'est enrichie jusqu'à ce jour; Par MM. G. P. Deshayes et H. Milne Edwards. Paris, 1835.

In King's College Library.

*Linn. Syst. Nat.*

Caroli a Linne Systema Naturæ per Regna tria Naturæ. Editio duodecima, reformata. Holmiæ, 1766. 3 vols. 8vo.

*Lister, Anim. Angl.*

Martini Lister e Societate Regia Londini Historiæ Animalium Angliæ tres Tractatus. Londini, 1678. 4to.

*Mont. Test. Brit.*

Testacea Britannica, or Natural History of British Shells, Marine, Land, and Fresh-water, including the most minute; systematically arranged and embellished with Figures, by George Montagu, F.L.S. London, 1803.

Supplement to Testacea Britannica, with additional Plates, by George Montagu, F.L.S. & M.W.S. London, 1808.

4to., with 30 plates. The figures rather rude but generally correct; the descriptions always intelligible, though often ill arranged and ungrammatical. A most valuable work.

*Muller, Verm. Terr. et Fluv.*

Vermium Terrestrium et Fluviatilium, seu Animalium Infusiorum, Helminthicorum et Testaceorum, non Marinorum, Succincta Historia, Auctore Othone Friderico Müller, Regi Daniæ a consiliis Justitiæ, &c. Havnæ et Lipsiæ, 1773-4. 2 vols. 4to.

The descriptions most accurate.

*Penn. Brit. Zool.*

Pennant's British Zoology. Vol. iv. London, 1777.  
In King's College Library.

*Rang. Man. des Moll.*

Manuel de l'Histoire Naturelle des Mollusques et de leurs Coquilles. Par M. Sander Rang, Officier au Corps Royal de la Marine. Paris, 1829. 12mo.  
In King's College Library.

*Risso, Eur. Merid.*

Histoire Naturelle des Principales Productions de l'Europe Meridionale, et particulièrement de celles des Environs de Nice et des Alpes Maritimes; par A. Risso, Ancien Professeur des Sciences Physiques et Naturelles au Lycée de Nice, &c. A Paris. 8vo. Tome Quatrième, 1826. Avec Planches 12.

In King's College Library.

*Turt. Brit. Biv., and Conch. Dict.*

Conchylia Insularum Britannicarum. The Shells of the British Islands systematically arranged. By W. Turton, M.D. Exeter, 1822. 4to. 20 Plates.

It contains the Bivalves only, treated as Shells, without reference to the Animals, the "connexion" of these subjects being, he says, "unnecessary if it were possible, and impossible if it were necessary." The descriptions are good, and the figures very beautiful and accurate.

Conchological Dictionary of the British Islands. London, 1819. 12mo.

*Walker, Test. Min. Rar.*

Testacea Minuta Rariora, nuperrime detecta in Arena Littoris Sandvicensis; A Gul. Boys, Arm. S.A.S. Multa addidit, et omnium Figuras ope Microscopii ampliatas accurate delineavit Geo. Walker. London, 1784. 4to.

The figures seldom very accurate, the descriptions too brief, and imperfect.

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## MALACOZOA. MOLLUSCA.

SOFT, symmetrical, inarticulated animals; enveloped in a muscular skin or mantle, which generally has attached to it, externally or internally, a calcareous part or shell, of one or several pieces; and having a complete double circulation, with white blood; branchial or pulmonic respiration; an intestinal canal with two apertures; a nervous system composed of a cerebriform ganglion, placed under or surrounding the œsophagus, and communicating with the ganglia of the various functions; those subservient to locomotion being lateral.

*Μαλάκια* and *Ὀστρακοδέρμα*, Aristotle. *Mollia* and *Testacea*, Pliny. *Vérmes*, Ray, Linnæus, Pennant. *Mollúsca*, Cuvier. *Malacoζόα*, Blainville. *Μαλακός*, soft; *ζῶον*, animal.

THE vast series of animals destitute of a brain and spinal cord, protected by a skull and vertebræ, has, by Cuvier and many other Zoologists, been considered as naturally divisible into three distinct portions, forming, as it were, three different types of organization. To these three groups have been given the names of MOLLUSCA, ARTICULATA, and RADIATA, or Soft Animals, Jointed Animals, and Rayed Animals. The Greek terms MALACOOZA, ENTOMOZOZA, and ACTINOZOZA, also employed to designate these groups, are more appropriate.

The Malacozoa, although some of them approach more nearly in structure to the Osteozoa or Vertebrata, are, as a whole, inferior in their organization and faculties to the Entomozoa, but superior to the Actinozoa, and may therefore be viewed as forming the third type or series of the animal kingdom.

Considered with respect to their external form, the Malacozoa vary extremely, insomuch that no general idea can be given of it. Their internal parts are always soft, although, in a small number of them, there are some solid internal pieces intended for the protection of certain organs. Their nervous system is composed of ganglia and nerves. The principal mass of these ganglia, which may in some respects be compared to the brain, forms a kind of collar round the œsophagus, and other ganglia are dispersed through the body, but not in symmetrical order, nor forming a chain, as in the Entomozoa. A few species have organs analogous to the ear; many are furnished with eyes; but it is not certain that any have a particular organ for smell; and it appears that, in very many of them, there are no other organs of sense than those subservient to touch and taste. The organs

of sense and locomotion are generally disposed symmetrically. The muscles are attached to the skin; and it is by the alternate elongation and contraction of certain parts that they crawl on the ground, swim in the water, and lay hold of objects; but, as their limbs are not supported by bones or other solid parts, their motions are in general very slow. They are never furnished with feet arranged in series on each side of the body, as in the Osteozoa and Entomozoa.

The blood of the Malacozoa is white, bluish, or limpid. The circulation is double: the heart, composed of a single ventricle, receives from one or two auricles the blood which comes from the respiratory organ, and propels it into the arteries which distribute it through the body, whence it returns to the branchiæ. As some molluscous animals live in the air, and others in the water, some have lungs, or rather a pulmonic cavity, and others branchiæ.

They all have a more or less convoluted alimentary canal, open at both ends, but varying in structure. Their mouth is sometimes furnished with horny jaws, or with hard or cartilaginous parts, or is variously prolonged. The stomach is sometimes simple, sometimes divided into several parts. The intestine is never supported by a mesentery; but there is always a very large liver, and most of the species have salivary glands.

In some the sexes are separated, in others united. They all produce eggs, which however are sometimes deposited externally, sometimes hatched in the interior of the animal, which is thus oviparous or ovo-viviparous. In all cases the young have from the first nearly the form which they present when mature.

The skin, always soft, and generally sensitive, often forms plaits or folds, which envelope the body in whole or in part. The portion of integument thus raised is named the *Mantle*. It is often almost entirely free, forming two large laminæ or lobes, which cover the rest of the animal; or the two laminæ unite so as to form a sort of tube; but sometimes the mantle forms a kind of disk, of which the margins only are free; or surrounds the body in the form of a bag.

In very many cases the soft skin is protected by a kind of calcareous crust, named the *Shell*, which is a secretion from the mantle, deposited in successive layers. The secreting glands or follicles, generally lodged in the edges of the mantle, pour forth a kind of horny substance mixed with carbonate of lime, which soon hardens; and internal laminæ are successively formed, so that the shell is gradually increasing in extent and thickness. The outer surface is generally covered by a horny membrane composed of the united margins of the laminæ, and named the *Epidermis*. Sometimes the whole shell is horny, but most commonly the calcareous part predominates, and the inner surface is more compact. In some cases the shell is internal or lodged in the skin, but generally it is external, and affords complete protection to the animal. Those Malacozoa which have no shell are said to be *Naked*; those having a shell are called *Testaceous* or *Conchiferous*. The shell varies in form, sometimes resembling a shield which covers the back of the animal, more frequently a conical tube spirally twisted; or it may be composed of two distinct pieces united by a joint: whence a distinction of these animals into *Univalve* and *Bivalve*. The shells are often ornamented with

colours, variously disposed, which are deposited by the edges of the mantle.

In a *Univalve* shell, there are distinguished, the *body* or larger part; the *spire* or tapering portion; the *turns* or *whorls*; the *suture* or line of junction of the turns; the *columella* or *pillar*, the axis of the shell; the *mouth* or *aperture*, with its *peristome* or margin, which may be complete or not, and may be described as forming an *outer lip*, and an *inner lip*. The spiral turns may be smooth, or variously marked with *striæ*, *laminæ*, *ribs*, *nodosities*, or *spines*, the markings being longitudinal or transverse. It is to be remembered that, in its natural position, the mouth of the shell is beneath and forward, the spire pointing backwards, and to the right side. Some shells have the mouth on the left side, and are called *sinistral*, those of the ordinary form being *dextral*.

*Bivalve* shells are those composed of two pieces, kept together by a sort of hinge. When the two valves are equal, the shell is said to be *equivalve*; when unequal, *inequivalve*. They may be round, elliptical, ovate, linear, or of various forms. The more or less prominent part of the valve at the joint is the *umbo*. When the umbo is nearly in the middle, the shell is said to be *isomeral* or *equilateral*; when not, *anisomeral* or *inequilateral*. The *hinge* may be plain, but generally it presents various prominences, called *teeth*, with *depressions*; the teeth of one valve fitting into the depressions of the other. The valves are further kept together by an elastic fibrous *ligament*, which tends to throw them open. They are approximated by a pair of strong *muscles* extended internally from the one valve to the other, and leaving strong impressions on the inner surface. The *teeth* are

distinguished into *central* and *lateral*. The *surface* may be convex in various degrees, concentrically striate, laminate, or rugose, or radiated from the umbones with striæ, ridges, grooves, ribs, or spines. In the natural position, the hinge is uppermost on the back ; that end of the shell to which the ligament is nearest is above, and is called the posterior end ; the other or lower, toward which is the head of the animal, being the anterior end ; the thin edges of the valves are their ventral margins. On the inner surface of the valves are seen the *impressions* made by the muscles, and that left by the mantle.

Some Mollusca live on land, others in fresh-water, but by far the greater number in the sea ; some residing along the shore, others in deep water, and some floating free. They are more abundant in warm than in cold climates ; larger and more brightly coloured the greater the heat and light to which they are subjected. This influence is perceptible within the range of even our own island ; for in the South of England the same species of Snail, for example, are larger and more beautiful than in the North of Scotland.

The district of which the natural productions are described in this work, although hitherto represented as extremely unproductive, contains a fair proportion of the British Mollusca ; but on this subject some remarks will find a more appropriate place at the end than at the beginning of the description of the species.

It may be observed, that the Malacozoa have been variously arranged by authors, and that one might display a great deal of useless ingenuity in exposing and criticising the proposed systems. According to the method

here adopted, they form six classes, of which three contain animals having a prominent or distinct head, and the other three, animals in which the head is not apparent.

#### MALACOZOA CEPHALATA.

I. CEPHALOPODA.—The body enclosed in a sac, open anteriorly, from which emerges the head, surrounded by filaments, which are at once organs of prehension and locomotion.

II. PTEROPODA.—The body not saccate, nor the head surrounded by filaments; but the sides of the neck furnished with membranous expansions.

III. GASTEROPODA.—None of the characters of the preceding classes; but a fleshy foot occupying the lower surface of the body, enabling the animal to crawl or swim.

#### MALACOZOA ACEPHALATA.

IV. TROPIPODA.—Four lamellar branchiæ, and a compressed fleshy foot.

V. BRACHIOPODA.—Branchiæ not distinct from the mantle; two ciliated filaments in place of a foot.

VI. APODA.—The body enclosed in a cartilaginous sac; branchiæ not distinct; no special organs of motion.

## CLASS I.—CEPHALOPODA.

Body enclosed in a sac formed by the mantle ; head distinct, furnished with all the organs of sense, and surrounded with fleshy filaments, which act as organs of prehension and locomotion.

*Cephalóphora*, Blainville. *Antlio-brachióphora*, Gray. *Cephalópoda*, Cuvier. Κεφαλή, head ; πόδα, feet : feet attached to the head.

Body enveloped in the mantle, which forms a muscular sac or bag, open anteriorly. Head distinct, protruded from the sac. Mouth situated anteriorly, armed with a pair of horny or calcareous mandibles, resembling the bill of a bird, and placed at the bottom of a cavity formed by the base of the fleshy appendages ; tongue covered with horny points ; œsophagus dilated into a kind of crop ; stomach a muscular gizzard, succeeded by a membranous, somewhat spiral sac ; intestine terminating near the neck. Liver large, discharging the bile into the membranous stomach. Circulatory apparatus, a systemic heart and an arterial system, and in many, two pulmonic hearts. Branchiæ equal, symmetrical, communicating externally by an infundibulum, into which the rectum also opens. Generative system of distinct sexual organs : there being in the male a testis, vas deferens, and fleshy penis—the latter situated on the left side of the vent ; in the female, an ovary situated in the bottom of the mantle-sac, and two oviducts. The head terminated by a circle of elongated fleshy organs, generally furnished with acetabula, or



suckers, and forming organs of locomotion and prehension. Brain-ganglion in a cartilaginous cavity in the head; two eyes formed of numerous membranes, and covered by skin, which is transparent in front; ears, a small cavity on each side, near the brain, without external tube, and containing suspended a membranous sac, in which are a limpid fluid and a small compact ossiculum. Some species naked, others partially contained in a shell.

The Cephalopoda may be primarily divided into three orders:—1. Cryptadibranchiata, 2. Siphonifera, and 3. Foraminifera; but as our species are not numerous, it is inexpedient to offer any more general observations. The Foraminifera probably belong to a different series; but as their nature is not yet clearly understood, and as they have usually been placed among the Cephalopoda, we may for the present consider them as belonging to that class. Several of the species are very abundant along our coasts, and some, not hitherto observed in other parts of Scotland, have occurred to me. They will be found among fine shell-sand, or adhering to dead shells, corallines, and other objects brought up by the fishing-lines. Although very minute, all the species here described may be distinctly seen with the aid of a good lens.

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*SYNOPSIS OF THE ABERDEENSHIRE SPECIES.*

ORDER I.—CEPHALOPODA CRYPTADIBRANCHIATA.

Branchiæ laminated, concealed within the mantle; head with eight arms, to which are sometimes added

two long tentacula; the body naked, sometimes partially enclosed in a shell.

*Cephalópoda Testácea Monothálama* and *Non-testácea*, Lamarck. *Κρυπταδίοσ*, concealed; *Βράγχια*, gills.

#### FAMILY I.—SEPIINA.

The mantle continuous round the body; an internal horn or calcareous lamina; head with eight or ten muscular appendages, furnished with acetabula; eyes very large.

Genus *Sépia*, Linnæus. *Σηπία*, *Sepia*, Cuttle-fish.

DECECERATA. *Blainville*. *Δέκα*, *ten*; *κέρατα*, *horns*.

GENUS 1. SEPIOLA.—Body short, sacciform, rounded behind, with two rounded lobes; eight sessile arms nearly equal; two pedunculated arms. Diminutive of *Sépia*, Cuttle-fish. Leach.

1. *Sepiola Rondelétii*.—Body orbicular, natatory lobes round. Named after Rondelet, a French naturalist.

GENUS 2. SEPIA.—Body sacciform, rounded behind, depressed, margined on each side with a narrow membrane; eight triangular fleshy arms, and two pedunculate arms; acetabula with entire horny margins; internal dorsal shell elliptical, lamellar, calcareous. *Σηπία*, *Sepia*, a Cuttle-fish. Linnæus.

1. *Sépia officinális*.—Body smooth; pedunculate arms, very long. Named from the bone being sold *in officinis*, in the shops.

GENUS 3. LOLIGO.—Body elongated, tapering, margined behind on each side with a broad membrane; eight long fleshy arms, and two very long pedunculate arms; acetabula with denticulate horny margins; internal dorsal shell elongated, horny. *Lóligo*, a Sleeve-fish or Calmary. Lamarck.

1. *Loligo vulgáris*.—Natatory appendages semi-rhomboidal; tip of the body free. *Vulgáris*, common.

OCTOCERATA. *Blainville*. Οκτώ, *eight*; κέρατα, *horns*.

GENUS 4. ELEDONE.—Body sacciform, rounded behind; eight arms connected at the base, and having each a single row of acetabula. Ελεδώνη, a species of *Polypus* or Cuttle-fish. Leach.

1. *Eledone Pennantii*.—Body globoso-elliptical, minutely granulated and dusky on the dorsal surface; arms nearly twice the length of the body, tapering to a fine point. Named after Pennant, a celebrated English naturalist.

2. *Eledone Aldrovandi*.—Body elliptical, smooth, white; arms of the same colour, nearly twice the length of the body, tapering to an extremely attenuated point. Named after Aldrovandus, a celebrated naturalist.

#### ORDER II.—CEPHALOPODA SIPHONIFERA.

Animal with a shell divided into chambers by transverse partitions, through which a siphon passes. *Sipho*, a tube; *féro*, to bear. D'Orbigny.

#### ORDER III.—CEPHALOPODA FORAMINIFERA.

Body bursiform, containing the shell in its hind part; the head very small, terminated by numerous tentacula; shell many-celled, destitute of siphon, but with one or several holes between the cells. *Forámen*, a hole; *féro*, to bear. D'Orbigny.

GENUS 1. POLYSTOMELLA.—Shell disciform, subcarinate, many-celled; the centres umbilicate, the partitions forming grooves, radiating from the centres to the circumference, the turns concealed by the last. Πολυς, many; στόμα, mouth. Lamarck.

1. *Polystomélla crispa*.—Shell disciform, equally convex on both sides, the last turn with flexuous ridges, having the intervals crenated. *Crispus*, curled or waved.

GENUS 2. NUMMULINA.—Shell discoid, with a plurilocular spire in the same plane; the two surfaces convex, the margin thin. *Nummus*, money; like a coin. Lamarck.

1. *Nummulina marginata*.—Shell discoid, convex on one side, conico-convex on the other, with a very thin broad margin. *Marginatus*, edged.

GENUS 3. DISCORBIS.—Shell discoid, spiral, many-celled; the upper surface occupied by the last-formed whorl. *Discus*, a disk; *orbis*, a ball. Lamarck.

1. *Discorbis lobatulus*.—Shell generally roundish, convex above, with the centre depressed; the last or upper turn of several convex frosted lobes. Name from *lobus*, a lobe.

*Var.* The shell reversed.

GENUS 4. ROTALIA.—Shell discoid, spiral, many-celled; the lower surface occupied by the last-formed whorl. *Róta*, a wheel. Lamarck.

1. *Rotalia Beccarii*.—Shell orbicular, depressed, convex above; of four or five obliquely lobate turns, the last with about twelve lobes. Named after Beccaria, an Italian philosopher.

*Var.* The shell reversed.

GENUS 5. SPIROLOCULINA.—Shell suborbicular, depressed, with the cells curved, and opposed to each other in a single plane, and completely exposed, or not embracing each other. *Spira*, a whorl; *loculus*, a cell. D'Orbigny.

1. *Spiroloculina concentrica*.—Shell suborbicular, depressed, concave on both sides. *Concentricus*, disposed round a centre.

GENUS 6. VERMICULUM.—Shell roundish, depressed, of few cells, alternately folded upon each other. *Vermicula*, a little worm. Montagu. *Miliola* of Lamarck.

1. *Vermiculum subrotundum*.—Shell orbicular, depressed, of three glossy white turns; the mouth toothless. *Subrotundus*, roundish.

2. *Vermiculum intórtum*.—Shell suboval, of several, glossy, white turns; the mouth divided by a thin tooth. *Intórtus*, bent inwards.

3. *Vermiculum oblóngum*.—Shell subelliptical, of several, glossy, white turns; the mouth divided by a thickish bifid tooth. *Oblóngus*, of greater length than breadth.

4. *Vermiculum lácteum*.—Shell oblongo-elliptical, of several glossy white elongated lobes, arranged obliquely along a common axis; the mouth circular. *Lácteus*, milky.

GENUS 7. TEXTULARIA.—Shell subpyramidal, of two vertical, alternating series of cellules; aperture of each cell semilunar, on the inner side. *Téxtus*, plaited. De-france.

1. *Textulária oblónga*.—Shell oblong, somewhat compressed, pointed, with the cells horizontal, minutely bul-lato-tuberculate, olivaceous. *Oblóngus*, longer than broad.

GENUS 8. LAGENULA.—Shell flask-shaped. *Lagénula*, a small flask. Fleming.

1. *Lagénula lævis*.—Shell flask-shaped, having an ovate body, smooth, bluish-white, with a subcylindrical prolongation; aperture a little raised, circular. *Lævis*, smooth.

2. *Lagénula reticuláta*.—Shell ovato-globose, considerably compressed, glossy, white, pellucid, with opaque white reticular internal markings. *Reticulatus*, marked with lines resembling network.

GENUS 9. CÆCALIUM.—Shell subcylindrical, more or less arcuate, closed at one end, open at the other. *Cæcum*, a tube closed at one end. Fleming.

1. *Cæcálium glábrum*.—Shell cylindrical, subarcuate, very thin, transparent, glossy, white, closed at one end, with a circular aperture at the other. *Glaber*, smooth.

2. *Cæcálium imperforátum*.—Shell cylindrical, arcuate, glossy, circularly substriated. *Imperforátus*, closed at the end.

3. *Cæcilium Trachéa*.—Shell subcylindrical, arcuate, glossy, annulated. *Trachéa*, the windpipe.

GENUS 10. DENTALINA.—Shell subcylindrical, somewhat tapering, more or less arcuate, composed of numerous oblique cells disposed in a single series; aperture submarginal. *Dens*, a tooth, or *Dentálium*, a tooth-shell. D'Orbigny.

1. *Dentalina lineáris*.—Shell subcylindrical, a little compressed, slightly arcuate, glossy, smooth, posteriorly longitudinally striato-sulcate, of about fourteen oblique cells. *Lineáris*, very slender.

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## ORDER I.

### CEPHALOPODA CRYPTADIBRANCHIATA.

Branchiæ laminated, concealed by the sac formed by the closed mantle. Head surrounded with eight fleshy appendages, by some called feet, by others arms, to which, in certain genera, are added two long tentacula or pedunculated arms. The body generally naked, sometimes partially enclosed in a shell.

#### FAMILY I.—SEPIINA.

Animal with the body globose, oval, or oblong; the mantle united so as to form a sac; an internal dorsal horny or calcareous lamina; eyes generally very large; head terminated by eight or ten fleshy appendages, furnished with acetabula or suckers; a sac, containing an inky fluid, opening into the infundibulum.

#### SECTION I.—DECACERATA.

*With eight arms, and two tentacular appendages.*

#### GENUS I. SEPIOLA. SEPIOLE.

Head nearly as broad as the body, with eight tapering fleshy arms, furnished with suckers on their internal surface, and two more elongated slender tentacula, enlarged at the end; the first pair of arms shortest;

the third pair largest, and equal in length to the second pair. Body semioviform or globose, with two subdorsal, semicircular, thin natatory appendages; mantle continuous behind with the skin of the head.

1. *Sepiola Rondelétii*. Common Sepiole.

Body, or visceral sac, short, somewhat flattened, semiovate, much rounded at the end; with two subdorsal, thin flaps or fins, of a nearly circular form, and curved forward; their narrowed base longitudinal, and occupying the middle third of the body. The surface is even, of a whitish colour, covered all over with numerous discrete, roundish, reddish-brown spots and dots, which are slightly elevated; the ventral surface paler, with fewer spots, especially along the middle; the fin-flaps white anteriorly, pale behind, with few dots. The margin of the sac or mantle is free, unless at the back, where it is continuous with the skin of the head; its edge reddish-white, with a slight groove on each side. The infundibulum is considerably flattened, tapering, obtuse, and extends to the base of the arms. The head, including the eyes, is nearly as broad as the body. The eyes are very large, with a somewhat prominent fold beneath, resembling a rudimentary eyelid. The head is crowned with a circle of large fleshy, tapering, subtrigonal arms. The four upper or dorsal arms are much more slender than the four inferior or ventral. The two middle dorsal are a little shorter, but thicker, than those of the second pair, or lateral dorsal. The third pair or lateral ventral are very thick, and rather longer than the second pair. The fourth pair, or the two ventral arms, are more slender, and a little shorter. These two medial ventral arms have at their base internally a prominent smooth space, and for more than two-thirds of their length are furnished with two irregular series of obtuse prominent tubercles or suckers. These arms are close together, but separated, at their base. They are connected with the next pair by a delicate membrane, extending to about a fourth of their length. These next, or lateral ventral arms, which are the largest, have also a bare space at the base, and are furnished with two series of suckers. The two upper or dorsal pairs, which are more slender, have the suckers almost uniserial, or rather irregularly and alternately disposed in two close series. The horny disks are small, with entire margin. On one of the upper arms the prominences are very irregular, and some of them abnormally developed. Two very long, slender, cy-

lindrical filaments or tentacula a little flattened and enlarged at the end, where they have membranous margins, come off between the medial pair and the next, internally of the connecting membranes. They are smooth, unless at the enlarged terminal portion, where they are furnished with a number of irregularly disposed very small suckers. The head and outer surface of the tentacula are dotted with reddish-brown, like the body, but paler; the long tentacula are white, slightly dotted at the end only.

	Inch.	Lines.
Length from the end of the abdominal sac		
to that of long tentacula.....	2	2
"    to end of upper pair of arms.....	1	7
"    "    anterior margin of mantle.....	0	7
"    "    mouth.....	0	11
"    "    base of upper pair of arms.....	0	10½
Breadth of body, excluding fins.....	0	8
"    "    head, across the eyes .....	0	6
Greatest breadth of fin .....	0	3½
Length of first pair of arms .....	0	8½
"    "    second do. ....	0	9
"    "    third do. ....	0	8½
"    "    fourth or anterior.....	0	8
"    "    pedunculated arms.....	1	4
Diameter of transparent part of eye.....	0	1½

The above description is from an individual found by one of my pupils, Mr. Blake, in February, 1842, and by him presented to me. It occurred in the Bay of Aberdeen.

*Sepia Sepiola*, Linn. Syst. Nat. i. 1096.—*Sepia Sepiola*, Penn. Brit. Zool. iv. 54. Pl. 29. f. 46.—*Sepiola Rondeletii*, Risso, Eur. Merid. iv. 7.—*Loligo Sepiola*, Delle Chiaje, Anim. di Nap. iv. 59. Pl. 58. f. 30.—*Loligo Sepiola*, Flem. Brit. Anim. 253.

## GENUS 2. SEPIA. CUTTLE.

Head very large, distinct, with eight short, triangular, tapering, fleshy arms, furnished with two rows of acetabula, having entire horny margins, and two more elongated, pedunculate, claviform, acetabulate arms. Body oval, obtuse, depressed, margined on each side with a narrow membrane, or natatory appendage. An internal, dorsal, oval or elliptical, thick, lamellar, cellular, calca-



reous shell, convex on both faces, and terminated behind by a harder median point.

1. *Sepia officinalis*. *Common Cuttle*.

Body smooth; pedunculate arms very long; dorsal shell elliptical, with a small slightly-curved point behind.

A shell or bone of this species, found on the coast, by Andrew Murray, Esq. Aberdeen, is in my possession. Dr. Dyce also informs me that he has seen several bones of this species. I have not, however, met with any myself, nor seen the animal.

*Sepia officinalis*, Linn. Syst. Nat. i. 1095.—*Sepia officinalis*, Penn. Brit. Zool. iv. 55.—*Sepia officinalis*, Lamk. Syst. vii. 668.—*Sepia officinalis*, Delle Chiaje, Anim. S. Vert. di Nap. iv. 60.—*Sepia officinalis*, Flem. Brit. Anim. 252.

GENUS 3. LOLIGO. CALMARY.

Head large, distinct, with eight unequal, tapering, fleshy arms, furnished with two rows of acetabula, having denticulated horny margins, and two very long pedunculate, claviform, acetabulate arms. Body elongated, subcylindrical, tapering behind, and there margined on each side with a large, angulate, natatory appendage. An internal, dorsal, elongated, narrow, horny or cartilaginous shell.

1. *Loligo vulgaris*. *Common Calmary*.

Body, or visceral sac, subcylindrical, considerably depressed, tapering behind to an obtuse point; and having two large, semirhomboidal flaps, or fins, attached to the dorsal region, for two-thirds of the length of the body. Together, they form a large, broadly rhomboidal expansion, which is attached nearly in its whole length, leaving only the terminal portion free. The dorsal aspect of the body is minutely punctate with reddish-brown on a greyish-yellow ground; the ventral aspect yellowish-white. The mantle is free all round at its anterior margin, which forms an obtuse point behind. The infundibulum compressed, tapering, truncate. The head comparatively small; the eyes large, but with a rather small circular aperture, of which the margins are rugose. The eight fleshy arms are short, and taper to a minute, acuminate point; the dorsal pair shortest, the lateral dorsal, and the ventral pairs nearly equal,

and much longer than the dorsal, the lateral ventral much thicker and longer. They are connected at the base by very short membranes. The acetabula are pedunculate, cup-shaped, with a thin horny, minutely denticulate margin, and are irregularly disposed in two rows—there being on each of the ventral pair about two hundred, besides some very minute at the tip. The two pedunculate arms are nearly two-thirds of the length of the head and body, slender, at first round, then compressed, ultimately clavato-lanceolate, with numerous irregular cup-shaped, pedunculate acetabula, like those on the other arms. Surrounding the mouth are two pyramidal prominences on each side, a lower prominence behind, and two ridges before. The lip is radiatingly rugose; the mandibles brown, at the tip black.

	Inch.	Lines.
Length from mouth to end of body .....	11	6
Breadth of body anteriorly .....	2	9
„ at the commencement of the fin .....	3	6
„ about the middle of the fin .....	4	0
Greatest breadth of fins .....	8	0
Space between the fins anteriorly .....	2	3
Length of dorsal arms .....	2	3
„ „ ventral arms .....	4	0
„ „ pedunculate arms.....	7	6
„ from the mouth to the dorsal peak of the mantle .....	1	3
„ from the mouth to the ventral margin .....	2	0

The above description is that of a specimen preserved in spirits, and belonging to Dr. Dyce, who obtained it from the Bay of Aberdeen, in 1836. He informs me that several other specimens have been in his possession. I have heard of two *Loligines*, which other individuals had; but, as they were simply esteemed to be “Cuttle-fish,” I cannot say whether they were of this or of other species. Pennant’s figure, referred to below, agrees remarkably well with the specimen here described—differing only in having the pedunculate arms rather shorter. It represents the form of the body and fins much more accurately than that of *Delle Chiaje*.

*Sepio Loligo*, Linn. Syst. Nat. i. 1096.—*Sepia Loligo*, Penn. Brit. Zool. iv. 53. Pl. 27. f. 43.—*Loligo vulgaris*, *Delle Chiaje*, Anim. S. Vert. di Nap. iv. 57. Pl. 59. f. 2.—*Loligo vulgaris*, Lamk. Syst. vii. 662.—*Loligo vulgaris*, Flem. Brit. Anim. 252.

## SECTION II.—OCTOCERATA.

*With eight arms, but no tentacular appendages.*

## GENUS 4. ELEDONE. ELEDONE.

Head large, distinct, with eight fleshy, tapering arms, furnished with a single series of acetabula on their internal surface, and connected by basal membranes. Body subglobose, or subelliptical, and somewhat depressed, without natatory appendages. Mantle continuous behind with the skin of the head.

1. *Eledone Pennantii*. *Pennant's Eledone*.

Body globoso-elliptical, somewhat flattened, much rounded at the end; with the surface minutely granulated and dusky on the dorsal aspect, smooth and yellowish-white on the ventral; which is also the case with the head. The mantle is continuous with the head behind, anteriorly free, with the margin moderately thin, and even. The infundibulum conical, compressed, truncate. The head very large, but narrower than the body. The eyes rather small, with a circular aperture, without eyelids. The arms very long, nearly equal, compressed, tapering gradually to a fine point, for a fourth of their length connected by membranes, the margins of which run along the back of each arm to the end. The dorsal surface of six of the arms more or less dusky—the rest yellowish-white. The acetabula are placed so closely that many of them, apparently by pressure, have assumed a squarish form. They are sessile, large, with a thick undulated margin, and internally radiated, the larger with from twenty to twenty-five rays; the fifth or sixth acetabulum from the base largest. On one of the dorsal arms are sixty-five, and on one of the ventral seventy-five. The two branchiæ consist each of twenty-four pinnæ.

	Inch.	Lines.
Length of the body .....	2	6
Breadth .....	2	0
Length from the mouth to the end of the body .....	3	6
,, of dorsal arms.....	5	6
,, ,, ventral arms .....	6	3

The above description is from an individual, preserved in spirits, and in the possession of Dr. Dyce, who obtained it in October, 1836—it having been taken in the Bay of Aber-

deen. It agrees very well with Pennant's figure referred to below. As the species represented by it is not *Sepia octapodia* of Linnæus, Mr. Forbes has named it *Eledone Pennantii*.

*Sepia octopodia*, Penn. Brit. Zool. iv. 53. Pl. 28. f. 44.—*Octopus octapodia*, Flem. Brit. Anim. 254.—*Eledone Pennantii*, Forbes, Malac. Mon. i.

2. *Eledone Aldrovandi*. *Aldrovandus's Eledone*.

Body elliptical, somewhat flattened, much rounded at the end; with the surface even, smooth, and of a bluish-white colour. The margin of the sac free, unless at the back, where it is continuous with the skin of the head. Measured across the eyes, the head is narrower than the body, but seems larger, owing to the great size of the bases of the arms. The eyes, although large, are comparatively small. The head is crowned by a circle of large, fleshy, compressed tapering arms, of unequal length, and extremely slender at the end; the dorsal arms shortest—the ventral pair longest. They are covered internally with a single series of sessile cups elevated on broad tubercles, of which there are from sixty to seventy. These suckers are not in mutual contiguity, but placed at a little distance from each other, and enlarge from the first to the fifth, which measures three-twelfths across; the horny portion cup-shaped or hemispherical. For more than a third of their length, the arms are connected by wide membranes, the margins of which run out upon them. The mandibles are brownish-black, with a portion of the base white.

	Inch.	Lines.
Length from mouth to end of sac.....	3	6
Breadth of body.....	2	2
Length of upper or dorsal arms.....	2	10
"    " lateral dorsal.....	3	4
"    " lateral ventral.....	3	6
"    " ventral.....	3	9

The above description is that of one of two individuals—one of which was found on the sands near Don-Mouth, in November, 1841, by my son John—the other by myself. Their smell was in no degree musky. The body being smooth and white, and the arms proportionally short, this species cannot be confounded with the last, which has the acetabula crowded, whereas in this they are well separated. It appears to me to accord best with Delle Chiaje's *Octopus Aldrovandi*, corpore, brachiis, et alis concoloribus.

Octopus Aldrovandi, Delle Chiaje, Anim. di. Nap. iv. 57. Pl. 56. f. 2.—“Octopus Aldrovandi, Montfort, Sur les Cephalop. 62.”  
—“Octopus leucoderma, Sangiovanni. Ann. des Sc. Nat. xvi. 315.”

## ORDER II.—CEPHALOPODA SIPHONIFERA.

Animal with a shell partially or entirely internal, and divided into chambers by transverse partitions, through which a siphon passes. To this order belong the families of the *Spirulina*, *Nautilina*, *Ammonitina*, and *Belemnina*—of which no species have been found on the Aberdeenshire coasts in a recent or living state.

## ORDER III.—CEPHALOPODA FORAMINIFERA.

Animal bursiform, containing the shell in its hind part; the head very small, scarcely distinct from the body, sometimes almost entirely enclosed in the anterior folds of the skin, and terminated by numerous tentacula forming several rows around the mouth, which is central.

Shell many-chambered, altogether internal; the last dissepiment terminal; no siphon, but only one or several apertures between the different cells.

### GENUS I. POLYSTOMELLA.

Shell discoid, subcarinate, many-celled; the centres umbilicate, the partitions numerous, forming grooves radiating from the centre to the circumference; the turns contiguous, not apparent externally, being concealed by the last; the aperture of several holes or notches variously disposed.

#### 1. *Polystomella crîspa*. *Crenated Polystomella*.

Shell discoid, with both sides equally convex, carinated on the margin; the last turn entirely concealing the rest, of about twenty cells, marked by flexuous ridges, the spaces between which are crenated; the aperture subcordate, closed.

Several specimens found in shell sand from Cruden Bay, sent to me by Mr. Alex. Murray, in November, 1842.

*Nautilus crispus*. Linn. Syst. Nat. i. 1162.—*Nautilus spiralis geniculis crenatis*. Walker. Test. Min. Rar. Pl. 3. f. 65.—*Nautilus crispus*. Mont. Test. Brit. 187. Pl. 28. f. 5.—*Nautilus crispus*. Flem. Brit. Anim. 228.—*Polystomella crispa*. Lamk. Syst. vii. 625.

## GENUS 2. NUMMULINA. NUMMULINE.

Shell discoid, suborbicular, depressed, with a plurilocular spire, with complex walls, and arranged in the same plane; the two surfaces convex, the margin thin.

### 1. *Nummulina marginata*. *Margined Nummuline*.

Shell suborbicular, depressed, glossy, convex on one side, conico-convex on the other, yellowish-white, with a very thin, broad margin, separated by a circular groove from the body of the shell; the internal spiral tube with few volutions. Diameter about a fourth of a twelfth of an inch, height nearly half the breadth.

Individuals vary a little in form, some being perfectly orbicular, others less so, some with a slight angle.

Found by me among shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Renoidea marginata*. Brown, Illustr. Pl. 1. f. 25. The references wrong, the shell indicated by them being *Lagenula marginata*, fig. 30, 31, of the same plate.

## GENUS 3. DISCORBIS.

Shell discoid, spiral, formed of a series of oblique lobiform cells, flattened beneath, convex above; the upper surface occupied by the last-formed whorl, the partitions of which radiate obliquely from the centre to the margin; the whorls on the lower disk exposed; the partitions generally imperforate; the aperture small.

### 1. *Discorbis lobátulus*. *Lobulate Discorbis*.

Shell depressed, spiral, lobed, generally roundish, but diversiform, convex above, with the centre depressed; of two or three whorls of oblique oblong or ovate lobes; the first turn exposed on the lower surface, the last occupying the upper, both surfaces obliquely radiated from the centre by the partitions of the cells, which are convex, frosted, and greyish-white;

aperture very minute, on the rounded extremity of the last turn. Diameter a twelfth of an inch.

A shell exactly similar, but with the spire reversed, or turned from right to left, I have repeatedly found on *Flustræ* from deep water.

Very common on *Flustræ*, *Tubulariæ*, and other zoophytes, as well as *Pectens*, *Anomiæ*, *Fusi*, *Buccina*, and other shells, from deep water off Aberdeen. First observed by me, in September, 1842, on *Tubularia indivisa*. Equally common at Banff, Gamrie, Fraserburgh, Peterhead, and Cruden, as shewn by specimens from Mr. Alex. Murray and Miss Macgillivray.

“*Nautilus lobatulus*. Turt. Linn. Syst. iv. 307.”—*Serpula lobata*. Mont. Test. Brit. 515. Suppl. 160. Pl.—*Discorbis vesicularis*. Lamk. Syst. vii. 623.—*Lobatula vulgaris*. Flem. Brit. Anim. 232.—“*Nautilus fartus*. Fichtel. Pl. 9. f, g, h, i.”—*Nautilus spiralis, lobatus, &c.* Walker, Test. Min. Rar. Pl. 3. f. 71.—*Discorbis vesicularis*. Blainville, Malac. Pl. 5. f. 3.

#### GENUS 4. ROTALIA.

Shell discoid, spiral, flattened beneath, convex above, formed of a series of oblique cells; all the whorls apparent on the upper disk, the lower occupied by the last whorl; the partitions radiating from the centre to the margin, generally imperforate; the aperture small, trigonal.

##### 1. *Rotalia Beccarii*. *Beccaria's Rotalia*.

Shell orbicular, depressed, spiral, lobed, convex above, flattened beneath; of four or five turns, which are obliquely lobate, convex, with the separating lines rather deep; the last turn with about twelve lobes, and solely occupying the lower surface, although also apparent above; the aperture small, directed rather downwards; the colour reddish-white, but varying. Diameter about half a twelfth of an inch.

First found by me, at Aberdeen, in September, 1842, on an *Echinus*. It occurs on various *Algæ* and *Zoophytes*; but is not nearly so common with us as *Discorbis lobatulus*, which it exceeds in regularity of form. Mr. Alexander Murray has also sent it from Fraserburgh, and the Bay of Cruden.

*Nautilus Beccarii*. Linn. Syst. Nat. i. 1162.—*Nautilus Spiralis, umbilicatus Geniculis in sculptis*. Walker, Test. Min. Rar. 18. Pl. 3. f. 63.—*Nautilus Beccarii*. Mont. Test. Brit. 186. Pl. 18. f. 4.—*Rotalia Beccaria*. Flem. Brit. Anim. 232.

A shell in all respects similar, unless in being convoluted in

the opposite direction, is considered by some as a distinct species, and by others as a sinistrorse variety of *Rotalia Beccarii*. I have found it on shells and *Flustræ* from deep water, but it is very uncommon with us.

GENUS 5. SPIROLOCULINA. SPIROLOCULINE.

Shell suborbicular, depressed, with the cells curved and opposed to each other in a single plane, and completely exposed, or not embracing each other; the aperture roundish at one end of the last turn.

1. *Spiroloculina concéntrica*. *Concentric Spiroloculine*.

Shell elliptico-orbicular, depressed, concave on both sides, very thin, of about five opposite arcuate cells, distinctly separated by a groove; the outer cells externally flattened, or slightly convex; the colour white, generally with two brown or blackish streaks on each turn; the aperture nearly square, with an erect tooth-like process, and thick brown margin. Diameter nearly half the twelfth of an inch.

The centre is frequently perforated, but apparently from accident.

Found by me among shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Miliola concentrica*. Brown, *Illustr. Pl. 1. f. 22*.

GENUS 6. VERMICULUM.

Shell roundish, depressed, of few cells, which are alternately folded upon each other; the aperture at the end of that last formed.

1. *Vermiculum subrotúndum*. *Roundish Vermiculum*.

Shell orbicular, depressed, flat beneath, of three smooth, glossy, opaque, white turns, of which the last two are incurved and margin the disk, the first running across its centre; their upper surface convex, the anterior end rounded, with the mouth depressed, oval, toothless. Diameter about a fourth of the twelfth of an inch.

Found by me adhering to an old cockle, from deep water off Aberdeen, 28th September, 1842; in October, by Mr. Alexander Murray, at Fraserburgh, and in Cruden Bay.

*Serpula subrotunda dorso elevato*. Walker, *Test. Min. Rar. Pl. 1. f. 4*.—*Vermiculum subrotundum*. Mont. *Test. Brit. 521*.—*Vermiculum subrotundum*. Flem. *Brit. Anim. 234*; Wern. *Mem. iv. 565. Pl. 15. f. 5*.



2. *Vermiculum intortum*. *Oval Vermiculum*.

Shell suboval, somewhat compressed or trigonal, of several smooth, glossy, opaque, white turns, three being generally visible on one side, four on the other; the last folds arcuate, or subcarinate, angular on the margin; the aperture roundish, divided by a thin plate or tooth attached to the proximal margin. Length from half a twelfth to nearly a twelfth of an inch.

Found by me in October, 1842, among sand and broken shells adhering to an *Ascidia* from deep water, off Aberdeen; and by Mr. Alexander Murray at Fraserburgh, and Cruden.

*Serpula Seminulum?* Linn. Syst. Nat. 1264.—*Serpula subovalis umbilico pervio*. Walker, Test. Min. Rar. Pl. 1. f. 1.—*Vermiculum intortum*. Mont. Test. Brit. 520.—*Vermiculum intortum*. Flem. Wern. Mem. iv. 564. Pl. 15. f. 3.—*Vermiculum intortum*. Flem. Brit. Anim. 233.

3. *Vermiculum oblongum*. *Oblong Vermiculum*.

Shell subelliptical, or lanceolate, somewhat compressed, of several smooth, glossy, opaque white turns, there being generally three visible on one side, and two on the other, the last folds arcuate, their inner margins partially embracing the central turn, their outer margin somewhat compressed, but rounded; the aperture suboval, with a pedunculated, thickish bifid tooth. Length half a twelfth of an inch.

Found by Mr. Alex. Murray, at Fraserburgh, Cruden, and Slains, and by me at Aberdeen, in October, 1842.

*Vermiculum oblongum*. Mont. Test. Brit. 522. Pl. 14. f. 9.—*Vermiculum oblongum*. Flem. Wern. Trans. iv. 565. Pl. 15. f. 4.; Brit. Anim. 233.

4. *Vermiculum lacteum*. *Plaited Vermiculum*.

Shell oblongo-elliptical, of several smooth, glossy, semi-transparent white elongated lobes or chambers, arranged obliquely and divergently along a common axis; the aperture circular. Length half a twelfth of an inch.

First found by me in October, 1842, on a dead shell, from off Aberdeen. In shell sand from Cruden: Mr. A. Murray.

*Serpula lactea*. Turton's Linn. iv. 609.—*Vermiculum lacteum*. Mont. Test. Brit. 522.—*Vermiculum lacteum*. Flem. Wern. Mem. iv. 566. Pl. 15. f. 6.—*Arethusa lactea*. Flem. Brit. Anim. 234.

GENUS 5. *TEXTULARIA*.

Shell subpyramidal, compressed, with the summit pointed, the base rounded; having on each side an angular

or sinuous groove extending from the summit to the base; and composed of two series of alternating cellules; the aperture semilunar, on the inner side of each cellule.

1. *Textulária oblóna*. *Oblong Textularia*.

Shell oblongo-lanceolate, pointed, somewhat compressed, of two alternate vertical series of horizontal, rather convex, depressed, glossy, somewhat tuberculate olivaceous cellules. Length half a twelfth of an inch, breadth about half the height.

Found among sand sent by Mr. Alex. Murray, in October, 1842, from Fraserburgh.

GENUS 8. LAGENULA.

Shell somewhat resembling a Florence flask, being globose or ovate, with a more or less produced neck.

1. *Lagénula lævis*. *Smooth Lagénula*.

Shell ovato-claviform, smooth, glossy, bluish-white, having an ovate body with a prolongation, gradually tapering into a cylinder; the larger end broadly rounded, the other with a depression and central aperture. Length about the twelfth of an inch.

First found by me, in October, 1842, adhering to fuci, and among the byssi of *Modiola barbata*, on the Girdleness, at Aberdeen.

*Serpula* (*Lagena*) *lævis ovalis*. Walker, Test. Min. Rar. Pl. 1. f. 9.—*Lagenula lævis*. Flem. Brit. Anim. 235.

2. *Lagénula reticuláta*. *Reticulated Lagénula*.

Shell ovato-globose, considerably compressed, highly glossed, smooth, pellucid, with numerous opaque white internal reticular markings, bounding irregular areolar spaces; the internal cavity simple, the cells being only parietal; the aperture terminal, rather large, oval. Length a third of a twelfth, breadth a fourth less.

Found by me in November, 1842, among shells and coralines, from the Bay of Aberdeen.

Not finding any description agreeing with this species, I have named it as above.

To these may be appended the *Dentalium glabrum* of Montagu, the nature of which seems to be unknown. As it does not agree with the *Orthocerae*, although some have placed it among them, it may be here described under the name of *Cœcalium*, given to the genus by Dr. Fleming, in his *Philosophy of Zoology*. Two other species have also occurred.

## GENUS 9. CÆCALIUM.

Shell cylindrical, more or less arcuate, of one cell, closed at one end, open at the other.

1. *Cæcálum glábrum*. *Smooth Cæcalium*.

Shell cylindrical, very slightly narrowed downwards, a little arcuate, of a single cell, very thin, transparent, smooth, glossy, iridescent, or opaline white, rounded at the lower end, open at the other, with the aperture circular. Length one-twelfth, breadth nearly a fourth of the length.

Several specimens among small shells sent by Mr Alex. Murray, who found them at Fraserburgh, in October, 1842. Many others found by me among shell sand, from the Bay of Cruden.

*Dentalium glabrum*. Mont. Test. Brit. 497.—*Brochus glaber*. Brown, Illustr. Pl. 1. f. 3.—*Orthocera glabra*. Flem. Brit. Anim. 237.—*Cæcum glabrum*. Flem. Edinb. Encycl. vii. 67. Pl. 204. f. 7.

2. *Cæcálum imperforátum*. *Imperforated Cæcalium*.

Shell cylindrical, arcuate, glossy, finely and obsoletely striated transversely, of a single cell, rather thick, somewhat pellucid, white or greyish, closed and truncato-convex, or hemispherical at the lower end, open at the other, with the aperture round, and having a thin, slightly contracted margin. Length an eighth of an inch, breadth about a fifth of the length.

This species is considerably larger than *Cæcalium glabrum*, from which it differs in being annulated with delicate striæ.

Found by me in shell sand, from the Bay of Cruden, sent by Mr. Alex. Murray, in November, 1842.

*Dentalium imperforatum*. Mont. Test. Brit. 496.—*Dentale apice imperforata transversaliter substriata*. Walker, Testæ Min. Rar. Pl. 1. f. 15.—*Orthocera imperforata*. Flem. Brit. Anim. 237.

3. *Cæcálum Trachæa*.

Shell subcylindrical, arcuate, annulated, or marked with circular striæ, and intervening convex rings, of a single cell, very thin, semitransparent, glossy, white or brownish, closed and truncated at the lower end, open at the other, with the aperture circular. Length a twelfth and a-half, or a little more, breadth about a fifth of the length.

Found by me in shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Dentalium Trachea*. Mont. Test. Brit. 497. Pl. 14. f. 10.—*Orthocera Trachea*. Flem. Brit. Anim. 237.

## GENUS 10. DENTALINA. DENTALINE.

Shell subcylindrical, somewhat tapering, more or less arcuate, composed of numerous more or less oblique cells disposed in a single series; aperture small, submarginal.

1. *Dentalina lineáris*. *Semistriated Dentaline*.

Shell elongated, subcylindrical, tapering a little toward the lower end, glossy, white, in its lower half marked with distinct longitudinal, somewhat oblique striæ and ridges; of fourteen somewhat oblique, transparent cells, rendered apparent by the opaque white dissepiments more than by the contractions, which are very slight; the lower end rounded; the last cell convex, with the aperture very small, circular, with a slightly thickened margin, and placed toward one side. Length two-twelfths of an inch, breadth about an eighth of the length.

This is evidently *Nautilus linearis* of Montagu, which however he represents as straight, with the cells transverse, and the mouth produced.

Found by me among shell sand, from the Bay of Cruden, sent in November, 1842, by Mr. Alexander Murray.

*Nautilus linearis*, Mont. Test. Brit. Suppl. 87. Pl. 30. f. 9.—*Orthocera linearis*, Flem. Brit. Anim. 236.

## CLASS II.—PTEROPODA.

Body partially covered by the mantle, and frequently furnished with a shell; head distinct, destitute of arms; the sides of the neck with membranous appendages for swimming.

*Aporobranchiáta*, Blainville. *Pterópoda*, Cuvier.  
Πτέρον, wing; πόδα, feet.

No species of this class has hitherto occurred to me on our coast. The Pteropoda are of small size, organized for swimming, and for the most part inhabit the tropical seas, although some species occur in vast abundance in those of the polar regions.

## CLASS III.—GASTEROPODA.

Body partially covered by the mantle, and generally furnished with a shell; head distinct, tentaculate; a muscular disk, or foot, for creeping, attached to the body beneath.

*Trachelípoda* and *Heterópoda*, Lamarck. *Paracephalóphora* and *Polyplaxíphora*, Blainville. *Gasterópoda*, Cuvier. Γαστήρ, the belly; πούς, a foot.

Body elongated; the back furnished with a mantle, which is sometimes bare, more frequently covered by a shell. Head distinct, protruded beyond the mantle. Mouth surrounded by contractile lips, sometimes armed with teeth inserted on the palate. Stomach, intestine and liver, with the other viscera lodged beneath the mantle; the anus generally on the right side of the body anteriorly. Circulatory apparatus a systemic heart, and an arterial system, together with pulmonic arteries and veins. Respiratory organs sometimes pulmonic, more frequently branchial. Generative system various. Nervous system composed of ganglia and filaments; eyes very small, sometimes adhering to the head, sometimes to the base, or side, or tip of the tentacula, sometimes wanting; two or four retractile tentacula, which are organs of touch, attached to the head, always above the mouth. Organ of locomotion a ventral fleshy mass, generally in the form of an oblong disk, sometimes a vertical fin. The shell generally large enough to contain the entire animal, and usually tapering and spirally convoluted. The mass of the viscera always enclosed

in the upper part of the spire or cone ; but the head and foot are protruded when the animal is in motion, and retracted when at rest. In many species, a solid horny or calcareous lid or operculum, which closes the aperture of the shell, when the animal has retired into it. Some species are terrestrial, but more are aquatic. Of the latter most live in the sea, the rest in fresh water.

Slugs, snails, welks, buccines, and other common mollusca afford familiar examples of this order, any species of which may be at once known by its fleshy disk or foot.

The Gasteropodous Malacozoa, being very numerous, are divided into several orders :—1. Pulmonata, or Pulmobranchiata ; 2. Pectinibranchiata ; 3. Tubulibranchiata ; 4. Scutibranchiata ; 5. Cyclobranchiata ; 6. Inferobranchiata ; 7. Tectibranchiata ; 8. Nudibranchiata ; 9. Cirrobranchiata.

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*SYNOPSIS OF THE ABERDEENSHIRE SPECIES.*

ORDER I.—GASTEROPODA PULMOBRANCHIATA.

Respiratory apparatus a pulmonary cavity on the back, opening by an aperture on the margin of the mantle over the neck, on the right side. Individuals bisexual.

*Pulmobranchiata*, Blainville. *Pulmónes*, Lungs.

TERRESTRIA. *Residing on land.*

FAMILY I.—LIMACINA.

Body elongated, contractile, with a shield-like mantle above, and united in its whole length with the foot beneath ; four retractile tentacula ; eyes on the summits of the upper ; generally no external shell, but an internal thin scale in the mantle.

*Limáciens*, Lamarck. *Limacinea*, in part, Blainville.  
*Nudilimáces*, Latreille. *Límax*, a slug.

GENUS 1. ARION.—Animal elongated, convex above; with the shield granulated; a mucous pore at the end of the body above; pulmonary orifice near the fore part of the shield. *Arion* was a horse remarkable for its speed; but our *Arion* is remarkable for its slowness. Ferussac.

1. *Aríon áter*.—Shield granulated, mantle with longitudinal, branched ridges; upper parts generally black. *Ater*, black.

GENUS 2. LIMAX.—Animal elongated, convex above; with the shield marked with concentric lines; pulmonary orifice near the hind part of the shield. *Límax*, a slug. Linnæus. Ferussac.

1. *Límax cinéreus*.—Shield elongated, mantle with parallel, somewhat undulated ridges; a prominent acute undulated keel on the posterior third of the body; the upper parts dusky brown with five pale-brown longitudinal bands, or variously spotted. *Cinéreus*, ash-grey.

2. *Límax variegátus*.—Shield short, sulcato-granulate, the posterior fourth of the body with a medial crenate keel; upper parts reddish or yellowish-brown, thickly spotted with blackish-brown. *Variegátus*, of different colours.

3. *Límax agréstitis*.—Shield large, striato-sulcate; a short obliquely bent keel toward the end of the body, upper parts yellowish-grey or pale-brown, somewhat mottled with dusky and whitish. *Agréstitis*, residing in fields.

4. *Límax marginátus*.—Shield elongated, with large undulated ridges, a rather obtuse white keel in the whole length of the body, the shield yellowish-grey with two longitudinal brown bands, the hind part of the body bluish-grey. *Marginátus*, having a margin.

#### FAMILY II.—HELICINA.

Body elongated, spiral, united anteriorly with the foot, and covered by a spiral shell; four retractile tentacula; eyes on the summits of the upper.

*Trachélipodes Colimacés*, Lamarck. *Limacinea*, in part, Blainville. *Géocochlides*, Latreille. Genus *Hélix*, Linnæus.

GENUS 1. HELIX.—Shell orbicular, subglobose, subconical, or depressed, umbilicate, thin, spiral, with the aperture roundish or semilunar, its margin thickened, and more or less reflexed, but incomplete behind. *Hélix*, a snail. Linnæus. Lamarck.

1. *Hélix aspérsa*.—Shell subglobose, imperforate, rugose, and subreticulate, reddish-brown with four longitudinal bands of blackish-brown, interrupted by yellowish curved spots. *Aspérsus*, sprinkled with dots.

2. *Hélix arbustórum*.—Shell subglobose, perforate, faintly rugose, brown, marbled with brownish-yellow, and having a longitudinal dark-brown band. *Arbústum*, a copse or orchard.

3. *Hélix horténsis*.—Shell subglobose, imperforate, yellow, with five longitudinal brown bands, the mouth with the margin white. *Hórtus*, a garden.

A. *H. horténsis vulgáris*. *Vulgáris*, common.

B. *H. horténsis marítima*. *Marítima*, living near the sea.

C. *H. horténsis arenícola*. *Arenícola*, inhabiting sand.

4. *Hélix caperáta*.—Shell moderately depressed, deeply striate, of six convex turns, the last subcarinate, the umbilicus rather large, aperture semilunar with the margin thin; the colour yellowish-grey, irregularly spotted or banded with brown above, the base with interrupted brown bands. *Caperátus*, wrinkled like the horns of a goat, *cáper*.

5. *Hélix hispída*.—Shell moderately depressed, very thin, horny, pale yellowish-brown, covered with numerous short glistening, yellowish-white hairs, the last turn subcarinate, the keel paler, a rather narrow deep umbilicus, aperture with the margin thin. *Hispídus*, bristly.

6. *Hélix Tróchulus*.—Shell conico-convex, of six well-rounded turns, faintly striate, transversely; the base convex with a shallow, undefined umbilicus. *Tróchulus*, a little “top wherewith children play.”

7. *Hélix lamelláta*.—Shell conico-convex, of six



rounded turns, covered with very numerous transverse lamellæ; the base convex with a deep umbilicus. *Lamel-látus*, covered with small plaits.

8. *Hélix aculeáta*.—Shell globoso-conical, of six rounded turns, the epidermis rising into thin spinous processes. *Aculeátus*, prickly.

9. *Hélix pulchélla*.—Shell depressed, equally convex on both sides, deeply umbilicate, greenish-white, the aperture circular with the margin thick, flat, and re-flexed. *Pulchéllus*, small and beautiful.

GENUS 2. ZONITES.—Shell orbicular, depressed, flat or little convex above, umbilicate, very thin, spiral; with the aperture roundish-semilunar, having a very thin margin, incomplete behind. Name from Ζώνη, a zone or belt. Montfort, Gray.

1. *Zonites rotundátus*.—Shell flattish, slightly convex above, deeply and regularly striate, variegated with spots of reddish-brown and greyish-yellow, the umbilicus very large, the aperture semilunar. *Rotundátus*, rounded.

2. *Zonites cellárius*.—Shell flattened, slightly convex above, somewhat rugose, shining, transparent, pale yellowish-brown, the last turn opaque and white to a great extent beneath, umbilicus, rather large and deep. *Cellárius*, living in cellars.

3. *Zonites nitídulus*.—Shell depressed, considerably convex above, somewhat rugose, glossy, transparent, light yellowish-brown, the last turn with a small part of the under side along its inner margin whitish and very slightly opaque, umbilicus rather large and deep. *Nitídulus*, somewhat shining.

4. *Zonites lúcidus*.—Shell depressed, considerably convex above, rather strongly striato-rugose, transparent, glossy above, shining beneath, dull greyish-brown, the whorls convex and inflexed at the suture margin, the last destitute of whiteness or opacity beneath, umbilicus large and deep, aperture oblique, longer than broad. *Lúcidus*, shining.

5. *Zonites allíarius*.—Shell nearly flat, somewhat

wrinkled, shining, transparent, yellowish-brown, with the suture margin planulate, part of the last turn beneath somewhat opaque and whitish, umbilicus rather large and deep. *Allium*, garlic. *Alliarius*, smelling of garlic.

6. *Zonites radiatulus*.—Shell depressed, very slightly convex above, regularly striate, transparent, glossy, pale greenish-grey, of three-and-a-half whorls, which are flattened at the suture margin, with the striæ more distinct there, umbilicus large and deep. *Radiatulus*, having small rays.

7. *Zonites pûrus*.—Shell flattened, somewhat convex above, wrinkled or striate, transparent, moderately glossy, greenish-white, of four whorls, which are a little convex and incurved at the suture margin, umbilicus rather large and deep. *Pûrus*, clean or clear.

8. *Zonites crystallinus*.—Shell flattened, very slightly convex above, extremely thin, transparent, shining, greenish-white, of five or six whorls, which are slightly flattened at the suture margin, and faintly striato-rugose, umbilicus deep, of moderate width. *Crystallinus*, clear like crystal, or glass.

9. *Zonites fuscus*.—Shell rather convex, extremely thin, flexible, the turns striato-sulcate. *Fuscus*, brown or dusky.

GENUS 4. VITRINA. Animal with a linguiform process extending backwards over the shell, on the right side. Shell spiral, of few turns, semiorbicular, imperforate, extremely thin, transparent; the last turn disproportionately large; the aperture roundish, with the margin very thin. *Vitrum*, glass. Draparnaud.

1. *Vitrina pellúcida*.—Shell ovato-orbicular, considerably depressed, very thin, brittle, glossy, pale apple-green, or hyaline; with the aperture very large, roundish, sub-lunate. *Pellúcidus*, permeable to light.

GENUS 5. SUCCINEA.—Shell oval or oblong, imperforate, very thin, with a short spire; the aperture very large, obovate or oblong, with the margin thin, and disunited behind. *Súccinum*, amber. Draparnaud.

1. *Succinea pútris*.—Shell ovato-oblong, very thin, transparent, glossy, with the spire short, the mouth ovate, vertical, two-thirds of the whole length. *Pútris*, filthy.

A. *S. pútris grácilis*. *Grácilis*, slender.

GENUS 6. BULIMUS.—Shell ovate, oblong, or subcylindrical, spiral, thin; the last turn proportionally larger than the next; the aperture oval, entire, toothless, not half so long as the spire; peristome incomplete, thickened. The name perhaps from βούλιμος, *insatiable hunger*. Bruguiere.

1. *Bulimus lúbrius*.—Shell ovato-cylindrical, shining faintly striated, with the aperture ovato-trigonal, the peristome thickened, but not reflexed. *Lúbrius*, smooth, slippery, or glossy.

2. *Bulimus obscúrus*.—Shell ovato-oblong, slightly lossed, faintly striated, with the aperture subovate, the peristome somewhat thickened and spread. *Obscúrus*, dusky or dull.

GENUS 7. PÚPA.—Shell oblongo-cylindrical, thin, spirate; the last turn not much larger proportionally; the aperture semioval, with the peristome incomplete, thickened, and reflexed. *Púpa*, a doll or puppet; also an insect in the second state of its existence, in which it resembles this shell.

1. *Púpa umbilicáta*. Shell oblongo-cylindrical, with the aperture semioval, subangulate, the peristome thick and flattened, a laminar tooth in or near the angle formed by the junction of the outer lip, the umbilicus narrow. *Umbilicátus*, having an umbilicus.

2. *Púpa margináta*.—Shell oblongo-cylindrical, with the aperture nearly circular, the peristome thin, but with a strong convex external rib behind it on the outer lip, an obtuse, often obsolete tooth in the middle of the columellar space. *Marginátus*, having a rim.

GENUS 8. VERTIGO.—Shell subcylindrical, very thin, spirate; the last turn not proportionally larger; the aperture semioval, toothless, the peristome slightly

thickened, incomplete. *Vertigo*, a whirling or turning round. Muller.

1. *Vertigo edéntula*.—Shell ovato-cylindrical, subconical, with the second turn much larger than the first, greatly exceeded by the third, which is little less than the fourth, the fifth not much larger. *Edéntulus*, toothless.

GENUS 9. CLAUSILIA.—Shell slender, turrite, subfusiform, thin, of numerous generally reversed turns, the last smaller than the next, the aperture suboval, oblique, with the peristome continuous, free, marginate, and toothed; the throat with an internal plait capable of closing the cavity. *Claudo*, to close. Draparnaud.

1. *Clausília pervérsa*.—Shell turrito-fusiform, rather glossy, with from ten to twelve little convex, transversely sulcato-striate turns, the last narrowed, with two wide grooves, the aperture subovate, narrowed near the upper end, and having generally two plaits on the columella. *Pervérsus*, turned the wrong way.

GENUS 10. BALEA.—Shell slender, turrite, thin, of numerous reversed turns, the last proportionally larger than the next, the aperture roundish or oval with the peristome thin and simple. Name unintelligible. Leach, Gray.

1. *Balea pervérsa*.—Shell oblongo-turrite, reversed, slender, with the aperture subovate, the peristome thin, simple, the umbilicus distinct. *Pervérsus*, turned the wrong way.

AQUATICA. *Residing in fresh water.*

FAMILY III.—LIMNÆINA.

Body ovate or elongated, spiral or conical, with a spiral or conical shell; the head surmounted by a large expansion or veil; two contractile tentacula, having the eyes situated at their base. *Limnæa*, Blainville. *Limnæadæ*, Gray. Named from *Limnæus*, one of the genera.

GENUS 1. LIMNÆUS.—Head with two flattened, sub-

obtuse tentacula; foot oval, anteriorly bilobate. Shell oval or oblong, thin, fragile, with a tapering pointed spire, the aperture longer than wide, oval, thin-edged, the columella with an oblique plait. Δίμνη, *a marsh* or *pool*. Draparnaud.

1. *Limnæus péreger*.—Shell ovate, thin, horny, with the spire short, acute, the last turn very large, the aperture ovate. *Peregrinor*, “to travel through strange places.”

- A. *L. péreger ovátus*. *Ovátus*, egg-shaped.
- B. *L. péreger commúnis*. *Commúnis*, common.
- C. *L. péreger limósus*. *Limósus*, living in mud.

2. *Limnæus palústris*.—Shell oblong, conical pointed, with the spire rather elongated, the turns forming an acute margin along the suture, the aperture ovato-oblong. *Palústris*, residing in marshes.

3. *Limnæus truncátulus*.—Shell ovato-oblong, conical, pointed, the turns somewhat abruptly curved at their upper margin, the aperture ovate or ovato-oblong. Named from the flattening or truncation of the turns.

- A. *L. truncátulus oblóngus*. *Oblóngus*, longer than broad.
- B. *L. truncátulus fossárius*. *Fossárius*, in ditches.
- C. *L. truncátulus minútus*. *Minútus*, very small.

GENUS 2. PHYSA.—Animal with two long, slender, tapering tentacula, the mantle with two expansile digitate lobes. Shell sinistrorse, oval, glossy, transparent, the last turn very large, ovate, ventricose, the aperture ovato-oblong, very narrow and acute behind. Φυσάω, *to inflate or blow out*. Draparnaud.

1. *Physsa fontinális*.—Shell oval, transparent, glossy, with the spire very short, the aperture ovato-oblong, occupying about half the size of the inferior surface. *Fontinális*, residing in springs or streams.

GENUS 3. PLANORBIS.—Animal very slender, elongated, involute, with two very long, setaceous tentacula. Shell orbicular, flat, coiled nearly in the same plane. *Plánus*, flat; *órbis*, ball. Muller.

1. *Planórbis Vórtex*.—Shell orbicular, extremely depressed, pellucid, slightly concave above and beneath,

with six gradually increasing volutions, the last with an acute angle or keel along the lower margin of the disk, the aperture roundish, somewhat rhombic. *Vortex*, a whirlpool, circular movement, or coil.

A. *P. Vortex crassulus*. Dim. of *crassus*, fat or thick.

B. *P. Vortex Spirorbis*. *Spira*, a whorl; *orbis*, a ball.

2. *Planorbis contortus*.—Shell orbicular, depressed, widely and slightly concave above, with six nearly equal, narrow, distinctly striated volutions, the last rounded, leaving a wide and deep cavity beneath; mouth narrow, semilunar. *Contortus*, twisted together or coiled.

3. *Planorbis albus*.—Shell orbicular, extremely depressed, widely concave above and beneath, with the volutions longitudinally sulcato-striate, transversely striulate, and hispid. *Albus*, white.

4. *Planorbis imbricatus*.—Shell orbicular, extremely depressed, widely and very deeply concave beneath, slightly concave in the middle above, with the volutions obliquely sulcato-striate. *Imbricatus*,

GENUS 4. *ANCYLUS*.—Animal conoidal, with two depressed, elongated, triangular, obtuse, tentacula. Shell elliptical, conoidal, with the point curved backwards, and nearer the posterior end. *Αγκύλη*, a kind of cup. Geoffroy.

1. *Ancylus fluviatilis*.—Oval, conoidal, striulate longitudinally and concentrically. *Fluviatilis*, residing in rivers.

#### ORDER II.—GASTEROPODA PECTINIBRANCHIATA.

Respiratory apparatus a branchial cavity on the back, containing two fimbriated branchiæ, and communicating externally by a large aperture between the edge of the mantle and the body. Sexes separated.

*Chismobranchiata*, Blainville. *Trachelipoda*, Lamarck. *Pectinibranchiata*, Cuvier. *Pecten*, a comb; *Branchiæ*, gills.

ASIPHONATA. *Without a Branchial Tube.*

## FAMILY I.—PALUDININA.

Body elongated, spiral, with a spiral shell; two conical, elongated tentacula, having the eyes situated at their base externally; the aperture of the shell oval, with the peristome complete; a corresponding operculum. The name from the Genus *Paludina*.

GENUS 1. PALUDINA.—Animal with the tentacula tapering, of moderate length. Shell oval, with the peristome thin; operculum horny. *Pálus*, a marsh.

1. *Paludina vivipara*.—Shell oval, rather thin, with the turns very convex, horn-coloured, with three spiral brown bands. *Viviparus*, producing live young.

GENUS 2. BYTHINIA.—Animal with the tentacula slender and elongated. Shell oval, with the peristome thickened internally; operculum calcareous. Name, I suppose, from *βυθίος*, dwelling in the deep.

1. *Bythinia tentaculata*.—Shell ovato-conical, of five convex turns; the mouth nearly half the entire length. *Tentaculátus*, having remarkable tentacula.

## FAMILY II.—NATICINA.

Body elongated, spiral, with a spiral shell; two conical tentacula; eyes on short pedicels at the outer side of their base; the aperture of the shell roundish; a horny or calcareous operculum. Name from the Genus *Natica*.

GENUS 1. NATICA.—Shell globose or oval, spiral, umbilicate; the aperture roundish or semicircular, with the outer lip thin, the inner partly covering the umbilicus. *Nátes*, a buttock or prominence. Lamarck.

1. *Natica monilifera*.—Shell globose, of five very convex turns, having a series of purple spots near their upper margin; spire very short and convex. *Monílis*, a necklace or string of beads; *féro*, to bear.

2. *Natica rútila*.—Shell subglobose, rather broader than high, of four very convex turns, dull-red, with a white band margining the narrow canaliculate suture;

the spire very short and convex; umbilicus transversely sulcate. *Rutilus*, reddish.

3. *Natica Aldéri*.—Shell subglobose, of five very convex turns, having five series of red spots; spire very short and rather acute, umbilicus longitudinally striated. Named after Mr. Alder, an English naturalist.

4. *Natica nitida*.—Shell ovato-globose, of five very convex turns, white without spots; spire very short and rather acute, umbilicus longitudinally striated. *Nitidus*, shining.

5. *Natica helicoides*.—Shell ovate, thin, with a delicate epidermis, of five turns, separated by a canaliculate suture; spire short, convex, rather obtuse, mouth ovate, continuous. *Helicoides*, a spurious compound of *Helix*, a snail, and *ēidos*, aspect, appearance, likeness.

6. *Natica squálida*.—Shell subglobose, rather thick, of three and a-half turns, separated by a canaliculate suture; spire depressed, obtuse; mouth ovate, continuous. *Squálidus*, slovenly or ill-favoured.

GENUS 2. *NERITINA*.—Shell semiglobose or oblong, with the spire very small, the aperture oblique, reduced to a hemispherical form by the thickening of the columella, which shelves to a thin edge. Name altered from *Nerita*, for a portion of that genus. Lamarck.

1. *Neritina fluviátilis*.—Shell transversely oblongo-elliptical, convex, rather thick, banded, tessellated, or spotted with olivaceous and white. *Fluviátilis*, living in rivers.

#### FAMILY III.—TURBININA.

Body elongated, spiral, with a spiral shell; two conical tentacula; eyes on prominences at their base externally; mouth with a spiral lingual filament; shell globose, ovate, conical, or turrite, with the aperture round, subangulate, ovate, or oblong, anteriorly rounded, without notch. Name from the genus *Turbo*.

GENUS 1. *TROCHUS*.—Shell conical, with the spire moderately elevated or low, the aperture somewhat square



or angulate, the columella arcuate, and often a little projecting. *Τροχός*, a potter's wheel, or a top. Linnaeus.

1. *Tróchus Sisyphínus*.—Shell imperforate, conical, acuminate, with the turns flat, spirally grooved, each with a prominent rim on the angle, the upper turns granulate. Named, I suppose, from some fancied analogy to the rolling stone of Sisyphus; if so, it is erroneously written *zizyphinus*.

2. *Tróchus conulóides*.—Shell imperforate, conical, acute, with the turns flat, spirally grooved, with the marginal ridge more prominent. Name from its resemblance to a cone.

3. *Tróchus Martíni*.—Shell imperforate, conical, acuminate, with the turns flat, with cord-like ridges, the angular margin of the turns with a very prominent crenulated rim. Named by Mr. Smith after Major Martin.

4. *Tróchus cíneráriu*s.—Shell umbilicate, depressedly conical, convex, of five sulcato-striate turns, of a pale-grey colour, with radiating, undulated, reddish purple lines. *Cíneráriu*s, ash-grey.

5. *Tróchus támidu*s.—Shell umbilicate convexo-conical, of five turns, which are depressed above, sloping, striate, brownish white, with transverse waved dusky or purple lines. *Támidu*s, swelled or bulging.

GENUS 2. PHORCUS.—Shell roundish, rather depressed, thickish, with the turns convex, the aperture circular, subangulate anteriorly; the umbilicus deep. *Phórcu*s, according to Hesiod, a son of the sea and the earth. Risso.

1. *Phórcu*s *Margaríta*.—Shell roundish, rather depressed, smooth, glossy, light-brown or olivaceous, with the interior pearly. *Margaríta*, a pearl.

GENUS 3. SKENEA.—Shell orbicular, discoid, with the turns rounded, the aperture circular, the peristome complete, the umbilicus wide. Named by Dr. Fleming after Dr. Skene, an Aberdeen physician and naturalist.

1. *Skénea depréssa*.—Shell orbicular, depressed, transparent, horny, with four transversely rugous olivaceous turns. *Depréssus*, pressed down.

2. *Skénea serpulöides*.—Shell orbicular, depressed, pellucid, glossy, white, flat above, very widely umbilicate. Named from its resemblance to a *Serpula*.

3. *Skénea divisa*.—Shell orbicular, depressed, pellucid, glossy, white, slightly convex and smooth above, spirally striate beneath. *Divisus*, separated into two parts.

GENUS 4. LITTORINA.—Shell imperforate, ovoidal, ovato-conical, or subglobose, with the spire short, the last turn very large, ventricose; the aperture roundish, the peristome incomplete behind, the outer lip bevelled to a thin edge. Named, by Ferussac, from their inhabiting the sea-shore, *littus*. Ferussac.

1. *Littorína littórea*.—Shell subovato-conical, thick, with the spire half the length of the last turn, which is very convex, longitudinally striate; the aperture roundish, white on the inner lip, streaked on the outer, which forms an acute angle at its junction. *Littóreus*, residing on the sea-shore.

2. *Littorína rúdis*.—Shell subovato-conical, thick, with the spire half the length of the last turn, which is very convex, longitudinally striate, transversely rugoso-striate; the aperture oval, the peristome very thick, the outer lip forming an acute angle at its junction. *Rúdis*, coarse.

3. *Littorína saxátilis*.—Shell subgloboso-conical, as broad as long, moderately thick, with the spire scarcely a third of the whole length, the last turn somewhat flattened above, angulate below, longitudinally striate; the aperture very large, roundish, the outer lip united at right angles. *Saxátilis*, living on or among stones.

4. *Littorína tenebrósa*.—Shell subovato-conical, rather thin, with the spire as long as the last turn, which is very convex, longitudinally striulate, transversely rugoso-striate, the exterior dusky, often banded or tessellated with lighter tints; the aperture roundish-oval, the outer lip united at right angles. *Tenebrósus*, dusky.

5. *Littorina petræa*.—Shell globoso-conical, rather thin, with the spire shorter than the last turn, which is very convex, transversely rugoso-striate; the aperture roundish, the outer lip united at a rather acute angle. *Petræus*, living on or among rocks.

6. *Littorina Beanii*.—Shell globoso-conical, obtuse, of three convex turns, the last very large, somewhat glossy, faintly striated transversely and longitudinally, and marked with alternate dark-brown and white lines disposed in a tessular manner. Named after Mr. Bean, a Yorkshire naturalist.

7. *Littorina neritoides*.—Shell subglobose, thick, with the spire depressed and rounded, the aperture roundish-ovate, the colour various. *Neritoides*, resembling a *Nerita*.

GENUS 5. TURRITELLA.—Shell turrite, with the spire very elongated, tapering to a fine point, the aperture roundish, entire, with the peristome incomplete behind, the outer lip very thin, and having a wide sinus. Name from *Túrris*, a tower. Lamarck.

1. *Turritella Térebrea*.—Shell turrite, acuminate, with from fifteen to twenty moderately convex turns, each with three longitudinal narrow ridges, and curved transverse lines. *Térebrea*, an auger or wimble.

GENUS 6. EULIMA.—Shell turrite, with the spire very elongated, tapering to a fine mammilliform point; the aperture ovate, entire, with the peristome incomplete behind, the outer lip thick and even. Risso.

1. *Eulima elegantissima*.—Shell turrite, very elongated, of numerous, flat, transversely grooved and obtusely ridged turns. *Elegantissimus*, very elegant.

2. *Eulima nitidissima*.—Shell very elongated-turrite, of about nine rounded, smooth, glossy turns; the aperture subovate, with the outer lip thick. *Nitidissimus*, very glossy.

3. *Eulima polita*.—Shell very elongated-turrite, tapering to a fine point, of about ten flat, smooth, very glossy

turns; the aperture oblong, very narrow behind. *Politus*, polished.

4. *Eulima subulata*.—Shell very elongated-turrite, tapering to a fine point, of about ten flat, smooth, very glossy turns, which are white with two brown bands; the aperture oblong, very narrow behind. *Subulatus*, slender and tapering.

GENUS 7. *LACUNA*.—Shell ovato-conical, thin, with a delicate epidermis; the aperture oval or roundish, the peristome incomplete behind, the columella flattened, and forming a deep groove, continued from the umbilicus. *Lacuna*, a furrow, trench, or hollow. Turton.

1. *Lacuna vineta*.—Shell ovate, conical, thin, semi-transparent, with a delicate epidermis, the whorls five, variously coloured, convex, the last somewhat angulate, obsoletely striated transversely, with minute undulated longitudinal striulæ; the aperture roundish-ovate, the columellar groove curved, narrow. *Vinctus*, girt.

A. *L. vineta quadrifasciata*. Four-banded.

B. *L. vineta bifasciata*. Two-banded.

C. *L. vineta unicolor*. Of one colour.

2. *Lacuna fasciata*.—Shell subglobose, broader than long, with the spire depressed, the turns three, very thin, transparent, the last extremely large, with four white and three reddish-brown bands. *Fasciatus*, banded.

3. *Lacuna pallidula*.—Shell semiovato-globose, sub-conical, thin, of four turns, with the spire very short, and having the margin of the turns sloping towards the suture, the aperture extremely large, the inner lip extended somewhat in the manner of that of a *Nerita*. *Pallidulus*, diminutive of *pallidus*, pale-coloured.

4. *Lacuna sulcata*.—Shell subglobose, broader than long, rather thin, of three and a-half turns, marked with oblique growth-lines at intervals, the spire very short, the aperture semicircular, extremely large, the inner lip nearly straight, with a very wide umbilical groove. *Sulcatus*, grooved.

GENUS 8. *RISSEA*.—Shell conical, with the spire elon-

gated, the apex mammilliform, the aperture roundish, ovate, or pyriform, with the anterior end rounded, the posterior acute; operculum horny. Named after M. Risso, a naturalist of Nice. Freminville.

1. *Rissoa úlva*.—Shell oblongo-turrite, rather thick, opaque, the spire elongated, the turns seven, flat, obscurely striate transversely, the last convex and more or less angulate. *Ulva*, sea-weed, from its living in salt marshes.

2. *Rissoa muriática*.—Shell oblongo-turrite, rather thin, transparent, the spire elongated, the turns six, slightly convex, faintly striate transversely, the last well-rounded. The name refers to its living in salt water.

3. *Rissoa ventricósa*.—Shell ovato-turrite, of five or six thin, pellucid, glossy, convex, slightly striate turns; aperture roundish-ovate, more than a third of the whole length. *Ventricósa*, bellying or bulging.

4. *Rissoa párrva*.—Shell ovato-turrite, rather thick, nearly opaque, glossy, of six rounded turns, with strong, convex, slightly waved, transverse ribs, those of the last turn not reaching the aperture, which is roundish ovate, the outer lip thickened externally. *Párrvus*, small.

5. *Rissoa álba*.—Shell ovato-turrite, rather thin, semi-transparent, glossy, of six rounded turns, with short, convex, slightly waved, transverse ribs, those of the last turn not reaching more than half-way; the aperture roundish, the outer lip thin. *Albus*, white.

6. *Rissoa semistriáta*.—Shell ovato-conical, pellucid, spirally striate, glossy, of five rather convex turns, the last sulcato-striate anteriorly, white, with two rows of red spots, aperture roundish ovate, outer lip thin. *Semistriátus*, half-striated.

7. *Rissoa interrúpta*.—Shell ovato-conical, pellucid, smooth, glossy, of five rather flat turns, white, with a spiral series of reddish-brown oblong spots near the upper margin of each turn, and a band on the last. The name has reference to the broken or interrupted reddish band.

8. *Rissoa reticuláta*.—Shell ovato-turrite, rather thick,

opaque, of five rounded turns reticulated with longitudinal and transverse slender ridges, the aperture roundish, the outer lip thickened externally. *Reticulátus*, covered with net-work.

9. *Rissoa Pállus*.—Shell ovate, of five little convex, glossy turns, the last as long as the spire, and banded with red; the aperture roundish-ovate. *Pállus*, a chicken, or any young animal.

10. *Rissoa tristriáta*.—Shell ovate, of five convex, glossy turns, having three impressed lines along their upper margin, the last with three rows of rhomboidal red spots; the aperture roundish. *Tristriátus*, with three striae.

11. *Rissoa truncáta*.—Shell oblong, subcylindrical, abruptly obtuse, of five turns, separated by a distinct suture, and transversely striato-sulcate; the aperture ovate. *Truncátus*, abruptly terminated.

12. *Rissoa striáta*.—Shell oblongo-turrite, subcylindrical, opaque, of six rounded, spirally striate turns, with obsolete ribs at their upper margin; the outer lip projecting and considerably thickened. *Striátus*, striated, scored with lines.

13. *Rissoa grácilis*.—Shell turrite, subcylindrical, thin, pellucid, glossy, of six turns, the aperture ovate, little narrowed behind, the outer lip thickened. *Grácilis*, slender.

#### FAMILY IV.—TORNATELLINA.

Shell spiral, ovate, oblong, or turrite, with the aperture oblique, ovate, oblong, or narrow, entire anteriorly, narrowed behind by the convexity of the last turn, the inner lip ending in an oblique plait on the columella. Named from the genus *Tornatella*.

GENUS I. ODOSTOMIA.—Shell ovato-conical, with the apex rather obtuse or mammillate, the aperture suboval, the peristome incomplete behind, and having a tooth-like plait. Ὀδοῦς, tooth; στόμα, mouth. Fleming.

1. *Odostómia unidentáta*.—Shell ovate, of four or five moderately convex, glossy turns, the last ventricose,

longer than the spire, the aperture ovate, with a thick tooth-like plait. *Unus*, one; *dens*, tooth.

2. *Odostómia plicáta*.—Shell ovato-oblong, of five or six glossy, transversely plicato-striate turns, which are rather flat, but convex toward the suture, the aperture ovate, with a distinct plait. *Plicatus*, having a plait.

3. *Odostómia scaláris*.—Shell ovato-conical, of five thin, transparent, glossy, faintly striated, moderately convex turns, the suture canaliculate, the aperture ovate, with a prominent plait. *Scalaris*, like a stair.

4. *Odostómia interstincta*.—Shell ovato-conical, of five thin, transparent, glossy, rather flat, finely plicato-costate turns, the aperture ovate, nearly half the whole length, with a very small plait. *Interstinctus*.

5. *Odostómia spirális*.—Shell ovato-conical, of five thin, transparent, glossy, nearly flat, finely ribbed turns, the last spirally striated in its anterior half, the two upper striae deeper and running along the spiral suture. *Spiralis*, spiral, in reference to the lines mentioned.

6. *Odostómia semicostáta*.—Shell ovato-conical, of five thin, transparent, glossy, rounded turns, marked with obsolete longitudinal striulæ, and distant, delicate, transverse ribs on the upper half of the last turn, no plait on the columella. *Semicostatus*, half-ribbed.

7. *Odostómia plicátula*.—Shell ovato-conical, of five rather thick, opaque, glossy, flat, finely plicato-striate turns, the last with the plicæ ending about the middle, and succeeded by three or four spiral striae, the terminal part plain; a very slight plait, no umbilicus. *Plicatulus*, finely plaited.

8. *Odostómia Marionæ*.—Shell ovato-conical, of five convex, thin, transparent rather glossy turns, finely plicate transversely, delicately striated spirally, and having the upper margin in the form of a rib. Named after Miss Marion Macgillivray.

9. *Odostómia Annæ*.—Shell oblongo-turrite, of five rather thick, opaque, glossy turns, the last convex and proportionally larger, the rest flattened, the aperture ovate,

nearly a third of the whole length, with a small plait. Named after Miss Anne Macgillivray.

10. *Odostomia oblonga*.—Shell oblong, subcylindrical, of five flattened turns, the last two finely ribbed, the spire very obtuse, the suture distinct, the aperture ovate. *Oblongus*, much longer than broad.

GENUS 10. *TORNATELLA*.—Shell ovato-conical, subcylindrical, spirate, the spire short and pointed, the aperture oblong, very narrow behind, the peristome incomplete, the outer lip thin, the columella with an obtuse plait. Name from *Tornátus*, fashioned in a turner's wheel. Lamarck.

1. *Tornatella tornátilis*.—Shell ovato-conical, subcylindrical, moderately thick, glossy, with the spire convex, the last turn longitudinally crenato-striate, pale red, with two white bands, each margined with two reddish purple lines.

2. *Tornatella pellúcida*.—Shell ovato-conical, subcylindrical, very thin, transparent, glossy, with the outline of the spire straight, the last turn longitudinally punctato-striate, with two deeper striæ along the suture, the colour hyaline white, with three faint reddish bands. *Pellucidus*, transmitting light.

3. *Tornatella pusilla*.—Shell ovato-conical, subfusiform, very thin, transparent, glossy, with the spire obtuse, the last turn distantly punctato-striate, the colour hyaline white. *Pusillus*, diminutive.

#### FAMILY V. SIGARETINA.

Animal with the body slightly spiral, the head with a frontal veil; large conical tentacula, with eyes at their outer base; the foot oval, very large and thick. Shell oval or roundish, external, much depressed, with a very small spire, and large aperture, without columella. Name from the genus *Sigarétus*.

GENUS 1. *VELUTINA*.—Shell ovate or roundish, convex, with a diminutive spire, and extremely large, roundish,



or ovate aperture. *Velutinus*, velvety, the epidermis being so in some of the species.

1. *Velutina striata*.—Shell roundish ovate, brittle, whitish, striated, with an olivaceous villous epidermis. *Striatus*, streaked.

GENUS 2. CORIOCELLA.—Shell oblong or ear-shaped, extremely thin, membranous in part, concealed in the mantle.

1. *Coriocella flexilis*.—Shell ear-shaped, membranous, flexible, olivaceous, with a thin calcareous layer on the inner lip and spire. *Flexilis*, capable of being easily bent.

#### SIPHONATA.

#### FAMILY VI.—BUCCININA.

Body elongated, spiral; head with two conical, depressed tentacula; eyes on basal external lobes, mouth with an annulated proboscis; mantle with an open canal, foot large. Shell generally ovate, spirate, with a very short notch or canal in the anterior part of the aperture, and a horny operculum. Name from the genus *Buccinum*.

GENUS I. BUCCINUM.—Shell ovate, with the spire moderate, pointed, the aperture oval or oblong, with a deep notch anteriorly, the columella plain, the outer lip toothless. *Buc*.

1. *Buccinum undatum*.—Shell ovato-conical, thick, with the turns convex, longitudinally striate and sulcate, with oblique waved convex ribs. *Undatus*, waved.

2. *Buccinum Anglicanum*.—Shell oblong-conical, thin, with the upper margin of the turns rather thick, and irregularly plicato-nodulose, the turns obsoletely ribbed and striate. *Anglicanus*, English.

3. *Buccinum breve*.—Shell ovato-conical, with five convex, transversely ribbed, and longitudinally sulcato-striate turns, the notch wide and oblique. *Brevis*, short.

GENUS 2. NASSA.—Shell ovate, with the spire moderate, pointed, the aperture oval or oblong, with a deep

notch anteriorly, the columella callous, the outer lip toothed.

1. *Nassa incrassata*.—Shell ovato-conical, thick, with the turns convex, longitudinally grooved, transversely ribbed, nodulose; the notch with a black spot. *Incrassatus*, thickened.

GENUS 3. PURPURA.—Shell ovate, thick, with the spire short, the aperture elliptical or semioval, the outer lip thin-edged, the columella flattened, the canal short. *Purpura*, purple, some animals of this and allied genera yielding a purple dye.

1. *Purpura Lapillus*.—Shell ovato-fusiform, thick, with the turns convex, longitudinally ribbed, transversely lamelloso-striate; aperture elliptical, the outer lip internally grooved or toothed. *Lapillus*, a small shell.

#### FAMILY VII.—FUSINA.

Body elongated, spiral; head with two conical, somewhat depressed tentacula, eyes on basal external prominences; mouth with a long cylindrical annulated proboscis; mantle with a long open canal; foot rather large. Shell more or less fusiform, spirate, with a long canal at the anterior part of the aperture, and a horny operculum. Name from the genus *Fusus*.

GENUS 1. MUREX.—Shell fusiform, oval or oblong; with rows of ridges, tubercles, or spines, generally in regular order, aperture oval, terminated anteriorly by an elongated closed canal. *Murex*, the ancient name of a shell. Linnæus.

1. *Murex Erinaceus*.—Shell ovate, with seven or eight turns, which are transversely costate and longitudinally sulcate; the aperture ovate, with the outer lip thick, internally dentate; the canal long and closed. *Erinaceus*, a Hedgehog.

GENUS 2. FUSUS.—Shell fusiform, with the spire pointed, the aperture oval or oblong, with an elongated, slightly recurved canal. *Fusus*, a spindle.

1. *Fusus antiquus*.—Shell ovato-fusiform, with the

turns very convex, faintly striated longitudinally and transversely, yellowish-white, with the inside of the mouth yellow.

2. *Fusus córneus*.—Shell oblongo-fusiform, moderately thick, white, with the turns little convex, with distinct longitudinal and very faint transverse striæ, and a yellowish-grey epidermis. *Córneus*, horny.

3. *Fusus Laskeyi*.—Shell ovato-turrite, subfusiform, moderately thick, with a greyish-yellow epidermis, the turns convex, somewhat flattened above, with five large and several smaller longitudinal ridges, and fine transverse striæ. Named after Captain Laskey.

4. *Fusus Buchanénis*.—Shell fusiform, rather thick, of six moderately convex turns, transversely ribbed, with raised spiral lines decussating the ribs, of which there are twelve on the last turn, the aperture oblong, nearly half the entire length.

GENUS 3. *PLEUROTOMA*.—Shell fusiform, with the spire pointed, the aperture oval or oblong, with an elongated, slightly recurved canal, the outer lip with a notch or slit near its upper angle.

1. *Pleurótoma Bánffium*.—Shell oblongo-fusiform, rather thick, white, the turns rounded, with numerous thin-edged, laminar, transverse ribs, bent toward the aperture. Named from Banff, where it was first noticed.

2. *Pleurótoma Túrricula*.—Shell oblongo-fusiform, thin, white, the turns angulate at their upper part, ribbed, and striate. Named from its resembling a turret or spire.

3. *Pleurótoma Trevéllianum*.—Shell ovato-fusiform, thin, white, the turns angulate at their upper part, ribbed and striate. Named by Dr. Turton after Mr. Trevellyan.

4. *Pleurótoma decussátum*.—Shell elongated fusiform, rather thick, the turns rounded, with transverse ribs, decussated by numerous spiral thin laminæ. *Decussátus*, with lines crossing each other.

5. *Pleurótoma reticulátum*.—Shell oblongo-fusiform, with the spire a little convex in outline, the whorls slightly angulate at their upper part, with numerous

transverse narrow ribs, reticulated with longitudinal raised lines, the ribs on the last turn divided into several. *Reticulátus*, marked like network.

GENUS 4. ROSTELLARIA.—Shell turrite or fusiform; its aperture oblong, with a prolonged canal, the outer lip much expanded, usually digitate or dentate. Named from the long beak, *Rostrum*, formed by the canal. Lamarck.

1. *Rostellária Pes-pelecani*.—Shell turrite, of ten convex turns having a medial series of oblique compressed obtuse odules, the outer lip extremely expanded, and angulate. Named from a fancied resemblance to a Pelican's foot.

#### FAMILY VIII.—CYPRÆINA.

Body elongated, spiral; the head with two filiform tentacula at the thickened base of which externally are the sessile eyes; mouth with a thin ribbon-like tongue, minutely echinate; the mantle with two very large lobes, capable of being extended over the back of the shell; which is oval or oblong, convolute, with the spire very short or concealed, the aperture linear, as long as the shell, and denticulate on one or both sides. Name from one of the genera, *Cypræa*.

GENUS 1. CYPRÆA.—Shell oval, convolute, very convex above, with the aperture longitudinal, linear, having a recurved notch at each end, both lips denticulate. Named after *Venus*.

1. *Cypræa Europæa*.—Shell ovate, very convex above, with numerous transverse grooves. The only species of northern *Europe*.

A. *C. Europæa, arctica*. *Arcticus*, northern.

#### ORDER III.—GASTEROPODA TUBULIBRANCHIATA.

#### ORDER IV.—GASTEROPODA SCUTIBRANCHIATA.

Respiratory apparatus a cavity on the back, containing pectinate or filamentous branchiæ, and commu-

nicating externally by an opening between the margin of the body and the mantle; unisexual.

*Cérvicobranchiáta* and *Chismobranchiáta*, Blainville. *Gastrópoda Calyptrácia*, and *Trachelípoda Neritácea*, Lamarck. *Scutibranchiáta*, Cuvier. *Scútum*, shield; *bráncchiæ*, gills.

#### FAMILY I.—FISSURELLINA.

Body conical, not spiral; two large triangular, thin tentacula; eyes on slight prominences at their outer margin; foot large, nearly circular; branchial cavity opening widely before. Name from the genus *Fissurélla*.

GENUS 1. *LOTTIA*.—Shell conical, with the apex nearer the anterior end, the aperture extremely large, oval or roundish. Gray.

1. *Lóttia virgínea*.—Shell ovato-elliptical, little elevated, subpellucid, with obsolete radiating striæ, and coloured with reddish rays. Named from its beauty and delicacy.

GENUS 2. *EMARGINULA*.—Shell conical, with the summit inclined backward, a vertical notch or slit in the anterior margin. Named from the slit in the margin. Lamarck.

1. *Emarginula Fissúra*.—Shell conical, somewhat compressed, cancellated with about forty radiating ribs, and numerous scalar lamellæ, the margin crenulate. *Fissúra*, a cleft.

GENUS 3. *RIMULA*.—Shell conical, with the summit inclined backward, and near it a ventrical slit. *Rimula*, a little chink. DeFrance.

1. *Rimula Flemingii*.—Shell conical, compressed, with twenty-four radiating ribs, alternating with smaller, and cancellated, the margin crenulate. Named after Dr. Fleming.

## ORDER V.—GASTEROPODA CYCLOBRANCHIATA.

Respiratory organs a continuous fringed lamina, surrounding the foot.

*Phyllidia*, Lamarck. *Chismobranchiata* and *Polyplaxiphora*, Blainville. *Cyclobranchiata*, Cuvier. *Cyclus*, a circle; *branchiæ*, gills.

## FAMILY I.—PATELLINA.

Body convex, covered by a conical shell, having the apex nearer the anterior end. Named from the Genus *Patella*.

GENUS 1. PATELLA.—Shell conical, with the aperture extremely large, elliptical, ovate, or roundish. Linnæus.

1. *Patella vulgata*.—Shell conical, with the apex direct, the surface radiated with about eighteen ribs, alternating with striæ, and crossed by striulæ, the margin angulate or crenate. *Vulgatus*, common.

2. *Patella lævis*.—Shell moderately thick, horny, with the apex obtuse, much nearer the anterior end, the surface concentrically striate, and usually marked with strong growth-lines, the colour yellowish-brown, often rayed with reddish. *Lævis*, smooth.

3. *Patella pellucida*.—Shell thin, fragile, transparent, with the apex incurved, obtuse, close to the smaller end, the surface with about twenty-eight faint ribs, and intermediate striæ, yellowish-brown, with some bright blue lines. *Pellucidus*, nearly transparent.

## FAMILY II.—CHITONINA.

Body elliptical, depressed, or little convex, covered by a shell composed of generally eight pieces. Name from one of the genera.

GENUS 1. CHITON.—Shell of eight transverse plates, moveable upon each other by muscular bands. *Χιτών*, a coat of mail. Linnæus.

1. *Chiton fascicularis*.—Shell elliptical, moderately convex, subcarinate; the valves shagreened; the marginal band with eighteen tufts of greyish hairs. *Fascicularis*, having fasciculi or tufts.

2. *Chiton margindtus*.—Shell elliptical, moderately convex, subcarinate; the valves shagreened, varying in colour; the marginal band granulated, with alternate dusky and whitish spots, and edged with minute spincllets. *Margindtus*, having a margin or edging.

3. *Chiton cinereus*.—Shell elliptical, moderately convex, carinate; the valves shagreened, with distinct growth-lines; the marginal band narrow, minutely reticulated, with the edge spinulose. *Cinereus*, ash-grey.

4. *Chiton fuscatus*.—Shell oblongo-elliptical, a little narrower anteriorly; carinate, the valves shagreened with irregularly disposed granules; the marginal band granulate, with a membranous border. *Fuscatus*, dusky.

5. *Chiton lævigatus*.—Shell broadly elliptical, a little narrower anteriorly, subcarinate; the valves minutely granulato-striate; the marginal band smooth. *Lævigatus*, smoothed.

#### ORDER VI.—GASTEROPODA INFEROBRANCHIATA.

#### ORDER VII.—GASTEROPODA TECTIBRANCHIATA.

Respiratory organs composed of branched or pectinated laminae, attached along the right side, or on the back, and covered by the mantle, which generally contains a shell.

*Gasteropoda Laplysia* and *Bullæa*, Lamarck. *Monopleurobranchiata*, Blainville. *Tectibranchiata*, Cuvier. *Tectus*, covered; *branchiæ*, gills.

#### FAMILY I.—BULLÆINA.

Body divided into two parts, the anterior often with lateral lobes; tentacula none or minute; shell very thin

and convolute, or none. Named from one of the genera, *Bullæa*.

GENUS 1. BULLÆA.—Shell in the substance of the mantle, over the branchiæ, very thin, partially curved in a spiral form, but without spire or columella, the aperture very wide, and extending the whole length of the shell. *Bulla*, a bubble.

1. *Bullæa punctulâta*.—Shell broadly ovato-elliptical, transparent, glossy, with numerous longitudinal striæ, and transverse raised lines, leaving between them regular series of squarish depressions. *Punctulâtus*, marked with little dots.

2. *Bullæa Caténa*.—Shell oval, transparent, glossy, subtruncate at the upper end, rounded at the other, the surface with regular distinct divergent, catenulate striæ. *Caténa*, a chain.

3. *Bullæa catenulifera*.—Shell oblongo-cylindrical, transparent, glossy, truncate at the upper end, wider and rounded at the other, the surface with regular distinct divergent catenulate striæ. *Caténula*, a little chain; *féro*, to bear.

GENUS 2. BULLA.—Shell partly external, very thin, involute, with the aperture extending its whole length, oblongo-linear, wider below. *Bulla*, a bubble.

1. *Bulla Cranchii*.—Shell ovato-elliptical, subtruncate, with a small spiral pit, the surface somewhat glossy, longitudinally divergingly striate, about ten striæ at the upper and eighteen at the lower end large, all punctate. Named after Mr. Cranch.

2. *Bulla candida*.—Shell broadly ovate, semitransparent, glossy, with faint growth-lines, the apex prominent, obtuse, but with a slight scrobiculus, the aperture ovato-oblong. *Candidus*, white.

GENUS 3. HALIA.—Shell obovate; the last turn very large, ventricose; the spire prominent, convex, obtuse; the aperture ovato-trigonal, curved anteriorly to the left. Name that of one of the Nereids. Risso.



1. *Halia Flemingidna*.—Shell obovate, thin, glossy, white, with faint striæ. Named after Dr. Fleming.

GENUS 4. *BULLINA*.—Shell cylindrical, involute, the last turn concealing the rest; the spire generally sunk: the aperture straight, very narrow, a little widened anteriorly. Named from *Bulla*. Ferussac.

1. *Bullina umbilicata*.—Shell oblongo-cylindrical, semitransparent, glossy, with faint growth-lines, the posterior extremity rounded, with a deep and narrow umbilicus. *Umbilicatus*, having a pit in the spire.

2. *Bullina truncata*.—Shell subcylindrical, thin, semitransparent, glossy, with distinct shallow sulci on half its length from the posterior extremity, which is truncate, with a wide and shallow umbilicus. *Truncatus*, cut off at the end.

3. *Bullina cylindracea*.—Shell cylindrical, thin, transparent, glossy, smooth, or with faint growth-lines, subtruncate with a deep umbilicus. *Cylindraceus*, elongated and round.

#### ORDER VIII.—GASTEROPODA NUDIBRANCHIATA.

Respiratory apparatus consisting of branchial tufts or papillæ, placed on the back, and exposed.

*Tritonia*, Lamarck. *Polybranchiata* and *Cyclobranchiata*, Blainville. *Nudibranchiata*, Cuvier. *Nudus*, bare; *branchiæ*, gills.

#### POLYBRANCHIATA.

*With numerous branchiæ on the sides of the body.*

#### FAMILY I.—ÆOLIDINA.

Body oval, oblong, or elongated, with papilliform or filamentous branchiæ disposed along the sides of the body above; two pairs of tentacula; eyes behind the upper. Named from the Genus *Æolis*.

GENUS 1. *ÆOLIS*.—Body oblong, tapering to a point, with numerous filamentous or papilliform branchiæ in rows on the sides above. Name from *Æolus*. Cuvier.

1. *Æolis papillósa*.—Body oblong, tapering to an obtuse point; the sides of the back with numerous subulate branchial filaments; the colour dusky, tinged with purple, the branchiæ brownish-black. *Papillósus*, with small soft prominences.

2. *Æolis Murraydna*.—Body oblong, tapering to an obtuse point; the sides of the back with numerous very large oblongo-conical, round branchial papillæ; the colour bluish-white, the papillæ bluish-grey. Named after Mr. Alexander Murray.

3. *Æolis Cuvieri*.—Body slender, tapering to a fine point; the sides of the back with elongated, tapering, obtuse papillæ in transverse series; upper parts pale purplish-grey, the branchiæ pink. Named after the illustrious Cuvier.

4. *Æolis Leslie*.—Body slender, tapering to a bidentate point; the sides with upwards of three hundred lanceolate oblong whitish compressed papillæ, in oblique series; the bare dorsal space linear-lanceolate, white, with a brown oval central prominence. Named after Mr. James Leslie.

#### FAMILY II.—TRITONIINA.

Body oval or oblong, with branchiæ in the form of tufts or plumes arranged symmetrically on the sides of the body above; a pair of tentacula retractile into a kind of sunk sheath. Named from the Genus *Tritonia*.

GENUS 1. TRITONIA.—Body oval or oblong, convex above, with a row of branchial tufts on each side; the mouth with two thin-edged laminar teeth. Named after *Triton*.

1. *Tritónia arboréscens*.—Body oblong, convex above, smooth, with four feathery appendages on the margin of the superoral veil, the branchiæ in six distinct decomposed tufts on each side; the colour above dusky, the branchiæ darker. *Arboréscens*, with tree-like tufts.

2. *Tritonia plebéia*.—Body oblong, tapering to an obtuse point, convex above, greyish-yellow, with seven prominent papillæ on the veil, and on each side six small

branchial tufts. Named, I suppose, from its plain or ignoble aspect.

CYCLOBRANCHIATA.

*Branchiæ in a circle behind.*

FAMILY III.—DORINA.

Body oval or elliptical, convex above, with the branchial tufts arranged circularly on the upper part of the body behind; four tentacula. Named from the Genus *Doris*.

GENUS 1. *DORIS*.—Body oval or elliptical, more or less convex and tuberculate above; the branchiæ in a circle behind; the mouth a short fleshy tube, with a denticulate lingual mass. *Doris*, “the mother of the Nereids.”

1. *Dóris tuberculáta*.—Ovato-elliptical, convex above, grey, covered above with small unequal depressed, granulated papillæ; the margin of the mantle thick and considerably expanded. *Tuberculátus*, covered with tubercles.

2. *Dóris obveláta*.—Oval, depressed, pale yellowish, covered above with numerous unequal, much depressed, granulated tubercles; the margin of the mantle thin, repand, projecting far beyond the foot; upper tentacula rugoso-granulate. *Verrucósus*, warty.

3. *Dóris bilamelláta*.—Oval, depressed, covered above with small, unequal, round tubercles, longer and more crowded toward the margin; the edge of the mantle thin, considerably extended; upper tentacula with the margin of their sheath bituberculate. *Bilamellátus*, with two plates.

4. *Dóris áspera*.—Ovato-elliptical, very convex above, covered with rather large, nearly equal, round tubercles, the margin of the mantle not extending far beyond the foot; upper tentacula rugoso-granulate. *Asper*, rough.

ORDER IX.—GASTEROPODA CIRROBRANCHIATA.

Respiratory apparatus of tufts of tentacular filaments on the sides of the neck.

*Cirrobranchiata*, Blainville. *Cirrus*, a filament; *branchiæ*, gills.

FAMILY I.—DENTALIINA.

Animal much elongated, conical, with a conico-tubular shell, open at both ends. Named from the Genus *Dentalium*.

GENUS 1. DENTALIUM.—Shell much elongated, conical slightly curved, open at both ends, with the aperture circular. Named from resembling a tooth, *dens*. Linnaeus.

1. *Dentalium Entalis*.—Shell elongated-conical, slightly curved, tapering to a fine point, but truncate at the tip, and having a small slit in the margin of its upper aperture, the surface glossy, obsoletely striulate, white. *Entalis*, perhaps a corruption of *Dentalis*.



ORDER I.—GASTEROPODA PULMOBRANCHIATA.

Respiratory apparatus a pulmonary cavity on the back, on which the vessels form a complex network, and communicating externally by an opening on the margin of the mantle, over the neck, on the right side, capable of being closed at will.

Although they all respire air, many of them reside habitually in water, but come occasionally to the surface. They all feed on vegetable substances.

SECTION I.—TERRESTRIA.

FAMILY I.—LIMACINA.

Animal with the body elongated, contractile, becoming convex or induplicate, united in its whole length with the foot, and covered anteriorly above with a shield-like mantle; the head and tentacula retractile into the

skin, which covers them as a sheath; four slender tentacula; the eyes situated at the tip of the upper pair of tentacula; orifice of the pulmonary cavity on the right side, near the edge of the mantle; anus opening into the pulmonary aperture; that of the generative organs near or immediately under it; foot very elongated.

Shell very delicate, variously developed: sometimes wanting or merely a thin scale, or agglutinated calcareous grains, in the substance of the skin; sometimes a partially external shell, sometimes entirely external; but always very small, and incapable of containing the animal.

The species are herbivorous, feeding on the tender parts of plants, on fruits, and mushrooms. They come abroad chiefly in the morning and evening, or after rain; remain concealed among the herbage, or under stones, or in holes, during the heat of the day; and in winter, having buried themselves in the ground, become torpid.

#### GENUS 1. ARION. ARION SLUG.

Animal elongated, linear-oblong, convex above; with the mantle shield-like and granulated; the head retractile, with four tentacula, of which the upper are longer and oculiferous; the mouth with an upper tooth and granuliferous tongue; the foot very large, oblong; the pulmonary cavity under the scutum, and opening near its right border anteriorly; the orifice of the anus at the posterior border of that of the respiratory cavity; the genital organs united, and placed on the right side anteriorly, immediately under the respiratory opening; a mucous pore at the end of the body above.

Shell rudimentary, internal, thin, or composed of calcareous particles.

##### 1. *Arion ater*. *Black Arion Slug*.

Shield granulated, cloak with numerous longitudinal branched or anastomosing ridges; upper parts black, margined with alternate brown and black lines, lower surface greyish-blue.

The general form oblong, flat beneath, convex above, margi-

nate. The four tentacula rather short, cylindrical, a little enlarged at the end. The shield soft, granulated, or marked with small rounded prominences; the rest of the surface with numerous longitudinal ridges and furrows, which are often nearly simple, frequently more or less branched or anastomosing. The pulmonary orifice circular, large, on the right side near the margin, toward the anterior part of the shield. The narrow, thin margin of the body transversely striated with brown and black; the colour of the upper parts black, sometimes brownish-black, or blackish-brown, or dusky, or light-grey; the lower surface greyish-blue, paler in the middle. Length from three to five inches.

The shell is composed of calcareous granules loosely aggregated.

The colour of this species appears to be easily modified by local circumstances. Most of the large individuals are black, brownish-black, or greyish-black; but some are brown or even reddish. Young individuals are grey, whitish, bluish-white, yellow, orange, or amber-coloured. The globular semi-transparent eggs are deposited among the roots of plants. The species is very voracious, and injurious to garden produce. It feeds on almost every sort of herbage, as well as strawberries, turnips, and apples.

Generally distributed. Very common in gardens, pastures, fields, thickets, woods, and by hedges and walks.

*Limax ater*. Linn. Fauna Suec. 507. Syst. Nat. i.—*Limax subrufus*. Linn. Syst. Nat.—*Limax rufus*. Linn. Fauna. Suec. 508.—*Limax ater*. Muller. Verm. Terr. et Aquat. 2.—*Limax ater*. Lister. Anim. Angl. 131.—*Limax ater*. Drap. 122. T. 9. f. 3, 4, 5.—*Limax rufus*. Drap. 123. T. 9. f. 6.—*Arion empiricorum*. Ferus. Hist. Moll. 60. 17. T. 1, 2, 3.—*Limax rufus*. Lamk. Syst. vi. 2. 49. Ed. 2. vii. 716.—*Arion ater*. Flem. Brit. Anim. 256.—*Arion ater*. Ald. Mag. Zool. and Bot. ii. 105.—*Arion ater*. Gray's Turt. 104.

## GENUS 2. LIMAX. SLUG.

Animal elongated, linear-oblong, or lanceolate, convex above, carinate behind; with the mantle shield-like, elliptical, and marked with concentric lines; head retractile, with the upper tentacula longer and oculiferous; pulmonary cavity under the scutum, and opening near its right border posteriorly; orifice of the anus at the posterior border of that of the respiratory cavity;

genital organs united, and placed on the right side anteriorly near the larger tentaculum.

Shell flat, nail-like, within the substance of the mantle.

*Limax* differs little from *Arion*. In the former, the shield is concentrically striated, the pulmonary aperture near the hind part of its border, the tail carinate; in the latter, the shield is granulated, the pulmonary aperture near the fore part of its border, the tail with a large mucous pore or cavity.

The species feed on tender herbage, fruits, mushrooms, and vegetable substances in general. They are most voracious after rain, or in the morning and evening, remain concealed during the heat of the day, and in long droughts suffer severely. In winter they are torpid, and concealed under the ground, or in crevices.

#### 1. *Limax cinereus*. Spotted Grey Slug.

Shield elongated, with fine concentric striæ, cloak with numerous parallel somewhat undulated ridges; the posterior third of the body with a prominent acute undulated keel; upper parts dusky-brown with five pale-brown longitudinal bands; surface of the foot with three longitudinal bands.

The form is very elongated, flat beneath, very convex above, laterally marginate. The upper tentacula very long, tapering, granulated, a little enlarged at the end; the lower short, but similar. The shield is elongated, and marked with fine concentric striæ; the rest of the upper surface with numerous longitudinal parallel somewhat undulated ridges; the posterior third of the body with a thin projecting undulated keel; the tail rather pointed; the surface of the foot with three longitudinal bands, of which the two lateral are longitudinally striated. The pulmonary aperture large, and near the hind part of the shield. The head and tentacula are pale yellowish-grey or reddish; the shield pale-brown spotted with black, the mantle dusky-brown, with five pale-brown longitudinal bands, that continuous with the keel pale yellowish-brown; the lower surface pale-grey. Length six, seven, or eight inches.

Shell thin, flat, oblong, yellowish-white; "fabæ fere magnitudine, multo tamen humilior, compressusque magis, modice transparens, inæqualis, admodum glaber, parte altera pla-

nior, altera veluti in oculum protuberans, sed dentibus friabilis, ita ut in arenulas atteratur.”

“Eosdem limaces circa Mensem Junium in sylvis opacis observavi ex arborum ramis demissos, singulos singulis funibus bipedalibus, crassis et validis satis; at e propria saliva confectis. Est sane magna affinitas inter humorem illum e quo Araneorum Erucarumque fila fiunt, atque horum animalium salivam.” Martinus Lister.

Not common. Plentiful in some places about Old Bridge of Don. At Torry, on the south side of the Harbour of Aberdeen. Occurs in thickets, pastures, hedges, and gardens.

*Limax cinereus*. Muller, Verm. Terr. et Fluviat. ii. 5.—*Limax cinereus*. Drap. Verm. Terr. et Fluviat. 124. Pl. 9. f. 10.—*Limax antiquorum*. Feruss. Hist. Moll. 68. T. 4.—*Limax cinereus*, maximus, striatus et maculatus. List. Anim. Angl. 127. Pl. 2. f. 15.—*Limax maculatus*. Nunneley. Trans. Phil. Soc. Leeds. i. 46. T. 1. f. 2.—*Limax cinereus*. Ferus. Hist. Moll. i. 65. T. 4.—*Limax cinereus*. Flem. Brit. Anim. 256.—*Limax maximus*. Grey's Turt. 113.—*Limax cinereus*. Lamk. Syst. vi. 2. 50. Ed. 2. vii. 717.

## 2. *Limax variegatus*. *Variegated Slug*.

Shield short, broadly rounded behind, concentrically sulcato-granulate; cloak with numerous longitudinal undulato-granulate ridges; the posterior fourth of the body with a medial crenate keel; upper parts dull reddish-brown, thickly spotted with blackish-brown.

The form oblong, very convex above. The upper tentacula nearly cylindrical, a little enlarged at the tip, and granulato-rugose; the lower very short; the neck about the same length as the shield, with a medial granulate ridge, and lateral oblique, broad, convex, granulato-crenate ridges; the shield short, broadly rounded behind, marked with concentric granulate furrows; the rest of the surface with numerous undulated or granulate ridges; the keel medial, crenate, occupying the posterior fourth of the body; the tail rather pointed; the surface of the foot with three longitudinal bands. The upper surface thickly and irregularly spotted with blackish-brown on a light dull reddish-brown ground; the neck paler and tinged with red; the lower surface yellowish-grey. It varies however in colour, individuals being darker or lighter. Length about an inch and a half.

It differs from *Limax cinereus* in having only the end of the tail keeled, in its inferior size, different markings, and other



circumstances; from *Limax agrestis* in not having the keel oblique.

Its slime is limpid; but, when irritated, it secretes a thicker bluish-white mucus. When on a twig, or other place, whence it cannot proceed in the direction intended, it allows itself to drop, being at first slowly lowered by the thread of adhesive mucus, which at length gives way.

In damp places, as beneath turf or stones, by walls, among plants, or sometimes about houses.

*Limax flavus*. Linn. Fauna. Succ. 363.—*Limax variegatus*. Drap. Hist. Moll. 127.—*Limax variegatus*. Nunneley. Trans. Phil. Soc. Leeds. 1. 47. T. 1. f. 3.—*Limax flavus*. Grey's Turt. 114.—*Limax variegatus*. Feruss. Hist. Moll. 71. T. 5. f. 1-6.—*Limax variegatus*. Desh. Lamk. Syst. Ed. 2. vii. 722.

### 3. *Limax agrestis*. Field Slug.

Shield large, broadly rounded behind, subconcentrically striato-sulcate; body with numerous longitudinal interrupted broad subgranulate ridges; a short keel bent obliquely toward the end; upper parts yellowish-grey, or pale brownish-yellow, somewhat mottled with dusky and whitish.

The form oblong, very convex above. The upper tentacula long, tapering for half their length, then cylindrical, very slightly enlarged at the tip; the lower very short; the neck protruding to nearly half the length of the shield, with a narrow convex medial ridge; the shield large, broadly rounded behind, marked with subconcentric striæ, the ridges between which are subgranulate; the rest of the surface with numerous interrupted broad, convex subgranulate ridges; the keel about a fifth of the whole length, and bent obliquely toward the end; the tail pointed; the surface of the foot with three longitudinal bands. The head, neck, and upper tentacula light brown, the eyes black; the upper surface light brownish-yellow, or yellowish-grey, somewhat mottled with lighter and darker tints, and with the sulci dark-coloured; the keel yellowish; the lower surface pale grey, margined with yellowish. Length about an inch and a-half.

It varies considerably in colour, being sometimes whitish or cream-coloured, or grey, or somewhat dusky.

When irritated it emits from the sulci a thick milky fluid, which leaves a white film when dry. It drops from a height by means of the slimy thread of its mucus.

Abundant, and generally distributed, occurring in fields, pastures, gardens, thickets, and on grassy banks, and by fences.

*Limax agrestis*. Linn. Syst. Nat. i. 1082.—*Limax cinereus*, parvus, immaculatus, pratensis. List. Anim. Angl. 130.—*Limax agrestis*. Nunneley, Trans. Phil. Soc. Leeds. i. 47. Pl. 1. f. 4.—*Limax agrestis*. Gray's Turton. 117.—*Limax agrestis*. Lamk. Syst. Ed. 2. vii. 717.—*Limax agrestis*. Flem. Brit. Anim. 256.

4. *Limax marginátus*. *Margined Slug*.

Shield elongated, free anteriorly for more than half its length, with large concentric undulated ridges, cloak with numerous parallel undulated ridges, interrupted behind; the whole length of the body with a rather obtuse keel, more prominent and undulated behind; neck scarcely extending a fourth of the length of the shield, which is dull yellowish-grey with two longitudinal pale-brown bands; hind part of body bluish-grey, the keel yellowish-white; surface of the foot with three longitudinal bands, of which the medial is less than half the breadth of the lateral.

The form is very elongated, flat beneath, laterally compressed, very convex above, with thin, transversely sulcate margins. The upper tentacula rather short, cylindrical, knobbed, granulated; the lower very short. The neck projecting about a fourth of the length of the shield, with a narrow medial ridge, and two broad transversely grooved ridges. The shield is elongated, broader and rounded behind, but with a slight apex. It is marked with strong undulated concentric ridges, and toward the hind part has an irregular prominence over the shell, which is broadly elliptical, nearly flat, thick, irregularly rugose, shining, white, covered above with crystalline granules. The body marked with longitudinal convex, undulated ridges, which toward the hind part are interrupted. An obtuse keel extends its whole length, becoming more elevated and somewhat undulated behind; the tail much compressed and rather pointed. The lateral margins are thin, with transverse rather distant sulci. The foot very narrow, with the lateral bands more than twice the breadth of the medial. The tentacula and a band running from them along each side of the neck, pale-brown; the eyes black; the shield yellowish-grey with two broad lateral pale-brown bands; the keel yellowish-white, the rest of the body of a delicate light bluish-grey; the foot bluish-grey, with paler margins. Length two inches. The pulmonary aperture less than a third of the length of the shield distant from its hind part.

It differs from *Limax cinereus*, to which it comes nearest, in many essential respects, as will be seen on comparing the descriptions of the two species.

I first met with it in my garden, in May, 1842, while searching for specimens of *Limax agrestis*, and was at once struck by its very elongated form. Even when contracted, it is nearly as slender as *Limax agrestis* when extended. Its slime is colourless and transparent; but leaves a shining whitish, opalescent trace, and it exudes, when irritated, an opaline greenish-blue mucus. At night, or by day in gloomy weather, it very frequently ascends trees, to a great height. From the middle of June it disappears; but I have found it again in October and November.

Common in many places about Old Aberdeen.

*Limax marginatus*. Mull. Verm. Terrestr. et Aquat. ii. 10.

*Limax marginatus* of Draparnaud appears to be different.

#### FAMILY II.—HELICINA.

Animal with the body elongated, united anteriorly with the foot, spirally rolled, and covered with a shell; the head and tentacula retractile into the skin, which covers them as a sheath; four tentacula; the eyes situated at the tip of the upper pair; orifice of the pulmonary cavity on the right side of the neck; the mantle forming a collar; the orifice of the generative organs near the outer base of the right upper tentaculum; the foot very large.

Shell spiral, orbicular and depressed, globose, ovate, or cylindrical; with the mouth roundish, ovate, or semi-lunar, its margin thickened; the axis perforated in young shells, but the umbilicus often concealed by the reflection of the inner lip in old individuals.

The species are herbivorous, feeding on the tender parts of plants. They come abroad chiefly in the morning and evening, or after rain; remain concealed in obscure places during the heat of the day; in long droughts close the mouth of the shell with a membrane secreted by the part of the mantle which encloses the foot; in winter, having retired into a hole or crevice, or among moss, close the mouth of the shell in the same manner, and remain torpid until the return of heat.

#### GENUS 1. HELIX SNAIL.

Animal elongated; the body spiral; the mantle forming

a fleshy collar, closing the shell; the head distinct; the mouth opening longitudinally, with a fleshy lobe on each side, and internally a lingual mass and an upper denticulate hard piece; tentacula four, retractile, subulate, all terminating in a knob, the upper long and each bearing an eye at the tip, the lower short; the foot large, elongated, depressed, flat beneath, tapering behind; orifice of the pulmonary cavity on the right side, on the collar; anal aperture beside it; genital organs united, and opening near the upper right tentaculum.

Shell orbicular, subglobose, subconical, or depressed, umbilicate, thin, spirally twisted; the aperture roundish or sumilunar with the margin thickened, and more or less reflexed, but incomplete behind.

The number of species being very great, and presenting great differences in the form of the shell and its aperture, various subdivisions have been instituted by authors, which however it would be of no utility to indicate in the present case, our species not being numerous enough to render it difficult to distinguish them.

The Snails are equally destructive to vegetables as the Slugs, which they resemble in their habits. When the animal is in motion, the shell is balanced obliquely on its back, and the tentacula are continually advancing and retiring.

### 1. *Hélix aspérsa*. Spotted Snail.

Shell subglobose, imperforate, moderately thick, rugose and subreticulate; the whorls four, the last very convex; the aperture roundish, lunate; the margin thickened, reflexed; the colour reddish or brownish-yellow, with four longitudinal bands of blackish-brown, interrupted by yellowish curved spots; the margin internally white. Diameter an inch and a-half.

It varies greatly in colour: sometimes the bands are very distinct, sometimes apparent only on the spire; in some the last whorl is nearly all yellow, in others nearly all dark-brown, but more frequently variegated with brown and yellow in transverse undulating bands.

The animal, when in motion, presents an oblongo-lanceolate foot, tapering behind to a somewhat acute tip, of a pale yellowish-grey colour beneath, margined with a corrugated

yellowish band, on the sides and upper part rugoso-granulate, as is the neck. The general colour grey, with a broad band of brown along the side of the foot and neck, succeeded on the latter by a pale band, and an upper brown band, with a medial narrow whitish line above. The upper tentacula are very long, subulate, granulated, dusky-brown, and terminated by a globose knob, on the summit of which is the black eye, the fore part of the head convex, declinate, granulate; the lower tentacula short, but similar, the mouth covered by a bifid obtuse flap.

Found here and there in the maritime and lower inland tracts, especially in gardens, about old walls, and on hedge-banks, but chiefly along the coast. At the approach of Winter retires into holes, where great numbers are often found adhering to each other.

The eggs, which are covered with a soft white membrane, are deposited in July among the roots of the herbage, and by the end of Autumn the young are about the size of a hazelnut. Where numerous, this species is very destructive to garden produce. "Olera depascunt et omnigenam herbam; neque ipsa poma intacta relinquunt," says Martin Lister, who gives a much better account of its structure and habits than one who had read our more modern works on British Mollusca could expect.

*Helix aspersa*. Muller, Verm. Terr. et Aquat. ii. 59.—*Helix aspersa*. Mont. Test. Brit. 407.—*Helix hortensis*. Penn. Brit. Zool. 136. Pl. 84. f. 129.—*Helix aspersa*. Flem. Brit. Anim. 263.—*Helix aspersa*. Drap. Moll. Terr. et Flew. 89. Pl. 5. f. 23.—*Helix aspersa*. Grey's Turt. 128.—*Helix aspersa*. Lamk. Syst. vi. 2. 68.—*Helix hortensis*. Penn. Brit. Zool. iv. 136. T. 84. f. 129.—*Cochlea vulgaris major, pulla, maculata, et fasciata, hortensis*, List. Anim. Angl. 113. Pl. 2. f. 2.

## 2. *Helix arbutorum*. Single-banded Snail.

Shell subglobose, perforate, moderately thick, faintly rugose; the whorls four, the last very convex; the aperture semi-elliptical or roundish, lunate, the margin thick, reflexed, and white; the whorls brown, marbled with brownish-yellow, and having a longitudinal dark-brown band. Diameter about an inch.

Animal generally with the head and upper part of the foot greyish-black, the rest of the body dusky, variegated with whitish, a black line corresponding to that on the shell, the lower surface of the foot yellowish-grey.

In the more coloured, regularly banded individuals, the animal has the neck, head, and tentacula black; in those which are paler, grey; and in such as are of a nearly reddish-grey colour, with a few markings, and without the band, the part of the animal protruded is of a light yellowish-brown colour. Similar variations are observed in other species, not of the genus *Helix* only, but of other genera also; so that the colouring of the animal cannot with propriety be considered as of much importance as indicative of specific distinction.

As to the shell in this species, it presents numerous variations, both in form, and more especially in colour. The spire is much more prominent in some individuals than in others; some are very thin, almost transparent, and of a nearly uniform brownish-yellow colour, while others are variegated, with a brown band, and some strongly marked, with the band black. Their shells have the peristome less thick, but with a white rib near the margin internally; thick shells have no appearance of an internal rib, but present a uniform thick peristome.

“*Juniores pellucidæ, fuscæ, vix lineis luteis notatæ, at alia nota noscuntur; intra marginem aperturæ acutum alter quasi margo elevatus candidus, a prima ætate observabilis; testa vero ad justam magnitudinem producta, hic secundus margo evanescit, vel in labium subreflexum album perditur.*” Muller.

Generally dispersed in the lower districts. Common on the grassy banks along the rocky coast of Kincardineshire, on the banks of the Don near the bridges, and many other places about Aberdeen. Extremely abundant among *Iris Pseudacorus*, on the coast to the north of Stonehaven. Plentiful also on the rocky coast of Buchan, from Colliston to Peterhead; and on the northern coast, as at Auchmedden and Banff.

*Helix arborum.* Linn. Syst. Nat. i. 1045.—*Helix arborum.* Muller. Verm. Terrestr. et Aquat. ii. 56.—*Helix arborum.* Mont. Test. Brit. 413.—*Helix arborum.* Penn. Brit. Zool. iv. 136. Pl. 85. f. 130.—*Helix arborum.* Drap. 38. T. 5. f. 18.—*Helix arborum.* Grey's Turt. 137.—*Helix arborum.* Flem. Brit. Anim. 264.—*Helix arborum.* Lamk. Syst. vi. 2. 80.—*Cochlea maculata, unica Fascia pulla, &c.* List. Anim. Angl. 119. Pl. 2. f. 4.

### 3. *Helix hortensis.* Garden Snail.

Shell subglobose, imperforate, of five convex whorls, finely striated, yellow, with five longitudinal brown bands; the mouth sublunate, with the margin thick, somewhat reflexed, white. Diameter ten-twelfths of an inch.

It varies in colour, being yellow, reddish, or whitish, sometimes without bands, sometimes with one, or any number up to five; the bands generally brown. When there is only one band, it sometimes covers nearly the whole surface.

Foot, when extended, oblong, rather pointed behind, margined, rugoso-granulate above, pale-grey; neck compressed, granulate, purplish-grey, with a medial narrow, and two lateral broad pale bands; head darker, its fore part declinate and convex; the upper tentacula long, subulate, clavate, granulate, dusky-grey, with the tip pale-grey, the eye black; lower tentacula short, but semilunar. Another individual, of which the shell is similarly banded, has the neck and tentacula a little darker; while another has the tentacula and their sheaths grey, and the colours of the head, neck and foot much paler. In general, the animal is of a pale-grey colour; the head and neck purplish-grey above, the neck with a medial whitish line; the hind part of the foot white, or yellowish-white. Some individuals are much darker than others, being all over of a purplish-grey tint.

“*Helicem hortensem* speciem a nemorali diversam suadent parvitas (illa enim adulta ætate hac semper minor) nitor testæ splendidus, ac labium in majori, sive *H. nem.* constanter fuscum, in minori, sive *H. hortensi* album. His accedit, quod varietates *nemoralis* cum variet, *hortensis* nunquam copula jungi vitæ sint, etiamsi in eas hoc respectu plures annos inquisiverim.” Muller. *Helix nemoralis*, so abundant in the south of Scotland, I have never met with in our district.

Very common in pastures along the coast, especially among the sand-hills, in the shelter of furze, and on the grassy slopes of cliffs, as well as by walls and on banks in the interior; but not in the highland tracts.

- A. *Helix hortensis fasciata*. Common banded variety.
- B. *Helix hortensis unicolor*. Similar, but not banded.
- C. *Helix hortensis arenicola*.

Shell subglobose, very thin, diaphanous, hyaline, with five opaque white bands; the epidermis thin, pale sulphur-yellow; the peristome thin, with an internal opaque white rib.

Animal pellucid, yellowish-white, diaphanous; with the foot oblong, rounded before, rather pointed behind, granulated on the sides; the neck and head granulated; the upper tentacula very long, subulate, with a small knob, the lower small, but similar.

This variety is somewhat larger than the *maritima*, with the spire more convex. The animal, which is remarkable for its nearly uniform hyaline tint, tinged with yellow, emits a faint alliaceous odour, like that of *Helix alliaria*, which is perceptible even after it has been killed in hot water. This circumstance, the more elongated tentacula and foot, the transparency of the shell, and the thin margin of its aperture, might induce one to think it distinct from *Helix hortensis*; yet I cannot find any decided differences in the form of either the animal or the shell. The white bands, generally five, vary to four, six, or seven.

First found by me, while with Dr. Fleming and Mr. Leslie, on the sand hillocks near Black Dog Farm, in the Parish of Belhelvie. It is there abundant, and unmixed with any other variety.

*Helix hortensis*. Muller, Verm. Terrestr. et Aquat. ii. 52.—*Helix hortensis*. Drap. 95. Pl. 6. f. 6.—*Helix hortensis*. Mont. Test. Brit. 412.—*Helix hortensis*. Grey's Turt. 130.—*Helix hortensis*. Flem. Brit. Anim. 264.—*Helix hortensis*. Lamk. Syst. vi. 2. 81.

#### 4. *Hélix caperata*. *Wrinkled Snail*.

Shell moderately depressed, somewhat hemispherical, deeply and regularly striate; the whorls six, convex, and very distinctly separated by the suture, the last whorl subcarinate; the base convex, with a rather large and deep umbilicus; aperture semilunar, oblique, with the margin thin and direct; the colour yellowish-grey, irregularly spotted or banded with brown above, the keel of the last whorl whitish, the base with faint interrupted brown bands; the peristome whitish. Diameter four-twelfths and a-half, height two-twelfths and three-fourths.

It varies greatly in its colour-markings; but is always easily distinguishable from any other species.

Animal with the foot compressed, oblong, obtusely pointed behind, transversely rugose on the margins, pale-yellowish, with series of minute prominences on the upper part; the neck pale greyish-yellow with oblong tubercles in longitudinal series, and two lateral bands of dark grey, the upper tentacula dusky-grey, granulated, capitate; the lower very short, clavate, light-grey. Some individuals have the foot pale bluish-grey, margined with darker; the neck and tentacula dark bluish-grey. Others have the neck and tentacula black.

Found in June, 1842, by Miss Isabella Macgillivray, by an old granite wall near the Brick-kilns at Old Aberdeen; and



afterwards gathered there by me in great abundance, along with *Zonites alliarius*, *Pupa umbilicata*, and *Bulimus lubricus*. This is the only spot in the district in which it has been met with.

*Helix caperata*. Mont. Test. Brit. 433. Pl. 11. f. 11.—*Helix striata*. Drap. 106. Pl. 6. f. 18-21.—*Helix caperata*. Gray's Turton, 162.—*Helix caperata*. Flem. Brit. Anim. 262.

#### 5. *Hélix hispida*. *Bristly Snail*.

Shell moderately depressed, somewhat hemispherical, very thin, horny, semitransparent, glossy, covered with numerous short, spreading, straight, tapering, glistening, yellowish-white hairs, each arising in a scrobiculus; the whorls six, convex, distinctly separated by the suture, transversely striate, the last whorl subcarinate; the base convex, with a rather narrow, deep umbilicus; aperture semilunar, oblique, with the margin thin and direct; the colour pale yellowish-brown, with a lighter band along the blunt keel or angle. Diameter four-twelfths, height three-twelfths.

The animal has the foot pale-grey, the tentacula granulated and dusky; the neck light-grey, granulated with brown, the collar white on the margin, with a transverse dusky band.

Several species are very nearly allied to this. *Helix granulata*, which is also hispid, is much more convex above. *Helix sericea* is also more globular. *Helix concinna* differs little unless in being somewhat larger and less hairy. All the individuals of the present shell which I have gathered are downy, with rather closely-set, shortish, spreading, straight hairs, which do not appear to be deciduous, and in fact cannot be rubbed off without some difficulty. The greatest size is four-twelfths in diameter, three-twelfths and a-fourth, or three-twelfths in height; the colour varying from pale yellowish-brown, to a deeper brown on the one hand, and yellowish-grey on the other.

First found by me, while with my class, under stones among the ruins of Dunottar Castle, where it is abundant, along with *Zonites cellarius*, *Zonites rotundatus*, *Pupa umbilicata*, *Vitrina pellucida*, and *Balea perversa*.

*Helix hispida*. Muller, Verm. Terrestr. et Aquat. ii. 73.—*Helix hispida*. Drap. 103. Pl. 7. f. 20, 21, 22.—*Helix hispida*. Lamk. Syst. Ed. n. viii. 73.—*Helix hispida*. Gray's Turton, 154.

#### 6. *Hélix Tróchulus*. *Pyramidal Snail*.

Shell conico-convex, with six whorls, which are well rounded, thin, transparent, glossy, faintly striate transversely, and very

distinctly separated by the suture; the base rather convex, with a shallow undefined umbilicus, encroached upon by the peristome; aperture semilunar, oblique, with the margin thin, but reflected and a little thickened near the umbilicus; the colour olivaceous, or deep yellowish-grey. Diameter a tenth of an inch or somewhat more, height nearly the same.

Found by me, in April, 1842, among moss in the Links near Don-Mouth, along with *Bulinus lubricus*, *Helix pulchella*, and *Vitrina pellucida*; also on the Banks of the Don, near the Old Bridge. In September found by Mr. Leslie near Inverury; in August and September by Miss Macgillivray in the Den of Auchmedden, and at Delgaty.

*Helix fulva*. Drap. 81. T. 7. f. 12-13.—*Helix Trochulus*. Muller, Verm. Terr. et Fluv. ii. 79.?—*Helix trochiformis*. Mont. Test. Brit. 427. Pl. 11. fig. 9.—*Helix Trochulus*. Flem. Brit. Anim. 260.—*Helix fulva*. Gray's Turton, 148. Pl. 5. f. 47.

This evidently is not *Helix fulva* of Muller, which he describes as attaining a diameter of three lines, with the tip acute and white, and the whorls seven.

#### 7. *Hélix lamelláta*. *Lamellate Snail*.

Shell conico-convex, with six whorls, which are well rounded, thin, semitransparent, glistening or sattiny, with numerous, regular, thin, lamellæ, and very distinctly separated by the suture; the base convex, with a small but deep umbilicus; aperture narrow crescent-shaped, thin; the colour reddish-brown. Diameter a twelfth of an inch, height nearly the same.

Distinguishable from *Helix Trochulus* by its laminæ, umbilicus, less convex and regularly tapering spire.

Found by Mr. Dickie, the most distinguished of our botanists, in the Den of Rubislaw, on leaves of the *Acer Pseudo-platanus*. Both he and Mr. Cruickshank have favoured me with specimens.

*Helix Scarburgensis*. Turton, Land and Fresh Water Shells, Ed. i. 162.—*Helix lamellata*. Jeffreys, Linn. Trans. xvi. 333.—*Helix lamellata*. Gray's Turton, 150. Pl. 5. f. 48.

#### 8. *Hélix aculeáta*. *Prickly Snail*.

Shell globoso-conical, with five whorls, which are rounded, thin, semitransparent, glistening, with a longitudinal series of oblique pointed laminæ; the suture deep; the base convex, with the umbilicus moderate; the aperture roundish-lunate; the colour greyish-brown. Diameter about the tenth of an inch.

Found by Mr. Dickie, in the Den of Rubislaw.

*Helix aculeata*. Muller, Verm. Terr. et Fluv. ii. 81.—*Helix aculeata*. Drap. Moll. 82. Pl. 7. f. 10, 11.—*Helix spinulosa* Mont. Test. Brit. 549. Pl. 11. f. 10.—*Helix aculeata*. Gray's Turton, 149. Pl. 4. f. 38.

### 9. *Hélix pulchella*. Little White Snail.

Shell depressed, equally convex on both sides, deeply umbilicate; the whorls deeply striate transversely; greenish-white, nearly opaque; the aperture circular, with the margin thick, flat, and reflexed. Diameter, one-twelfth of an inch.

The animal white, or yellowish-white.

The peristome is nearly complete; the spiral turns transversely grooved, often at intervals marked with prominent ridges, being the remains of former reflexed peristome margins. The shell thin, usually semitransparent and greenish-white, sometimes opaque and white.

Abundant among moss on the inner sand-hills between the Dee and the Don; under stones in the pasture adjoining the Bay of Nigg; and in various other parts along the coast, as well as far inland.

*Helix pulchella*. Muller, Verm. Terrestr. et Aquat. ii. 30.—*Helix pulchella*. Drap. 112. T. 7. f. 30, 31, 32, 33, 34.—*Helix crenella*. Mont. Test. Brit. 441. T. 13. f. 3.—*Helix pulchella*. Gray's Turt. 141.—*Helix costata*. Flem. Brit. Anim. 263.

## GENUS 2. ZONITES. ZONE-SNAIL.

Animal elongated, very slender; with an elongated extremely compressed foot, which extends far behind; four tentacula, the upper long, the lower short, all terminating in a knob. In other respects like that of *Helix*.

Shell orbicular, depressed, little convex above, widely umbilicate beneath, very delicate, generally transparent and glossy; the aperture roundish-semilunar, with a very thin margin.

The last-mentioned character, and the discoid or flattened form of the shell, distinguish this genus from *Helix*.

When the animal is in motion, the shell is balanced obliquely or nearly horizontally on its back, the umbilicated surface being lowest. The tentacula are protruded and withdrawn with surprising quickness. The species

feed on vegetable substances, and reside in damp or shaded places, as under stones, or among grass or moss.

1. *Zonites rotundatus*. *Radiated Zone-Snail*.

Shell flattish, slightly convex above, deeply and regularly sulcato-striate, variegated with undefined spots of reddish-brown and greyish-yellow; the umbilicus very large, exposing all the turns; the lower surface more glossy and less strongly striate; the whorls six, convex, the last slightly angulate; the aperture semilunar, oblique. Diameter four-twelfths of an inch.

This species, easily distinguishable by the deep transverse striæ on the whorls, varies in the degree of convexity of the spire, and in its colours, although it is generally marked in a somewhat radiating manner with spots of brown and yellowish-grey or whitish, or of dusky-brown and reddish-grey.

The animal is of a pale bluish-grey colour, anteriorly tinged with green, and spotted above with whitish.

Very abundant under stones, on walls, among grass and other herbage, in dry and moist places, on dead leaves and decayed wood, in short in a great variety of situations, along the coast and in the interior. Ruins of Dunottar Castle, rubbish of Saltworks in the Bay of Nigg, about Old Machar Cathedral. About Slains Castle, and the Bullers of Buchan. Also in the interior, as far as the Highland valleys. Den of Auchmedden, Delgaty, Banff, and Turriff; Miss Macgillivray.

*Helix rotundata*. Drap. Moll. 114. Pl. 8. f. 4, 5, 6, 7.—*Helix rotundata*. Muller, Verm. Terrestr. et Aquat. ii. 29.—*Helix radiata*. Mont. Test. Brit. 431. Pl. 24. f. 3.—*Helix rotundata*. Lamk. Syst. Edit. 2. viii. 74.—*Helix rotundata*. Flem. Brit. Anim. 263.—*Helix Turtoni*. Flem. Brit. Anim. 260.—*Zonites rotundatus*. Gray's Turton, 165.

2. *Zonites cellarius*. *Cellar Zone-Snail*.

Shell flattened, slightly convex above, somewhat wrinkled, shining, transparent, pale yellowish-brown or yellowish-grey, of six whorls, which are slightly depressed at the suture-margin, and of which the last has a large extent of the under side somewhat opaque and whitish; the umbilicus rather large and deep; the aperture oblique, semilunar of about equal length and breadth. Generally five or six, sometimes eight-twelfths in diameter; height a third of the breadth.

This, the largest of our *Zonitæ*, has the shell highly glossed, marked with faint, but sometimes strong irregular convex

wrinkles; generally pale yellowish-brown or yellowish-grey or horn-colour, sometimes variegated with a lighter tint; the whorls well defined, the last rounded; the mouth oblique, semi-lunate; the lower surface generally paler, and more or less tinged with a somewhat opaque milky or opaline white. In very dry situations, the shell is thicker, often firm, somewhat opaque and of a pale horn-colour; in moist situations, often very thin, fragile, and yellowish-brown, always however paler than *Zonites nitidulus*. When long dead, it becomes opaque white.

The animal is of a pale grey or greyish-white colour, with the tentacula purplish-grey or dull lilac, the upper marked with a dusky shade; the eyes blackish; the foot extremely thin, linear beneath, and pointed behind.

Common in damp shady places, by walls and hedges, and among stones, chiefly near the sea-coast. I have not found it far in the interior. Very abundant below stones, among grass and nettles, and in the buildings, among the ruins of Dunottar Castle. Plentiful about Old Aberdeen; at Delgaty, and Banff, where it was found by Miss Macgillivray.

*Helix cellaria*. Muller, Verm. Terrestr. et Aquat. ii. 28.—*Helix lucida*. Mont. Test. Brit. 425. Pl. 23. f. 4.—*Helix nitida*. Drap. Moll. 117. Pl. 8. f. 23, 24, 25.—*Helix cellaria*. Lamk. Syst. Ed. 2. viii. 71.—*Zonites cellarius*. Gray's Turton, 170.—*Helix nitida*. Flem. Brit. Anim. 262.

### 3. *Zonites nitidulus*. *Nitidulous Zone-Snail*.

Shell depressed, considerably convex above, somewhat wrinkled, transparent, glossy, light yellowish-brown, of five whorls, which are direct and slightly convex at the suture-margin, and of which the last has a small part of the under side along its inner margin whitish and very slightly opaque; the umbilicus rather large and deep; the aperture oblique, subelliptical, longer than broad, Diameter four-twelfths of an inch, height nearly ten-twelfths.

This species is so nearly allied to *Zonites lucidus* that a not very careful collector might readily confound them. It is smaller than *Zonites cellarius*, of a richer colour, generally yellowish-brown, with a kind of waxy appearance in light reflected from its interior, of a duller external gloss, higher in proportion to its breadth, and with the whorls not bent at the suture-margin, so as to form a flattened or concave space. There is comparatively very little opacity or whiteness on the lower surface, and only along the inner part of the whorl; the umbilicus is a little larger, and the mouth less obliquely placed.

Not uncommon among herbage close to the foot of walls, or under stones. First found by me, on the 21st of June, 1842, along the north side of the south wall of Seaton Park, where it occurs rather plentifully, along with *Zonites cellarius*, *Zonites rotundatus*, *Pupa umbilicata*, and other species. About Slains Castle, and the Bullers of Buchan, 5th August, 1842.

It extends from the sea-coast far into the interior, being found, for example, among the ruins of Dunottar Castle, and among those of Corse Castle.

*Helix nitida*. Muller, Verm. Terrestr. et Aquat. ii. 32.—*Helix nitidula*. Drap. Moll. Terr. et Fluv. 117.—*Helix nitidula*. Shepp. Linn. Trans. xiv. 160.—*Helix nitidula*. Alder. Mag. Zool. and Bot. ii. 107.—*Helix nitidula*. Lamk. Syst. Ed. 2. viii. 87.—*Zonites nitidulus*. Gray's Turton, 173.

#### 4. *Zonites lucidus*. *Lucid Zone-Snail*.

Shell depressed, considerably convex above, rather strongly striato-rugose, transparent, glossy above, shining beneath, dull greyish-brown, of five whorls, which are convex and inflexed at the suture-margin, and of which the last is destitute of any whiteness or opacity beneath; the umbilicus large and deep; the aperture oblique, roundish, subelliptical, longer than broad. Diameter three-twelfths of an inch, height nearly half the breadth.

This species is very nearly allied to *Zonites nitidulus*, from which it differs in having the lustre not waxen, the colour with less red, the convexity above rather greater, the suture-margins convex and inflexed, the striæ stronger and more regular, the umbilicus wider. When the animal has not been withdrawn, the shell is of a dark chocolate-brown.

The animal has the foot dull grey, the tentacula and neck greyish-brown, the body dusky. The eggs are elliptical, with a very firm white calcareous shell. One in my possession was deposited by the animal in the vial in which I was carrying it home.

First found by me, on the 5th of July, 1842, in Seaton Haugh, and at Don Bridge; by Miss Macgillivray, in the Den of Auchmedden, in September.

It inhabits moist places among the herbage.

*Helix lucida*. Drap. Moll. 103. Pl. 8. f. 11, 12.—*Helix lucida*. Gray's Turton, 174. Pl. 4. f. 38.—*Helix nitida*. Alder. Mag. Zool. and Bot. ii. 107.

5. *Zonites alliarius*. *Garlic-scented Zone-Snail*.

Shell nearly flat, being but slightly convex above, somewhat wrinkled, shining, transparent, yellowish-brown, of four or five whorls, having the suture-margin planulate, and of which the last has part of the under side somewhat opaque and whitish; the margin of the aperture forming three-fourths of a circle; the umbilicus rather large and deep. Diameter about three-twelfths of an inch.

Smaller than *Zonites cellarius*, and somewhat higher in proportion to its breadth, and having the mouth less oblique. It is also of a darker colour, and has a spiral turn less. *Zonites nitidulus* is much less glossy, more convex above, and having the suture-margin of the turns not planulate.

The animal is black above, light grey beneath; with the foot extremely compressed, and pointed behind; the upper tentacula of moderate length, claviform, and granulate; the lower very short, pale grey; the neck transversely rugose, with a median ridge and two grooves.

When irritated, torn, or crushed, the animal emits a very strong smell resembling that of garlic, which is also given out on its being immersed in hot water. It ceases after death, if heat has been applied. Frequently, especially in wet weather, the smell of a single small specimen, on being gathered, may be felt at the distance of several feet.

Very abundant, on banks among moss, in woods, thickets, among herbage, decayed leaves, and under stones, along the coast and in the interior, in very dry, ordinary, and moist situations. Plentiful among moss on the inner sand-hillocks of the Links near Don-Mouth, on both sides, and in the Parish of Belhelvie, along with *Bulimus lubricus*, *Helix pulchella*, *Helix Trochulus*, *Pupa umbilicata*, and *Vitrina pellucida*; also at Peterhead, and about the Bay of Cruden. Abundant under stones at the Bay of Nigg, Old Machar Church, and Don Bridge; about Auchmedden, Gamrie, Banff, and Turiff. Very rare in the higher valleys of the interior, in Glen Tannar, for example, and not occurring in heathy tracts.

*Zonites alliarius*. Miller, Ann. Phil. N. S. vii. 379.—*Helix alliaria*. Alder. Mag. Zool. and Bot. ii. 108.—*Zonites alliarius*. Gray's Turton, 168.

6. *Zonites radiátulus*. *Minute Striated Zone-Snail*.

Shell depressed, very slightly convex above, regularly striate, transparent, glossy, pale greenish-grey, of three and a-half whorls, which are flattened at the suture-margin, with

the striæ more distinct there, the last whorl proportionally large; the umbilicus large and deep; the aperture oblique, lunate, as broad as long. Diameter nearly three-fourths of a twelfth, height half the breadth.

It differs from *Zonites crystallinus* in being less highly glossed, more regularly and strongly striate, of a duller colour, with the last turn proportionally double the size. It resembles the young of *Zonites lucidus*, but is less convex, paler, more striate, and more glossy.

First found by me, on the 5th of July, 1842, among decayed leaves in a damp place under the shade of trees, near Seaton House; in September, by Mr. Leslie, near Inverury; by Miss Macgillivray, at Delgaty, Parish of Turriff, and in the Den of Auchmedden.

*Helix radiatula*. Alder. Cat. 12: Mag. Zool. and Bot. ii. 270.—*Zonites radiatulus*. Gray's Turton, 174.—*Helix nitidulus*. var. 3. Drap. Pl. 8. f. 21, 22.

#### 7. *Zonites purus*. Clear Zone-Snail.

Shell flattened, somewhat convex above, wrinkled or striate, transparent, moderately glossed, greenish-white, of four whorls, which are a little convex and incurved at the suture-margin, and of which the last is proportionally large, not thickened or opaque beneath; the umbilicus rather large, and deep; the aperture oblique, longer than broad, subelliptical. Diameter two-twelfths of an inch, height rather more than half the breadth.

It resembles *Zonites nitidulus* in form, but differs in being of a different and paler colour, in having the mouth less oblique, and in its much smaller size.

Animal bluish-white, with the tentacula pale lilac or bluish, the mantle variegated with dusky.

First found by me and Miss Marion Macgillivray, on the 27th June, 1822, about stumps of felled trees, in moist ground, in Seaton Park. In September found by Mr. Leslie near Inverury; by Miss Macgillivray at Gamrie, in Banffshire, and in the Den of Auchmedden.

*Helix pura*. Alder. Cat. 12.—*Zonites purus*. Gray's Turton, 171.

#### 8. *Zonites crystallinus*. Crystalline Zone-Snail.

Shell flattened, very slightly, convex above, extremely thin, transparent, shining, greenish-white, of five or six whorls, which are moderately convex above, slightly flattened at the suture-margin, and faintly striato-rugose; the turns re-



gularly increasing, the last not proportionally larger; the umbilicus of moderate width, and deep; the aperture oblique, semilunar, wider than long. Diameter nearly a twelfth and a quarter, height a third less.

Animal with the foot and neck white, with a tinge of lilac, the tentacula purplish; the hind part of the body of a pale reddish tint, which appears through the shell.

The brilliant gloss, and delicate, clear, glassy transparency of the shell of this species, distinguish it from all the others.

First found by me among moss and grass, and around the stumps of felled trees, in moist places, in Seaton Haugh, on the 23d and 27th of June, 1842. In September, found by Mr. Leslie, near Inverury and in the Parish of Cluny; by Miss Macgillivray at Banff, Gamrie, Auchmedden, and other places along the northern coasts.

*Helix crystallina*. Muller, Verm. Terrestr. et Aquat. ii. 23.—*Helix crystallina*. Drap. Moll. 118. Pl. 8. f. 13, 14, 15, 16, 17.—*Helix crystallina*. Jeffreys, Linn. Trans. xiii. 341.—*Helix crystallina*. Flem. Brit. Anim. 262.—*Zonites crystallinus*. Gray's Turton, 176. Pl. 4. f. 42.

#### 9. *Zonites fuscus*. Membranous Zone-Snail.

Shell suborbicular, depressed, slightly convex above, extremely thin, being quite membranaceous, flexible, transparent, glossy, and very strongly wrinkled; of five spiral turns, of which the last is proportionally larger; the suture deep, the turns being considerably rounded toward the margin; the aperture large, oblique, roundish-lunate; umbilicus very small, encroached upon by the thin inner lip; the colour greenish-hyaline or pale greenish-brown. Diameter four-twelfths of an inch, height as one to two.

The animal, unlike that of *Vitrina*, can retreat within the shell as far as that of a *Zonites* or *Helix*, leaving a large space vacant. It is of a pale greenish-grey, and the shell is so transparent that the pulsations of its heart are distinctly seen through it. It resides among moss, nettles, or other herbage in small recesses on banks.

When we consider that some species of *Helix*, and in particular *Helix aspersa*, *H. arbustorum*, and *H. hortensis*, often occur in a semimembranaceous state, we might reasonably suppose that the *Zonitæ*, which are much thinner, might present individuals perfectly membranaceous, and thus might be led to imagine the shells here described as merely undeveloped individuals of some species; but no *Zonites* found

in the district has the umbilicus so narrow, it being in fact obliterated so as to present only a slight pit, or the aperture so wide. It is certainly therefore a perfectly distinct species, forming in some respects, especially in the mouth and umbilicus, a transition to the Genus *Vitrina*.

First found by me, on the 27th June, 1841, on a bank near Old Machar Cathedral, where it occurred along with multitudes of *Vitrina pellucida*, and *Pupa umbilicata*; in September, by Miss Macgillivray, in the Den of Auchmedden, where it is not uncommon.

It appears to be the species figured by Captain Brown, under the name of *Vitrina membranacea*, and which he states to have been found by him on the Lomond Hills, in Fifeshire. In the young state, and when as yet only two or three whorls have been formed, it presents a different aspect, the mouth not having received its ultimate form. I have obtained it in this state also, in which it appears to be represented by Capt. Brown's *Vitrina margaritacea* (Illust. Pl. 40. f. 54, 55, 56), from specimens found by Mr. Gerard amongst moss on an old wall at Corstorphine Hill, near Edinburgh. Specimens of *Helix fusca*, from Ireland, sent to me by Mr. Thompson, agree entirely with my Aberdeenshire shells, unless in being a little less wrinkled and more glossy.

*Helix fusca*. Mont. Test. Brit. 424. Pl. 13. f. 1.—*Helix fusca*. Alder. Mag. Zool. and Bot. ii. 107.—*Helix fusca*. Gray's Turton, 147. Pl. 4. f. 36.—*Helix fusca*. Flem. Brit. Anim. 264. *Vitrina membranacea*. Brown, Illustr. Pl. 40. f. 3, 4, 5.

#### GENUS 4. VITRINA. GLASSY-SNAIL.

Animal moderately elongated, spiral; with the foot large and depressed; four tentacula, the upper rather long, all clavate; the mantle protruding anteriorly so as to cover part of the shell, and having a linguiform process extending backwards externally on the right side.

Shell spiral, of few turns, semiorbicular, moderately convex above, imperforate, extremely delicate, transparent, glossy; the last whorl disproportionately large; the aperture roundish, with a very thin margin.

##### 1. *Vitrina pellucida*. Green Glassy-Snail.

Shell ovato-orbicular, considerably depressed; with the

aperture large, roundish, sublunate; the lip thin, the pillar-cavity small; the whorls convex, rapidly diminishing to an obtuse point; their substance very thin, brittle, pellucid, glossy, pale apple-green or hyaline, sometimes partially opaque and whitish. Breadth three-twelfths; height a twelfth and a-half.

The animal light-grey, with the head and tentacula blackish: when young, very active, and incapable of withdrawing entirely within the shell; but when full-grown, as I have observed, it can withdraw itself completely. Very common among moss, in the shelter of whins or broom, and under stones, in dry as well as moist places, near the coast, and in the interior. Vast numbers are destroyed by insects, and little heaps of the empty shells are frequently met with. It extends far into the Highland valleys, being found, for example, in Glentannar and Glenmuick.

*Vitrina pellucida*. Flem. Phil. Zool. ii. Pl. 24. f. 1.—*Helix elliptica*. Brown, Wern. Mem. ii. 525. Pl. 24. f. 8.—*Vitrina pellucida*. Gray's Turton, 120.—*Helicolimax pellucida*. Feruss. Hist. Moll. Pl. 9. f. 6.—*Vitrina pellucida*. Flem. Brit. Anim.—*Vitrina pellucida*. Drap. Hist. Mol. 119. Pl. 8. f. 34-37.—*Vitrina pellucida*. Lamk. Syst. vi. 2. 53; Ed. 2. vii. 728.

#### GENUS 5. SUCCINEA. AMBER-SNAIL.

Animal with the body ovato-oblong, slightly spiral at the end; four short flattened tentacula; the foot very large, oblong, flat beneath.

Shell oval or oblong, very thin, with a short spire; the aperture very large, obovate or oblong, with the peristome thin, and disunited behind, the pillar imperforate.

The Succineæ, so named from the colour of the shell, which has some (very remote) resemblance to that of amber, succinum, live in damp places, marshes, and the grassy or mossy margins of rills.

##### 1. *Succinea pútris*. Oval Amber-Snail.

Shell ovato-oblong, very thin, transparent, glossy, striated, light brownish-yellow; whorls three; the spire short; the mouth vertical, ovate, two-thirds of the whole length, posteriorly acute, the margin very slightly thickened and blunt. Length from half an inch to eight-twelfths.

Animal with the foot elliptical, oblong, yellow or yellow-

ish-grey beneath, granulated with dusky on the sides above; the neck and head corrugated, dull-green, the collar greenish-grey; the mantle grey, covered all over with small dots of black; the hind part of the body black, marbled with bluish-grey; until emptied, the shell appears greenish-black.

“Auctores hanc cognomine *amphibium* dixere, minus vero accurate; maximam enim vitæ partem in sicco vivit, et in aqua non perire pluribus commune est. Sponte in aquam descendere nunquam vidi, et e contra quoties eum aqua immisi, confestim egrediebatur. Characteribus quoque terrestrium non dubiis, licet omnes (claris. Schröter excepto) eum fluviatilibus annumeraverunt, instruitur; tentacula quatuor distincta (Lister ei duo perperam tribuit) ac oculos apice majorum habet, aperturamque testæ spuma membranacea claudit. Putris dicitur, quia limo obducta, quod pluribus commune est, interdum reperietur, sæpius tamen testa lævis est, verme etiam fœta, nitida, pura.” Muller.

Abundant among the herbage, in marshy places, and on the banks of streams and pools; among sedges and Iris Pseudacorus on the coast of Kincardineshire, near Stonehaven; among sedges and grasses on the margins of the Don, near Seaton; also by the Inverury Canal. Individuals vary considerably in form—in the width of the mouth, in the thickness of the shell, and in its striæ or rugæ. Yet it appears to me that the variations which this species presents are not nearly so great as those of *Limnæus pereger*; and that if certain of these variations are to be considered as specific in the one case, so ought certain of those, still more remarkable, to be so viewed in the other. As described above, *Succinea putris* is of rarer occurrence with us than another variety, the form which it more usually presents being that to which the name of *gracilis* has been given by Mr. Alder. Whether this be a really distinct species or not, I cannot affirm, as it sometimes occurs along with the other, and often by itself. It is always of smaller size, with the shell generally thicker, of a duller colour, and frequently in part somewhat opaque.

*Helix succinea*. Muller, Verm. Terrestr. et Aquat. ii. 97.—*Helix putris*. Linn. Syst. Nat. i. 1249.—*Helix putris*. Mont. Test. Brit. 376. Pl. 16. f. 14.—*Succinea amphibia*. Drap. Moll. Terr. et Fluv. Pl. 3. f. 22, 23.—*Succinea putris*. Flem. Brit. Anim. 267.—*Succinea amphibia*. Lamk. Syst. vi. 135; Ed. 2. viii. 316.—*Succinea putris*. Gray's Turton, 178.

*A. S. pútris grácilis*. *Slender Amber-Snail*.

Shell ovato-oblong, very thin, transparent, glossy, striated,

light brownish-yellow; whorls three; the spire very short; the mouth oblique, ovato-oblong, three-fourths of the whole length, posteriorly acute, the outer lip thin. Length from five-twelfths to half an inch.

The animal has the body black, the foot oblong, with its lower surface greyish blue; the shell until emptied appears greenish-black; part of the last turn and the spire are frequently whitish and opaque.

Abundant by rills, as on the south bank of the Don between the bridges, and on the north side near the Cruives, crawling on the rocks, straws, and leaves; not in the water, but generally bedewed with it; also on plants by the Canal, and in mill-dams.

*Succinea Pfeifferi*. Gray's Turton, 179.—*Succinea gracilis*. Alder. Mag. Zool. and Bot. ii. 106.—*Succinea putris* var. a. Jeffreys. Linn. Trans. xvi. 325, 505.—*Succinea Levantina*. Deshayes, Lamk. Syst. Ed. 2. viii. 317.

#### GENUS 6. BULIMUS.

Animal with the body elongated, spiral, the head with four tentacula, the upper long, the lower short, all terminating in a knob; the foot small, elongated.

Shell ovate, oblong, or subcylindrical, spirate, thin; the last or body-whorl proportionally larger than the next; aperture oval, entire, toothless, not half so long as the spire; peristome incomplete, thickened.

When the animal is in motion, the shell is balanced obliquely on its back, or dragged along the ground. In dry weather, or at the approach of winter, it retires within the shell, and closes its aperture with a thin membrane.

##### 1. *Bulimus lubricus*. *Glossy Bulimus*.

Shell oblongo-cylindrical, shining, semitransparent, of six moderately convex whorls, which are faintly striated transversely, and distinctly separated by the well-marked suture; the apex blunt; the mouth ovato-trigonal, with the peristome thickened, but not reflexed, the columella covered by the thin inner lip; the colour olivaceous, the peristome whitish, or pale purplish-red. Length three-fourths of an inch; breadth less than half the length.

The animal has the foot oblong, thick, obtuse behind, grey beneath, dusky and granulated above; the neck dusky, rugoso-

granulate, with a median groove; the upper tentacula moderately long, cylindrical-clavate, dusky, with the tip paler, the eyes black; the lower tentacula very small, pale-grey. In walking it drags the shell after it, but now and then jerks it forwards, raising it obliquely. Its motions are rather slow.

Young individuals have the peristome thin, the mouth much shorter. The colour varies in tint, some shells being partially reddish or whitish; some pale-grey, with streaks of white; some nearly opaque.

Common among moss and fine grass, or under stones, in the three counties, more especially along the coast, as at Stonehaven, Aberdeen, Cruden Bay, the Bullers of Buchan, Peterhead, Auchmedden, Gamrie, and Banff; but also extending into the interior as far as the Highland glens.

*Helix lubrica*. Mont. Test. Brit. 390. Pl. 22. f. 6.—*Helix lubrica*. Muller. Verm. Terrestr. et Aquat. ii. 104.—*Bulimus lubricus*. Drap. Moll. 75. Pl. 4. f. 24.—*Bulimus lubricus*. Flem. Brit. Anim. 265.—*Helix lubrica*. Mont. Test. Brit. 390.—*Helix subcylindrica*. Linn. Syst. Nat. i. 1248.—*Zua lubrica*. Gray's Turt. 188.—*Bulimus lubricus*. Lamk. Syst. Ed. 2. viii. 237.

2. *Bulimus obscurus*. *Lustreless Bulimus*.

Shell ovato-oblong, slightly glossed, semitransparent, of six moderately convex whorls, which are faintly and irregularly striate, and distinctly separated by the well-marked suture; the apex blunt; the mouth subovate, with the peristome somewhat thickened, and spread, the inner lip leaving the narrow umbilicus apparent; the colour dull yellowish-brown, the inside of the lip white. Length five-twelfths of an inch, breadth little more than a third of the height.

The animal has the neck compressed, rounded above, longitudinally striate, transversely rugose; the upper tentacula long, slender, cylindrical, terminated by a large knob; the lower very short, clavate; the mouth with two large lips; the foot oblong, compressed, transversely rugose, pale grey beneath, on the margin transversely rugose and spotted with brown, its sides above pale-grey with five longitudinal rows of brown tubercles. It crawls with considerable speed, carrying the shell inclined at an angle of about 50°, and directed backwards a little to the right. When at rest, the shell is directed at an angle of 45°.

First found by Mr. James Duncan, while with me on an excursion among the ruins of Dunnottar Castle. The specimen obtained by him, and which he politely presented to me, I kept alive for some time, in order to observe its habits.

*Helix obscura*. Muller. Verm. Terrestr. et Aquat. ii. 103.—*Helix obscura*. Mont. Test. Brit. 391. Pl. 22. f. 5.—*Bulimus obscurus*. Drap. Moll. 74. Pl. 4. f. 23.—*Bulimus obscurus*. Gray's Turton. 183.—*Bulimus hordeaceus*. Lamk. Syst. Ed. 2. viii. 236.—*Bulimus obscurus*. Flem. Brit. Anim. 265.

#### GENUS 7. PUPA. CHRYSALIS-SNAIL.

Animal with the body elongated, spiral; the head with four tentacula, of which the upper are long, the lower short, all clavate; the foot small, elongated.

Shell oblongo-cylindrical, spirate, thin, with the apex obtuse, the last whorl not proportionally much larger; the mouth semioval, with the peristome incomplete, thickened, and reflexed.

The Pupæ, so named from their fancied resemblance to chrysalids, dolls or puppets, are similar in their habits to the *Bulimi*: they feed on vegetable substances, reside among moss or herbage, or under stones; remain inert in continued drought; and search for food at night, or when the grass is moist.

##### 1. *Púpa umbilicáta*. *Umbilicated Chrysalis-Snail*.

Shell oblongo-cylindrical, glossy, with six moderately convex turns, which are transversely striated and distinctly separated by the suture; the aperture semioval, subangulate, with the peristome thick, reflexed, and flattened; a single laminar tooth in the angle formed by the junction of the outer lip; the umbilicus narrow; the colour dark-olive, the peristome pale yellowish-grey, or tinged with reddish. Length two-twelfths of an inch, breadth about half the length.

The animal has the foot oblongo-elliptical, greyish-white; the neck and tentacula blackish-grey, the eyes black. It moves slowly, bearing the shell at an angle of about 15 degrees.

Very common, among moss, under stones, in the fissures of walls, along the coast, and in the interior, in dry and moist, sunny and shaded places.

*Turbo muscorum*. Mont. Test. Brit. 335. Pl. 22. f. 3.—*Pupa umbilicata*. Drap. Moll. Terr. et Fluv. 62. Pl. 3. f. 39, 40.—*Pupa umbilicata*. Lamk. Syst. Ed. n. viii. 179.—*Pupa umbilicata*. Gray's Turton, 193.—*Pupa muscorum*. Flem. Brit. Anim. 268.

##### 2. *Púpa margináta*. *Margined Chrysalis-Snail*.

Shell oblongo-cylindrical, slightly glossy, with six little-con-

vex turns, which are transversely striated and distinctly separated by the suture; the aperture nearly circular, the peristome thin, but with a strong, convex external rib behind it on the outer lip; a single obtuse, often obsolete, tooth in the middle of the columellar space between the two lips, and unconnected with either; the umbilicus narrow; the colour olivaceous, or yellowish-grey, the peristome and rib greyish or yellowish-white. Length two-twelfths, breadth about half the length.

The animal has the foot oblong, rounded behind, transparent, hyaline-white; the neck and head brownish-black; the tentacula dusky, the upper long, subulate, clavate, the lower short.

Very nearly allied to *Pupa umbilicata*; but easily distinguishable, it being more cylindrical, with the last turn smaller, the tooth or plait not connected with the outer lip, as in that species, but free, and placed nearly half-way between the two lips, considerably within the mouth. Sometimes the tooth is entirely absent, the shell remaining in other respects the same. The mouth, instead of having the margin flattened and expanded, is thin-edged, but with a strong convex external rim. Individuals much exposed to the weather, are often grey, or whitish, and opaque; those well sheltered, and especially such as live in grassy places, are olivaceous, or light brown, and more or less glossy and transparent.

Found by me, on the 5th of August, 1842, on the banks of the Bay of Peterhead; and on the 6th among the sand-banks of the Bay of Cruden, and on rocks, under stones, and among moss, at Slains Castle, and at the Bullers of Buchan; in all which places it is very abundant. In the end of August I found it on the inner sand-hillocks of the Links of Old Aberdeen, where it is abundant in some places, while *Pupa umbilicata* is equally so in others.

*Pupa marginata*. Drap. Moll. Terr. et Fluv. 61. Pl. 3. f. 36, 37, 38.—*Pupa marginata*. Flem. Brit. Anim. 268.—*Pupa muscorum*. Lamk. Syst. Ed. 2. viii. 180.—*Pupa marginata*. Gray's Turton, 196.

#### GENUS 8. VERTIGO. WHORL-SNAIL.

Animal with the body elongated, spiral; the head with the two upper tentacula elongated subulate and clavate, the lower very short or rudimentary; the foot small, elongated; the orifice of the pulmonary cavity on the right side of the neck, near that of the intestine;



generative organs united, and having their orifice near the right tentaculum.

Shell subcylindrical, spirate, very thin, transparent; with the apex obtuse, the whorls convex, compressed, the last whorl not proportionally larger; the aperture moderate, with the peristome circular, incomplete, more or less thickened, but not reflexed.

Vertigo differs very little from Pupa, the animal being similar, with the exception of not having the lower tentacula developed, and the shell with the peristome thinner.

1. *Vertigo edentula*. *Toothless Whorl-Snail*.

Shell ovato-cylindrical, subconical, moderately glossed, transparent, with five convex turns, which are transversely striated, and distinctly separated by the suture, the second whorl much larger than the first, greatly exceeded by the third, which is little less than the fourth, the fifth not much larger; the aperture semiovate, toothless, with the peristome slightly thickened, incomplete; the umbilicus narrow; the colour dark olive, the peristome paler. Length three-fourths of a twelfth, breadth rather more than half the length.

A single specimen found by me, on the 25th of June, 1842, when with my class on an excursion, beneath a fragment of serpentine, on a hill of that rock, at Potterton, Parish of Belhelvie, six miles from Aberdeen. Another found by Mr. Leslie, in September, near Inverury; and one by Miss Macgillivray in the Den of Auchmedden.

*Pupa edentula*. Drap. Moll. Terr. et. Fluv. 59. Pl. 3. f. 28, 29.  
—*Pupa edentula*. Flem. Brit. Anim. 269. — *Vertigo edentula*. Alder, Mag. Zool. and Bot. ii. 112.

GENUS 9. CLAUSILIA.

Animal with the body elongated, spiral; the head with four tentacula, of which the upper are short or moderate, filiform, the lower very short, all capitate; the foot small, compressed, oblongo-lanceolate.

Shell slender, turrite, subfusiform, thin, with the spire tapering to an obtuse point; the whorls numerous, the last smaller than the next; the aperture generally reversed, suboval, oblique, with the peristome continuous, free, marginate, and toothed or plicate; the throat with

an internal spiral calcareous plait, attached to an elastic pedicel, and closing the cavity when the animal has withdrawn.

1. *Clausilia perversa*. *Dusky Clausilia*.

Shell slender, turrito-fusiform, rather glossy, slightly transparent, with from ten to twelve little convex, transversely sulcato-striate, distinctly separated turns, the first two shining, smooth, forming an obtuse apex, the rest gradually enlarging to the penultimate, the last three faintly striated spirally, the ultimate narrowed, with two wide grooves; the aperture subovate, narrowed near the posterior end, which forms a rounded angle, the margin thick, continuous, reflexed, elevated from the columella, on which are two plaits, the posterior near the angle, thin, and running out upon the lip, the anterior thicker, less elevated, and not running so far out; the colour deep chestnut-brown, or blackish-brown, that of the peristome brownish-white. Length half an inch, breadth from a twelfth to an eighth.

The shell varies considerably in form, as well as in colour. Some individuals are much thicker and more fusiform than others. The number of spiral turns is sometimes nine, often ten, not unfrequently eleven, sometimes twelve. The colour is reddish-brown, dusky-brown, or blackish-brown. Individuals occurring in dry places, much exposed to the sun, have the shell thicker, and of a grey colour, as if weathered; and many have streaks of grey. The peristome, which is always thickened, entire, raised, more or less reflexed, and whitish, varies in form, being roundish-ovate or ovate, more or less narrowed toward the posterior end, sometimes oblong, or subquadrate. The varieties which I have observed in the mouth, in specimens gathered in the same spot, are the following:—A single thin plate on the collumella near the posterior angle of the mouth, (the shell elongated, narrow, thin, and less prominently streaked). A thin posterior plate, and a less elevated but slender posterior plate, scarcely apparent, and not reaching the mouth. The posterior thin plate, a thick anterior plate not reaching the mouth, and a third concealed plate formed by the dorsal fold of the shell. Two plaits, and between them a very slender parallel plait. Two slender plaits between the two larger. Three plaits, the middle one bipartite. Very often the anterior plait appears thus bipartite, which depends upon a prominent fold of the columella, more or less apparent. Often also there is a transverse rib internally above

the outer lip. The bipartite tooth then is not characteristic of *Clausilia dubia*, which differs only in being more fusiform.

The clausilium is curved, thin, with a thick revolute smooth margin.

The animal is very slender and elongated. When it is in motion, the foot is compressed, linear-oblong beneath, about a third of the length of the shell, pale grey, semitransparent; the neck semicylindrical, striato-sulcate, transversely rugose, dusky grey; the upper tentacula short, nearly cylindrical, with a large terminal knob, and black; the lower very short, forming two cylindrical knobs, and of a lighter tint. The shell is dragged in the same line as the foot and neck, the animal being incapable of raising it, unless when about to repose, when it inclines at an angle of about 70°.

First found by me, on the 18th of June, 1842, among wet moss by a spring in Thorny-hive near Stonehaven; next on the 6th of August, under stones and turfs, by a mill in a creek near Slains Castle, and in a Cove near the Bullers of Buchan, where it is abundant; in September, by Miss Macgillivray, in the Den of Auchmedden, at the Old Castle of King Edward, in Aberdeenshire, and at Gamrie, in Banffshire, in great profusion.

*Helix perversa*. Muller, Verm. Terr. et Aquat. ii. 118.—*Turbo nigricans*. Dillu. Cat. 375.—*Turbo perversus*. Penn. Brit. Zool. Ed. n. iv. 311. Pl. 85. f. 3.—*Turbo bidens*. Mont. Test. Brit. 357. Pl. 11. f. 7.—*Clausilia perversa*. Flem. Brit. Anim. 271.—*Clausilia rugosa*. Lamk. Ed. n. viii. 201.—*Clausilia rugosa*. Drap. Moll. 73. Pl. 4. f. 19, 20.—*Clausilia nigricans*. Gray's Turton, 217. Pl. 5. f. 58.

*Clausilia dubia* scarcely deserves being adduced even as a variety. Its description, taken from specimens found in various places, is as follows:—

Shell slender, turrito-fusiform, glossy, semitransparent, with about twelve little convex, transversely sulcato-striate, distinctly separated turns, the first two shining, smooth, forming an obtuse apex, the rest gradually enlarging to the penultimate, the last three faintly striate spirally, the ultimate narrowed, with two wide grooves or undulations; the aperture subovate, narrowed near the posterior end, with the margin thick, continuous, reflexed; the columella with two plaits, of which the anterior is forked internally; the colour deep reddish-brown, with silky lustre; toward the margin of most of the whorls small grey indistinct spots at intervals formed

generally by three of the transverse grooves being of that colour. Length half an inch, breadth an eighth.

Deshayes' description agrees precisely:—"This species seems intermediate between *Clausiliæ rugosa* and *ventricosa*. It is elongated, fusiform, finely and regularly striated; its colour is chestnut brown; the tip is obtuse, the spiral turns little convex, and the last turn bears on the back, before its termination, a pretty deep groove which divides it into two; in this part in which the groove is, the striæ are deeper and larger. The aperture is oval, posteriorly angular; it is white, and the columella bears two prominent plaits, of which the most anterior does not advance like the other to the margin; in the bottom of the aperture is a third transverse plait. The length is 13 millimetres, the breadth a little more than three."

*Clausilia dubia*. Drap. Moll. 70. Pl. 4. f. 10, 11.—*Clausilia dubia*. Gray's Turton. 216.—*Clausilia dubia*. Lamk. Syst. Ed. 2. vii. 209.

#### GENUS 10. BALEA.

Animal with the body elongated, spiral; the head with four tentacula, the upper long, cylindrical, clavato-capitate, oculiferous, the lower short, conical, obtuse or capitate; the foot small, slender, oblong, compressed.

Shell oblongo-turrite, thin, with the spire tapering to an obtuse point, the last whorl proportionally larger than the next; the aperture reversed, roundish or oval, with the peritreme thin and simple.

##### 1. *Balea perversa*. *Reversed Balea*.

Shell oblongo-turrite, slender, glossy, transparent, of eight convex, transversely striated, distinctly separated turns, the suture being deeply impressed; the spire tapering to an obtuse point; the aperture subovate, with the peristome thin, simple, a little reflexed on the columella; the umbilicus distinct; the colour yellowish-grey, yellowish-brown, or dusky-brown. Length from four to five-twelfths of an inch, breadth nearly a twelfth.

Animal with the head and tentacula black; the upper tentacula long, filiform, with an enlarged rounded tip, the lower very short, conical, obtuse; the foot oblong, depressed, semi-transparent, pale purplish-grey.

First found in June, 1842, by Mr. Leslie, while searching

for Helices, with me, at the foot of the wall behind Old Machar Cathedral; afterwards gathered there by Miss Macgillivray and myself. On the 18th of June, found by me among the ruins of Dunottar Castle.

*Turbo perversus*. Linn. Syst. Nat. i. 1240.—*Turbo perversus*. Mont. Test. Brit. 335. Pl. 11. f. 12.—*Pupa fragilis*. Drap. Moll. 68. Pl. 4. f. 4.—*Pupa fragilis*. Lamk. Syst. vi. 2. 110; Ed. n. viii. 178.—*Balæa perversa*. Flem. Brit. Anim. 271. *Balæa perversa*. Gray's Turton. 207.

## SECTION II.—AQUATICA.

### FAMILY III.—LIMNÆINA.

Animal with the body ovate or elongated, spirally bent or coiled, or conical, covered by the mantle, the thin edge of which forms a circular collar around the neck; the head surmounted by a large expansion or veil; two generally depressed, contractile tentacula, having the eyes situated near their base; orifice of the pulmonary cavity on the collar, near the anal aperture; genital organs separated; foot ovate or elongated, depressed.

Shell delicate, fragile, spiral, involute, rarely conical, of a uniform colour, with a firm, olivaceous, brownish, or yellowish-grey epidermis; the outer margin of its aperture thin.

The species live in brooks, rivers, ditches, pools, and lakes, generally immersed in the water, and crawling on the mud, on stones, or plants, but coming occasionally to the surface to respire. They are capable of advancing along the surface of the water with the disk of the foot applied to it, and the body reversed. Their food consists of vegetable substances.

### GENUS I. LIMNÆUS. MUD-SHELL.

Animal oval, spiral; head with two flattened subtriangular, obtuse tentacula, bearing the eyes at their base internally; mouth with an upper piece for mastication, and surmounted by a short veil; foot oval, anteriorly two-lobed, narrowed behind; pulmonary orifice on the

right side, in the form of a groove on the collar, and capable of being covered by a fleshy appendage by which it is margined beneath; intestinal aperture near the pulmonary; genital organs distant, the orifice of the male under the right tentaculum, that of the female organ at the pulmonary aperture.

Shell oval or oblong, thin, fragile, dextral, with a tapering, pointed spire; the aperture longer than wide, oval, sharp-edged; the columella with an oblique plait.

They inhabit still water, brooks, rivers, and ditches. In a state of repose, they adhere to stones or plants by their foot. They crawl slowly, can advance along the surface of the water, in a reversed position, are capable of remaining long under water, and in drought sink partially into the mud, or creep into shady places.

Some of the species vary so much in form, that authors are not agreed as to what ought to be considered as varieties.

1. *Limnæus péreger*. *Wandering Mud-Shell*.

Shell ovate, thin, horny, semitransparent, of four transversely striated, convex turns, the last very large; the spire very short, acute; the aperture ovate, acute behind, with the inner lip reflexed on the columella, leaving a concealed narrow groove from the umbilicus; the colour varying from pale greyish-yellow to umber or dark reddish-brown. Length from half an inch to an inch, breadth generally two-thirds of the length.

*Helix limosa*. Linn. Syst. Nat.—*Buccinum peregrum*. Drap. Verm. Terr. et. Fluv. ii. 130.—*Limnea limosa*. Flem. Brit. Anim. 274.—*Limnæus péreger*. Gray's Turton. 233.

The principal varieties which this species presents, are the following:—

A. *Limnæus péreger ovátus*. *Ovate Mud-Shell*.

Shell ovato-elliptical, ventricose, very thin, brittle, semi-transparent, glossy; with the spire extremely short; the aperture obliquely extended, oval, acute behind, four-fifths of the whole length; the tip often eroded; the last turn oblique, finely but distinctly striate transversely; the colour pale greenish-yellow. Length ten-twelfths of an inch, breadth seven-twelfths.

The animal has the lower surface of the foot yellowish-green, its margins greenish-yellow; the broad bilobate flap above the mouth greenish-yellow; the tentacula of the same colour, broad, thin, and broadly rounded; the collar, or anterior induplicate fold of the mantle, yellowish-green anteriorly, greenish-grey on the margin, grey variegated with black above; the body yellow, variegated with black, its hind part chiefly of the latter colour, with the tip yellow.

This species differs from any of the following, in having the spire extremely small, although convex forming a minute point or acumination, or frequently truncate by decay or erosion; the shell so thin as to be semitransparent, or even so clear that one can see an object through it, with fine regular striæ, but very seldom any longitudinal angular ridges on the last turn; the inside glassy. When it has lain dead for some time, the shell becomes opaque, pale yellow externally, and white within.

Individuals of this species, shorter and broader than usual, make a close approximation to *Limnæus auricularius*.

It occurs plentifully in the Loch of Skene, where I found it on the 2d July, 1842; in pools of the Dee, on the 16th; in a mill pond near the base of the Hill of Fare, on the 30th, and in various other localities.

*Limnæus ovatus*. Drap. Moll. Terr. et Fluv. 50. Pl. 2. f. 30, 31.—*Lymnæa ovata*. Lamk. Syst. vi. 2. 161; Ed. n. viii. 413.—*Limneus pereger*. Var. i. *L. ovatus*. Drap. Alder. Mag. Zool. and Bot. i. 115.—*Limnæus pereger*. Var. Gray's Turt. 234.—*Limnea limosa*. Flem. Brit. Anim. 274.—*Lymnæa ovata*. Brown, Illustr. Pl. 42. f. 10, 11.

### B. *Limnæus pereger communis*. Common Mud-Shell.

Shell ovate, ventricose, very thin, brittle, semitransparent, glossy with the spire short; the aperture oval, acute behind, three-fourths of the whole length; the last turn oblique, distinctly striate transversely, generally marked with obscure longitudinal ridges; the colour pale brown, yellowish-brown, or dull yellow. Length about nine-twelfths of an inch, breadth five-twelfths.

The animal has the head, foot, and lower surface of the broad thin collar, greenish-grey, the upper or posterior surface of the collar grey, variegated with black; the rest of the body blackish-brown, spotted with whitish-grey, or light brown, the terminal portion umber-brown.

The shell, when the animal is in it, appears of a dusky-

green, olivaceous, or blackish-green colour, usually variegated with light brown or yellowish-grey. It is thicker and much less transparent than that of the last species.

Common, in ditches, pools, and rivers; generally distributed.

*Limnæus pereger*. Drap. Moll. Terr. et. Fluv. 50. Pl. 2. f. 34, 35.—*Buccinum peregrum*. Muller, Moll. Terr. et Fluv. 130.—*Lymnæa peregra*. Lamk. Syst. vi. 2. 161; Ed. n. viii. 413.—*Helix peregra*. Gmel. Syst. Nat. 3659.—*Helix putris*. Penn. Brit. Zool. iv. 139. Pl. 86. f. 137.—*Lymnæa peregra*. Brown, Illustr. Pl. 42, 36, 38.—*Limnæa limosa*. Flem. Brit. Anim. 274.—*Limnæus pereger*. Gray's Turton. 233.—*Helix peregra*. Mont. Test. Brit. 373. Pl. 16. f. 3.

C. *Limnæus pereger limosus*. Brook Mud-Shell.

Shell ovato-oblong, very thin, brittle, semitransparent, glossy, with the spire short; the aperture oval-oblong, acute behind, two-thirds of the whole length; the last turn oblique, very faintly striated transversely; the colour light brown. Length about five-twelfths of an inch, breadth about half the length.

The animal has the head and foot greyish-green, the hind part of the collar variegated with black; the rest of the body black, spotted with light brown.

Although brown, the shell is so transparent that an object can be seen through it. When it contains the animal, it appears black, with brown spots.

*Helix limosa*. Linn. Syst. Nat. 1249.—*Helix limosa*. Brown, Wern. Trans. ii. 530. Pl. 24. f. 11, 12; Illustr. Pl. 42. f. 39, 40.—*Limnæa limosa*. Flem. Brit. Anim. 274.

It occurs in brooks, and marshy places. Powis Burn at Old Aberdeen; Ditches with running water near the same place; Burn of Cruden; Auchmedden.

There certainly is much difference in form and size between the largest and broadest individuals of *Limnæus ovatus*, and the smallest or narrowest of *Limnæus limosus*; yet the three supposed species so graduate into each other that, I think, they must be merely races or varieties. Many more might be given, were one so disposed; but the task would be useless. It appears to me that we have but one species, which varies in the size, colour, and thickness of the shell, according to circumstances. The larger and more ventricose it is, the shorter is the spire. In still water, especially if of great extent, it assumes the form of *Limnæus ovatus*; in running water, espe-



cially small brooks, that of *Limnæus limosus*. When not exposed to the effects of drought, it is plump and glossy; but when the reverse it becomes wrinkled, and has the shell flattened or marked with longitudinal ridges, or irregular sinkings, like the skull of a New Hollander. It never leaves the water, in so far as I have observed, although the water in summer often leaves it. Yet Muller says, "*Buccinum hoc, uti Helix succinea, vere amphibium est; tempore enim brumali, truncis et ramis Tiliarum ultra centum passus ab omni aqua remotarum plurima inhærentia reperi:*"—quod vere mirum est.

## 2. *Limnæus palustris*. Marsh Mud-Shell.

Shell oblong, conical, pointed, thin, horny, semitransparent, of about six turns, which are little convex, distinctly separated by the moderately impressed suture, along which they form an acute but thickened margin, transversely striolate, the last turn large, with faint longitudinal angular ridges; the mouth ovato-oblong, nearly half the length of the shell, with the pillar-lip expanded so as partially or entirely to cover the umbilicus; the colour varying from greyish-yellow to umber or dusky reddish-brown, that of the interior from horn-colour to dusky purplish-brown, of the inner lip from white to purple. Length half an inch, breadth two and a-half twelfths.

This species might be divided into as many varieties as the last, for, being subjected to the same influences, it undergoes similar modifications. I have not met with it alive of a size approaching to that of specimens from England, its greatest length with us being seven-twelfths, the size and form being about those of Draparnaud's Fig. 2. Pl. 3. Not unfrequently the spire is trunculate from erosion or decay of the first turns. A dead specimen, however, found at Don-Mouth in September, 1842, although having the spire broken, measured seven and a-half-twelfths in length, and three and three-fourths in breadth.

The animal elongated, spiral; with the foot oblong, depressed, obtuse behind, dusky green; the head, tentacula, and neck greenish-black; the neck transversely rugose; the collar with the margin thickened, dusky green; the mantle black, variegated with pale green; the rest of the body black.

In pools, lakes, marshy places, and streams, in the maritime and lower inland tracts.

*Buccinum palustre*. Muller, Verm. Terr. et Aquat. ii. 131.—*Helix palustris*. Mont. Test. Brit. 370. Pl. 16. f. 10.—*Helix*

fragilis. Linn. Syst. Nat. i. 1249?—*Lymnæa palustris*. Lamk. Syst. vi. 2. 162; Ed. n. viii. 409.—*Limnæa palustris*. Flem. Brit. Anim. 274.—*Lymnæa palustris*. Brown, Illustr. Pl. 42. f. 17, 18.—*Limnæus palustris*. Gray's Turton.

### 3. *Limnæus truncátulus*. *Little Mud-Shell*.

Shell ovato-oblong, conical, pointed, thin, horny, semi-transparent, of about six turns, which are well rounded, deeply separated by the suture, somewhat abruptly curved at the upper margin, transversely striate, the last turn large with faint longitudinal ridges; the mouth ovato-oblong or ovate, rather obtuse behind, nearly half the length of the shell, with the pillar-lip expanded so as partially or entirely to cover the umbilicus; the colour varying from yellowish-grey to umber or dusky purplish-brown, that of the interior from horn-colour to purplish-brown, of the inner lip from white to purple. Length from five-twelfths of an inch, breadth about half the height.

It differs from *Limnæus palustris* in having the turns of the spire more convex, and somewhat abruptly bent toward the suture. Muller has clearly expressed this character. "Anfractus quinque, quilibet, qua majorem spectat, declinatus, qua minorem truncatus est, quo caractere a reliquis europæis differt."

Generally distributed, occurring abundantly in pools, rivers, brooks and rills; as in Hilton Quarries, the mill-pond near the New Bridge of Don, the Inverury Canal, and similar places, from the coast far into the interior.

It presents very great differences in size and form, the degree of smoothness or rugosity, the outline of the mouth, the extent of the inner lip, the prominence of the spire, which is frequently truncate or eroded. The most remarkable varieties are the following:—

#### A. *Limnæus truncátulus oblongus*. *Common Little Mud-Shell*.

Shell ovato-oblong, pointed, with the turns moderately convex, thin, glossy, distinctly striulate; the mouth oval-oblong, the inner lip expanded and reflexed; the umbilicus generally covered, but sometimes distinct; the colour light purplish-brown, of the interior yellowish-brown, of the inner lip pinkish.

This variety is common in clear still water; as the pools in Hilton Quarries.

B. *Limnæus truncátulus fossárius*. Ditch Mud-Shell.

Shell oblong, pointed, but generally abrupt by erosion, with the turns moderately convex, thickish, distinctly striulate and often rugose; the mouth oval-oblong, the inner lip expanded, the umbilicus covered; the colour yellowish-brown, frequently with a tinge of reddish or purplish, of the interior yellowish-brown, of the inner lip pink or white.

Common in still muddy water, as in ponds and ditches.

C. *Limnæus truncátulus minútus*. Dwarf Mud-Shell.

Shell ovato-oblong, pointed, with the turns well rounded, glossy, striate; the mouth ovate, the inner lip moderately expanded; the umbilicus covered; the colour clear deep reddish-brown, of the interior similar, of the mouth pinkish.

Occurs in clear brooks, rills, and sometimes mossy springs.

*Lymnæa minuta*. Var. Drap. Moll. Terr. et Fluv.

To one or other of these varieties belong the following references:—

*Buccinum truncatum*. Muller, Verm. Terr. et Fluv. ii. 130.  
—*Helix fossaria*. Mont. Test. Brit. 372. Pl. 16. f. 9. Pl. 16. f. 9. bad.—*Lymnæa minuta*. Lamk. Syst. vi. 2. 162. Ed. n. viii. 415.  
—*Lymnæa minuta*. Drap. Moll. Terr. et Fluv. 53; Pl. 3. f. 5, 6, 7.—*Lymnæa fossaria*. Brown, Illustr. Pl. 42. f. 12, 13.—*Limnæa fossaria*. Flem. Brit. Anim. 274.—*Limnæus truncátulus*. Gray's Turton. 240.

There is a character by which *Limnæus palustris* may readily be distinguished from *Limnæus truncátulus*, in all their forms. In the former, the upper margin of the spiral turns gradually slopes to a sulcato-crenulate edge, which although thin has a slight rim, and is laid over the next turn so as to form a little-impressed suture. In *Limnæus truncátulus*, the upper margin of the spiral turns curves in rather abruptly, forming a deeply impressed suture, without any appearance of a rim or border.

## GENUS 2. PHYSA. BUBBLE-SHELL.

Animal oval, spiral; head with two long, slender, tapering tentacula, bearing eyes at their base internally; mantle with two digitate lobes capable of being much extended; foot long, rather pointed behind.

Shell sinistral, subglobose, oval, or oblong, delicate,

extremely fragile, smooth, glossy; with the spire generally short, the last turn very large; the aperture oval, narrowed behind; the columella a little twisted, the edge of the outer lip thin.

1. *Physa fontinalis*. *Stream Bubble-Shell*.

Shell sinistrorse, oval, glossy, transparent, pale greenish-grey; with the spire very short, convex, and obtuse; the turns four, obsoletely striate, the first three extremely small, the last ovate, ventricose; the aperture ovato-oblong, very narrow and acute behind; the inner lip thickened, white. Length about three-twelfths of an inch, breadth more than half the length.

*Physa fontinalis*, as described by authors, varies considerably in form, the length of the spire, the size of the aperture, and other characters, in which respects it resembles the species of *Limnæus*, and affords materials for supposed species. The individuals which I have seen, many thousands in number, vary little from the above description. The spire is from a fifth to a fourth of the whole length; the breadth is greater or less; but the aperture is always about half the size of the entire outline of the shell. The spire is always convex and obtuse, sometimes eroded or trunculate.

First found by me, while with my class, on an excursion to the Loch of Skene, on the 2d of July, 1842. Having walked all round, and partly through the lake, we found it everywhere cast ashore or lying in patches at the bottom, in vast profusion, intermixed with *Cyclas flavescens*. None of the individuals examined exceeded four-twelfths of an inch in length, or two and a-half in breadth. A specimen was found by Mr. Mitchell, while searching with me, in a pool in the Dee, on the 16th of July; and on the 22d of August, I found one in the Don, near Seaton. The last individual I kept alive for a fortnight.

The following account of the habits of the species may prove interesting:—

This animal, which is herbivorous, resides, with us, in lakes and rivers, frequenting more especially beds of *Potamogeton*, on the leaves of which it feeds. Its foot, when extended is oblong, obtuse before, rather pointed behind; the neck of moderate length, the fore part of the head obtuse; the tentacula long, tapering, very slender, almost sectaceous; the eyes situated at the inner base of the tentacula, and, being black, very conspicuous, all the other parts being yellowish-white and semitransparent; the body oblong, spiral; the mantle with

the margins extended into digitiform contractile lobes, which can be spread out on the columellar side, behind, and over part of the outer lip of the shell, and may sometimes be seen meeting above; the veil, or supraoral flap broad, emarginate, projecting over the anterior edge of the foot.

In its ordinary mode of progression under the water, it glides along with a uniform, moderately quick motion performed by minute undulations of the foot, which does not then extend to the anterior edge of the shell, but projects a little beyond its hind part or apex; the margin of the head or flap scarcely appearing, the tentacula extended. It moves equally well in a reversed position, with the foot applied to the surface of the water. Ordinarily, the digitations of the mantle are not extended. If the animal be turned on its back in the water, it protrudes the foot, head, and tentacula, writhes the foot, of which the margins then form obtuse lobes, and emits the digitations of the mantle which move in various directions, until it either ascends to the surface or regains its ordinary position, when the mantle-lobes are withdrawn. When in shallow water, beyond the surface of which part of the shell protrudes, it extends the head and neck, as well as the foot, the latter then not reaching as far as the end of the spire, and at intervals jerks forwards the shell. In the air, it does not erect the tentacula, and advances by jerks. Its movements are rather quick, and it turns with rapidity on meeting an obstacle. Montagu states that it "will sometimes let itself down gradually by a thread affixed to the surface of the water, in the manner of the *Limax filans* from the branch of a tree;" but I have not seen it do so.

*Planorbis Bulla*. Muller, Verm. Terr. et Fluv. ii. 167.—*Physa fontinalis*. Drap. Moll. Terr. et Fluv. 54. Pl. 3. f. 8, 9.—*Bulla fontinalis*. Linn. Syst. Nat. 1185.—*Bulla fontinalis*. Mont. Test. 226.—*Physa fontinalis*. Lamk. Syst. vi. 2. 156; Ed. n. viii. 401.—*Physa fontinalis*. Flem. Brit. Anim. 276.—*Buccinum exiguum*, trium spirarum a sinistra in dextram convolutarum. Lister. Anim. Angl. 142. Pl. 2. f. 25.

### GENUS 3. PLANORBIS. COIL-SHELL.

Animal very slender, elongated, involute; head with two very long, tapering, setaceous tentacula, bearing the eyes on their dilated base internally; mouth surmounted by a bilobate veil, and having a crescent-shaped tooth above, and a lingual mass armed with small hooks below;

foot small, oval or elliptical, depressed; orifice of the pulmonary cavity on the collar, near the anus, on the left side, as are those of the separated genital organs.

Shell orbicular, flat, coiled nearly in the same plane, generally delicate and more or less transparent; with a roundish, sublunate, or squarish aperture, somewhat encroached upon by the convexity of the preceding turn, and having a thin border, and a simple cavity. The shell is dextral, as several observers have proved, not sinistral, as many have alleged. This will be apparent on placing a *Helix*, a *Zonites*, and a *Planorbis* beside each other. In *Helix* in its natural position, the oblique aperture of the shell has its upper and anterior margin more advanced, and the spire projecting to the right. In *Zonites*, the same circumstances are observed, the spire being little prominent, or quite flat. *Planorbis* is similar, but with the spire flat or more generally sunk.

The species live in still and running water, generally on plants.

1. *Planorbis Vortex*. *Angular-mouthed Flat Coil-Shell*.

Shell extremely depressed, very thin, pellucid, glossy, slightly and regularly concave above and beneath, with six, or sometimes seven, gradually increasing volutions, which are convex above, rather flattened beneath, and transversely rugosostriate, the outer rounded but sloping so as to form a rather sharp sometimes obtuse keel on the lower margin of the disk; mouth oblique, roundish-elliptical, somewhat rhombic. Diameter four-twelfths, height less than half a twelfth.

This species, as it presents itself with us, has the keel much less acute, and the lower surface of the turns much less flattened, than in specimens from England and the South of Scotland. In young shells the keel is often acute, but in old individuals it is often obtusely angular, and even rounded toward the mouth, which in that case is not rhombic, but roundish, or broadly elliptical.

The animal, in moving, presents an apparatus which at first sight appears scarcely adequate to the task of dragging forward so large a mass as the shell and body. It consists of an elliptical, depressed or flattened foot, a twelfth and a third in length, little more than half a twelfth in breadth, of a choco-

late-brown colour, rarely reddish-brown, tinged with grey toward the margins. Extending this foot, it produces in it a series of undulations, by means of which it slowly glides along the solid surface of a stem, leaf, or other immersed body. Every now and then, the shell is jerked forward by a sudden movement, which is not performed by the foot, but by the muscles which pass from it or along the neck into the body. Sometimes the shell is laid flat, the more advanced edge or lip of its oblique aperture being above the anterior part of the outer whorl, to the left hand, as in a *Zonites*. The dextral nature of the shell is thus apparent. But the animal often also keeps the shell inclined at an angle of from  $15^{\circ}$  to  $20^{\circ}$ , or even so much as  $45^{\circ}$  or  $60^{\circ}$ , the right margin of the disk touching the plane on which it moves. It can even raise the shell on edge, so as to be quite perpendicular. Moreover, as the neck is so slender, it can easily be twisted without receiving injury, so that sometimes the animal is seen advancing at the bottom of the water, with the shell reversed, or having the prolonged lip of its aperture below, and the right margin of the disk above; or it may be turned over, so as to have its lower surface uppermost. An individual seemed to prefer this arrangement, and I thought it might be natural to it, or that it might be sinistrorse; but, on taking it out of the water and replacing its shell in the ordinary position, it kept it so. Sometimes the animal moves along with a continuous progress, without jerking the shell forwards at intervals. Generally however, it combines both methods. Like many other mollusca, it can move on the surface of the water. In this case, the plane of the shell is parallel to the surface, the extended foot of the animal is applied to the surface of the atmosphere in contact with that of the water, forming a concavity, and the undulatory contractions of the foot cause a slow advance; but the animal does not usually travel this way. It readily changes its direction, the foot turning to either side with ease, on the slender pedicel formed by the body. The mantle forms but a slight margin or collar; the head projects with a rounded extremity; over the mouth is a broad flap of two rounded lobes, and below it the foot, anteriorly rounded and decurved, projects a little. The tentacula, nearly as long as the foot, or a twelfth and a third in length, are extremely slender or setaceous, dilated at the base, then contracted, and thence gradually tapering to the point. They are contractile, but not in the manner of the tentacula of snails and slugs, and can be moved in any direction, but seem to be not generally employed as

organs of touch, nor to be nearly so sensible as those of snails. The eyes, small globose, black dots, are placed at the base of the tentacula internally, on the middle of their dilated part, which is of a reddish colour, the long taper portion being dusky brown. The tentacula have no auricle at the base, a character given in most books as generic, which it therefore is not. The orifices of the pulmonary, alimentary, and genital organs are on the left side, but these organs themselves on the right. When the foot and head are protruded, a large portion of the last spiral turn is filled with air, so that probably the shell is very little heavier than water. Out of the water, the animal in advancing drags the shell flat, or lying in the natural position, with the right side of the disk to the right, and it cannot advance in any other position. These observations are quite sufficient to prove that this species is truly dextral, and that the concave surface of the disk is the upper.

*Planorbis vortex* resides, not in the mud, but on its surface, and more especially on the stems and leaves of plants, generally in the water, but often also out of it; and it retires to rest into cavities or recesses on the banks, formed by overlying stems and leaves, or upon the plants themselves. Individuals frequently crowd together to repose. In long-continued droughts, it closes the aperture of the shell with a whitish membranous substance, like that of the *Helices*.

*Planorbis vortex* is liable to considerable distortion, some of the turns frequently projecting beyond their proper level, and sometimes the whole disk preter-naturally hollowed out on one side, and protruding on the other.

First found by me, on the 20th of July, 1842, on aquatic plants, and on the mud, in a ditch with stagnant and rather putrid water, in the hollow between Aberdeen and the Spital, where it is abundant.

*Planorbis vortex*. Muller, Verm. Terrestr. et Aquat. ii. 158.—*Planorbis vortex*. Var. a. Drap. Moll. 45. Pl. 2. f. 4, 5.—*Helix spirorbis*. Mont. Test. Brit. 455; Suppl. Pl. 25. f. 2.—*Planorbis vortex*. Lamk. Syst. vi. 2. 154. Ed. 2. viii. 385.—*Planorbis spirorbis*. Gray's Turton, 267. Pl. 8. f. 91.—*Planorbis vortex*. Flem. Brit. Anim. 277.

A. *Planorbis Vortex crassulus*. *Thickish Flat Coil-Shell*.

Shell extremely depressed, very thin, pellucid, shining, regularly and equally concave above and beneath; with five gradually increasing volutions, which are convex above and beneath, and transversely obsoletely striulate, with scarcely



perceptible longitudinal striulæ; the outer whorl rounded, but flattened on the periphery so as to form a rounded angle on the upper and an obtuse angle on the lower margin of the disk; mouth nearly square, but with the upper angle more rounded. Diameter two twelfths and a half, height half a twelfth.

This variety, although closely allied to *Planorbis Vortex*, is easily distinguished from it. Compared with young individuals of that species of the same size, it is found to be sometimes twice the height or thickness, it being, although not much more than half the diameter, thicker than even a full-grown vortex. Its glossy, delicately striolate surface is very different from that of the other shell; its periphery is almost flat, although slightly sloped, in place of being rounded and considerably sloped; and its mouth is either square, in young individuals, or square with the angles rounded, in old ones. The turns are more convex above, as well as much more so beneath, where the cavity is much deeper. At first sight one might almost mistake it for a large *Planorbis contortus*. The colour of the shell is a rich yellowish-brown, like that of *Zonites nitidulus*.

The animal is similar to *Planorbis Vortex*, but with the lobes of the veil less deeply separated, and the tentacula less dilated at the base. Its habits are similar.

It occurs in the same ditch as the last species, where I first found it at the same time.

The next species or variety is connected with *Planorbis Vortex* by the present, which, if merely a variety, belongs as much to the one as to the other.

#### B. *Planorbis Vortex Spirorbis*. Round-edged Coil-Shell.

Shell extremely depressed, very thin, pellucid, glossy, regularly and equally concave above and beneath; with five, sometimes six, gradually increasing volutions, which are convex above and beneath, and transversely obsoletely striolate; the outer whorl rounded on the periphery, forming an obtuse angle on the lower margin of the disk; mouth nearly square, a little oblique, sometimes roundish. Diameter nearly three-twelfths of an inch, height a third of a twelfth.

It varies considerably in the form of the aperture, the degree of carination of the margin, and the thickness; but may always be distinguished from *Pl. Vortex* by having the turns fewer, smaller, more finely striate, and more glossy; and from *Planorbis Crassulus*, by being larger and much thinner. At the

same time, all these shells differ much less from each other than the varieties of *Limnæus pereger*.

First found by Miss Marion Macgillivray in a ditch at Banner Mill, near Aberdeen, where it exists in great profusion, among *Ranunculus aquatilis*, and other plants; afterwards by Miss Isabella Macgillivray.

*Planorbis spirorbis*. Muller, Verm. Terr. et Aquat. 161.—*Planorbis spirorbis*. Mont. Test. Brit. 455. Pl. 25. f. 2.—*Planorbis vortex*. Var. B. Drap. Moll. Terrestr. et Aquat. 44. Pl. 2. f. 6, 7.—*Planorbis spirorbis*. Flem. Brit. Anim. 277.—*Planorbis spirorbis*. Gray's Turton, 268. Pl. 8. f. 98.

## 2. *Planorbis contortus*. Contorted Coil-Shell.

Shell widely and slightly concave above, with six nearly equal, narrow, distinctly striated volutions; the last rounded, leaving a wide and deep cavity beneath, exposing part of all the other whorls; mouth narrow, semilunar; colour light brown, glossed or bronzed. Diameter nearly two-twelfths, height one-twelfth.

This, the smallest British species, is very abundant in pools, ditches, rivers, and brooks. Its actions are in all respects similar to those of the species described above. In advancing in the water, it extends its foot, which is elliptical, depressed, scarcely a twelfth of an inch in length, and moves regularly and continuously onwards, but also at intervals exhibits the sudden jerking motion above mentioned. The foot is of a dusky brown colour; the neck and head are black, the latter projecting with a rounded extremity. The tentacula, longer than the foot, are setaceous, a little dilated at the base, tapering to a fine point, and a dusky grey colour; the eyes black, on the dilated base of the tentacula internally. The shell is generally kept in the normal position, nearly horizontally, a little declined to the right; but the animal can raise it considerably. It advances on the surface, in the manner described, keeping the shell horizontal. On land, it creeps in the same manner; but should the shell be turned round by twisting the neck, it can proceed equally well with it in that manner. It lives habitually among the roots, stems, and leaves of aquatic plants.

First found by Mr. John Macgillivray in a pool in the Old Aberdeen Links, in May, 1841; in May, 1842, by Mr. Leslie, in a small pond in the garden of the Professor of Medicine of King's College, where it is very abundant on the grass and

decayed leaves of trees; in June by Miss Macgillivray in a stripe of the Don, near Seaton House; in July by myself in the Loch of Skene, the Inverury Canal, and subsequently in many other localities, it being generally distributed in the lower tracts.

*Planorbis contortus*. Muller, Verm. Terr. et Fluv. ii. 162.—*Planorbis contortus*. Linn. Syst. Nat. i. 1244.—*Helix contorta*. Mont. Test. Brit. 457. Pl. 25. f. 6.—*Planorbis contortus*. Drap. Moll. Terr. et Fluv. 42. Pl. 1. f. 39, 40, 41.—*Planorbis contortus*. Lamk. Syst. vi. 2. 154. Ed. n. viii. 387.—*Planorbis contortus*. Flem. Brit. Anim. 277.—*Planorbis contortus*. Gray's Turton, 270.

### 3. *Planorbis albus*. *Bristly Coil-Shell*.

Shell widely concave above and beneath, with three and a half or four rapidly increasing volutions, which are convex on both sides, longitudinally finely sulcato-striate, minutely striate transversely, delicately hispid with tapering shreds of the epidermis; the last turn disproportionately enlarged, considerably depressed, with the outer margin convex; the mouth a little oblique, semiovate or nearly elliptical, dilated, with the peristome somewhat thickened and slightly spreading; the colour pale horny or yellowish-grey. Diameter two-twelfths and a half, height nearly a fourth of the breadth.

The animal in walking in the water bears the shell inclined at an angle varying from 70° to 80°, the right margin, as usual, touching the ground, or other surface. Out of the water, it drags the shell, laid flat, by sudden jerks. The foot is ovato-triangular, pale grey beneath, brown above, in length about a third of the diameter of the shell. The neck is short, dusky; the head oblong in front, dusky, with a large emarginate veil; the tentacula subulato-setaceous, pale grey or white, with a medial brown line, dilated and transparent at the base, on the inner side of which is the small black eye. The head, and especially the veil, can be expanded to a great breadth. This species is found with us on various species of *Potamogeton*, as well as other plants, particularly *Veronica Beccabunga* and *Poa fluitans*, on which it feeds.

First found by me in the Aberdeen Canal, on the 22d of August, 1842.

It occurs abundantly there, chiefly on the different species of *Potamogeton*, on the foliage of which it feeds, with great voracity, as I ascertained by keeping it alive for many days. Its actions are similar to those of the species already described,

As the shell is not really white, I think Muller's name *albus* ought to be rejected, and that of Draparnaud employed.

*Planorbis albus*. Mull. Verm. Terr. et Fluv. ii. 164.—*Planorbis hispidus*. Drap. Moll. Terr. et Fluv. ii. 43. Pl. 1. f. 45, 46, 47.—*Planorbis hispidus*. Lamk. Syst. vi. 2. 154. Ed. 2. viii. 387.—*Helix alba*. Mont. Test. Brit. 459.—*Planorbis albus*. Flem. Brit. Anim. 278.

The shell when emptied is generally very pale yellowish or greenish-grey, sometimes greyish-white; when containing the animal, dusky.

#### 4. *Planorbis imbricatus*. Crested Coil-Shell.

Shell flat, slightly concave in the middle, above, widely and very deeply concave beneath, with three rapidly increasing, depressed, obliquely sulcato-striate volutions, which are convex above, sloping deeply to the suture, more convex beneath; the last turns disproportionately enlarged, depressed, sloping to an obtuse medial angle, and much widened toward the mouth, which is somewhat oblique, subelliptical, with the peristome complete, a little thickened, and spreading or slightly reflexed; the colour pale yellowish-grey. Diameter two-twelfths of an inch.

In form and colour this shell resembles *Planorbis albus*; from which however it is distinguished by the greater concavity of its lower surface, by its having the turns more flattened, the periphery with a kind of blunt keel, the mouth wider, the peristome thicker, the turns destitute of spiral striæ, and strongly marked with transverse grooves, almost in the manner of *Zonites rotundatus*. It appears to be *Planorbis imbricatus* of Draparnaud, with whose description and figure it agrees in every particular, with the exception of the lamellar epidermis, which may have been abraded, the specimen being a dead one, and the "lames," according to him, being "tres-caduques."

*Planorbis imbricatus*. Drap. Moll. Terr. et Fluv. 44. Pl. i. f. 49, 50, 51.—Muller, Verm. ii. 165.—Gray's Turt. 261.—Lamk. Syst. vi. 2. 155.

#### GENUS 4. ANCYLUS. LID-SHELL.

Animal conoidal, with an elliptical outline beneath; head with two depressed, elongated, triangular, obtuse, contractile tentacula, mouth with a flattened, carinate,

spiral, elongated tongue, having numerous triangular spinelets; foot elliptical, very large; orifice of the pulmonary cavity on the left side, close to the anus; mantle adherent to the shell all round.

Shell elliptical, conoidal, with the point curved backwards, and nearer the posterior end, thin, fragile, striate.

The Ancyli adhere, like Limpets, to stones and plants in running and still waters, and although pulmonated, are very seldom seen out of it.

1. *Ancylus fluviatilis*. *Oval Lid-Shell*.

Shell conoidal, with the point recurved, and nearer the posterior end, diaphanous, slightly striated longitudinally, more distinctly striated concentrically, pale yellowish-grey or horn-colour; the aperture oval; the inside whitish, and highly glossed. Nearly a fourth of an inch long, two-fourths high.

It varies somewhat in form, and greatly in the prominence of its ridges, of which the longitudinal are sometimes strongly marked. Old shells, in still water, sometimes have the margin much expanded, considerably thickened, and a little reflected.

The foot is broadly elliptical, pale grey; the head oblong, pale grey, minutely dotted with darker; the flap broad and of the same colour; the tentacula depressed or flattened, somewhat triangular, obtuse; the eyes black; the body conical, yellowish-grey, partly dotted with dark grey, olivaceous-brown toward the apex.

Abundant in brooks and rivers, on stones and plants, especially potamogetons; occurs also in pools, as in those of the granite quarries of Rubislaw and Hilton, and in mill-dams.

*Ancylus fluviatilis*. Muller, Verm. Terrestr. et Fluv. ii. 201.—*Ancylus fluviatilis*. Drap. Moll. 48. Pl. 2. f. 23, 24.—*Patella fluviatilis*. Mont. Test. Brit. 482.—*Ancylus fluviatilis*. Gray's Turton, 249.—*Ancylus fluviatilis*. Flem. Brit. Anim. 280.—*Ancylus fluviatilis*. Lamk. Syst. vi. 2, 27.—*Patella fluviatilis*. Mont. Test. Brit. 482.—*Patella fluviatilis fusca*, vertice mucronato, inflexoque. Lister, Anim. Angl. 151. Pl. 2. f. 32.

ORDER II.—GASTEROPODA PECTINIBRANCHIATA.

Respiratory apparatus a branchial cavity situated on the back, containing two branchiæ, composed of parallel rows of laminæ or fimbriæ attached to its upper part,

and communicating externally by a large aperture between the body and the edge of the mantle.

Some species have a respiratory tube, formed by a prolongation of the margin of the branchial cavity on the left side, and passing along a channel or notch in the shell; but others are destitute of this branchial siphon, and cannot respire without partially emerging from the shell.

#### SECTION I.—ASIPHONATA.

*Branchial aperture plain; shell with the mouth entire.*

#### FAMILY I.—PALUDININA.

Animal with the body elongated, spiral, and covered with a shell; head probosciform; mouth with a small serrulate lingual mass; two long slender, conical or setaceous contractile tentacula; eyes at the outer side of their base; orifice of the branchial cavity without tube or canal; branchiæ pectinated or reticulated; orifice of the intestine on the floor of the branchial cavity; sexes separated; the foot large and depressed. A horny operculum.

Shell spirally bent, globose, ovate, conical, or discoid, thin, generally covered with an epidermis.

The species inhabit fresh-water, and occur chiefly in the warmer parts of the globe.

There is little distinction between this family, and the operculated branchiferous pulmonated Cyclostomina of the first order, of which there are no representatives in our district, and the next family of the Turbinina.

#### GENUS 1. PALUDININA. MARSH-SHELL.

Animal elongated, spiral, with the head probosciform; two contractile, tapering tentacula, bearing the eyes on prominences at the base externally; the mouth with a small hispid lingual mass; the foot oval.

Shell ovato-conical or subglobose, spiral, covered with a thin epidermis; the turns convex, rapidly enlarging, the last ventricose; the aperture roundish-oval, angular behind, with the peristome complete, thin-edged, reflexed on the columella. Operculum thin and horny, with concentric striæ.

1. *Paludina vivipara*. *Viviparous Marsh-Shell*.

Shell thin, ovato-conical, with the apex pointed, the turns five, thin, very convex, transversely striated; the last turn very large, olivaceous with three brown bands, two of which are apparent on the other turns; the suture deeply impressed; the aperture roundish-ovate, the inner lip nearly covering the umbilicus. Length about an inch and a fourth, breadth nearly an inch.

A dead shell was found on the beach near the mouth of the Dee, in the spring of 1842, by Mr. Alexander Cruickshank; another by Mr. Martin, at Torric. The species has not been found alive in the district. Its occurrence on our coasts indicates the source whence probably are derived the shells of *Bythia tentaculata*, *Littorina muriatica*, and *Neritina fluviatilis*, sometimes cast on the beaches.

*Helix vivipara*. Linn. Fauna. Suec. 529.—*Cochlea maxima, fusca sive nigricans, fasciata*. Lister, Anim. Angl. 133. Pl. 2. f. 18.—*Cyclostoma viviparum*. Drap. Moll. Terr. et Fluv. 34. Pl. 1. f. 16, 17.—*Paludina vivipara*. Lamk. Syst. vi. 173.—*Paludina vivipara*. Flem. Brit. Anim.—*Paludina vivipara*. Gray's Turton, 90. Pl. 18. f. 118.

GENUS 2. BYTHINIA.

Animal elongated, spiral; with the head probosciform; two contractile, tapering, setaceous tentacula, bearing the eyes on prominences at their base externally; the mouth with a small hispid lingual mass; the foot oval, with a marginal groove at the anterior part.

Shell ovato-conical, spiral, covered with a thin epidermis; the whorls convex, rapidly enlarging, the last about as long as the spire; the aperture oval, angular behind, with the peristome complete, thin-edged, reflexed on the columella. Operculum somewhat calcareous, with concentric striæ.

1. *Bythinia tentaculata*. *Tentaculated Bythinia*.

Shell ovato-conical, with the apex pointed, the turns five or six, pellucid, rather glossy, faintly striated transversely, convex, the last very large, ventricose; the mouth nearly half the whole length, ovate, angulate behind, with the peristome thin, reflexed on the left side; the colour yellowish-grey. Length five-twelfths of an inch, breadth rather more than half the length.

Although very common in England, this species has not been met with in the eastern parts of Scotland. In August, 1842, a single specimen was found by Miss Anne Macgillivray while searching the beach with me, near the mouth of the Dee, and in the beginning of October another specimen by myself in the same place. At the former time there was a profusion of small shells along high water mark, among which we found many marine species, together with specimens of *Limnæus pereger*, *Limnæus truncatulus*, *Clausilia perversa*, *Ancylus fluviatilis*, and *Neritina fluviatilis*. Whether these shells may have come from the Dee or Don, or from among ballast in the harbour, or been drifted from a distant coast, can only be conjectured.

*Helix tentaculata*. Linn. Syst. Nat. 1249.—*Helix tentaculata*. Penn. Brit. Zool. 140. Pl. 86. f. 140.—*Nerita Jaculator*. Muller, Verm. Terr. et Fluv. ii. 185.—*Helix tentaculata*. Mont. Test. Brit. 389.—*Paludina impura*. Lamk. Syst. vi. 2, 175. Ed. n. viii. 514.—*Paludina tentaculata*. Flem. Brit. Anim. 315.

## FAMILY II.—NATICINA.

Animal with the body elongated, spirally rolled into a globose form, and covered with a shell; head flattened, semilunar, emarginate; two long conical tentacula, eyes on short pedicels at the outer side of their base or sessile; orifice of the branchial cavity an oblique slit, without tube or canal; two unequal pectinated branchiæ; orifice of the generative organs near the base of the right tentaculum; the foot very large, thick, and roundish. A horny or calcareous operculum.

Shell spiral, globose or ovate, with the aperture large, roundish, semicircular, or ovate, without anterior canal or notch; the columellar margin straightish, or septiform.



## GENUS 1. NATICA. LAMK.

Animal elongated, or oval, spiral; head broad, with two flattened tentacula; mouth with two unequal lips and a short proboscis; foot very large, thin, bilobate anteriorly; mantle enveloping a portion of the shell. Operculum horny.

Shell globose, or oval, spiral, umbilicate; the aperture entire, roundish, semicircular, or obovate; the umbilicus narrowed, and sometimes covered by callus, the outer lip thin, internally even.

1. *Natica monilifera*. *Beaded Natica*.

Shell globose, rather thick, glossy; with the spire very short and convex; the suture deep; the turns five, very convex, faintly striate transversely, the last turn ventricose; the mouth oblique, semicircular, the outer lip thin, the inner covering but not narrowing the spirally grooved umbilicus with a mass of white callus; the colour brownish-yellow, reddish-yellow, or pale greyish-purple, with a series of dark purple spots near the upper margin of each turn, and four additional series, often obliterated, on the last; the base of the shell white; the inside white or tinged with red. Length an inch and a fourth, breadth somewhat less.

Young individuals are of the same convex form, but less glaucous, being banded on a flesh-coloured or yellowish-red ground, with five series of brownish-red or reddish-purple spots. The red markings vary in form, but are generally linear and oblique. Frequently they are all obliterated, excepting the upper series; but in young shells they are generally distinct. The umbilicus is obscurely spirally grooved, and is sometimes not intruded upon by the callus, but more commonly is partially covered by it.

Not very common on the beach at Aberdeen, after storms. Found also about Peterhead.

*Cochlea rufescens, fasciis maculatus*. Lister. Anim. Angl. 163. Pl. 3. f. 12.—*Nerita glaucina*. Penn. Brit. Zool. iv. 140. Pl. 87. f. 141; Ed. 2. Pl. 90. f. 1.—*Nerita glaucina*. Mont. Test. Brit. 469.—*Natica glaucina*. Flem. Brit. Anim. 319.—*Natica monilifera*. Lamk. Syst. vi. 2, 200. Ed. n. vii. 636.—*Natica monilifera*. Johnst. Berw. Trans. iii. 265.—*Natica monilifera*. Forbes. Malac. Mon. 30.

2. *Natica rútila*. *Ruddy Natica*.

Shell subglobose, rather broader than high, thick, glossy; with the spire very short and convex; the suture channelled but narrow; the turns four, very convex, transversely striulate, the last turn ventricose; the aperture oblique, subovate, its inner side nearly straight, the outer lip thin, the inner thickened, slightly reflexed at the umbilicus, but not forming a prominence there; the umbilicus strongly sulcate; the colour dull greyish-red, with a white band margining the suture, at which the margin of the turns is sharply inflexed, the base of the shell paler, the inside reddish-white; operculum semicircular, horny, spirate.

This species does not agree with any that I have seen described; but seems to be intermediate between *Natica monilifera*, and *Natica rufa* of Montagu. It was found in October, 1842, by Mr. Alexander Murray, at Fraserburgh.

3. *Natica Alderi*. *Alder's Natica*.

Shell subglobose, rather thick, highly glossed; with the spire very short and rather acute; the suture simply linear, with the edge of the turns closely overlying; the turns five, very convex, faintly striate transversely, the last turn ventricose; the mouth oblique, semicircular, the outer lip thin, the inner partly covering and narrowing the longitudinally striated umbilicus with a mass of white callus; the colour light reddish-yellow, with an undefined band of yellowish-white along the margin of the whorls, another from the umbilicus to the mouth, and on the last turn five series of red spots, generally alternating with white or whitish spots; a brown band entering the umbilicus, and a brown spot or band on the callosity of the inner lip. Length half an inch, breadth about the same.

The ground-colour varies from yellowish-white to orange-red, and the spots are linear, square, roundish, direct or oblique, curved, angularly bent, sagittiform, or even cruciform. Frequently the bands are articulated with white, or the red spots seem painted on a white band. Individuals sometimes occur without markings.

This species, very nearly allied to *Natica monilifera*, may be distinguished by its having the spire much less convex, the general form less globose, the umbilicus narrower and compressed by the callus. The red spot or band on the callus is not distinctive of this species, for it occurs occasionally in both.

Plentiful off Aberdeen and Peterhead, at Gamrie and Banff; sometimes cast on the beaches; very frequently brought up on the lines, but usually the shells only, containing Paguri.

*Natica glaucina*. Var. B. Turt. Conch. Dict.—*Natica Alderi*. Forbes, Malacol. Mon. 31.—*Natica Alderi*. Johnst. Berw. Trans. iii. 266.

#### 4. *Natica nitida*. *White Natica*.

Shell ovato-globose, rather thick, highly glossed; with the spire very short, and rather acute; the turns five, faintly striated transversely, flattened toward the margin, so that those on the spire are but slightly convex, with the suture inconspicuous; the last turn ventricose; the mouth oblique, semicircular; the outer lip thin, forming at its junction an acute angle filled by callus, the inner partly covering and narrowing the longitudinally striated umbilicus with a mass of callus; the colour milk-white, with a band of more opaque white margining the whorls, and another encircling the umbilicus. Length four-twelfths of an inch, breadth three-twelfths.

This species is very closely allied to *Natica Alderi*, from which it differs in being less ventricose, with the spiral turns flattened, and the colour white, without any markings. It differs from *Natica Mammilla* in many respects.

A single specimen found by me, in a fishing-boat, at Boddam, near Peterhead, on the 5th of August, 1842.

*Nerita nitida*. Donov. Brit. Shells. 144.—*Nerita nitida*. Mont. Test. Brit. Suppl. 149.—*Natica nitida*. Flem. Brit. Anim. 319.

#### 5. *Natica helicoïdes*. *Helicine Natica*.

Shell ovate, thin, covered with a delicate epidermis; of four turns, which are convex, separated by a canaliculate suture, and obsoletely striulate transversely and longitudinally; the spire short, convex, rather obtuse; the mouth oblique, ovate, rather angulate anteriorly, the outer lip thin, the inner continued over the columella, but very thin, and leaving a narrow fissure in the umbilical space, on which there is no callosity; the colour white, that of the epidermis yellowish-white. Length four-twelfths of an inch, breadth a fourth less.

The above description is taken from a specimen which I found, on the 5th of August, 1842, in a fishing-boat, at Boddam, or Buchan-Ness, near Peterhead. The shell is quite perfect, and is identical with a fossil shell found by Mr. Lyell, in the Norwich Crag. It has been described by Dr. John-

stone, as well as by Mr. Lyell, under the name of *Natica helicoides*. At first sight it seems to have no resemblance to a *Natica*, but rather to belong to the genus *Bythinia* or *Paludina*, and Mr. Lyell has remarked that it closely resembles in shape *Paludina solida* of Say; but a comparison with various *Naticæ* has led to its being placed among them, and this arrangement may be correct, although, as both Mr. Lyell and Dr. Johnstone observe, it departs from the normal form of the genus, and the latter gentleman remarks that it is closely allied to the *Natica canaliculata* of Gould. I had determined my specimen to be identical with that described by the eminent naturalist just mentioned, when I was favoured by Dr. Fleming with Mr. Lyell's paper on the Fresh-water deposits of Eastern Norfolk, in which is a figure of "*Natica helicoides*." On comparing it with my specimen, I find no essential difference between them. The spire being however a little shorter in mine, and the mouth a little narrower at its anterior extremity, where there is a slight angular appearance, as in all *Naticæ*, but which has not been represented in Mr. Lyell's figure. The only other instance of its occurrence in a recent state is that mentioned by Mr. Jeffreys, who found a specimen while dredging in Lerwick Sound.

*Natica helicoides*. Johnst. Berw. Trans. 1835. p. 266.—*Natica helicoides*. Lyell, Phil. Mag. S. 3. v. xvi. p. 365. f. 12.—*Natica helicoides*. Jeffreys, in Ann. and Mag. of Nat. Hist. viii. 165.

#### 6. *Natica squálida*. Dull-coloured *Natica*.

Shell subglobose, thick; of three-and-a-half very convex turns, which are convex, separated by a subcanaliculate suture, and striated transversely; the spire depressed, convex, rather obtuse; the mouth nearly twice the length of the spire, oblique, ovate, rather angulate anteriorly, the inner lip continued over the columella, but very thin, and leaving a rather deep fissure in the umbilical space, on which there is no callosity; the colour yellowish-white. Length three-and-a-half twelfths, breadth three-twelfths.

A single specimen, dead, decayed, and having part of the outer lip broken, was found by Miss Anne Macgillivray, in October, 1842, among corallines brought up from deep water off Aberdeen. It bears a great affinity to *Natica helicoides*, of which it may possibly be merely a variety, should that shell be found to vary as much in form as *Bythinia tentaculata*, which it also somewhat resembles. The specimen however

presents characters perfectly distinct from those of either of the species just mentioned.

## GENUS 2. NERITINA. LAMK.

Animal elongated, spiral ; head broad, with two long, setaceous tentacula ; eyes at their outer base, on a small tubercle ; mouth with two unequal lips ; foot large, depressed ; a horny operculum, marked with lines diverging from the inner to the outer margin.

Shell semiglobose or oblong, of moderate thickness, with a persistent glossy epidermis ; the spire very small ; the aperture oblique, roundish or elliptical, but reduced to a semiglobular form by the thickening of the columella, which shelves to a thin edge nearly parallel to the axis. Operculum horny slightly calcareous.

The species, with very few exceptions, are fluviatile.

### 1. *Neritina fluviatilis*. River Neritine.

Shell transversely oblongo-elliptical, convex, rather thick ; with the spire very short, and as if lateral, the last turn excessively disproportionate, being extended obliquely to the axis, so as to render the outline of the mouth elliptical, but half filled up by the shelving callosity of the columellar lip, which ends in a thin outer edge ; the margin of the outer lip thin but firm ; the colouring of the exterior various, banded, tessellated, or spotted. Length about two-and-a-half twelfths, breadth four-twelfths.

It occurs in slow rivers in England and Ireland, also in the Loch of Stennis in Orkney. A perfect shell, but without the animal, was found by me on the 1st of July, 1842, among shell sand on the beach, between the mouth of the Dee and the Don ; and, in September, another was picked up by my son, Paul. The first specimen has the exterior dark olive-green, with numerous oblong, greenish-white spots, disposed longitudinally, the inside bluish-white.

According to Draparnaud, "the animal is transparent, blackish ; with the foot of a pale colour beneath ; the tentacula long, setaceous, very flexible ; the eyes small, black, situated at the outer base of the tentacula on a little tubercle. When the animal walks, it is entirely concealed under the shell, and shews only the anterior edge of the head and the tentacula."

The occurrence of dead terrestrial and fluviatile shells of other districts on our shores may be accounted for in various ways. For example, *Nerita fluviatilis*, and *Bithinia tentaculata*, may have come to Aberdeen in mud or sand, from England, used as ballast.

*Nerita fluviatilis*. Linn. Syst. Nat. 1253.—*Nerita fluviatilis*. Muller, Verm. Terr. et. Fluv. ii. 194.—*Nerita fluviatilis*. Drap. Moll. Terr. et. Fluv. 31. Pl. 1. f. 1, 2, 3, 4.—*Nerita fluviatilis*. Penn. Brit. Zool. iv. 141. Pl. 88. f. 142; Ed. n. iv. 345. Pl. 90 f. 2.—*Nerita fluviatilis*. Mont. Test. Brit. 470.—*Neritina fluviatilis*. Flem. Brit. Anim. 321.—*Neritina fluviatilis*. Lamk. Syst. vi. ii. 188; Ed. n. viii. 576.—*Neritina fluviatilis*. Gray's Turton.

### FAMILY III.—TURBININA.

Animal with the body elongated, spiral, and covered with a shell; head with a frontal veil; two large conical tentacula; eyes on prominences at their base externally; mouth toothless, but with a spiral lingual filament; respiratory cavity containing two unequal pectiniform branchiæ, its opening without tube; organs of generation in the female opening into the branchial cavity, in the male near the base of the right tentaculum. A horny or calcareous operculum.

Shell spiral, globose, ovate, conical, or turrite, with the aperture round, ovate, pyriform, semicircular, or oblong, rounded anteriorly, without canal or notch.

All the species are marine, although some inhabit brackish water, and are phytophagous, living chiefly on Algæ.

This family, of which the organization is similar throughout, has been variously subdivided by authors according to the form of the shell, and especially of its aperture into a number of distinct families. For example, Blainville arranges his order Asiphonobranchia into Fam. 1. Goniostomes, or angular-mouthed shells; Fam. 2. Cricostomes, or round-mouthed; Fam. 3. Ellipostomes, or elliptical-mouthed. These three families however present no essential differences in the structure of the animal, and are all here included under the general name of Turbinina. Used even sectionally such an arrange-

ment would be useless, for in many cases the student could not decide whether a mouth should be considered as angular, round, or pyrante; and all these forms occur even in a single most natural genus, *Littorina*.

#### GENUS 1. TROCHUS. LINN. PYRAMID-SHELL.

Animal spiral; head broad, with two long, slender tentacula; eyes at their outer base; mouth with a long spirally rolled lingual filament, passing into the abdomen; foot rather short, thick, rounded at both ends. A thin horny operculum, with numerous narrow spiral turns.

Shell conical, with the spire moderately elevated, or low, the turns flat or somewhat convex, longitudinally sulcate or striate, the last large, angulate along the middle; the aperture somewhat square or angulate, oblique, the margin incomplete behind, the columella somewhat arcuate and often projecting a little, the outer lip thin; the inner layers of the shell pearly.

The Trochi feed on vegetable substances; adhere to rocks, stones, and other hard bodies, or to plants, and creep in the manner of snails.

##### 1. *Trochus Sisyphinus*. *Sisyphine Pyramid-Shell*.

Shell conical, with the pillar closed, the base flattened, the aperture somewhat square, oblique; the interior pearly and iridescent, the lip very thin; the last turn angulate; all the turns, eight or ten in number, flat, glossy, faintly striate transversely, marked longitudinally with from three to five grooves and corresponding inconspicuous delicate ridges, of which the upper is larger, and a lower prominent rim with a single groove upon it; the colour pale reddish-yellow, the raised band on the spire and angle of the last turn with alternate whitish and red spots, the apex often purple; the base concentrically grooved, and radiatingly striate; the outline of the spire rather concave, the apex very acute, the ridges of the upper turns granulate.

I have seen only a few live specimens, of which four are in my collection, brought up by the fishing lines, off Aberdeen. The first was found by Miss Marion Macgillivray. Mr. Alex. Murray has also found it on the coast of Peterhead and St.

Fergus; and Miss Macgillivray at Gamrie, in Banffshire. I have found at Aberdeen, a most beautiful white individual, with the apex purplish.

*Trochus zizyphinus*. Penn. Brit. Zool. iv. Pl. 80. f. 103.—*Trochus zizyphinus*. Mont. Test. Brit. 274.—*Trochus zizyphinus*. Lamk. Syst. vii. 23.—*Trochus zizyphinus*. Flem. Brit. Anim. 323.

### 2. *Tróchus conuloïdes*. *Conuloid Pyramid-Shell*.

Shell conical, with the pillar closed, the base flattened, the aperture somewhat square, oblique; the interior pearly and iridescent; the lip thin; the last turns obtusely angulate; all the turns, eight or ten in number, flat, little-glossed, rude, marked longitudinally with from three to five prominent narrow ridges, and corresponding broader grooves, the upper and lower ridges larger, but the latter not forming a conspicuous rim, as in the last species; the colour reddish-white, with patches of rose-red across the turns; the base concentrically grooved and radiatingly striulate. Height an inch and ten-twelfths, breadth about the same.

This species, generally confounded with the last, differs in being much thicker, coarser, strongly ridged, with the spire less pointed, its outline rather convex. It is abundant in the Islands of Lewis and Harris.

One specimen found by Miss Isabella Macgillivray, at Gamrie, in Banffshire, in September, 1842; others by Mr. Murray, at Fraserburgh.

*Trochus conuloïdes*. Lamk. Syst. vii. 24.

### 3. *Tróchus Martini*. *Martin's Pyramid-Shell*.

Shell conical, with the pillar closed, the base flattened, the aperture somewhat square, oblique; the interior pearly and iridescent; the lip very thin; the last whorl angulate; all the whorls, eight or ten in number, flat, with from four to eight cord-like ridges, beautifully granulato-crenulate with transverse furrows, and on the lower margin and the angle of the last whorl, a very prominent larger rope-like granulated ridge, the granulations formed by the oblique striæ or lines of growth; the lower surface grooved and crenulate, but less distinctly; the colour pale yellow, with some deeper blotches. Diameter six-twelfths of an inch, height seven-twelfths.

Two specimens, dead and partially decayed, brought up by fishing-lines from deep water and hard ground, about eight miles off Aberdeen, in March, 1842, both found by myself.



This most elegant shell appears to be *Trochus Martini* of Mr. Smith, described and figured by Capt. Brown, in vol. viii. *Wernerian Transactions*. The figure there given agrees in all respects, excepting the lower ridges of the whorls not being granulate, although described as being so.

*Trochus Martini*. Smith, *Wern. Trans.* viii. 99. Pl. 1. f. 26.

#### 4. *Tróchus cinerárius*. *Grey Purple-streaked Pyramid-Shell*.

Shell depressedly conical, somewhat convex, umbilicate, with about five longitudinally sulcato-striate whorls, the last angulate; the sutures somewhat distinct; the umbilicus narrow; the mouth roundish, obliquely depressed; the colour pale grey, with radiating undulated reddish-purple lines, the interior pearly. Diameter about eight-twelfths of an inch, height about seven-twelfths.

Individuals vary much in form, and considerably in colour. When young, the cone is much depressed, and scarcely convex, of a grey or whitish tint, or reddish-grey, distinctly radiated with purplish-red lines or bands, which are more or less undulated. As it enlarges, the spire becomes proportionally more elevated and convex, and the markings less distinct. Ultimately the height of the cone is equal to its breadth, and the umbilicus becomes nearly covered. The apex is very minute and thin, and being not unfrequently abraded, the pillar cavity is open at both ends. Generally the lines next the sutures, especially on the last whorl, are somewhat granulate.

Abundant on stones and rocks, among fuci, especially in pools left by the tide.

*Trochus umbilicatus*. *Mont. Test. Brit.* 286.—*Trochus umbilicaris*. *Penn. Brit. Zool.* iv. 126. Pl. 80. f. 106.—*Trochus cinerarius*. *Mont. Test. Brit.* 284.—*Trochus umbilicatus*. *Flem. Brit. Anim.* 322.—*Trochus cinerarius*. *Flem. Brit. Anim.* 322.—*Trochus cinerarius*. *Lamk. Syst.* vii. 29.

#### 5. *Tróchus túmidus*. *Tumid Pyramid-Shell*.

Shell convexo-conical, with the pillar perforated by a small aperture; the base rather flat; the mouth roundish; the interior pearly and iridescent; the whorls five, depressed above, the last sloping and angulate, all longitudinally striate, yellowish or brownish-white, with transverse waved lines of dusky or purple. Diameter about four-twelfths, height about three-twelfths.

Several specimens found on fishing-lines at Aberdeen and the Cove. The first observed by Mr. Leslie, others by Mr. Davidson, one by Miss Marion Macgillivray, in the Winter of 1841-2. In August, 1842, I found it also in fishing-boats at Boddam, near Peterhead; in September, it was found at Cruden by Mr. Alexander Murray; and, in December, by Mr. Clark, at Banff.

*Trochus tumidus*. Mont. Test. Brit. 280. Pl. 10. f. 4.—*Trochus tumidus*. Flem. Brit. Anim. 322.

## GENUS 2. PHORCUS.

Shell roundish, rather depressed, thickish, with the suture distinct, the turns convex, the aperture circular, subangulate anteriorly, the peristome almost complete, its columellar portion straightish; umbilicus deep. Risso, Eur. Merid. iv. 133.

### 1. *Phórcus Margarita*. *Pearly Phorcus*.

Shell roundish, rather depressed; with the mouth nearly circular, the peristome rather thin, and discontinued only for a small space; the umbilicus deep and of moderate width; the last whorl very large, convex, the rest rapidly decreasing to an obtuse tip; the surface smooth, glossy, light brown, olivaceous, or reddish, paler beneath, or whitish, the interior nacreous and iridescent. Height two-twelfths, breadth three-twelfths.

Individuals vary much in colour. Frequently there is a single reddish longitudinal band along the whorls.

Common on Fuci; as in the Bay of Nigg, at Slains, and Banff. Frequent in shell sand on the beaches.

*Turbo margarita*. Flem. Brit. Anim. 299.—*Helix margarita*. Laskey, Wern. Mem. i. 408. Pl. 8. f. 5.

## GENUS 3. SKENEÆ.

Animal elongated, spiral; with two filiform contractile tentacula, and round horny operculum.

Shell orbicular, depressed, discoid; the whorls rounded; the aperture circular, with the peristome complete.

### 1. *Skéneæ depréssa*. *Brown Skeneæ*.

Shell orbicular, depressed, horny, transparent, glossy, almost flat above, widely umbilicate beneath; with four transversely

rugous whorls; the suture deep; the aperture circular, the peristome complete, and free; the colour yellowish-brown or olivaceous, the interior white. Diameter one-twelfth of an inch.

Found by me in April, 1842, among shell sand on the beach at Aberdeen; by Mr. Murray at Cruden and Ugie-mouth.

*Skenea depressa*. Flem. Brit. Anim. 313.—*Helix depressa*. Mont. Test. Brit. 439. Pl. 13. f. 5.—*Skenea depressa*. Johnst. Berw. Trans. ii. 273.

### 2. *Skenea serpuloides*. *Serpuline Skenea*.

Shell orbicular, depressed, pellucid, glossy, flat above, very widely umbilicate, of three convex turns, which are faintly striato-rugose above, and smooth beneath; the suture channelled; the aperture roundish, angulate anteriorly, the peristome complete, but reflexed and adherent behind; the colour white. Diameter half a twelfth of an inch.

Found among sand at Fraserburgh by Mr. Alex. Murray, in October, 1842; also in Cruden Bay, and at Ugie-mouth.

*Helix serpuloides*. Mont. Test. Brit. Suppl. 147. Pl. 21. f. 3.—*Skenea serpuloides*. Flem. Brit. Anim. 313.

### 3. *Skenea divisa*. *Semistriated Skenea*.

Shell orbicular, depressed, pellucid, glossy, slightly convex and smooth above, umbilicate and spirally striate beneath, of three convex turns; the suture deep; the aperture circular, the peristome complete, reflexed and adherent for a short space; the colour hyaline-white. Diameter little more than half a twelfth of an inch.

Found at Fraserburgh, by Mr. Alexander Murray, in October, 1842; Cruden Bay, Ugie-mouth, Aberdeen.

*Turbo divisus*. Adams, Linn. Trans. iii. 254.—*Skenea divisa*. Flem. Brit. Anim. 314.

## GENUS 4. LITTORINA. PERIWINKLE.

In their dismemberments of the Linnæan genus *Turbo*, authors have differed as to what group ought to retain the original name; but without entering here into any discussion on so intricate a subject, it seems necessary to state that our common Periwinkle, *Turbo littoreus* of Linnæus, is that which has been taken to form the type of the genus *Littorina*. Some of our species deviate

considerably from it in form, such as *Turbo neritoides*; and were mere outline to be assumed as indicating generic difference, we might form of them two or three genera; but it seems expedient to leave them together. Several of the most recent authors still refer the species here described to the genus *Turbo*.

Animal with the body elongated, spiral; mouth with two triangular thick lips, and a spiral ribbon-like tongue, marked with numerous transverse denticulate striæ; two tapering, depressed, obtuse, contractile tentacula, bearing the eyes near their base, which is dilated; foot oval, short; operculum ovate, horny or calcareous, spirally marked.

Shell ovoidal, ovato-conical, or subglobose; with the spire short, the whorls convex, longitudinally striate, the last very large, ventricose; the aperture roundish, the peristome incomplete behind, the pillar-lip thickened and generally covering the umbilicus, the outer lip thick, bevelled to a thin edge.

They feed on vegetable substances; adhere to rocks, stones, and other hard bodies, or to plants, and move about with ease, creeping in the manner of snails. The species, being generally not confined to particular kinds of situation, vary much in appearance.

#### 1. *Littorina littorea*. Common Periwinkle.

Shell subovato-conical, thick; with the spire half the length of the last whorl, the apex acute; the whorls convex, longitudinally striate; the suture distinct but very small; the mouth roundish; the peristome very thick, bevelled to a thin edge, the outer lip forming an acute angle at its junction, the inner thickened by callosity; the exterior dusky, with irregular greyish or whitish longitudinal lines or bands; the interior dusky grey, the inner thickened part of the peristome white, its thin margin dusky with light-coloured lines. Length, an inch and a quarter, breadth three-fourths of an inch.

Animal with the head and tentacula black or spotted; the foot whitish, yellowish, or grey, ovato-elliptical, transversely rugous, with a medial depressed line, and crenate margins; the neck grey; the thin margin of the mantle yellowish-grey.

The shell varies in the degree of prominence of the longitudinal ridges, in colour, and thickness. In young shells the ridges are prominent and acute, in old individuals obsolete. Young shells have the peristome thin without being bevelled, the whole inside blackish-brown; very old shells have the inside wholly white, others partly white. Frequently the surface is corroded or crusted, so that the markings are obliterated.

Occurs abundantly on all the rocky coasts; also in estuaries on stones.

The animal affords an article of food, of little value, and not much esteemed. In most seaport towns it is sold, chiefly to the poorer people, who consider it a kind of luxury.

*Turbo littoreus*. Linn. Syst. Nat. i. 1232.—*Turbo littoreus*. Penn. Brit. Zool. iv. 128. Pl. 81. f. 109.—*Turbo littoreus*. Flem. Brit. Anim. 298.—*Turbo littoreus*. Mont. Test. Brit. 301.—*Turbo littoreus*. Lamk. Syst. vii. 47.—*Littorina littorea*. Johnst. iii. 267.

## 2. *Littorina rudis*. Coarse Periwinkle.

Shell subovato-conical, thick; with the spire half the length of the last whorl, the apex acute; the whorls very convex, subangulate above, longitudinally striate, transversely rugoso-striate; the suture distinct and deeply impressed; the mouth oval, the peristome very thick, bevelled to a thin edge, the outer lip united at right angles; the exterior dusky, pale olive, dull yellowish-grey, yellow, or red; the interior purplish-black, reddish-purple, yellow, or red. Length eight-twelfths, breadth nearly seven-twelfths.

Animal with the head, tentacula, and collar blackish-brown; the foot yellowish-grey, elliptical, transversely rugous. In the red and yellow shells, the head and tentacula are brown, the foot and mantle white.

It varies considerably in form, the spire being shorter or longer; in thickness, being sometimes remarkably solid and ponderous, sometimes thin and light; in its striæ, which may be obsolete, moderately developed, or very conspicuous; in colour, individuals being dusky, or brown, or light red, or orange, or yellow, banded, or variegated. In almost all cases, however, it may be recognised by the somewhat angular rounding of the upper part of the last spiral turn. The strongly striate varieties have by some been considered as a distinct species, named by Montagu *Turbo jugosus*.

Abundant on all the rocky coasts, near high-water mark.

*Turbo rudis*. Mont. Test. Brit. 304.—*Turbo rudis*. Flem. Brit.

Anim. 298.—*Turbo rudis*. Lamk. Syst. vii. 49.—*Littorina rudis*. Johnst. Berw. Tr. 1835. 268.—*Turbo jugosus*. Mont. Test. Brit. 586.

### 3. *Littorina saxatilis*. *Rock Periwinkle*.

Shell subgloboso-conical, as broad as long, moderately thick; with the spire scarcely a third of the whole length, the apex obtuse; the whorls three, longitudinally striate, the suture distinct and deeply impressed, the last turn somewhat flattened above, and angulate toward its lower part; the mouth very large, roundish, the peristome thin, the outer lip united at right angles; the exterior white, banded or tessellated with dusky, brown, or green; the interior deep chocolate-brown, the margin white or yellow, unless on the callosity of the inner lip, where it is purplish-brown. Length four-twelfths of an inch, breadth nearly the same.

This species, very nearly allied to *Littorina rudis*, but apparently distinct, varies little in form, but considerably in the prominence of its spiral ridges, and greatly in colour.

It first attracted my notice, as plentiful among Balani, on a large block of gneiss, known as "the Black Deg," on the sands of Belhelvie, about three miles north of Don-Mouth. Abundant on the rocky coasts of Buchan and Kincardine, about high-water mark, in crevices and among Balani.

*Turbo saxatilis*. Bean.—*Littorina saxatilis*. Johnst. Berw. Tr. iii. 268.

### 4. *Littorina tenebrósa*. *Marsh Periwinkle*.

Shell subovato-conical, rather thin; with the spire as long as the last whorl, the apex acute; the whorls very convex, longitudinally striulate, transversely rugoso-striate; the suture distinct and deeply impressed; the mouth roundish-oval, the peristome thin, unless on the columella, the outer lip united at right angles; the exterior dusky, often banded or tessellated with lighter tints; the interior dark purplish-brown, the callosity of the inner lip deep purple. Length nine-twelfths of an inch, breadth from six to seven-twelfths.

Animal with the head, tentacula, and collar black; the foot greyish, elliptical, transversely rugous, with a medial depression, and crenate margins.

It varies in form, the last whorl being sometimes broader than the length of the spire, sometimes equal to it; in having distinct or obsolete longitudinal lines; and in colour, being plain, or banded, or tessellated. It is always distinguishable

from young individuals of *Littorina littorea* by its having the outline of the spire a little convex, the spiral turns more convex, the suture deeper, the junction of the upper edge of the last whorls coming off directly, and the outer lip consequently forming a right angle, whereas in *Littorina littorea* it forms a very acute angle, and by its inside being always of a deep purple-brown colour. But it approaches very closely to some of the varieties of *Littorina rudis*, of which, in fact, it is probably only a variety, individuals occurring which might with equal propriety be referred to either species. In its most characteristic state, it differs from that shell, in being much thinner, in having the spire longer, the whorls more convex, the last much rounded, and without the angular band usually seen on that of *Littorina rudis* above, and of *Littorina saxatilis* below.

First observed by me on an excursion with my class, on the 18th of July, 1841, in a small inlet or salt-marsh, near Newburgh, on the Estuary of the Ythan, where it resides among *Poa maritima* and *Salicornia herbacea*, near high-water mark, and creeps about on the clayey mud, along with *Rissoa Ulvæ*.

*Turbo tenebrosus*. Mont. Test. Brit. 303. Pl. 20. f. 3.—*Turbo tenebrosus*. Flem. Brit. Anim. 298.

##### 5. *Littorina petræa*. Smooth Periwinkle.

Shell globoso-conical, rather thin; with the spire shorter than the last whorl, the apex obtuse; the whorls very convex, transversely rugoso-striate, the suture distinct; the mouth roundish; the peristome thin, the outer lip united at a rather acute angle; the exterior glossy black, often banded or variegated with white; the interior dark purple. Length three-twelfths of an inch, breadth nearly the same.

Nearly allied to *Littorina saxatilis*, but distinguishable by its glossy surface, destitute of spiral striæ.

On the Kincardineshire coast at high-water mark. Among shell sand on the beaches from Aberdeen to Fraserburgh.

*Turbo petræus*. Dillw. Rec. Shells. 820.—*Helix petræa*. Mont. Test. Brit. 403.—*Turbo petræus*. Flem. Brit. Anim. 298.—*Littorina petræa*. Johnst. Berw. Trans. iii. 268.

##### 6. *Littorina Beanii*. Bean's Periwinkle.

Shell globoso-conical, obtuse, of three convex, rather thick turns, separated by a moderately deep suture; the last turn very large, somewhat glossy, faintly striated transversely, with hardly perceptible indications of longitudinal grooves, and

marked with alternate dark brown and white lines, presenting a tessellar appearance; the aperture roundish, or somewhat semicircular, with the margin thin, white spotted with brown, the interior dark purplish-brown. Height two-twelfths of an inch, breadth rather more.

This is so nearly allied to *Littorina saxatilis*, from which it differs only in not being so conical, in wanting the longitudinal ridges on the turns, and in being less angulate beneath, that I can hardly consider it distinct.

It occurs abundantly on many parts of the rocky coast, from Stonehaven to Peterhead, among Balani and in crevices, near high-water mark. On the stones of the Pier-head at Aberdeen, along with *Turbo saxatilis*.

Dr. Turton, in dedicating this species to Mr. Bean, playfully named it "fabalis;" but as this would lead one to suppose the shell to resemble a bean, and as Mr. Bean is not known abroad by the name of Faba, I have given the specific name the usual form.

*Turbo fabalis*. Turt. Zool. Journ. ii. 366. Pl. 12. f. 10.—*Turbo fabalis*. Flem. Brit. Anim. 298.

#### 7. *Littorina neritoïdes*. Flat-topped Periwinkle.

Shell subglobose, thick, with the spire depressed and rounded, the suture distinct, the last whorl extremely large, ventricose, longitudinally striulate, transversely striate; the mouth roundish-ovate, laterally dilated, the outer lip thinned at the margin, and forming an acute angle with the last whorl; the colour olivaceous brown, dusky, greenish, yellow, orange, plain, banded, or chequered; the inside dusky, purple, pink, yellow, or white. Length eight or nine-twelfths of an inch, breadth six or seven.

Very abundant on the rocky coasts, generally among fuci, between the tide-marks: Stonehaven, Aberdeen, Collieston, Peterhead, Gamrie, Banff, Portsoy.

*Turbo neritoïdes*. Linn. Syst. Nat. 1232.—*Nerita littoralis*. Linn. Syst. Nat. 1258.—*Nerita littoralis*. Penn. Brit. Zool. iv. 141. Pl. 87. f. 143; Ed. n. 346. Pl. 90. f. 3.—*Turbo retusus*. Lamk. Syst. vii. 48.—*Turbo neritoïdes*. Lamk. Syst. vii. 48.—*Nerita littoralis*. Flem. Brit. Anim. 318.—*Littorina neritoïdes*. Johnst. Berw. Trans. iii. 269.

#### GENUS 5. TURRITELLA.

Shell turrite, with the spire very elongated and tapering to a fine point, the whorls convex, longitudinally



striate, the last not proportionally larger; the aperture roundish, entire, the peristome incomplete behind, the outer lip very thin, and having a wide sinus, the pillar-lip thickened. The operculum roundish, horny.

Animal very elongated, spiral; head furnished with a fringed veil, and a proboscis; tentacula long, slender, bearing the eyes at their base externally; foot oblong.

### 1. *Turritella Terebra*. *Auger Turritella*.

Shell turrite, acuminate, with from fifteen to twenty moderately convex whorls, each with three longitudinal narrow ridges, several small raised lines, and curved transverse lines, the last whorl with an additional ridge, angulate, and flattened beneath; the aperture somewhat square; the colour whitish or reddish. Length two inches, breadth half an inch.

It varies somewhat in form, but more in colour, individuals being pure white, others light reddish, and some reddish-white with transverse red bands on the whorls.

In deep water off the coast; often brought up by the lines, and frequently cast on the beach: Stonehaven, Aberdeen, Peterhead, Banff, Macduff, Portsoy.

Turbo Terebra. Linn. Syst. Nat. i. 1239.—Turbo Terebra. Penn. Brit. Zool. iv. 130. Pl. 81. f. 113.—Turbo Terebra. Mont. Test. Brit. 293.—Turritella Terebra. Lamk. Syst. vii. 56.—Turritella Terebra. Flem. Brit. Anim. 302.

## GENUS 6. EULIMA.

Shell very elongated, turrite, regularly tapering, with the apex slender, mammilliform; the whorls numerous, generally flat, distinctly separated by the suture; the aperture subovate, with the anterior end rounded, the posterior acute; the peristome incomplete behind.

### 1. *Eulima elegantissima*. *Reticulated Eulima*.

Shell turriculate, very elongated, tapering; the turns separated by a narrow but rather deep suture, about twelve, flat, with transverse rounded ribs, and narrower intervening grooves, marked with about eight transverse deeply impressed lines; the ridges direct from the base to the apex; the last turn with its anterior half plain, but spirally striated; the aperture sub-

ovate, anteriorly rounded, subangulate, narrowed behind; the peristome rather thick, reflexed on the columella for a short space, leaving a slight groove. Length four-twelfths of an inch, breadth about a fourth of the length.

First found by Mr. Davidson in the Spring of 1842, adhering to an Actinia from deep water, off Aberdeen. Rather thick, dull white; said when recent to be glossy, with a brown epidermis.

*Turbo elegantissimus*. Mont. Test. Brit. 298. Pl. 10. f. 2.—*Turritella elegantissima*. Flem. Brit. Anim. 303.

### 2. *Eulima nitidissima*. *Round-whorled Eulima*.

Shell very elongated-turrite, tapering to a somewhat obtuse point, of about nine very convex, smooth, glossy turns, separated by a distinct suture; aperture subovate, with the outer lip thickened; the colour pale brown. Length an eighth of an inch, breadth a fourth of the height.

Found by Miss Macgillivray in shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Turbo nitidissimus*. Mont. Test. Brit. 299. Pl. 12. f. 1.—*Turritella nitidissima*. Flem. Brit. Anim. 304.

### 3. *Eulima polita*. *Polished Eulima*.

Shell very elongated-turrite, slender, tapering to a fine point; of about ten almost quite flat, smooth, semitransparent, exquisitely glossy turns; the suture scarcely perceptible; the aperture oblongo-acuminate, being very narrow behind, the outer lip slightly thickened, the inner reflexed; the colour white. Length three-twelfths of an inch, breadth a fourth of the length.

Found plentifully by Miss Macgillivray and myself, among shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842; one specimen curved.

*Helix polita*. Mont. Test. Brit. 398.—*Phasianella polita*. Flem. Brit. Anim. 301.—*Turbo politus*. Gmel. Linn. Syst. Nat. 3612.—*Turbo lævis*. Penn. Brit. Zool. iv. 130. Pl. 29. uppermost figure?—*Eulima polita*. Desh. Lamk. Syst. 2d. Ed. viii. 453.

### 4. *Eulima subulata*. *Banded Eulima*.

Shell very elongated-turrite, slender, tapering to a fine point; of about ten, flat, smooth, semitransparent, very glossy turns, which are very slightly concave toward the somewhat distinct but very slender suture; the aperture oblong, very

narrow behind, the outer lip thin, the inner reflexed; the colour whitish, each turn with two submarginal faint brown bands. Length five-twelfths of an inch, breadth a fourth of the height.

Very similar to *Eulima polita*, but larger, stronger, and proportionally broader at the base.

Not uncommon in shell sand, from Cruden Bay.

*Turbo subulatus*. DONOV. Brit. Sh. Pl. 162.—*Helix subulata*. MONT. Test. Brit. Suppl. 142.—*Phasianella subulata*. FLEM. Brit. Anim. 301.—*Eulima subulata*. DESH. Lamk. Syst. Ed. 2. viii. 455.

#### GENUS 7. LACUNA. TURTON.

Animal with the body elongated, spiral; mouth proboscoidiform, with two thick lips, and a spiral filiform tongue; two slender contractile tentacula, bearing the eyes on small pedicels near their base; foot oval, broader behind; operculum horny, spirally marked.

Shell ovato-conical, or subglobose, thin, with a delicate horny epidermis, the spire short, the whorls convex, rapidly enlarging, the last ventricose; the apex rather obtuse; the aperture oval or roundish, the peristome incomplete behind; the columella flattened, and forming within the peristome an elongated groove continued from the umbilicus.

Nearly allied to *Littorina* and *Phasianella*, this genus may at once be known by the groove from the umbilicus, bounded internally by the decurved margin of the pillar.

##### 1. *Lacuna vineta*. Variable *Lacuna*.

Shell ovato-conical, thin, semitransparent, with a delicate epidermis; the spire rather obtuse; the whorls five, well separated by the suture, moderately convex, glossy, obsoletely striate transversely, with minute undulate longitudinal striulæ; the mouth roundish-ovate; the outer lip united nearly at a right angle, very thin, the inner forming with the columella a large obsoletely striate canal continuous with the pillar-cavity; the colour various, generally whitish, or greenish-blue, with four reddish-brown or chestnut bands on the last whorl, two of them entering the mouth, two only appearing on the next turn, and the apical turns uniform brown, more glossy, and

without longitudinal striulæ, the pillar-groove white. Length five-twelfths of an inch, breadth three-twelfths.

It varies much in colour, and considerably in form, and thickness. Sometimes it is of a uniform yellowish-grey; rarely reddish-grey or rose-colour; often with one broad purplish-brown band, or with two broad brown, and two narrow white bands; or with three brown and four white bands. It has accordingly been made into several species by authors. "In all," as Dr. Johnston remarks, "the body whorl is obscurely angulated near the base, and at the suture, which is made more obvious by a whitish band winding up the spire."

According to the same accurate observer, "The snail is of a pale flesh-colour, the probosciform mouth reddish-orange, the sides, and sometimes the head, dusky or black; tentacula setaceous, contractile, the eyes on short pedicles at their base; foot oval, rounded at both ends, widest behind, the anterior end capable of being extended considerably beyond the head, the margins plain, but there are two very short filaments between the hinder part and operculum. It swims on the surface in a reversed position, and it frequently leaves the water to settle on the surface of fuci exposed to the atmosphere."

On Fuci, near low-water mark, on the Kincardineshire coast. On the Pier-head at Aberdeen. Abundantly on the sandy beach between the Dee and the Ythan; where it is often found alive on algæ; found also on the coast from Cruden to St. Fergus, by Mr. Alex. Murray.

The principal varieties that occur with us are:—

A. *L. variabilis quadrifasciata*, as described above.

Turbo quadrifasciatus and vinctus. Mont. Test. Brit. 308. Turbo quadrifasciatus. Flem. Brit. Anim. 299.—Lacuna quadrifasciata. Turt. Zool. Journ. iii. 192.—Lacuna vincta. Johnst. Berw. Trans. iii. 270.

B. *L. variabilis bifasciata*. *Two-banded*.

Shell broadly ovato-conical, of four rapidly enlarging convex, thin, pellucid whorls, which are faintly striated transversely, and obscurely marked with undulated longitudinal striulæ; the last turn very large, with two broad brown and two narrow white bands, of which the two upper appear on the next turn; the mouth round, with the peristome thin and white; a deep broad groove from the umbilicus margined by the slightly reflected columellar margin. Length two-twelfths of an inch,

breadth about a fourth less. Broader in proportion to its length than the last variety, and with the turns less convex.

Found by me, in August, 1842, among shell sand, on the beach, between the Dee and the Don; and in September on Algæ, alive.

*Phasianella bifasciata*. Brown, Illustr. Pl. 46. f. 44, 45.

C. *L. variabilis unicolor*. One-coloured.

Shell ovate, the last turn generally thick, sometimes thin, and of a reddish or yellowish-grey or brown tint.

Turbo canalis. Mont. Test. Brit. 309. Pl. 12. f. 11.

2. *Lacuna fasciata*. Banded Round Lacuna.

Shell subglobose, broader than long, with the spire depressed, of three very thin, transparent, rapidly enlarging volutions, which are glossy, faintly striated transversely, distinctly separated by a rather deep suture; the last turn extremely large, with four white and three reddish-brown bands, the middle brown band broader, and sometimes separated into two by a pale line; the mouth roundish, with the peristome thin and whitish; a deep and wide groove from the umbilicus, margined by the slightly reflexed columellar margin.

Very similar in texture and colouring to *Lacuna vincta* or *quadrifasciata*, but differing entirely in its form, which resembles that of *Helix aspersa*.

Adams, Linn. Trans. v. Pl. 1. f. 20, 21.—*Helix fasciata*. Mont. Test. Brit. 446.—*Phasianella fasciata*. Brown, Brit. Sh. Pl. 46. f. 54.

3. *Lacuna pallidula*. Pallid Lacuna.

Shell semiovato-globose, subconical, thin, subdiaphanous, of four whorls, with the spire very short, the suture distinct and having the margin of the turns sloping toward it, the last whorl disproportionately dilated, convex, smooth, glossy, somewhat striated transversely; the mouth roundish-ovate, the peristome thin, the inner lip extended somewhat in the manner of a *Nerita*, but forming behind a wide groove continuous with the large pillar-cavity; the colour yellowish-grey, olivaceous, or pale yellowish-brown, the columellar space white. Length two-twelfths and a-half, breadth three-twelfths.

This shell has a remarkably close resemblance to *Velutina striata* in its form.

Found by me, in August, 1842, on the sands at Aberdeen; in September by Mr. Alexander Murray, on the beach of St.

Fergus; and in October by me, in abundance on fuci on the rocky coast of Kincardineshire.

*Nerita pallidula*. Mont. Test. Brit. 468.—*Nerita pallidula*. Flem. Brit. Anim. 320.—*Lacuna pallidula*. Turton, Zool. Journ. iii. 190.—*Lacuna pallidula*. Johnst. Berw. Trans. iii. 270.

#### 4. *Lacuna sulcata*. Glossy *Lacuna*.

Shell subglobose, broader than long, rather thin, semitransparent, of three-and-a-half rapidly increasing, convex whorls; the spire very short, obtuse, the suture moderately distinct, the last whorl very large, glossy, smooth, but with oblique growth-lines at intervals; the mouth circular, when considered as bounded on the left by the ridge margining the broad concave striated pillar groove, or semicircular if the nearly straight margin of the columella be taken as its limit; the colour greyish-white, with a slight tinge of red near the outer lip. Diameter nearly a twelfth and a-half.

The specimen described is considerably worn, and damaged in the outer lip. It was found by me in shell sand, on the beach between the Dee and the Don. This species approaches to *Natica*, as much as the last to *Sigaretus* or *Velutina*.

*Nerita sulcata*. Turt. Conch. Dict. 124. f. 56, 57.—*Natica sulcata*. Flem. Brit. Anim. 320.—*Nerita glabrissimus!* Brown, Wern. Mem. ii. 532. Pl. 24. f. 12.

### GENUS 8. RISSOA.

Animal elongated, spiral; with the head probosciform, the mouth somewhat prolonged; the tentacula subulate, with the eyes on a small prominence near their base externally; the foot oval or elliptical.

Shell conical, with the spire elongated, the apex mammilliform; the whorls generally convex, the suture distinct; the aperture roundish, ovate, or pyriform, with the anterior end rounded, the posterior acute, the peristome complete. Operculum roundish, oval or pyriform, spirally marked, thin and horny.

The species are all diminutive, the largest of those occurring on our coasts not exceeding a third of an inch in length, and the smallest being scarcely a twenty-fourth. They are phytophagous, and reside among fuci, in clefts of rocks, on stones, or on mud or sand;

and in their habits resemble the Littorinæ. Most of them may be found on the sandy beaches, along the line of the last tide, or among shell sand.

Rissoa is closely allied to Littorina, Melania, Phasianella, Eulima, Odostomia, and several other genera. The genus, as M. Deshayes remarks, was first "instituted by M. de Freminville for some small shells observed by M. Risso, a distinguished naturalist of Nice, and described in 1814 by M. Desmarest in the New Bulletin of the Philomathic Society." Dr. Fleming, in 1828, proposed the genus Cingula for the same shells, in his History of British Animals. In the second edition of Lamarck, M. Deshayes defines the genus and describes forty-four species. But in these works there are placed in the genus some species which do not belong to it, while some of its proper species are referred to other genera. Those admitted here will, I think, be found to agree with the above generic character.

### 1. *Rissoa ulvæ*. Salt-Marsh Rissoa.

Shell oblongo-turrite, rather thick, opaque, somewhat corneous; the spire elongated, tapering to a small but bluntish point; the whorls seven, flattened, transversely obscurely rugoso-striate; the last turn always more or less angulate; the suture distinct; the aperture ovate, acute behind, the peristome thin, slightly reflected on the columellar side, leaving a narrowed space between it and the whorl, and but partially concealing the umbilicus; the exterior brown, olivaceous, or yellowish, often crusted or corroded; the interior whitish. Length four-twelfths of an inch, breadth a twelfth and a-half.

Animal with the head, tentacula, and collar black; the mouth probosciform; the tentacula tapering, with the eyes near their base externally; the foot subelliptical, yellowish-grey.

In great profusion, along with *Littorina tenebrosa*, in a small salt-marsh, near Newburgh, on the Estuary of the Ythan, where I first met with it in July, 1841.

Turbo *ulvæ*. Mont. Test. Brit. 318.—*Cingula ulvæ*. Flem. Brit. Anim. 308.—*Littorina ulvæ*. Johust. Berw. Trans. iii. 270.

There is confusion among the references to this species even in the most recent works. The species above described is very certainly that of Montagu and Fleming; but *Paludina muriatica* of Lamarck, and *Cyclostoma acutum* of Draparnaud, as well as *Turbo ulvæ* of Pennant, refer to quite a different animal.

### 2. *Rissoa muriatica*. Horn-coloured *Rissoa*.

Shell oblongo-turrite, rather thin, transparent, somewhat corneous; the spire elongated, tapering to a small but bluntish point; the whorls six, slightly convex, obscurely striated transversely, the last turn rounded, without an angle; the aperture ovate, acute behind, the peristome thin, considerably reflected on the columellar side, leaving a slight fissure, but concealing the umbilicus; the colour pale yellowish or greenish-grey. Length about two-twelfths and a-half, breadth less than half the length.

Several specimens found by me and my daughter Anne, in August, 1842, on the sands between the Dee and the Don. I have not however met with it alive in the district.

*Turbo ulvæ*. Penn. Brit. Zool.—*Cyclostoma acutum*. Drap. Moll. Terr. et. Fluv. 40. Pl. 1. f. 23.—*Paludina muriatica*. Lamk. Syst. vi. 2, 175; Ed. 2. viii. 463.—*Paludina acuta*. Flem. Brit. Anim. 315.

### 3. *Rissoa ventricosa*. *Ventricose Rissoa*.

Shell ovato-turrite, of five or six thin, pellucid, glossy, convex volutions, which are distinctly separated, and slightly rugoso-striate; the aperture more than a third of the whole length, roundish-ovate, little narrowed behind, with the peristome thin, the outer lip semicircular, the inner raised, slightly reflexed, with an umbilical groove; the colour light yellowish-brown. Length two-twelfths of an inch, breadth nearly half the height.

Somewhat resembling *Rissoa ulvæ* at first sight, but easily distinguishable by its thinness, semitransparency, and rounded volutions.

Found by me, in June, 1842, among shell sand, on the beach, near Don-Mouth.

*Turbo ventrosus*. Mont. Test. Brit. 317. Pl. 12. f. 13.—*Cingula ventricosa*. Flem. Brit. Anim. 307.—*Pyramis ventrosus*. Brown, Illustr. Pl. 51. f. 27, 59.



6. *Rissoa parva*. *Thick-lipped Ribbed Rissoa*.

Shell ovato-turrite, rather thick, nearly opaque, glossy; the spire nearly half as long again as the last turn, directly tapering, rather obtuse; the whorls six, rounded, with strong, convex, slightly waved, transverse ribs, but without spiral striæ; the ribs of the last whorl ten or twelve, not reaching the mouth; the suture distinct, the aperture roundish-ovate, the outer lip thickened externally by a broad convex rib, the inner a little reflexed, and leaving a groove behind, but no perforation; the colour white, tinged with red, or reddish with the ribs white. Length an eighth of an inch, breadth nearly half the length.

It varies in colour, number, and extent of the ribs.

Among shell sand on the beach between the Dee and the Don; also in Cruden Bay, at Fraserburgh, and Gamrie.

Turbo parvus. Mont. Test. Brit. 310.—*Rissoa parva*. Johnst. Berw. Trans. iii. 272.—*Cingula parva*. Flem. Brit. Anim. 306.—Turbo quinque anfractibus subcarinatis, apice purpureo, apertura ovali. Walker, Test. Min. Rar. 12. Pl. 2. f. 43.

5. *Rissoa alba*. *Thin-lipped Ribbed Rissoa*.

Shell ovato-turrite, rather thin, semitransparent, glossy; the spire nearly half as long again as the last turn, directly tapering, rather obtuse; the whorls six, rounded, with convex, slightly waved transverse short ribs, those of the last whorl from twelve to sixteen, not extending beyond the middle; the suture very distinct; the aperture roundish, the outer lip thin, the inner a little reflexed, and leaving a slight groove; the colour white, reddish, or pale brown, sometimes with brown bands. Length an eighth of an inch, breadth less than half the height.

Nearly allied to *Rissoa parva*. It varies greatly in the extent and number of the ribs.

Among sand and shells sent by Mr. Alexander Murray from Fraserburgh, Cruden, and Ugie, in 1842; also on the beach at Aberdeen.

Turbo albus. Adams, Linn. Trans. iii. 66. Pl. 15. f. 17, 18.—*Rissoa alba*. Forbes, Mal. Mon. 16—*Cingula alba*. Flem. Brit. Anim. 309.

6. *Rissoa semistriata*. *Semistriated Rissoa*.

Shell ovato-conical, pellucid, spirally striated, glossy; the spire shorter than the last turn, directly tapering to a rather obtuse point; the whorls five, rather convex, the last sulcated-striated anteriorly; the suture distinct; the aperture roundish-

ovate, the outer lip thin; the colour white, with two rows of red spots on the whorls, and a third on the last, or the spots of the two anterior rows of the last whorl united into one band. Length an eighth of an inch, breadth rather more than half the length.

Distinguished from *Rissoa interrupta* by its broader form, spiral striæ, and more convex whorls.

Found by me among shell sand between the Dee and the Don.

*Turbo semistriatus*. Mont. Test. Brit. Suppl. 136.—*Cingula semistriata*. Flem. Brit. Anim. 309.—*Rissoa semistriata*. Johnst. Berw. Tr. iii. 271.

### 7. *Rissoa interrupta*. *Spot-banded Rissoa*.

Shell ovato-conical, pellucid, smooth, glossy; the spire a little shorter than the last turn, directly tapering to an obtuse point; the whorls five flattish, the suture distinct; the aperture roundish or very broadly ovate, the outer lip rather thin; the colour white, with the apex purplish, a spiral series of reddish-brown oblong spots near the upper margin of each whorl, and a band on the last. Length one-eighth of an inch, breadth half the length.

It varies in colour, being sometimes brown with a white spiral band.

Common on the rocky coasts between tide-marks. Frequent among shell sand between the Dee and the Don; also in Cruden Bay.

*Turbo interruptus*. Mont. Test. Brit. 329. Pl. 20. f. 8.—*Cingula interrupta*. Flem. Brit. Anim. 271.—*Rissoa interrupta*. Johnst. Berw. Tr. iii. 271.

### 8. *Rissoa reticulata*. *Reticulated Rissoa*.

Shell ovato-turrite, rather thick, pellucid, white; of five rounded volutions, strongly reticulated with numerous longitudinal and transverse ridges, the last turn with only spiral ridges anteriorly; the suture distinct; the aperture roundish, the outer lip thickened externally by a convex reticulated rib, the inner reflexed on the columella, leaving a small groove behind. Length nearly a twelfth of an inch, breadth rather more than half the length.

When long dead the shell is thicker, opaque, and brownish or dull white; or, among sand, thinner, more transparent, and hyaline-white. I have seen it transparent, yellowish, with the spiral ridges brown.

First found by Miss Isabella Macgillivray, in October, 1842,

among corallines from rather deep water off Aberdeen; afterwards by Mr. Alexander Murray at Fraserburgh.

*Turbo reticulatus*. Mont. Test. Brit. 322. Suppl. Pl. 21. f. 1.  
—*Cingula reticulata*. Flem. Brit. Anim. 306.—*Turbo subumbilicatus* quatuor anfractibus reticulatus apertura subrotunda. Walker, Test. Min. Rar. Pl. 2. f. 32.

### 9. *Rissoa Pállus*. *Oval Banded Rissoa*.

Shell ovato-turrite, of five thin, semitransparent, glossy, slightly convex turns; the last about as long as the spire; the suture deep; the aperture ovato-rotundate, rather acute behind; the outer lip scarcely thickened, the peristome complete, a little reflexed on the left side, without umbilicus, but with a small groove; the colour yellowish-white, the last turn with a band of oblique elongated red spots toward the upper margin, and two bands of the same toward the end. "Operculum remarkably strong, thick, testaceous, very convex, white and smooth externally, the inner part a little concave, with a small and singular spiral groove near one end." Mont. Length a twelfth and a-half of an inch, breadth nearly half the length.

It varies greatly in its markings, being pale red with dark lines, or deep red spotted with white.

Among shell sand from Stonehaven, Aberdeen, and Cruden.

*Turbo pullus*. Linn. Syst. Nat. 1233.—*Turbo pullus*. Mont. Test. Brit. 319.—*Cingula pullus*. Flem. Brit. Anim. 308.

### 10. *Rissoa tristriata*. *Tristriated Rissoa*.

Shell broadly ovato-conical, of five thin, glossy, semitransparent, moderately convex turns, the last ventricose, and longer than the spire, of which the outline is convex, and the tip rather obtuse; the suture moderately impressed, but rendered conspicuous by a narrow rim bordering the turns behind, and accompanied by two smaller raised lines, and three striæ; the colour hyaline-whitish, with three series of square or rhombic red spots on the last turn; the aperture large, roundish-ovate, nearly half the entire length; the peristome thin, incomplete behind. Length a twelfth of an inch, or more.

This beautiful species scarcely belongs to the genus *Rissoa*, it not having the peristome complete.

Several specimens found by me in shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Rissoa tristriata*. Thompson, Ann. of Nat. Hist. v. Pl. 2. f. 10.

11. *Rissoa truncata*. *Blunt Rissoa*.

Shell oblong, subturrite, slowly tapering, but with an abruptly rounded tip; of five turns, which are transversely striato-sulcate, longitudinally striulate, flattened, but separated by a deeply impressed suture; the aperture ovate, with the inner margin reflexed; the colour greyish-white. Length two-twelfths of an inch, breadth about a third of the length.

Found by Miss Marion Macgillivray among shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Turbo truncatus*. Mont. Test. Brit. 300. Pl. 10. f. 7.—*Turritella truncata*. Flem. Brit. Anim. 303.—*Truncatella costulata*. Risso, Europ. Merid. iv. 125. Pl. 4. f. 57.

12. *Rissoa striata*. *Striated Rissoa*.

Shell oblongo-turrite, subcylindrical, rather thick, opaque, glossy; the spire about half as long again as the last turn, convexly tapering, rather obtuse; the whorls six, rounded, spirally striate, with obsolete ribs at their upper margin, and separated by a deep suture; the aperture ovate, rather acute behind, the outer lip considerably thickened, the inner thin; the colour of the exterior pale brown, reddish or yellowish-brown, often with two reddish irregular bands on the last turn; the mouth brownish-purple; the peristome white. Length an eighth of an inch, breadth a third of the length.

Abundant on the rocky coasts. Plentiful in shell sand, on all the beaches, where it is white, and when the reddish bands are present, they are often then more conspicuous. Found also among corallines from deep water off Aberdeen, by Miss Macgillivray.

*Turbo striatus*. Adams, Linn. Trans. iii. 66. Pl. 13. f. 25, 26.—*Turbo sex anfractibus reticulatis apertura ovali submarginata*. Walker, Test. Min. Rar. Pl. 2. f. 49.—*Turbo striatus*. Mont. Test. Brit. 312.—*Cingula striata*. Flem. Brit. Anim. 307.—*Rissoa striata*. Johnst. Berw. Trans. iii. 271.

13. *Rissoa gracilis*. *Slender Rissoa*.

Shell turrite, subcylindrical, of six thin, pellucid, glossy, moderately convex turns, distinctly separated by the rather deep suture; the mouth about a fourth of the whole length, ovate, oblique, a little narrowed behind, with the peristome complete, thickened externally on the outer lip, thinner and

direct on the inner, leaving a very small cavity; the colour hyaline-white, the last turn brownish-red around the mouth. Length a twelfth and a fourth, breadth a fourth of the height.

This shell is nearly allied to *Rissoa rubra*, which however differs in being less attenuated, with the mouth rounder. It resembles *Rissoa striata* in form, but is much more elongated, and, being destitute of markings, cannot be mistaken for that species.

Found, in August, 1842, by Miss Anne Macgillivray, in shell sand on the beach between the mouths of the Dee and the Don.

#### FAMILY IV.—TORNATELLINA.

Shell spiral, ovate, oblong, or turrite, with the aperture oblique, ovate, oblong, or narrow, entire anteriorly, narrowed behind by the convexity of the last volution, the inner lip ending in an oblique plait on the columella.

The structure of the animals of this group seems to be little known; but any shell belonging to it may be at once known by comparing it with the above definition.

#### GENUS 1. ODOSTOMIA.

Shell ovato-conical, with the apex rather obtuse or mammillate, the aperture suboval, with the peristome incomplete behind, and having a tooth-like plait on the columella.

This genus, instituted by Dr. Fleming, who named it by its most prominent character (*οδους*, a tooth, and *σωμα*, mouth), closely resembles *Rissoa*, and is composed of similarly minute shells, which are to be looked for on the sandy shores. Montagu, in describing *Turbo spiralis*, observes, “the pillar-lip turns inward and forms an apparent small denticle, which in fact is a plication or ridge, that runs spirally some way up the columella; a character in this and the three following species (*Turbines interstinctus*, *unidentatus*, and *plicatus*), not subject to vary like the denticulations in some other shells, but is the constant formation of the *Columella*, occasioned by the intortion of the pillar lip, as in the *Voluta tornatilis*; to which genus they become a sort of link.”

1. *Odostómia unidentáta*. *One-toothed Odostomia*.

Shell ovate, of four or five moderately convex, rather thick, glossy turns, distinctly separated by the suture; the last turn ventricose, longer than the spire; the mouth ovate, acute behind, with the outer lip thin, the inner reflexed, and terminating in a thick tooth-like plait on the columella; the umbilicus small; the colour white. Length two-thirds of a twelfth, breadth half the length.

Found by me and Miss Anne Macgillivray, in August, 1842, among shell sand, on the beach, between the mouths of the Dee and the Don; Cruden Bay, Mr. Murray.

*Turbo unidentatus*. Mont. Test. Brit. 324.—*Jaminia unidentata*. Brown, Pl. 50. f. 34, 35.

2. *Odostómia plicáta*. *Oblong Odostomia*.

Shell ovato-oblong, subturrite, of five or six thin, glossy, transversely plicato-striate turns, which are distinctly separated, rather flat, but convex toward the suture; the mouth ovate, rather narrow, less than half the whole length, with the outer lip slightly thickened, the inner reflexed and ending in a distinct plait, expanded over the narrow umbilicus, from which proceeds a groove; the colour hyaline-white. Length rather more than a twelfth of an inch, breadth less than half the length.

Resembles *Odostomia interstincta*, but differs in being longer, in having the pillar-lip reflexed, and the tooth-like plait large.

Found by me, in August, 1842, in shell sand, between the mouths of the Dee and the Don; Cruden Bay, Mr. Murray.

*Odostomia plicata*. Flem. Brit. Anim. 310.—*Turbo plicatus*. Mont. Test. Brit. 37. Pl. 21. f. 2.

3. *Odostómia scaláris*. *Scalar Odostomia*.

Shell ovato-conical, of five thin, transparent, glossy, faintly striated, moderately convex turns, which are distinctly separated by the spirato-canaliculate suture, toward which the upper margin is suddenly inflexed; the mouth ovate, nearly half the whole length, with the peristome thin, the columellar lip rather inflexed, and terminating in a prominent plait on the columella; no umbilicus; the colour hyaline-white. Length two-thirds of a twelfth, breadth half the height.

This species differs from all the others in having the pillar-lip *inflexed*, in wanting the umbilicus, and in the subscalar form of its spire.

Found by me, in August, 1842, among shell sand, between the mouths of the Dee and the Don.

4. *Odostómia interstincta*. *Oval Ribbed Odostomia*.

Shell ovato-conical, of five thin, transparent, glossy turns, which are distinctly separated, rather flat, finely plicato-costate transversely; the mouth ovate, nearly half the whole length, with the peristome rather thick, the pillar-lip not reflexed, but ending in a very small tooth-like plait, and leaving exposed a very narrow umbilical groove, the colour hyaline-white. Length three-fourths of a twelfth, breadth about half the height.

Easily distinguished from *Odostomia spiralis* by its more ovate form, and its want of spiral striæ.

Found by me, in August, 1842, in shell sand, between the mouths of the Dee and the Don.

Montagu's figure of this species is too elongated, and that of *Odostomia spiralis* too short.

*Turbo interstinctus*. Mont. Test. Brit. 324. Pl. 12. f. 10.—*Odostomia interstincta*. Flem. Brit. Anim. 310.

5. *Odostómia spirális*. *Spiral Odostomia*.

Shell ovato-conical, of five thin, transparent, glossy turns, which are distinctly separated, nearly flat, finely ribbed transversely, the last turn spirally striated in its anterior half, the uppermost pair of striæ deeper and running along the spiral suture, which thus appears ridged; the mouth widely ovate, a third of the whole length, with the peristome of uniform thickness, the pillar-lip not reflected, but ending in a small tooth-like plait, and leaving exposed the narrow umbilicus, from which a groove proceeds; the colour hyaline-white. Length one-twelfth of an inch, breadth nearly half the height.

Found by me, in August, 1842, in shell sand, between the mouths of the Dee and the Don; and, in September, alive from deep water off Aberdeen.

*Turbo spiralis*. Mont. Test. Brit. 323. Pl. 12. f. 9.—*Odostomia spiralis*. Flem. Brit. Anim. 310.—*Turbo longitudinaliter striatus quinque anfractibus, apertura subrotunda*. Walker, Test. Min. Rar. Pl. 2. f. 46.

6. *Odostómia semicostáta*. *Half-ribbed Odostomia*.

Shell ovato-conical, of five thin, transparent, glossy turns, which are distinctly separated, rounded, with obsolete longitudinal striulæ, and distant, delicate, transverse ribs, on the

upper half of the last turn, which is ventricose on the right side; the aperture roundish-oval, obtuse behind, nearly half the whole length, with the peristome of uniform thickness, incomplete for a short space above, a little reflexed over the umbilicus, and terminating in an inflexed fold, not rising so prominently as to form a tooth, and leaving a groove from the umbilicus. Length half a twelfth, breadth more than half the length.

This species, although destitute of a tooth, has the general conformation of the genus. The peristome not being complete, it cannot be referred to *Rissoa*. It closely resembles *Odostomia spiralis*, but differs, as Montagu has remarked, in the volutions being more rounded, in the ribs being coarse, and in being destitute of the tooth-like plication on the columella. The mouth is large, the spiral striæ not forming a ridge along the suture.

Found by me, in September, 1842, among shell sand, on the beach, between the mouths of the Dee and the Don.

*Turbo semicostatus*. Mont. Test. Brit. 326. Pl. 1. f. 5.—*Pyramis semicostatus*. Brown, Brit. Sh. Pl. 50. f. 1, 2.—*Cingilla semicostata*. Flem. Brit. Anim. 307.

#### 7. *Odostomia plicátula*. *Plicatulate Odostomia*.

Shell ovato-conical, of five rather thick, opaque, glossy turns, which are distinctly separated by a deep suture, flat, finely plicato-striate transversely, the last turn with the plicæ ending about the middle, and succeeded by three or four spiral striæ, the terminal part of the turn plain; the mouth ovate, subangulate anteriorly, acute behind, less than half the whole length, with the peristome rather thin; a very slight plait on the columella; no umbilicus or groove. Length nearly half a twelfth, breadth about half the height.

Similar in form to *Odostomia interstincta*, but differing in having the turns more flattened, the plicæ more numerous, the columellar plait smaller, and in having the spiral striæ on the last turn.

Found by me, in September, 1842, among shell sand, on the beach, near the Broadhill.

#### 8. *Odostomia Marionæ*. *Marion's Odostomia*.

Shell ovato-conical, of five convex, thin, transparent, rather glossy turns, which are finely plicate transversely, and delicately striate spirally, the upper margin of each in the form of a plaited rib; the mouth ovate, nearly half the whole length, with



the peristome slightly thickened, not reflexed on the pillar, but ending in a very slight plait behind the umbilicus, which is very small; the colour hyaline-white. Length half a twelfth of an inch, breadth half the length.

The peculiar markings of this species render it one of the most easily recognized of the genus. The tooth is so little apparent that, were not the peristome incomplete for a short space, it might be referred to the genus *Rissoa*, to which it forms the transition. I have named it after one of my daughters, Marion, who has greatly aided me in collecting the Mollusca of the district, and evinced the greatest pleasure in finding anything that could be useful to me.

Found by me, in August, 1842, in shell sand, between the mouths of the Dee and the Don.

9. *Odostómia Annæ*. *Anne's Odostomia*.

Shell oblongo-turrite, of five, rather thick, opaque, glossy turns, destitute of markings, and separated by a not deeply-impressed line; the last turn convex and proportionally large, the rest flattened; the mouth ovate, nearly a third of the whole length, with the peristome thin, its columellar portion rather inflexed, and terminating in a small plait on the columella, opposite the slight umbilicus; the colour pure white. Length half a twelfth of an inch, breadth a third of the length.

Found, in August, 1842, by me and my daughter Anne, after whom I have named it, her conchilegal propensity having often been indulged in my behalf.

This species is easily distinguished from all the rest by its peculiar form.

10. *Odostómia oblónga*. *Oblong Odostomia*.

Shell oblong, subcylindrical, very slowly tapering, and ending in an obtuse point; of five flattened turns, of which the upper three are smooth, the rest transversely marked with numerous fine ribs; the suture deeply-impressed; the aperture a fourth of the whole length, ovate, with the peristome ending about the middle of the inner side in a prominent plait running into the interior. Length scarcely half a twelfth, breadth a third of the length.

Very similar in form and markings to *Rissoa truncata*; but not a third of the size, and having the essential character of an *Odostomia*.

Found by me among shell sand from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

## GENUS 2. TORNATELLA.

Shell ovato-conical, subcylindrical, spirate, longitudinally striate; the spire short, pointed; the aperture oblong, very narrow behind, entire before, with the peristome incomplete behind, the outer lip thin, the columella with a strong obtuse plait at the base.

The transition from *Odostomia* to *Tornatella* is obvious, although authors place these genera at very great distances, and even in different families or orders.

1. *Tornatella tornatilis*. *Two-banded Tornatella*.

Shell ovato-conical, subcylindrical, of moderate thickness, glossy; with the spire convex, tapering to a small point; the turns little convex, longitudinally striate, transversely striulate, and slightly marked with growth-lines; the last whorl twice as broad as the length of the spire; more deeply striate anteriorly; and towards the suture, the anterior striæ minutely crenulate; the suture distinct, the edge of the whorls being abruptly involute; the aperture narrow-oblong, much narrowed behind by the convexity of the last turn, the outer lip very thin, the columella with an obscure prominent plait; the colour pale-reddish, with two longitudinal bands of white on the last whorl, each band margined with two reddish-purple lines. Length ten twelfths of an inch, breadth nearly half an inch.

Not uncommon in deep water off Aberdeen and Peterhead; frequently brought up by the lines, but seldom alive, and sometimes found on the beaches.

*Voluta Tornatilis*. Linn. Syst. Nat. i. 1187.—*Voluta Tornatilis*. Penn. Brit. Zool. iv. 117.—*Voluta Tornatilis*. Mont. Test. Brit. 231.—*Tornatella fasciata*. Lamk. Syst. vi. 2. 220.—*Tornatella Tornatilis*. Flem. Brit. Anim. 336.—*Speo bifasciatus*. Risso. Eur. Merid. iv. 236. Pl. viii. f. 107.

2. *Tornatella pellúcida*. *Pellucid Tornatella*.

Shell ovato-conical, subfusiform, very thin, transparent, glossy; with the spire having a straight outline, and tapering to a small point; the turns little convex, longitudinally striate, transversely striulate; the last whorl nearly twice as broad as the length of the spire, more deeply striate anteriorly and toward the suture, where there are two punctulate impressed lines, the anterior striæ minutely crenulate; the suture distinct,

the edge of the whorls simply incurved; the aperture narrow-oblong, much narrowed behind by the convexity of the last turn, the outer lip extremely thin, the columella with an obscure obtuse plait; the colour hyaline-white, with two very faint reddish bands on the last whorl. Length two-and-a-half twelfths, breadth one-and-a-half twelfths.

The above description from a specimen from the Bay of Aberdeen, found by me in a fish-basket, in the middle of October, 1842.

It closely resembles a young *Tornatella fasciata* of the same size, but differs in having the spire longer and more pointed, in wanting the channel in the suture formed by the involution of the spiral turns, in having two impressed lines near the posterior margin of the turns, and in being differently coloured. The three reddish bands however are analogous to the reddish spaces between the white bands in *Tornatella fasciata*.

Risso's account of *Speo tornatilis* does not agree with the present species; but his notices are very frequently incorrect, and his description of *Speo bifasciata*, which is *Voluta Tornatilis* of Linnæus, is very imperfect.

The transition from this species to the genus *Odostomia* is almost direct.

### 3. *Tornatella pusilla*. Diminutive *Tornatella*.

Shell ovato-conical, subfusiform, very thin, transparent, glossy, with the spire tapering to an obtuse point; the turns four, little convex, the last turn about thrice as broad as the length of the spire, marked with longitudinal punctulate striæ, which are stronger at the anterior part, obsolete and distant on the upper two-thirds, crowded toward the suture, which is distinct; the aperture narrow-oblong, much narrowed behind by the convexity of the last turn, the outer lip extremely thin, the columella with an inconspicuous oblique obtuse plait or nodosity terminating the inner lip; the colour hyaline-white. Length one-twelfth of an inch, breadth half the length.

This species has the spire shorter than the two preceding, and is narrower than *Tornatella pellucida*. It seems to agree in most respects with Turton's *Voluta fusiformis*, but differs in being only a third of the size, and spirally striate.

*Voluta fusiformis*. Turt. Conch. Dict.—*Acteon fusiformis*. Flem. Brit. Anim. 337?

Many specimens of *Tornatella fasciata* are equally or more

fusiform, and whether the species may have been described or not, it is clearly a Tornatella.

#### FAMILY V.—SIGARETINA:

Animal with the body oval, convex, slightly spiral, and covered with a shell; head with a frontal veil; tentacula large, conical; eyes at the outer side of their base; orifice of the branchial cavity an oblique slit, without tube; two unequal pectinated branchiæ; the mantle with an anterior thin margin; the orifice of the generative organs near the base of the right tentaculum; the foot oval or roundish, very large and thick.

Shell oval or roundish, external or internal, much depressed, with a small spire, its aperture very large, without columella.

#### GENUS I. VELUTINA.

Animal oval, convex above, little spiral; with the head broad, depressed; two large tapering tentacula; eyes sessile at the base of the tentacula externally; mouth with a short tube; the mantle double toward the margin; the foot very large, oval. No operculum.

Shell ovate or roundish, convex, with a diminutive spire; the aperture extremely large, round or ovate, entire, the margin thin, almost continuous; no umbilicus; the surface covered with epidermis.

##### 1. *Velutina striata*. *Striated Velutina*.

Shell roundish-ovate, very thin, brittle, transparent, whitish or pinkish, longitudinally striate, invested with an olivaceous or greyish-yellow epidermis, covered with transverse lamellæ in shreds or minute points, so as to present a villous appearance; spire extremely small, the last turn excessively dilated toward the margin; aperture roundish-ovate, with the edges reflexed and almost continuous, the inside purple or whitish. Length about eight-twelfths of an inch, breadth nearly the same.

Animal with two short, tapering, obtuse tentacula, bearing the eyes on a lobe at their base externally; foot elliptical, of moderate size; margin of the mantle plain.

Not uncommon off the coast, in deep water.

This shell having been erroneously referred to *Helix lævigata* of Linnæus, characterized as "lævissima" and "magnitudine pisi," I offer no apology for giving it a specific name consistent with truth.

The impropriety of converting specific into generic names is very apparent in this genus, in which *Velutina* is applicable to one of the species only.

*Helix lævigata*. Mont. Test. Brit. 382.—*Velutina lævigata*. Flem. Brit. Anim. 326.—*Velutina lævigata*. Johnst. B. Tr. iii. 275.

## GENUS 2. CORIOCELLA.

Animal with the body elliptical, much depressed, having the borders of the mantle very thin, notched in front, and spreading out widely all round; the foot oval, very small; the head scarcely distinct; two tentacula concealed under the shield, rather thick, short, contractile; the eyes at the base of the tentacula externally.

Shell extremely thin, membranous in part, concealed in the mantle, ear-shaped, with a small spiral turn at the apex.

### 1. *Coriocella flexilis*. *Flexible Coriocella*.

Shell ear-shaped, membranous, flexible; being formed of a layer of epidermic substance, transversely lamelloso-striate, and of a pale olivaceous colour, with an extremely thin glossy opaque, white layer of calcareous matter, along the inner lip and spire. It may further be described as oval-oblong, with the aperture extremely large and oval, the inner lip thin but obtuse, the outer very thin and edged, the apex convoluted into a single turn, the upper surface convex, the interior glossy. Length half an inch, breadth four-and-a-half twelfths.

A shell, without the animal, found by me, at Aberdeen, in the Winter of 1841; another, by Mr. Alexander Murray, on the Buchan coast, in September, 1842.

*Bulla flexilis*. Laskey, Wern. Mem. i. 396. Pl. 8. f. 6.—*Bulla flexilis*. Mont. Test. Brit. Suppl. 168.—*Sigaretus flexilis*. Brown, Illustr. Pl. 44. f. 3, 4.—*Bulla flexilis*. Flem. Brit. Anim. 294.

## SECTION II.—SIPHONATA.

*Branchial aperture with a tube formed by the edge of the mantle, and occupying a canal or notch in the shell.*

## FAMILY I.—BUCCININA.

Animal with the body elongated, spiral, and covered with a shell; the head with two conical depressed tentacula, which bear the eyes on a lobe or prominence at their base externally; the mouth furnished with a long cylindrical annulated proboscis, and a small tongue; the mantle forming a thin-edged flap over the branchial cavity, and on the left side an elongated open canal, which emerges by a notch or groove in the shell; branchiæ two, elongated, unequal, pectinate; foot large, generally broad; a horny operculum.

Shell various, generally elongated, spiral; its aperture with a notch or very short canal at its anterior part.

Most of the species are marine, and feed on animal substances.

## GENUS I. BUCCINUM. BUCCINE OR WHELK.

Animal elongated; the body spiral; with two tapering depressed tentacula, on a lobe at the base of each of which externally is a very small eye; the proboscis long, cylindrical; the foot large, subelliptical; the operculum ovate, concentrically striate, thin, horny.

Shell ovate, elongated; the spire moderate, pointed; the aperture oval or oblong, with a deep notch anteriorly; the columella plain or callous; the outer lip plain.

Most of the species are marine. The proboscis being armed with minute teeth, and the tongue beset with prominences like a rasp, they have the power of perforating shells of mollusca and crustacea, their food consisting of animal substances.

1. *Buccinum undatum*. *Waved Buccine*.

Shell ovato-conical, thick; with the spire tapering to a fine point, the turns convex, longitudinally striate and sulcate, obliquely undulated with convex curved ribs, and transversely

striate; the last whorl rather broader than the length of the spire; the suture distinct; the mouth ovato-oblong, with the outer lip rather thin, but sometimes thickened, the notch distinct, the columella with an oblique indistinct groove; the colour whitish, pale red, or brownish-red; the epidermis more or less villous, yellowish-grey or brownish; the inside white, tinged with red or yellow. Length from four to five inches, breadth from two to two-and-a-half.

Animal elongated, spiral; with the head anteriorly depressed, with two tapering flattened contractile tentacula, each having a lobe at the base externally, bearing a very small black eye; in the mouth an exsertile, cylindrical proboscis, about an inch long, containing a long filiform bright red lingual mass, the foot large, oval-oblong, marginate; the operculum of an irregular oval shape, concentrically striate; the penis very large, about two inches long, flattened, subclavate, obliquely striate, with a papillar prominence on the left side near the end; anterior part of the mantle membranous, a little thickened at the margin; the siphonal canal short, and emarginate; the branchiæ long, unequal, striate; the muscle of adhesion large, flattened. The general colour is yellowish-white, the tentacula yellow, the margin of the mantle reddish or yellow.

The shell varies greatly in the prominence of the undulated ribs, which are sometimes obsolete on the spire, and entirely absent on the last whorl. Individuals having the shell very thin, without ribs, have by many been considered as a distinct species and named *Buccinum striatum*. Young shells are frequently banded with brownish-red.

The nidus is composed of a great number of whitish membranous-cartilaginous, roundish, thin sacs, convex on one side, concave on the other, united by a ligament into a roundish mass; each sac with an internal delicate membrane and containing three or four young, which at the period of exclusion have the shell already well-formed, with about four whorls.

The animal is sometimes used for bait.

Abundant along the coast from Stonehaven to Banff; very frequently taken up by the fishing-lines, and often cast on shore.

*Buccinum undatum*. Linn. Syst. Nat. 1204.—*Buccinum undatum*. Penn. Brit. Zool. iv. 121. Pl. 73. f. 90.—*Buccinum striatum*. Penn. Brit. Zool. iv. 121. Pl. 74. f. 91.; Ed. n. iv. 272. Pl. 77.—*Buccinum undatum*. Mont. Test. Brit. 237.—*Buccinum crassum, rufescens, striatum et undatum*. List. Anim. Angl. 156. Pl. 3. f. 2.—*Buccinum tenue, leve, striatum et undatum*. Lister, Anim. Angl. 157. Pl. 3. f. 3.—*Buccinum undatum*. Flem. Brit. Anim. 342.

2. *Buccinum Anglicanum*. *English Buccine*.

Shell oblongo-conical, thin; with the last turn somewhat ventricose, depressed toward the upper margin; the other turns little convex below, and less concave above; the suture distinct; the upper margin of the turns rather thick, and irregularly plicato-nodulose; the turns transversely obsoletely ribbed and striate, and longitudinally striate; three of the striæ on the last turn larger, more prominent and subnodulose, one of them a little more prominent than the rest; the mouth ovate, with the outer lip thin; the notch distinct; the columella with an oblique spiral groove; the colour white, tinged with reddish in three obsolete longitudinal bands. Length an inch and a-half, breadth nine-twelfths.

This description is taken from a specimen, dead and worn, with the epidermis abraded, found by Mr. A. Davidson, at the Cove, in the Winter of 1841.

*Buccinum Anglicanum*. Flem. Brit. Anim. 322?—*Buccinum Anglicanum*. Lamk. Syst. vii. 264.—*Buccinum Anglicanum*, Mart. Conch. iv. Pl. 126. f. 1212.—*Buccinum Norvegicum*. Brug.

3. *Buccinum brève*. *Short Buccine*.

Shell ovato-conical, ventricose; with five convex whorls, of which the upper three are smooth and glossy, the rest transversely ribbed and longitudinally sulcato-striate; the apex obtuse; the suture distinct; the aperture about half the length of the shell, ovate, the pillar twisted, the outer lip plain and thin, the notch oblique; the colour whitish, with two reddish-brown bands on the last whorl, but varying to chestnut-brown.

It greatly resembles the young of *Nassa incrassata*; but differs in having the ribs more numerous, in being thinner and more transparent, and in having the mouth larger, and its notch wider, than the shell of the fry of that species.

Not uncommon in shell sand on the beach between the Dee and the Ythan, where I found it in April, 1842.

*Buccinum brève*. Adams, Linn. Trans. iii. 64. Pl. 13. f. 3, 4.—*Buccinum brève*. Mont. Test. Brit. 250.—*Buccinum brève*. Flem. Brit. Anim. 344.—*Buccinum brève*. Johnst. B. Tr. iii. 238.

GENUS 2. *NASSA*.

Animal elongated; the body spiral; with two slender tentacula, having the eyes placed half way up on their



outer side; the proboscis long, cylindrical; thicker toward the end; the foot rather large, elliptical; the operculum ovate, concentrically striate, thin, horny.

Shell ovate, elongated; the spire moderate, pointed; the aperture roundish or oval, with a deep narrow oblique notch anteriorly; the columella rounded, plaited, generally with a mass of callosity; the outer lip thickened with a strong external rib.

Marine mollusca, similar in habits to the *Buccina*. Young shells, not having the lip thickened, present all the characters of that genus.

1. *Nassa incrassata*. *Black-spot Nassa*.

Shell ovato-conical, thick; with the spire tapering to a bluntish point; the turns convex, longitudinally grooved, transversely ribbed, nodulose at the intersections of the ridges; the first three turns smooth and glossy, the last about the same breadth as the length of the spire; the suture distinct; the mouth ovato-elliptical, the outer lip much thickened with a strong external rib, and internal plicæ; the notch short, deep, and narrow; the columella callous, with oblique ridges; the exterior white, reddish, pink, brown, or variegated, the tip pink; the mouth and lips white, a dusky spot over the notch. Length half an inch, breadth a quarter.

Sometimes covered with a yellowish or olivaceous epidermis; the rib of the outer lip sometimes smooth and white, or white and grooved, or of the same colour as the rest of the shell. Some individuals elongated, others abbreviated.

Animal pale yellow, spotted with black; the tentacula filiform, but bulging at the base; the branchial siphon long, variegated with brown and black; the proboscis long, thicker toward the end; the foot large, pale yellow.

*Tritonium incrassatum*. Mull. Zool. Dan. Prodr. 244.—*Nassa incrassata*. Flem. Brit. Anim. 340.—*Nassa incrassata*. Johnst. Berw. Tr. iii. 238.—*Buccinum Macula*. Mont. Test. Brit. 241. Pl. 8. f. 4.—*Buccinum minutum*. Penn. Brit. Zool. iv. 122. Pl. 79.

About low-water mark, and in deep water, at Stonehaven, near Aberdeen, Cruden, Peterhead, Boddam, Banff, Portsoy, and other parts of the coast; frequently cast on the beach, and sometimes brought up by the lines.

## GENUS 3. PURPURA. WHELK.

Animal elongated; the body spiral; the head large, with two approximated tapering, flattened tentacula, supporting the eyes on an enlargement at their middle externally; the proboscis short; the foot large, broad, two-lobed anteriorly; the operculum semioval, horny.

Shell ovate, thick, with the spire short, the last whorl very large, its breadth being at least three times the length of the spire; the aperture elliptical or semioval, with the outer-lip thin-edged, the columella flattened, and often ending in a point anteriorly, the canal short and wide.

Marine, inhabiting the rocky shores. The genus obtains its name from the purple dye yielded by some of the species.

1. *Purpura Lapillus*. *White Whelk*.

Shell ovato-fusiform, thick; with the spire small and pointed; the turns convex, the last very large, longitudinally ribbed, transversely lamelloso-striate; the aperture elliptical; the outer lip thin-edged, undulated or denticulate, and somewhat grooved internally; the columellar lip rather flattened, externally transversely rugose; the notch small, a little recurved; the colour generally white, the mouth tinged with purple. Length an inch and four-twelfths, breadth seven-twelfths.

Animal with the tentacula tapering and depressed, with the eyes situated in a notch near their middle on the outer side; the proboscis short; the foot oval, yellowish, with the brown horny operculum placed on its back. The fluid which yields the purple colour is found in a vessel on the back of the animal. It is of a yellowish-white colour, but on being exposed to the air becomes bright yellow, then pale green, bluish-green, and purplish-red. It has been used for marking linen.

The nidus is an oblong, somewhat cup-shaped, semitransparent yellow cartilaginous sac supported on a short pedicel, attached to a rock or stone, and covered with a convex lid. It contains a viscid fluid, in which are numerous ova, which on being developed so as to present a regularly-formed shell of four turns, make their escape by the bursting of the lid.

The shell varies in colour, individuals being grey, purplish, yellow, brown, black, purple, pink, or white, plain or variously

anded. In young shells the ribs and undulated lamellar striæ are generally well defined, but in old shells obsolete.

Abundant on all the rocky coasts.

*Buccinum minus albidum, asperum.* Lister, Anim. Angl. 158. Pl. 3. f. 5, 6.—*Buccinum Lapillus.* Linn. Syst. Nat. i. 1202.—*Buccinum Lapillus.* Penn. Brit. Zool. iv. 118. Pl. 72. f. 89.—*Purpura Lapillus.* Lamk. Syst. vii. 244.—*Purpura Lapillus.* Flem. Brit. Anim. 341.—*Buccinum Lapillus.* Mont. Test. Brit. 239.

## FAMILY II.—FUSINA.

Animal with the body elongated, spiral, and covered with a shell; the head with two somewhat conical depressed tentacula, which bear the eyes on a prominence at their base externally; the mouth furnished with a long cylindrical annulated proboscis, and a filiform tongue; the mantle forming a thin-edged flap over the branchial cavity, and on the left side an elongated open canal, which emerges by a groove in the shell; branchiæ two, unequal, pectinate; foot very large, generally broad; a horny operculum.

Shell various, more or less fusiform, spiral; its aperture with a prolonged canal for the respiratory tube at its anterior part.

The species are marine, and zoophagus. There is perhaps no real zoological distinction between the *Buccinina* and *Fusina*; but the latter may always be known by their elongated canal, which in some of the species is even as long as the spire.

### GENUS 1. MUREX. ROCK-SHELL.

Animal elongated; the body spiral: with two tapering depressed tentacula, much dilated at the base, and having the eyes, which are small, situated near their base externally; the proboscis long, exsertile, cylindrical; the foot large, oval, rugose; the operculum ovate, concentrically striate, horny.

Shell generally oval, with the spire pointed; the turns traversed by three or more prominent varices or ribs; the aperture rather small, ovate, or oblong, pro-

longed anteriorly into a nearly straight narrow canal, sometimes closed by the meeting of its margins.

1. *Múrex Erináceus*. *Hedgehog Rock-Shell*.

Shell ovate, with seven or eight moderately convex turns, which are scabrous, with six or seven transverse prominent ribs, crossed by spiral elevated striæ, and imbricated all over with small arcuate squamiform lamellæ; the spire tapering to a small point; the aperture oval, with the outer lip thick and denticulate internally, the inner lip smooth and glossy, the canal elongated and closed by the meeting of its two edges; the colour dull white, or brownish, sometimes banded or tessellated with dark brown or reddish-brown. Length an inch and a-half or somewhat more, breadth about two-thirds of the length.

Two broken specimens, or rather fragments, found among shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Murex Erinaceus*. Linn. Syst. Nat. 1276.—*Murex Erinaceus*. Penn. Brit. Zool. iv.—*Murex Erinaceus*. Mont. Test. Brit. 259.—*Triton Erinaceus*. Flem. Brit. Anim. 356.

GENUS 2. *FUSUS*. SPINDLE-SHELL.

Animal elongated; the body spiral; with two tapering depressed tentacula, much dilated at the base, and having the eyes, which are small, situated in a notch near their middle externally; the proboscis long, exsertile, cylindrical; the foot large, oval, rugose; the operculum ovate, concentrically striate, thin, horny.

Shell ovato-fusiform, elongated; the spire pointed; the aperture oval or oblong, with a more or less prolonged and slightly recurved canal at its anterior part; the outer lip thin, the columella smooth.

The *Fusi* reside generally in deep water, and feed on animal substances.

1. *Fúsus antiquus*. *White Spindle-Shell*.

Shell ovato-fusiform, thick; with the spire tapering to a small but obtuse point; the whorls very convex, the last ventricose, broader than the length of the spire, with distinct

longitudinal and faint transverse striæ, which however are prominent and lamelliform at the columella; the mouth oval, with the outer lip thin-edged, the columella with an oblique groove; the canal short; the colour white, or yellowish-white, that of the interior yellow, orange, or white. Length from five to six inches, breadth more than half the length.

Animal elongated, spiral, yellowish-white; with the tentacula short, depressed, rounded, each having a rounded lobe at the base externally, bearing a small black eye; in the mouth an exsertile cylindrical proboscis, about an inch-long, containing a long, filiform, bright red lingual mass; the foot large, oval, rugose, tinged with yellow; the operculum ovato-oblong, concentrically striate; the penis about an inch long, depressed, transversely striolate, abruptly terminated; the margin of the mantle plain, with an open tapering canal on the left, often spotted with black externally.

Sometimes used as bait.

Very abundant in deep water, on hard ground, off the coast from Stonehaven to Banff; frequently brought up by the lines.

*Buccinum album læve, maximum.* Lister, Anim. Angl. 155. Pl. 3. f. 1.—*Murex antiquus.* Linn. Syst. Nat. i. 1222.—*Murex despectus.* Mont. Test. Brit. 256.—*Fusus antiquus.* Flem. Brit. Anim. 348.—*Murex despectus.* Penn. Brit. Zool. iv. 124. Pl. 78.—*Fusus antiquus.* Lamk. Syst. vii. 125.—*Fusus antiquus.* Johnst. 235.

## 2. *Fusus corneus.* *Horny Spindle-Shell.*

Shell oblongo-fusiform, moderately thick, covered with a thin epidermis; the spire tapering to a small but obtuse point; the whorls little convex, the last rather broader than the length of the spire, with distinct longitudinal and very faint transverse striæ; the mouth oblong, with the outer lip thin; the canal rather long, and considerably recurved; the colour white, that of the interior bluish-white; the epidermis yellowish-grey or horn-colour.

Animal white; with the foot short, oval, and rugose; the operculum brown.

Not uncommon in deep water, on hard ground, off the coast, from Aberdeen to Peterhead, also at Gamrie, Fraserburgh, and Banff; often brought up by the lines.

*Buccinum angustius, tenuiter admodum striatum.* Lister. Anim. Angl. 157. Pl. 3. f. 4.—*Murex corneus.* Linn. Syst. Nat. i. 1234.—*Murex corneus.* Mont. Test. Brit. 258.—*Murex corneus.* Penn. Brit. Zool. iv. 124. Pl. 76. f. 99.—*Fusus corneus.* Flem. Brit. Anim. 348.—*Fusus corneus.* Johnst. Berw. Tr. iii. 235.

3. *Fusus Laskéyi*. *Laskey's Spindle-Shell*.

Shell ovato-turrite, subfusiform, rather thick, covered with a thin greyish-yellow epidermis; the spire tapering to a small but obtuse point; the whorls convex, the last broader than the length of the spire, with five prominent, compressed, rounded longitudinal ridges, alternating with smaller ridges, and having on its rather flattened sloping posterior space two small ridges; on the other turns five ridges apparent, one of them much larger and medial; the turns transversely marked with fine rather deeply impressed striæ, rendering the ridges crenulate; the aperture roundish-ovate, with a narrow canal tapering to a point; the inner replicate and smooth. Length three-twelfths of an inch, breadth nearly two-twelfths.

Two specimens found by Mr. Alexander Davidson, in the Winter of 1841, among substances brought up from deep water off Aberdeen. One of them, the smallest, agrees in all respects with that figured by Capt. Laskey in the first volume of the Wernerian Transactions; the other, much larger, is as described above. Both have the outer lip unformed, being thin, with the ridges running out upon it, and producing notches in their intervals; and the larger has the mouth somewhat distorted by a mended fracture. Captain Laskey believed it to be the young of *Fusus carinatus*, which however it does not appear to be. I have therefore given it a different name.

*Murex carinatus*. Laskey, Wern. Mem. i. 400. Pl. 8. f. 9.

4. *Fusus Buchanensis*. *Buchan Spindle-Shell*.

Shell fusiform, rather thick; with the spire tapering to a small nipple-shaped point; the whorls six, moderately convex, with prominent obtuse strong ribs, separated by wider concave spaces, and nodulose by the decussations of the strong spiral raised lines; the last turn with twelve ribs, the two first ribless and glossy; the suture distinct; the aperture narrow-oblong, nearly half the entire length, the canal moderate, narrow, straight, the outer lip thickened by a rib and crenate; the colour dull grey, the spiral striæ and nodules of the ribs dusky, the tip of the spire pale brown. Length three-twelfths of an inch, breadth a third of the length.

The above description from a specimen found by Miss Macgillivray, in shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842. It comes very near to *Pleurotoma Smithii*, from which however it differs in having the aperture proportionally longer, and the canal much nar-

rower, besides wanting the sinus characteristic of the genus *Pleurotoma*. I have compared it with *Fusus linearis* of Montagu, but find it different in many respects.

### GENUS 3. PLEUROTOMA.

Shell ovato-fusiform; the spire pointed; the aperture oval or oblong, with a more or less prolonged and slightly recurved canal at its anterior part, the outer lip with a distinct notch, slit, or sinus at its upper angle, the columella smooth.

#### 1. *Pleurotoma Bánffium*. *Banff Pleurotoma*.

Shell oblongo-fusiform, rather thick; with the spire tapering to a fine point; the whorls rounded, with numerous rather irregular, thin-edged, laminar, transverse ribs bent toward the mouth of the shell, and marked with rather obsolete transverse and spiral striæ; the suture distinct; the last whorl about the same breadth as the length of the spire; the mouth oval, with a moderately wide canal deflected to the left and somewhat recurved; the colour of the exterior dull white or yellowish-white, of the mouth white. Length eight-twelfths, breadth three-twelfths and a-half.

From deep water off Aberdeen; apparently rare. Found also by me, on the 5th of August, 1842, in a fishing-boat at Boddam, or Buchan-Ness. A live individual found at Aberdeen, by Miss Macgillivray, in September, 1842.

*Murex Bamffius*. Penn. Brit. Zool. iv. 284. Pl. 82. f. 5.—*Murex Bamffius*. Mont. Test. Brit. Suppl. 117.—*Fusus Bamffius*. Flem. Brit. Anim. 351.

#### 2. *Pleurotoma Turricula*. *Turret Pleurotoma*.

Shell oblongo-fusiform, thin; with the spire tapering to a fine point; the whorls angulate at their upper part, giving the spire a remarkable scalar appearance; the last whorl of less breadth than the length of the spire; the suture distinct; the whorls with transverse narrow, convex ribs, which are nodose on the angle, and slender longitudinal, unequal ridges, giving the surface a cancellated aspect; the mouth narrow, oblong, with the outer lip thin, more or less sinuate at the angle; the canal rather short; the colour of the exterior white or yellowish, of the mouth white. Length eight-twelfths of an inch, breadth nearly three-twelfths.

Very common in deep water, on hard ground, off Aberdeen; and frequently brought up by the lines, but seldom alive; the dead shells usually occupied by *Pagurus Bernhardus*. Found also at Peterhead, Gamrie, and Banff.

*Murex Turricula*. Mont. Test. Brit. 262. Pl. 9. f. 1.—*Murex angulatus*. Donov. Brit. Sh. Pl. 156.—*Fusus Turricola*. Flem. Brit. Anim. 349.

### 3. *Pleurótoma Trevellianum*. *Trevellyan's Pleurotoma*.

Shell ovato-fusiform, thin; with the spire tapering to a fine point; the whorls angulate at their upper part, giving the spire a remarkable scalar appearance, and marked with numerous transverse narrow ribs, and very numerous slender longitudinal, nearly equal raised lines; the mouth ovato-oblong, with the outer lip thin, and having a distinct notch near its upper angle, the canal rather short; the colour of the exterior yellowish-white, of the mouth white. Length seven-twelfths of an inch, breadth three-twelfths and a half.

First distinguished by me in October, 1842, among specimens of *Fusus Turricula*, from deep water off Aberdeen. It very closely resembles that shell, but differs in having both the ribs and striæ much more numerous, in being broader in proportion to its length, and in having a more distinct notch in the outer lip. I much suspect however that it is merely a variety of the species mentioned.

*Pleurotoma Trevellianum*. Turton, Mag. Nat. Hist. vii. 351.

### 4. *Pleurótoma decussátum*. *Decussated Pleurotoma*.

Shell elongated fusiform, rather thick; with the spire tapering to a fine point; the suture distinct; the whorls rounded, with transverse ribs, narrower than their interstices, and numerous spiral thin laminae traversing the interstices, and decussating the ribs, on which they form small oblong tubercles; the mouth ovato-oblong, with the canal very oblique and elongated; the colour yellowish-white.

The only specimen I have obtained at Aberdeen is a dead and mutilated shell, a quarter of an inch long, but with the tip of the spire and the tail broken off. Another, complete, excepting the outer lip, was found by me, in August, 1842, in a fishing-boat at Boddam, near Peterhead. It appears to agree with Captain Brown's *Fusus decussatus*, which he says was found at Killough, in the County of Down, Ireland. The Aberdeen specimen was brought up from deep water by a fishing-line, in the Winter of 1841-2.



5. *Pleurótoma reticulátum*. *Reticulated Pleurotoma*.

Shell oblongo-fusiform, thin; with the spire tapering to a rather obtuse point, and somewhat convex in outline; the whorls slightly angulate at the upper part, giving the spire somewhat of a scalar appearance, but with the space between the angle and the suture convex and sloping; the last whorl of rather less breadth than the length of the spire; the suture distinct; the whorls with numerous transverse narrow ribs, on the last dividing into several raised lines, and on all reticulated with longitudinal raised lines; the aperture oblong, narrow, deeply sinuate at the suture, with the outer lip thin, the canal very short, the inner lip with a rather thick, smooth layer; the colour dull white. Length half an inch, breadth a third of the length.

A single specimen sent by Mr. Alexander Murray, who found it at Slains, in November, 1842.

*Pleurotoma reticulatum*. Brown, Illustr. Pl. 38. f. 43, 44.

## GENUS 3. ROSTELLARIA.

Animal with the body elongated, spiral; the head with two conical tentacula, bearing the eyes on a prominence at their base externally; the mouth at the end of a long cylindrical annulated proboscis, and a filiform tongue; mantle forming a thin-edged flap over the branchial cavity, and on the left side an elongated open canal, which emerges by a groove in the shell; branchiæ two, unequal, pectinate; foot large, generally broad; a horny operculum.

Shell more or less turrite or fusiform, spiral; its aperture oblong, with a prolonged canal for the respiratory tube, and the outer lip much expanded in old individuals, entire, dentate, or digitate.

1. *Rostellária Pes-pelecáni*. *Pelican's-foot Rostellaria*.

Shell turrite, with the spire tapering to a point, the suture distinct, the whorls ten, convex, with a medial series of oblique compressed obtuse nodules, and fine spiral striæ, the last whorl with two additional nodulose bands, the lower smaller and approximated; the aperture oblique, oblong, with the outer lip extremely dilated, angulate, very thick, sinuated

above and below, and marked with three or four grooves, one of which extends halfway up the spire; the canal bent downwards; the colour pale reddish-grey, the mouth yellowish-white. Length an inch and three-fourths, breadth an inch and a fourth.

Young individuals have the lip less expanded, or merely thin and simple.

Dr. Johnston gives the following account of this species:—  
 “Animal with two long cylindrical slightly tapered tentacula of a scarlet colour spotted with pale yellow, yellowish on the under side: eyes at the base, external, prominent, sessile: mouth at the end of a long cylindrical snout, scarlet, speckled with pale yellow; the tongue slender, cartilaginous, jointed, invested in a sheath: body whitish, freckled with scarlet: margin of the cloak plain, reflected, with a very short canal in place of a siphon: penis placed under the opposite tentaculum, retroflexed, curved, flattened; rectum opening above the penis with a narrow orifice: foot somewhat pedunculate, oblong, truncate anteriorly, tapered behind, rather short, plain, white: operculum fixed on the back of the foot, horny, elliptical, and rather small. Creeps very slowly, the tentacula being widely extended and used as feelers.”

In deep water off Aberdeen, Banff, and Macduff, not uncommon.

*Strombus Pes-pelecani*. Penn. Brit. Zool. iv. 122. Pl. 75. f. 94.—  
*Strombus Pes-pelecani*. Mont. Test. Brit. 253.—*Rostellaria Pes-pelecani*. Lamk. Syst. vii. 193.—*Rostellaria Pes-pelecani*. Flem. Brit. Anim. 359.—*Chenopus Pes-pellicani*. Johnst. B. Tr. iii. 233.

### FAMILY III.—CYPRÆINA.

Animal with the body elongated, spiral, and covered with a shell; the head distinct, with two filiform or subulate tentacula, at the thickened base of which are situated externally the sessile eyes; the mouth at the bottom of a small cavity, and furnished with a thin ribbon-like tongue, beset with minute prickles in transverse lines; the mantle with two very large lobes, of which the margins can be extended so as to meet externally on the back of the shell; siphon short, tubular but slit beneath; branchiæ two, pectinated; foot very large, elongated; no operculum.

Shell ovate or oblong, convolute so as that the last

turn almost entirely covers the rest ; the spire very short or covered ; the aperture linear, extending the whole length of the shell, with a notch at the anterior end ; the surface glossy, without epidermis.

#### GENUS 1. CYPRÆA. COWRIE.

Animal elongated, spiral ; with two slender, tapering tentacula, at the base of each of which externally is a small eye ; the mouth with a long thin tongue beset with small prickles, and extended into the abdomen ; the foot elongated, large ; no operculum.

Shell oval, very convex above, convolute ; with the aperture longitudinal, linear, having a recurved notch at each end, the lips denticulate or grooved, the outer involute ; a longitudinal dorsal mark left by the margins of the mantle.

##### 1. *Cypræa Europæa*. *European Cowrie*.

Shell ovate, very convex above, with numerous transverse grooves ; the spire covered ; the aperture linear, both lips denticulate, the outer involute, posteriorly extended beyond the spire and curved ; the lower surface white, the upper grey or purplish-grey, with three dusky spots. Length five-twelfths of an inch, breadth three-and-a-half.

There is a smaller variety, similar in form, but with the upper surface flesh-coloured without the dusky markings.

Both kinds occur along the coast, but are uncommon.

Found by Miss Marion Macgillivray, in the Autumn of 1841, at Don mouth ; by Mr. Davidson, in the following Winter. I have specimens obtained at Collieston ; Mr. Murray has gathered it on the coast of St. Fergus, Fraserburgh, and Peterhead ; and Miss Macgillivray at Gamrie. Mr. Gray has also sent me numerous specimens found about Peterhead. I have not, however, seen this species alive.

*Cypræa Europæa*. Dillw. Rec. Shells. 467.—*Cypræa Pediculus*. Penn. Brit. Zool. iv. 115. Pl. 70. f. 82 ; Ed. 2. 252. Pl. 73.—*Cypræa coccinella*. Lamk. Syst. vii. 404.—*Cypræa pediculus*. Mont. Test. Brit. 200.—*Cypræa arctica*. Mont. Test. Brit. 201.—*Cypræa Europæa*. Flem. Brit. Anim. 330.—*Cypræa Europæa*. Johnst. Berw. Trans. iii. 240.—*Concha veneris exigua alba, striata*. List. Anim. Angl. 168. Pl. 3. f. 17.

## ORDER III.—GASTEROPODA TUBULIBRANCHIATA.

No species of this order have been met with in our seas.

## ORDER IV.—GASTEROPODA SCUTIBRANCHIATA.

Respiratory apparatus a cavity on the back, containing pectinate or filamentous branchiæ attached to its roof, and communicating externally by an opening between the margin of the mantle and the body, either on the back or to the left.

## FAMILY I.—FISSURELLINA.

Animal with the body conical, not spiral; the head broad, depressed; the tentacula two, large, triangular, thin; the eyes situated on a slight projection of the middle of their outer margin; the mantle very thin; the foot large, nearly circular; the branchial cavity opening widely before, and containing filamentous branchiæ.

Shell conical, with the summit direct, or curved.

The species are all marine, and occur chiefly in warm climates. Three only have been found in our district.

## GENUS 1. LOTTIA.

Animal elliptical or roundish, convex, covered by a univalve conical shell; head with two tapering tentacula, bearing the eyes near their base externally; mouth fleshy, with a short proboscis, and containing a lingual denticulate filament; foot very large, elliptical or roundish; mantle marginate, with an inner circle of filaments between it and the foot; respiratory cavity containing a vascular elongated scaliform or pectinate branchia.

Shell conical, with the apex nearer the anterior end; the aperture extremely large, elliptical, oval or roundish.

1. *Lóttia virgínea*. *Delicate Lottia*.

Shell ovato-elliptical, little elevated, thin, subpellucid, glossy, smoothish, but with obsolete radiating striæ and faint concentric ridges; the umbo pointed, nearer the anterior end, being at about a third of the length; the colour yellowish-grey, whitish or dusky, with radiating bands of red; the inside smooth, glossy, purplish. Length about half an inch, breadth a third less, height two-twelfths.

Found by me and my daughter Anne, in August, 1842, on the sands between the mouths of the Dee and the Don; in October, by Mr. Alexander Murray, at Fraserburgh.

According to Mr. Alder, a falciform process, containing two large vessels running on opposite sides through its whole length, and crossed at right angles by smaller vessels forming projecting rings, with the whole surface ciliated, is attached to the branchial cavity. It is capable of great extension and contraction, and a free action from side to side of the cavity, and may be seen emerging in a curved form on the right side of the head. There is also "a dense fringe of filaments completely surrounding the cloak, and bearing a strong resemblance both in position and appearance to the branchial fringe of *Patella*," but placed nearer the margin, and instead of being composed of flat leaflets, as in that genus, consisting of nearly linear filaments of unequal length, with thickened ends.

*Patella parva*. Mont. Test. Brit. 480.—*Patella virgínea*. Flem. Brit. Anim. 287.—*Lottia virgínea*. Alder, Ann. and Mag. of Nat. Hist. vi. 404.

## GENUS 2. EMARGINULA. SLIT-LIMPET.

Animal conical or convex, oval or elliptical beneath, covered by a univalve shell; head with two short, conical tentacula, bearing the eyes on large tubercles near their base internally; mouth probosciform; foot very large, oval, margined externally with tentacular appendages; mantle very large, with its margins replicate, widely open in front, and also communicating by a fissure with a corresponding slit in the shell; two equal pectinated branchiæ; intestinal aperture at the extremity of a small tube opening into the respiratory cavity.

Shell conical, with the aperture oval and wide, the summit inclined backward; a vertical notch or slit in the

anterior margin; muscular impression forming three-fourths of a circle.

1. *Emarginula Fissura*. Common Slit-Limpet.

Shell conical, somewhat compressed, with the aperture oval, narrow before; a vertical median slit extending from its anterior part to a third of its height; with an external groove, and corresponding internal ridge to the apex, which is pointed, placed behind the middle, and curved a little backward; the anterior median outline convex, the posterior concave below the point, afterwards nearly straight; from the apex to the margin about forty prominent, narrow, but convex ribs, cancellated by scalar concentric laminæ, at the intersections of which the radiating ribs are nodose; the margin crenated, having a notch at each of the ribs; the colour yellowish-white. Length of the aperture four-twelfths and three-fourths, height four-twelfths.

The above description from dead and partially damaged shells; one found on the Buchan coast in the middle of September, 1834; the other brought up from deep water off Aberdeen, and found by Mr. Leslie, on the 27th of that month. When recent, it is said by Montagu, to be brown externally, glossy and flesh-coloured within.

Patella Fissura. Linn. Syst. Nat. 1261.—Patella Fissura. Penn. Brit. Zool. iv. 144. Pl. 90. f. 161.—Patella Fissura. Mont. Test. Brit. 490.—Emarginula Fissura. Lamk. Syst. vi. 2. 5. Ed. 2. vii. 582.—Emarginula Fissura. Flem. Brit. Anim. 365.

GENUS 3. RIMULA. CHINK-LIMPET.

Shell conical, with the aperture oval or elliptical and wide, the summit inclined backward; a vertical slit anterior to the summit, opening internally by a roundish semimarginate aperture half-way down the anterior side.

This genus differs from *Emarginula* only in having the slit toward the summit instead of being at the margin.

1. *Rimula Flemingii*. Fleming's Chink-Limpet.

Shell conical, compressed, with the aperture oval, narrower before; the apex recurvate, pointed, and adherent; a canal of a somewhat triangular form commencing internally, half-way up the anterior medial line, and opening externally in a vertical slit, gradually narrowed, near the apex, and having a groove from it extending to almost the extreme point; from

the apex to the margin twenty-four prominent convex ribs, alternating with smaller, and decussated by numerous irregular concentric rugæ; the margin crenulate; the colour yellowish-white, the interior white. Length of the aperture three-twelfths, breadth two-twelfths, height two-twelfths.

This species resembles *Emarginula Fissura* in form and markings, but differs in the curvature of the apex, and especially in having the fissure at the top. It is nearly allied to *Emarginula Fissurella*, from which it differs in having the external opening of the canal, not wide and of a rhomboidal form, but a narrow chink. One malacologist has named it after Noah, another after Dr. Fleming. I am unable to determine the priority, and therefore take the living godfather.

The above description from a dead shell, brought up from deep water off Aberdeen, and found by Miss Isabella Macgillivray, on the 30th of September, 1812.

*Sypho striata*. Brown, Illustr. 36. f. 14, 15, 16.—*Cemoria Flemingii*, Leach. *Fissurella Noachina*, Sowerby.

#### ORDER V.—GASTEROPODA CYCLOBRANCHIATA.

Respiratory organ a continuous fringed lamina placed in the groove which separates the mantle from the foot.

They are all marine, adhere to rocks, stones, shells, or plants, feed on vegetable substances, and are covered with a wide-mouthed more or less conical shell.

#### FAMILY I.—PATELLINA.

Animal with the body broad, convex or conical, covered by a conical expanded shell, to which the mantle adheres, until toward the margin, beneath which, in the groove between the mantle and the foot, the branchiæ are disposed in the form of a thickened border; the head with two conical tentacula; the eyes situated near their base internally; orifice of the anus and generative organs over the head toward the right side; foot very broad, firm, marginate.

Shell of the form of a short cone, with the apex nearer the anterior end.

All the species marine.

## GENUS 1. PATELLA. LIMPET.

Animal elliptical or roundish, convex, covered by a univalve conical shell; head with two conical tentacula, bearing the eyes at their base internally; mouth fleshy, transverse, with a short proboscis, and containing an extremely elongated, linear, flattened organ, covered on one side with tufts of small spines symmetrically disposed, and directed backwards into the intestine; stomach membranous; intestine long, convoluted; foot very large, elliptical or roundish, marginate; branchiæ apparently formed of the lower thickened margin of the mantle.

Shell conical, with the apex nearer the anterior end; the aperture extremely large, elliptical, ovate, or roundish.

The species adhere to rocks, stones, fuci, and other objects.

1. *Pátella vulgáta*. Common Limpet.

Shell conical, with the outline of the mouth obovate or rotundato-obovate; the apex nearer the anterior or smaller end; the surface radiated with about eighteen ribs alternating with striæ, and crossed by concentric striæ; the colour dusky-green with rays of yellowish-grey, the interior greyish-white, beyond the attachment of the mantle rayed with dusky and yellow, appearing through a transparent iridescent layer. Length an inch-and-a-half or more, height ten-twelfths or more.

Varies greatly in form, some individuals being roundish, others ovate, some very high, others low; in the number and size of the ribs, the degree in which they render the margin undulated; and in the colours, which may be yellow, grey, red, olivaceous or dusky, plain or in bands. "Quiconque n'aurait qu'un exemplaire de cette coquille, pourrait se trouver fort embarrassé pour le rapporter à son espèce, tant celle-ci est variable; aussi les auteurs différent-ils beaucoup dans les descriptions et les figures qu'ils en donnent."

The animal may be described as flat and with an oval outline beneath, convex above. If examined from beneath, it will be seen to present a roundish expanded, flat, foot, of which the surface is smooth, and of an olivaceous colour, margined with a thick yellow rim, and attached to the shell by in-



terlaced muscular fibres all round, forming anteriorly two strong ligaments, one on each side of the head. Anteriorly is seen the head, convex in front, decurved, terminating in a short proboscis, having a thick rugose margin, of a somewhat reno-cordate form; the two tentacula conical, extensile, dusky toward the end; the eyes at the outer base of the tentacula. Behind or above the head is a large cavity opening widely, and by some supposed to contain the respiratory apparatus, consisting of a kind of network covering its surface. In it are seen on the right side of the animal, the anal aperture, and that of the generative organs. All round the insertion of the foot and anterior cavity is a soft, fimbriated flap, supposed by Cuvier and others to be the respiratory organ; and beyond it is the skin or mantle, forming a double-rimmed, crenulate, flap, contractile, and very sensible. If we now remove the animal from the shell, by cutting its attachments, we find the mass of the viscera situated over the foot. In the mouth, besides the cartilaginous folds, and muscular apparatus, is seen attached to a fleshy pedicel, a very slender, flattened filament, having on one surface, in its whole length, three series of hard denticulate plates, those of the medial series transverse, the lateral oblique. This tongue or lingual filament passes backward into the intestine, and is about two inches and a half in length. The stomach is membranous; the intestine long, and convoluted. The liver forms a large olivaceous-brown mass; and the ovary, of a yellowish-colour lies behind it. The heart is placed over the neck, a little to the right side. The disk of the foot will now be seen to be very thick, of cartilaginous firmness, composed of interlaced muscular fibres, and having a deep medial groove on its upper surface.

On the shell, of which the inner surface is smooth and iridescent, will be seen the two anterior impressions of the ligaments, and continuous with them a narrow band of an oval outline, to which the foot was attached all round, unless in front.

Abundant on all the rocky coasts; in exposed places crusted or corroded, most perfect when among large fuci. It is used for bait, and sometimes as an article of food.

*Patella ex livido cinerea, striata.* Lister, Anim. Angl. 195. Pl. 5. f. 40.—*Patella vulgata.* Linn. Syst. Nat. i. 1258.—*Patella vulgata.* Penn. Brit. Zool. iv. 142. Pl. 89. f. 145.—*Patella vulgata.* Mont. Test. Brit. 475.—*Patella vulgata.* Flem. Brit. Anim. 286.—*Patella vulgata.* Lamk. Syst. vi. 331; Ed. 2. vii. 535.

2. *Patella lævis*. *Smooth Limpet*.

Shell of moderate thickness, and horny appearance, with the outline of the mouth oval, the apex obtuse, much nearer the smaller end; the surface concentrically striate, generally with well-marked growth-lines, one of which is near the apex; the colour generally yellowish-brown, frequently with some and occasionally with numerous rays of purple or brown from the apex; the inside glossy, opaline; the margin thick and plain. Length about ten-twelfths of an inch.

It varies in form, in the position of the apex, and in colour, being sometimes dusky, or brown, or yellowish-grey, with or without bands.

Occurs on fuci, especially the stalks of the tangle; not uncommon on the rocky coasts: Stonehaven, Aberdeen, Cruden, Peterhead, Fraserburgh, and Gamrie.

*Patella lævis*. Penn. Brit. Zool. iv. 144. Pl. 90. lowest figure.—*Patella cærulea*. Mont. Test. Brit. Suppl. 152.—*Patella lævis*. Flem. Brit. Anim. 287.—*Patella pellucida*. Lamk. Syst. vi. 334; Ed. 2. vii. 540.

3. *Patella pellucida*. *Transparent Limpet*.

Shell very thin, fragile, transparent, with the outline of the mouth oval, the apex incurved, obtuse, close to the smaller end; the surface with about twenty-eight very faint ribs and intermediate striæ, together with faint concentric striæ, more marked toward the margin, which is thin and even; the colour generally yellowish-brown or dusky, with some light-blue interrupted rays from the apex; the inside greyish-white, toward the margin horny. Length about two-thirds of an inch.

It varies in being more or less convex, with the apex nearer to the edge or more remote from it, in colour, and in the number of blue lines. In all stages it is easily distinguishable from *Patella lævis*, with which however many authors have confounded it.

Common on fuci near low-water mark, on all the coasts; and frequent on the beaches.

*Patella pellucida*. Linn. Syst. Nat. i. 1260.—*Patella pellucida*. Penn. Brit. Zool. iv. 143. Pl. 90. f. 150.—*Patella pellucida*. Mont. Test. Brit. Suppl. 152.—*Patella pellucida*. Flem. Brit. Anim. 287.—*Patella pellucida*. Lamk. Syst. vi. 334; Ed. 2. vii. 240.

## FAMILY II.—CHITONINA.

Animal with the body elliptical or oblong, covered with a shell formed of several distinct transverse plates, adherent to the mantle, which is very thick at the margin, and extends beyond the shell; the branchiæ disposed around the body between it and the mantle; the head without tentacula or eyes; the orifice of the anus at the posterior extremity.

All the species marine, and adherent to rocks, and other bodies, like limpets.

## GENUS 1. CHITON. CANOE-SHELL.

Animal elliptical or oblong, convex, covered by a shell composed of eight transverse pieces; head destitute of tentacula or eyes; mouth fleshy, transverse, with a very long tongue armed with minute horny teeth; stomach membranous; intestine long, foot very large, elliptical, marginate; branchiæ between the mantle and the body, and consisting of a row of small triangular laminæ or protuberances.

Shell of eight transverse plates, moveable upon each other by means of muscular bands attached to their under surface, and margined with the thickened mantle.

They live attached to rocks, shells, and other bodies, in the manner of limpets.

1. *Chiton fascicularis*. Tufted Canoe-shell.

Shell elliptical, moderately convex, subcarinate, of eight minutely tuberculate (shagreened) valves, of a dark-grey colour; the marginal band thick, tuberculate, with eighteen tufts of yellowish hairs, and edged with minute spinelets. Length nearly three-fourths of an inch, breadth about five-twelfths.

An individual found on the pier of Aberdeen, by Mr. Alex. Davidson, in March, 1842.

*Chiton fascicularis*. Linn. Syst. Nat. i. 1106.—*Chiton fascicularis*. Mont. Test. Brit. 5.—*Chiton fascicularis*. Flem. Brit. Anim. 288.—*Chiton fascicularis*. Lamk. Syst. vi. 321; Ed. 2. vii. 492.

2. *Chiton marginatus*. *Bordered Canoe-Shell*.

Shell elliptical, moderately convex, subcarinate, of eight minutely dotted (shagreened) valves, of a greyish or reddish colour, or variegated; the anterior and posterior valves semi-circular, quincuncially granulated, the rest nearly even, the areas being but faintly defined, and having the granules disposed in curved lines; the marginal band also granulated, coloured with alternate dusky and whitish spots, and edged with minute spinelets. Length about three-fourths of an inch or more, breadth nearly half an inch.

It varies greatly in colour, being sometimes plain, grey, greenish-grey, or brownish, or reddish, more frequently variegated with numerous spots. Often the beaks are very distinct, and the posterior margins of the valves somewhat tuberculate, the prominences usually whitish.

Not uncommon on the rocky coasts, at Peterhead, Portsoy, Collieston, and in the Bay of Nigg.

Found by Mr. Leslie and by Mr. Alexander Murray on the coast of Gamrie and Peterhead. Plentiful in pools on the Girdleness, and about the Cove.

*Chiton marginatus*. Penn. Brit. Zool. iv. 71. Pl. 36. f. 2.—*Chiton marginatus*. Mont. Test. Brit. i.—*Chiton marginatus*. Flem. Brit. Anim. 289.—*Chiton marginatus*. Lamk. Syst. vi. 321. Ed. 2. vii. 492.

3. *Chiton cinereus*. *Yellow-grey Chiton*.

Shell elliptical, moderately convex, carinate, with the sides sloping, and even; and the valves eight, moniliformly striated; the anterior semicircular, emarginate behind, concentrically rugose, and radiatingly striulate; the posterior similar, its anterior half subcarinate; the rest narrow, carinate, slightly beaked, striulate, with the striæ of the anterior area longitudinal, those of the two posterior areas, which are elevated, radiatingly transverse; the border narrow, minutely reticulated, with the edge spinulose; the colour yellowish-grey, with the posterior areas of the valves variegated with brown. Length four-twelfths, breadth two-and-a-half twelfths.

An individual found on a star-fish, at Gamrie, in September, 1842, by Miss Macgillivray; others by Mr. Murray.

*Chiton cinereus*. Linn. Syst. Nat. 1107.—*Chiton cinereus*. Mont. Test. Brit. 3.—*Chiton cinereus*. Flem. Brit. Anim. 289.

4. *Chiton fuscatus*. Dusky-grey Chiton.

Shell oblongo-elliptical, a little narrower anteriorly, carinate, with the sides sloping and marked with a faint longitudinal depression; the valves eight, minutely granulate; the anterior semicircular, marginate, with dots in quincuncial striæ; the posterior similar, with its anterior half carinate; the rest narrow, marginate, carinate, somewhat beaked, with an oblique, obtuse ridge on each side, somewhat more elevated in the middle, from the beak to the extremity of the anterior margin, the anterior area with rather irregular longitudinal series of granules, the two posterior with irregularly-disposed, somewhat quincuncial granules; the border granulate, with the margin membranous; the colour uniform dull leaden-grey, that of the interior bluish. Length seven-twelfths, breadth four-twelfths.

Found by Mr. Alexander Murray, in September, 1842, in Cruden Bay.

This species is quite distinct from *Chiton cinereus*, of which the markings are finer and more regularly disposed.

*Chiton fuscatus*. Brown, Illustr. Pl. 35. f. 17.

5. *Chiton lævigatus*. Smooth Canoe-Shell.?

Shell broadly elliptical, a little narrower anteriorly, subcarinate, with the sides sloping and slightly convex; the valves eight, minutely granulate-striate; the anterior lunato-semicircular, with minute radiating granulated striæ; the posterior semicircular, with growth-lines, and radiated in the same manner; the rest narrow, marginate, obtusely subcarinate, not beaked, with the posterior areas very slightly raised and radiatingly striulate, the anterior with longitudinal striulæ, the prominent medial part nearly smooth; the border granulate, narrow; the colour dull reddish-white with longitudinal streaks of reddish-brown, radiating on the anterior and posterior valves; the interior flesh-coloured. Length three-twelfths of an inch, breadth two-twelfths.

Found by Miss Isabella Macgillivray on a shell from deep water off Aberdeen, on the 30th September, 1842.

*Chiton lævigatus*. Flem. Brit. Anim. 290.

## ORDER VI.—GASTEROPODA INFEROBRANCHIATA.

The Infero-branchiate Gasteropoda, having the respiratory organs in the form of lamellæ beneath the projecting edge of the mantle, the body always naked and more or less tubercular, have no representatives in our seas.

## ORDER VII.—GASTEROPODA TECTIBRANCHIATA.

Respiratory organs composed of branched or pectinated laminæ, attached along the right side or on the back, and more or less covered by the mantle, which generally contains in its substance a thin shell.

They are all marine, and have a very complex digestive apparatus.

## FAMILY I.—BULLÆINA.

Animal with the body subglobose, oval, or oblong, divided into two parts, of which the anterior is often furnished with lateral lobes; head destitute of tentacula, or having these organs rudimentary or united to form an anterior tentacular disk; the branchiæ placed on the back, protected by the mantle, often also by a shell.

Shell none, or if present external or internal, generally very thin and convolute.

## GENUS 1. BULLÆA.

Body oval, elongated, somewhat convex above, transversely divided into two parts; lateral lobes of the foot with a thickish margin, and bent upwards; head scarcely distinct, without tentacula; branchiæ dorsal, placed under the posterior part of the mantle.

Shell concealed in the substance of the mantle, over the branchiæ, very thin, partially bent in a spiral form, without spire or columella, the aperture very wide.

1. *Bullæa punctáta*. *Punctulate Bullæa*.

Shell broadly ovato-elliptical, very thin, transparent, glossy, with numerous longitudinal striæ, and transverse raised lines, leaving regular series of squarish depressions between them, or presenting longitudinal lines of alternate prominences and depressions; the apex truncate, but with the first turn very slightly projecting; the aperture wide, obovate, but very narrow at the right side; the columellar margin exposed and a little thickened, the outer edge thin, at the right end forming a rounded lobe; the colour hyaline-white. Length about a twelfth, breadth nearly a third less than the length.

Intermediate in form between *Bullæa aperta* and *Bullæa Catena*, but differing from the latter in having the striæ not catenulate, but punctate.

A specimen found by me among shell sand on the beach near Aberdeen, 3d May, 1842; another in August.

*Bulla punctata*. Adams, Linn. Trans. vi. Pl. 1. f. 6, 7, 8.—*Bullæa punctata*. Turt. Mag. Nat. Hist. vii. 353.

2. *Bullæa Caténa*. *Oval Chain-streaked Bullæa*.

Shell oval, very thin, transparent, glossy, brittle, pure white; subtruncate at the right extremity, rounded at the other; the aperture extending its whole length, very wide, narrowed in its upper fourth; the outer lip very thin, crenulate, the columella exposed; the apex depressed, scarcely umbilicate, with two turns, the suture deep; the surface with numerous regular distinct divergent longitudinal elevated striæ, which present the appearance of two undulated lines intersecting each other, or of a chain. Length three-twelfths of an inch, breadth two-twelfths.

Exactly similar in its markings to *Bullæa catenulifera*, but more oval, and differing in the umbilicus.

Not uncommon at Aberdeen, adhering to Actiniæ and Ascidiæ, and often on the beach. First observed by me in January, 1842; about the same time by Mr. Davidson.

*Bulla Catena*. Mont. Test. Brit. 215. Pl. 7. f. 7.—*Bulla Catena*. Flem. Brit. Anim. 294.

3. *Bullæa catenulifera*. *Oblong Chain-streaked Bullæa*.

Shell oblongo-cylindrical, very thin, transparent, brittle, pure white; truncate at the right extremity, wider and rounded at the other; the aperture extending its whole length, narrow for a fourth only, then dilated into an oblongo-truncato form,

the outer lip very thin, the columella exposed and gently waved; the surface with regular distinct divergent longitudinal striæ, which are moniformly marked, or present the appearance of two undulated lines intersecting each other, and faint lines of growth; the colour white. Length two-eighths, breadth one-eighth.

The markings are exactly similar to those of *Bullæa Catena*, to which however this species has no other direct resemblance.

Common in deep water off Aberdeen, frequently brought up by the lines adhering to Actiniæ, Ascidiæ, Shells, and other bodies; generally dead, and opaque dull white, or tinged with brown, but sometimes alive, in which state I have several times found it.

## GENUS 2. BULLA.

Body oval or oblong, somewhat convex, transversely divided into two parts; hind part of the mantle bent upwards; head scarcely distinct, without tentacula; branchiæ dorsal, placed under the hind part of the mantle.

Shell partially covered by the mantle, oval, or oblong, convolute, with the aperture wide at one end, the outer lip thin, the place of the spire occupied by a cavity.

### 1. *Bulla Cranchii*. *Cranch's Bulla*.

Shell subelliptical, subtruncate at the right extremity, somewhat narrowed at the left; the aperture extending its whole length, narrow at the right end, widened at the other, the outer lip extending a little beyond the spiral depression, which is small and deep, with the margin rounded, the columella visible for a third of its length, and there decurved; the surface rather glossy, but longitudinally divergingly striate, about ten of the striæ at the right end, and eighteen at the left larger, all punctate, and crossed by fine faint lines of growth; the colour white, with a broad medial zone of a faint reddish tint. Length five-twelfths of an inch, breadth three-and-a-half twelfths.

The above description is from an individual found by Mr. Alexander Davidson, in the Winter of 1841, adhering to a fishing-line, at Footdee, Aberdeen. Another specimen, in my possession, was found by Mr. James Smith. It is considered by Dr. Fleming as identical with his *Bulla Cranchii*, and presents, on being compared with his specimen of that shell, no other difference than that of size. It was recognized by him,



it having been accidentally in company with a shell sent to him for inspection.

*Bulla Cranchii*. Flem. Brit. Anim. 292.

2. *Bulla cándida*. Glossy *Bulla*.

Shell broadly ovate, thin, semitransparent, glossy, with faint growth-lines; the apex prominulous, obtuse, two very small volutions being apparent, but with a slight scrobiculus; the aperture wide, ovato-oblong, acute behind, the columellar margin a little thickened and reflexed, the outer margin thin; the colour white. Length two-eighths, breadth more than half the length.

Found by me in shell sand from the beach near Aberdeen.

*Diaphana candida*. Brown, Illustr. Pl. 38. f. 13, 14.

GENUS 3. HALIA.

Shell subovate, spiral; the spire short, convex, obtuse; the turns rapidly enlarging, separated by an impressed suture, the last very large, tumid; the aperture large subovato-trigonal, acute behind, anteriorly curved outwards and ending in a rather wide notch, the outer lip thin, the inner formed by the thin-edged sinuous columella before, without peristome or umbilicus.

This genus, instituted by Risso, is correctly placed by him in the family of "Acères," and between the genera *Bullina* and *Acera*. But its affinities, one might at first think, to be most obviously among the *Buccina* and *Fusina*. The form of the mouth is, in fact, almost the same as that of a young, thin-lipped *Buccinum undatum* of the same size.

1. *Halia Flemingiána*. Fleming's *Halia*.

Shell subovate, thin, brittle, glossy, semitransparent; of four turns, which are convex, obsoletely striated longitudinally and transversely; the apex very obtuse; the suture distinct; the aperture two-thirds of the whole length, subovato-trigonal, acute behind, the thin-edged outer lip forming the fourth of a circle, the inner side sinuous, its posterior half formed by the body-whorl, the anterior by the thin flexuous edge of the columella, the anterior extremity curved to the left in the form of a short and rather wide canal; the colour pure white. Length seven-twelfths of an inch, breadth half the length.

The only specimen seen by me, and which is in my collection, was presented to me by one of my pupils, Mr. James Smith, in the Spring of 1842. It was brought up from deep water, off Aberdeen, by one of the fishing-lines.

Although most closely allied to *Halia helicoides* of Risso:—*Hist. Nat. des principales Productions de l'Europe Meridionale*, iv. 2. Pl. 6. f. 79. it differs specifically, that shell being described as “*opaca, anfractibus quinque, striis transversis (nonnullis antiquatis) sculptis,*” and according to the figure having the spire narrower, the canal longer, and the striæ more distinct. That species is stated to be an exanimate denizen of the “*Argile tertiaire de Magnan.*”

This being one of the most interesting additions that could be made to our Scottish Fauna, I have thought it worthy of being dedicated to one who by his many discoveries has added so much to our knowledge of nature, and who is the only Malacologist personally known to me in the north of Scotland.

Neither it nor Risso's *Halia helicoides* have any affinity to *Natica helicoides* of Dr. Johnston. Every naturalist to whom I have shewn it, has suspected it to be a young *Fusus* or *Buccinum*, to which it bears that general resemblance which a cow has to a sheep.

#### GENUS 4. BULLINA.

Shell internal, cylindrical, convolute, with the aperture very narrow, a little wider anteriorly, the outer lip very thin, the place of the spire occupied by a cavity.

##### 1. *Bullina umbilicata*. Oblong *Bullina*.

Shell oblongo-cylindrical, thin, semitransparent, glossy, with faint growth-lines; the left extremity rounded, with a deep and narrow umbilicus; the aperture extending the whole length, very narrow for more than half, then oblong, the outer lip thin, extending slightly beyond the margin of the spiral depression, the columella visible for a fourth of its length, and there reflected; the colour white. Length an eighth of an inch.

Found by me in shell sand from the beach near Aberdeen; also in shell sand from Cruden Bay, sent by Mr. Murray.

*Bulla umbilicata*. Mont. Test. Brit. Pl. 7. f. 4.—*Bulla umbilicata*. Turt. Conch. Dict.—*Bulla umbilicata*. Flem. Brit. Anim. 293.

2. *Bullina truncata*. *Semiplicate Bullina*.

Shell subcylindrical, thin, transparent, glossy, with distinct shallow sulci extending over half its length from the left extremity, which is truncate, with a wide and shallow umbilicus, exposing a whorl and the central obtuse apex; the aperture extending the whole length, very narrow for about half, then ovato-oblong, the outer lip thin, the columella visible for a third of its length, and there reflected; the colour white. Length nearly two-twelfths, breadth half the length.

Found by me in shell sand from the beach near Aberdeen; also in shell sand, from Cruden Bay, sent by Mr. Alex. Murray.

*Bulla truncata*. Adams, Linn. Trans. i. Pl. 1. f. 12.—*Bulla truncata*. Flem. Brit. Anim. 293.—*Bulla truncata*. Mont. Test. Brit. 223. Pl. 7. f. 5.

3. *Bullina cylindræca*. *Cylindric Bullina*.

Shell subcylindrical, rather thin, or thick, transparent, glossy rugose, with strong growth-lines, and covered with a greenish or yellowish epidermis, truncate, with a deep umbilicus, exposing two whorls; the aperture extending the whole length, extremely narrow for nearly two-thirds, then ovato-oblong, the outer lip thin, the inner reflected, and having a slight prominence at the end of the columella; the colour of the shell hyaline-white. Length four-twelfths, breadth less than half the length.

Frequently brought up by the lines adhering to ascidiæ, and not uncommon in shell sand, on the beach at Aberdeen, where it has become opaque and white. Found also at Slains by Mr. Alex. Murray, and at the Cove, by Mr. Fergusson.

*Bulla cylindræca*. Penn. Brit. Zool. iv. 117. Pl. 70. f. 85.—*Bulla cylindræca*. Mont. Test. Brit. Pl. 7. f. 2.—*Bulla cylindræca*. Flem. Brit. Anim. 293.

## ORDER VIII.—GASTEROPODA NUDIBRANCHIATA.

Respiratory apparatus consisting of branchial tufts or papillæ on the back, exposed, and symmetrically arranged, whether in the middle or along the sides.

The animals of this order, all marine, have a considerable resemblance to Slugs, and crawl much in the same manner as they.

#### SECTION I.—POLYBRANCHIATA.

*Branchiæ numerous, in the form of arbuscules, laminæ, or papillæ, disposed along the sides of the body above.*

#### FAMILY I.—ÆOLIDINA.

Body oval, oblong, or elongated, limaciform, with the skin smooth; the branchiæ in the form of shreds, cirri, or papillæ, disposed along the sides; two pairs of tentacula, the one occipital, the other frontal; the eyes placed behind the latter.

#### GENUS I. ÆOLIS.

Body oblong, tapering to a point behind, convex above, flat beneath; head short, with four tentacula, two upper and two labial; eyes two, placed at the base of the upper tentacula; branchiæ of numerous soft filaments or laminæ, disposed in rows along the sides of the back; genital and alimentary organs terminating on the right side.

##### 1. *Æolis papillósa.* *Papillate Æolis.*

Body linear-oblong, tapering behind to an obtuse point, convex above, flattened beneath, laterally compressed; the head with four tentacula, the upper conical, obtuse; the back smooth, its sides with numerous soft, subulate, branchial filaments, extending their whole length, those nearest the foot shorter; the mouth with a thick circular margin, an internal very thin circular lip, and opening by a vertical slit, bounded by two thin horny plates, of which the tip is pointed; foot oblong, anteriorly abrupt, with the angles pointed, obtuse behind; the colour dusky, tinged with purple, the branchiæ brownish-black. Length about two inches.

The above description from an individual found, in April, 1842, by Mr. Leslie, among the rocks at Collieston.

*Limax papillosus*. Linn. Syst. Nat. 285.—*Eolida papillosa*. Flem. Brit. Anim. 285.—*Eolidia papillosa*. Johnst. Ann. of Nat. Hist. i. 118.

### 2. *Æolis Murrayana*. Murray's *Æolis*.

Body oblong, tapering behind to an obtuse point, convex above, bare along the middle of the back, at its sides continuously covered with very large oblongo-conical, round or somewhat compressed obtuse branchial papillæ, in several series; head depressed; upper tentacula conical, obtuse, granulate; mouth probosciform, with a very thick external, circular margin, a very thin inner, and opening by a vertical slit, bounded by two large thin, anteriorly convex, horny plates; foot oblong, anteriorly abrupt, rounded at the angles, on the margin waved, gradually narrowed, obtuse behind; the back bluish-white, with the papillæ bluish-grey, the upper tentacula rose-red, the mouth reddish-white, the foot white. Length seven-twelfths of an inch.

Found by Mr. Alexander Murray, in September, 1842, under a stone, on the beach at St. Fergus; several specimens also sent by him in December.

In this species the papillæ are larger and more closely set than in *Æolis papillosa*, from which it differs further in having the anterior angles of the foot rounded. Not finding a description exactly agreeing with it, I have named it as above.

### 3. *Æolis Cuvierii*. Cuvier's *Æolis*.

Body slender, tapering behind to a fine point, convex above, bare along the middle of the back, at its sides covered with elongated tapering, obtuse papillæ, arranged in transverse series; head depressed, somewhat truncate; upper tentacula elongated, subulate; mouth with two long similar tentacula on each side; foot linear-oblong, slightly marginate, its anterior part acutely biangulate, or extended into tentacula; upper parts pale purplish or reddish-grey, the branchiæ pink; the tentacula hyaline-white; the foot reddish-white. Length an inch and a-half.

Two specimens found by me, in a pool among the rocks, at Collieston, in April, 1842.

*Eolis Cuvierii*. Lamk. Syst. vi. 1. 302.—*Eolidia Cuvierii*. Johnst. Ann. of Nat. Hist. i. 120. Pl. 3. f. 9, 10, 11.

4. *Æolis Leslieana*. Leslie's *Æolis*.

Body elongated, tapering behind, flat beneath, convex above; the medial bare space along the back very narrow, linear-lanceolate, white, with an oval brown obtuse prominence about the middle; on each side about a hundred and sixty papillæ, disposed, in about thirty transverse rows, or, if examined when the animal is in a state of repose, of about fifteen oblique rows; those near the middle of the back lanceolate, compressed, rather obtuse, rugoso-undulate, those along the sides shorter, linear, a little enlarged at the tip, their colour a faint pinkish tint, margined and tipped with white; a tuft of about forty smaller papillæ on each side, about and anterior to the upper tentacula, which are conico-subulate, rather obtuse, granulate, brown, at the end pale reddish-yellow, and arising each from an oblong elevated brown space; the anterior tentacula long, subulato-setaceous, hyaline, with a white line in each, running backward into a triangular white space before the upper tentacula, and from which proceeds backward a medial narrow white line, between the two elongated brown spaces mentioned, expanding into a triangular white space, succeeded by the brown dorsal prominence, which is margined by a curved white line on each side, the two meeting behind it, in the tapering white line which extends to the end of the body; the margin of the mantle thin, considerably extended; the foot hyaline-white, oblong, anteriorly rounded in a semicircular form, with a small decurved tapering point on either side, the margins very thin, undulated, the hind part gradually attenuated into a point, having a small denticle on each side. Length an inch and a-half.

This remarkable, and prominently marked species, I first found in the beginning of October, 1842, in crevices of the rocks on the Girdleness, at Aberdeen. It being, in so far as I can learn, not described, and certainly not by Dr. Fleming, Dr. Johnston, or Mr. Alder, in their respective works or memoirs, I have named it after my good friend James Leslie, Esq., who was with me at the time of its discovery, and also obtained a specimen.

It resides in crevices filled with water, and when at rest presents somewhat of the appearance of an Actinia with its filaments extended. Its movements are very slow. When advancing, it continually moves its anterior tentacula, apparently using them as instruments of touch, and keeps the upper extended divergently. The tentacula are retractile, and the upper can be entirely withdrawn. The tail or hind part

of the foot, protrudes far beyond the last papillæ. It can also creep or repose at the surface of the water, with its back below. When reposing it assumes an elliptical form, contracts the anterior antennæ, but leaves the upper extended. In a vessel with sea-water, it has a habit of reposing for hours at the surface with the back beneath, the foot contracted to an elliptical form, the oval tentacula half-contracted and curved backwards. It also frequently creeps out of the water, and reposes in the air.

## FAMILY II.—TRITONIINA.

Body oval, oblong, or elongated, with the branchiæ in the form of arbuscules or papillæ disposed along the sides, two tentacula retractile into a kind of sunk sheath; a membranous veil over the mouth; terminations of the genital and alimentary organs distant, on the right side.

### GENUS 1. TRITONIA.

Body oval or oblong, convex above, flattened and having a broad muscular disk or foot beneath; the head broad, with two retractile, pectinate or tufted tentacula; a broad semicircular veil over the mouth, which is furnished with two lateral thin-edged and denticulate teeth; branchiæ in the form of tufts or plumes arranged symmetrically on the two sides of the body.

#### 1. *Tritonia arborëscens*. *Arborescent Tritonia*.

Body oblong, convex above, smooth; with four feathery appendages on the margin of the veil over the mouth; tentacula conical, transversely striated; branchiæ in distinct decomposed tufts, six on each side, decreasing in size from the head backwards; foot narrow; the colour above dusky, of the branchiæ darker, of the lower parts whitish. Length about an inch, height nearly half the length.

An individual brought up by the lines from deep water off Aberdeen, presented to me in the Winter of 1841.

*Tritonia arborescens*. Cuv. Mem. 28. Pl. 1. f. 8, 9, 10.—*Tritonia arborescens*. Flem. Brit. Anim. 284.—*Tritonia arborescens*. Johnst. Ann. of Nat. Hist. i. 115.

2. *Tritonia plebeia*. *Plebeian Tritonia*.

Body oblong, tapering to an obtuse point, convex above, laterally compressed, flat beneath; the mantle slightly rugosogranulate, not forming a margin laterally, but prolonged anteriorly into a kind of veil having seven prominent papillæ, of which the lateral are longest; tentacula cylindrical, obtuse, divided into several pinnatifid segments, their sheaths with the margin entire; branchial tufts small, six on each side; foot oblong, without prominent margin; upper parts greyish-yellow, sides yellowish, variegated with tortuous branched dusky lines, lower parts pale yellow. Length eight-twelfths of an inch, height two-and-a-half twelfths.

An individual from deep water off Aberdeen found by my son John in March, 1842.

*Tritonia plebeia*. Johnst. Edinb. New Phil. Journ. v. 77; Ann. of Nat. Hist. i. 115. Pl. 3. f. 3, 4.

## SECTION II.—CYCLOBRANCHIATA.

*Branchiæ in the form of arbuscules symmetrically disposed around, or anteriorly to the anus; which is placed in the median line, near the posterior part of the body above; the skin tuberculated.*

## FAMILY I.—DORINA.

Animal with the body oval or elliptical, flat beneath, more or less convex above; the head indistinct; the tentacula four, two larger on the head above, two smaller near the mouth, under the edge of the mantle; mouth with a denticulate lingual mass; the mantle covering the body above, and projecting all round, so as to extend beyond and conceal the head and foot, when the animal is viewed from above; the foot large, oval, elliptical, or oblong; the branchiæ tufted, and disposed in a circular form at the hind part of the body above, before the anal aperture.

The species, which are all marine, have a great resemblance to Slugs, and crawl much in the same manner.



Some of them however employ the expanded margins of the mantle for swimming.

### GENUS 1. DORIS.

Body oval, flat beneath, convex above, where it is covered by the mantle, the margin of which projects all round over the foot and mouth. Four tentacula: two upper obtuse, capable of being withdrawn into a cavity; two lower or anterior very small, near the mouth, under the edge of the mantle. Mouth near the anterior edge of the foot, in the form of a short fleshy tube, toothless, but with a denticulate lingual mass. Foot elongated, oval or oblong, broader before. Branchiæ in the form of tufts, arranged circularly, on the superior, posterior, medial part of the body, immediately before or surrounding the anal aperture. Genital organs terminating in a common tubercle or papilla at the anterior third of the right side, between the foot and the edge of the mantle.

Marine, residing in clefts of rocks, under stones, or on fuci, and creeping in the manner of Slugs.

#### 1. *Dóris tuberculáta*. *Tuberculated Doris*.

Body ovato-elliptical, convex above, and covered with small, unequal, depressed, granulated tubercles; the margin of the mantle thick, somewhat undulated, projecting considerably beyond the foot, rounded and repand anteriorly; the foot elliptical, broader before, with the margin waved; the two upper tentacula distant, mammilliform, with the terminal half pinnatifido-lamellate; the two oral tentacula thick, obtuse, near the mouth, at its base; the mouth small; the branchial tufts eight, tripinnate, circularly disposed on the hind part of the body above; the space between the edge of the mantle and the foot minutely granulate, nearly smooth; the genital organs terminating in a prominent conical rugose papilla, in a cavity on the right side, under the mantle-edge, at the anterior third of the length of the body; the colour pale leaden grey above, partly with a tinge of yellowish, and irregularly spotted with dark-grey, as well as a few pink dots. Length an inch and three-fourths, breadth nine-twelfths.

The above description from three specimens found by Mr. Alex. Murray, on the coast of Cruden, in December, 1842.

*Doris Argo.* Penn. Brit. Zool. iv. 43. Pl. 22. f. 22.—*Doris tuberculata.* Cuv. Mem. 23. Pl. 2. f. 4.—*Doris tuberculata* Lamk. Syst. vi. 311.—*Doris tuberculata.* Delle Chiaje, Anim. di Nap. iii. 134. Pl. 38. f. 21.—*Doris Argo.* Flem. Brit. Anim. 282.—*Doris tuberculata.* Johnst. Ann. of Nat. Hist. i. 50. Pl. 2. f. 1, 2, 3.

### 2. *Dóris obveláta.* *Veiled Doris.*

Body oblongo-elliptical, depressed, little convex above, and covered with very small, unequal, much depressed, granulated tubercles; the margin of the mantle thin, somewhat undulated, projecting far beyond the foot, rounded anteriorly; the foot oblong, broader before, with the margin repand; the two upper tentacula distant, mammilliform, rugoso-granulate; the two oral tentacula thick, obtuse, near the mouth, the space over which is roughish; the branchial tufts numerous, bipinnate, circularly disposed on the hind part of the body above; the space between the edge of the mantle and the foot minutely granulate; the genital organs terminating in a prominent conical rugose papilla, in a cavity on the right side, under the mantle-edge, at the anterior third of the length of the body; the colour pale yellow above, and of a lighter tint beneath. Length an inch and a-half, breadth more than a third of the length.

The above description from a specimen found by Mr. Leslie on the coast of Kincardineshire.

*Doris obvelata.* Lamk. Syst. vi. 311.—*Doris obvelata.* Johnston, Ann. of Nat. Hist. 52.

### 3. *Dóris bilamelláta.* *Papillate Doris.*

Body oval, depressed, and covered with numerous unequal diversiform papillæ, generally hemispherical above, more crowded and elongated toward the margins, somewhat depressed at the anterior part; the margin of the mantle thin, slightly repand, projecting considerably beyond the foot, and rounded at both ends; the foot elliptical, with the margin slightly waved, somewhat emarginate before, rounded behind; the two upper tentacula conico-acuminate, retractile into a cavity, on each side of which is a tubercle, and minutely tuberculate or rugous; a short semicircular veil over the mouth, somewhat crenate on the margin; the mouth transversely oblong, small, close to the edge of the foot; branchial tufts numerous, pinnate, disposed in a semicircle; genital papilla on the right side, at about a third of the length of the body;

the colour yellowish-white. Length nearly an inch, breadth nearly half the length.

The above description from two specimens found by Mr. Leslie on the coast of Kincardineshire.

*Doris bilamellata*. Linn. Syst. Nat. 1083.—*Doris fusca*. Lamk. Syst. vi. 1. 312; Ed. 2. vii.—*Doris verrucosa*. Penn. Brit. Zool. iv. 43. Pl. 21. f. 23?—*Doris verrucosa*. Flem. Brit. Anim. 282.—*Doris bilamellata*. Johnst. Ann. of Nat. Hist. i. 53.

#### 4. *Doris áspera*. *Rough Doris*.

Body ovato-elliptical, very convex above, and covered with rather large, nearly equal, round tubercles; the margin of the mantle thick, not extending far beyond the foot, and at its fore part crenate; the foot ovato-oblong, somewhat repand before, obtusely pointed behind; the two upper tentacula distant, subcylindrical, obtuse, rugoso-granulate; the two lower very small, approximated; the space over the mouth granulated; the mouth transversely oblong, small, close to the edge of the foot; branchial tufts of about ten small pectinated laminae, disposed in a circle and retractile; the space between the mantle and the foot minutely granulated; the colour hyaline-white; the upper tentacula with a faint tinge of a reddish-yellow. Length of an individual nearly half an inch, breadth two-and-a-half twelfths, height two-twelfths and a fourth.

Found by me in September, 1842, on fuci cast on the sands, near Don mouth, and at the Black Dog of Belhelvie.

*Doris áspera*? Alder and Hancock. Ann. and Mag. Nat. Hist. ix. 30.

### ORDER IX.—GASTEROPODA CIRROBRANCHIATA.

Respiratory apparatus composed of tufts of tentacular filaments situated on the sides of the neck.

#### FAMILY I.—DENTALIINA.

Animal much elongated, conical, covered with a conico-tubular shell, open at both ends.

#### GENUS 1. DENTALIUM. TOOTH-SHELL.

Animal much elongated, conical, covered with a long tapering, slightly curved shell, the dorsal surface of the

animal corresponding with the convexity of the shell; mantle attached posteriorly to the origin of the foot, free and thickened anteriorly by a circular muscle capable of closing the shell, and through the centre of which is protruded the foot, which is elongated, subcylindrical, with a conical protuberance in the middle of its anterior corolliform extremity; the head indistinct, situated about a third up, composed chiefly of a mouth having two internal horny spherical jaws, and two lips, each with three pairs of labial tentacula; oesophagus short, stomach pyriform, containing a complex dental apparatus; intestine straight, slender, terminating at the posterior extremity of the body; branchiæ two, symmetrically disposed on the upper and lateral parts of the neck, and composed of numerous tentacular filaments.

Shell much elongated, conical, slightly curved, open at both ends with circular apertures.

#### 1. *Dentalium Entalis*. Common Tooth-Shell.

Shell tubular, elongated-conical, slightly curved, tapering almost to a point, but truncate at the tip, and having a small slit in the margin of its posterior aperture on the dorsal side; the surface glossy, nearly smooth, being obsoletely longitudinally and transversely striulate; the colour white. Length two inches, breadth nearly two-twelfths.

Although placed by M. Deshayes in the section including the species which have the tip not slit, this, when perfect, *always has a small fissure at the end*. This error has of course arisen from the very rare occurrence of entire shells. Of twenty of the best specimens which I could obtain only five have the slender extremity complete.

Abundant in deep water off Aberdeen, Boddam, Peterhead, and Cruden, and very frequently brought up by the lines, seldom with the animal, but often containing a siphunculus.

*Dentalium Entalis*. Linn. Syst. Nat. i. 1263.—*Dentalium Entalis*. Penn. Brit. Zool. iv. 145. Pl. 90. f. 154.—*Dentalium Entalis*. Lamk. Syst. v. 345.—*Dentalium Entalis*. Mont. Test. Brit. 494.

## CLASS IV.—TROPIPODA.

Body compressed, covered by the mantle, and enclosed in a bivalve, hinged shell; head not distinct; mouth with four flattened labial appendages; a compressed muscular foot attached to the abdomen.

*Acephala*, Cuvier. *Mollusca Bivalvia*. *Τροπίς*, a keel, or *Τροπή*, turning; *πόὺς*, foot.

Animal compressed, higher than broad, with two nearly equal and similar sides, and enclosed in a bivalve hinged shell. Head not distinct. Mouth situated anteriorly, between four flattened labial palpi; œsophagus generally short; stomach pyriform; intestine convoluted within the liver and ovary, continued along the back to the vent, of nearly equal width throughout. Liver very large, discharging the bile into the stomach by biliary crypts. Circulatory apparatus, a ventricle and an arterial system, and a venous system with two auricles. Two pairs of laminiiform transversely striated branchiæ, situated between the mantle and the body. Generative system an ovary enveloped in the visceral mass. Nervous system very simple; no cerebral mass, or head; nor any organs of sense besides those of taste and touch. A generally compressed muscular foot. Two adductor muscles, sometimes approximated so as to seem single, generally distant, for the valves of the shell. Mantle very large, thin, laminiiform, induplicate, and enclosing the body. Shell of two distinct pieces, or valves, covering the mantle, and having at its upper part an elastic

ligament, which throws them open, when the adductor muscles are relaxed.

The Tropiopoda so graduate into each other that the attempts to separate them into orders have been unsuccessful. Lamarck instituted a division of them into Monomyaria and Dimyaria, or those with one adductor muscle, and those with two, and many authors have adopted this arrangement, confessing however that there is no real distinction between the groups, and that species considered by some as Monomyarian are in fact furnished with two muscles, although the anterior muscle is very small. A little more complexity in the organization of a cockle than in that of a clam does not appear to me to furnish a sufficient reason for referring these animals to two distinct orders. It is even difficult to divide this class into well-characterized families, founded on prominent distinctions in the organization of the animals, while nothing can be more easy than to form groups depending merely on differences in the shells.

Many of these animals live absolutely fixed to a particular spot, others have merely a little locomotion in a hole in sand or mud, some are enclosed in stone or wood, and few move about from place to place, the foot or fleshy appendage of most of them not being formed for creeping. They are all aquatic, and feed on organic particles. Many species are used as food, some being generally esteemed delicious, and in this respect they rank much higher than the Gasteropoda.

## SYNOPSIS OF THE ABERDEENSHIRE SPECIES.

## ORDER I.—TROPIPODA LAMELLIBRANCHIATA.

Respiratory organs of two unequal pairs of very thin expanded branchiæ, on the sides of the body, within the mantle.

*Lamella*, a thin plate; *branchiæ*, gills. Blainville.

MONOMYARIA. *A Single Adductor Muscle.*

## FAMILY I.—PECTININA.

Body roundish, compressed, with the lobes of the mantle disunited beneath, their margin thickened and fringed with filaments; the foot very small. Shell inequivalve, auriculate, more or less radiatingly costate or striate, the hinge toothless, with a central depression for the ligament; the muscular impression very large, sub-central. Named from the genus *Pecten*.

GENUS 1. PECTEN.—Shell free, regular, inequivalve, roundish, compressed, divergently costate; umbones very small, pointed; ligament internal, trigonal. *Pecten*, a comb. Lister.

1. *Pecten maximus*.—Shell nearly orbicular, inequivalve, with sixteen convex ribs, which, with their nearly equal convex interstices, are longitudinally striate; the upper valve flat. Named from being the largest known.

2. *Pecten opercularis*.—Shell nearly orbicular, inequivalve, with twenty-two convex subcarinate ribs, which, with their concave interstices, are longitudinally striate, and transversely lamelloso-striate; the upper valve convex. *Opercularis*, resembling a lid.

3. *Pecten varius*.—Shell roundish, somewhat oval, nearly equivalve, with about thirty-two rounded, somewhat compressed, irregularly echinato-laminate ribs. *Varius*, of different colours.

4. *Pecten Isabellæ*.—Shell roundish-oval, nearly equivalve, little convex, with twenty-four slender, compressed,

rounded ribs, with very numerous thin-edged lamellæ, toward the margin rising into triangular spines. Named after Miss Isabella Macgillivray.

5. *Pecten sinuosus*.—Shell somewhat orbicular, irregularly undulated or distorted, with about forty crowded, unequal, more or less scaly or spinous ribs. *Sinuosus*, winding, or uneven.

6. *Pecten Pusio*.—Shell ovate or ovato-oblong, equi-valve, with about forty alternately large and small, regular, somewhat nodose ribs, becoming somewhat spinous toward the margin; one of the ears almost obliterated. *Pusio*, a dwarf.

7. *Pecten Islandicus*.—Shell suborbicular, subequi-valve, with about forty, crowded, narrow, convex, lamello-striate, subscabrous ribs, which subdivide, so as to amount to more than a hundred toward the margin. Named from being found in Iceland.

8. *Pecten obsoletus*.—Shell triangulari-orbicular, thin, subdiaphanous, little convex, minutely shagreened with divergent striulæ crossed by smaller, variously costate or striate, and varying in colour. *Obsoletus*, worn smooth.

9. *Pecten lævis*.—Shell orbicular, subtriangular, little convex, very thin, semitransparent, glossy, smooth; the two sides equal; the auricles unequal, radiatingly striated; the colour various. *Lævis*, smooth.

10. *Pecten similis*.—Shell orbicular, flattish, very thin, semitransparent, glossy, smooth; one side more produced; the auricles nearly equal in length, smooth; the colour various. *Similis*, similar to the last.

11. *Pecten tumidus*.—Shell suborbicular, flattish, thin, smooth, semitransparent hyaline toward the margins, opaque-white in the centre; one side tumid, or much produced and rounded. *Tumidus*, swollen.

GENUS 2. LIMA.—Shell free, oval or oblong, equi-valve, anisomeral, thin, fragile; the hinge-line straight; an external triangular depression for the ligament; the valves radiatingly striate or costulate. *Lima*, a file. Bruguière.

1. *Lima Loscómbi*.—Shell obliquely oval-oblong, tumid,



pellucid, with numerous radiating costulæ and intervening striæ. Named after Mrs. Loscombe.

GENUS 3. CRENELLA.—Shell free, subelliptical, equi-valve, isomeral, convex, pearly; the hinge with a single abrupt fold in each valve; the ligament external, in a narrow groove, under the umbones, which are prominent and contiguous; the valves radiatingly striate, and concentrically striulate. Named by Capt. Brown apparently from its crenulate appearance.

1. *Crenella decussata*.—Only one species known. *Decussatus*, marked with lines crossing each other.

GENUS 4. ANOMIA.—Shell adherent, irregular, inequi-valve, delicate, fragile; the lower valve flat, with an aperture or notch near the hinge, for the attachment of the animal to some hard substance. Linnæus.

1. *Anomia Ephippium*.—Shell roundish, but variable; the upper valve little convex, irregularly undulated, squamoso-lamellate, with the umbo small. *Ephippium*, a saddle.

2. *Anomia Squamula*.—Shell roundish, very thin; the upper valve little convex, smooth, with the umbo small. *Squamula*, a little scale.

3. *Anomia undulata*.—Shell roundish, moderately thin; the upper valve little convex, concentrically rugose, and radiated with irregular undulated ribs. *Undulatus*, waved.

4. *Anomia aculeata*.—Shell roundish, thin, opaque, white; the upper valve with numerous radiating lamello-spinous ridges; the umbo glossy and projecting. *Aculeatus*, prickly.

5. *Anomia punctata*.—Shell orbicular, thin, transparent; the upper valve little convex, undulatingly rugose, with roundish pustular prominences; the dorsal outline even or little rounded. *Punctatus*, covered with raised dots.

6. *Anomia cylindrica*.—Shell subovate, thin, subpellucid; the upper valve very convex, squamoso-rugose,

with the umbo convex, narrowed to an obtuse decurved projecting point. *Cylindricus*, long and round.

7. *Anómia striolata*.—Shell subovate, thin, subpellucid; the upper valve very convex, somewhat gibbous, squamoso-rugose, with radiating striæ. *Striolatus*, with small streaks or ridges.

DIMYARIA. *With two adductor muscles.*

#### FAMILY II.—MYTILINA.

Animal oblong, with the mantle open beneath, coherent behind, forming a single orifice; the foot slender, tongue-shaped, with a byssus at its base behind. Shell regular, equivalve, very inequilateral; the hinge toothless; the ligament linear and dorsal; the anterior muscular impression very small. Named from the genus *Mytilus*.

GENUS 1. MYTILUS.—Shell oblong or obovate, equivalve, extremely inequilateral, convex; the umbones small, prominulous, terminal. *Mytilus*, a mussel. Linnæus.

1. *Mytilus édulis*.—Shell ovato-oblong, extremely variable in form, size, and colour. *Edulis*, eatable.

- A. *M. édulis vulgáris*. Common.
- B. *M. édulis pellúcidus*. Pellucid.
- C. *M. édulis incurvátus*. Incurved.
- D. *M. édulis angulátus*. Angulate.
- E. *M. édulis pusíllus*. Diminutive.

GENUS 2. MODIOLA.—Shell oblong or obovate, equivalve, very inequilateral, convex; the umbones small, prominulous, nearly terminal.

1. *Modiola barbáta*.—Shell obovato-oblong, very convex, more or less covered with filamentary processes of the epidermis. *Barbátus*, bearded.

2. *Modiola discrepans*.—Shell obovate, compressed, anteriorly and posteriorly radiatingly striate, smooth in the middle. *Discrepans*, discordantly marked.

3. *Modiola discors*.—Shell ovate, tumid, anteriorly

and posteriorly radiatingly striate, smooth in the middle. *Discors*, discordant, or with diversiform markings.

GENUS 3. PINNA.—Shell elongated, obovato-triangular, equivalve, inequilateral, moderately convex, compressed behind, thin, horny, semitransparent, fragile. *Pinna*, a sea-fan. Linnæus.

1. *Pinna ingens*.—Shell oblongo-triangular, moderately convex, with the dorsal line nearly straight, the end rounded, the valves thin, brittle, yellowish-brown or dusky, with about ten longitudinal narrow, obtuse ridges on the half next the ligament, disappearing beyond the middle. *Ingens*, very large.

#### FAMILY III.—UNIONINA.

Animal oblong, elliptical, or roundish, with the mantle open beneath, coherent behind, forming two orifices, the lower barbate; the foot large, compressed, tapering; both adductor muscles large. Shell regular, equivalve, inequilateral, with a strong epidermis; the ligament linear and dorsal; the anterior muscular impression large.

GENUS 1. ALASMODON.—Shell equivalve, very inequilateral, compressed, concentrically rugose; umbones small, incurved, carious; hinge with an irregular prominent crenulated tooth in one valve, two in the other.

1. *Alasmodon margaritiferus*.—Shell ovato-oblong, rather compressed, thick, rugose, becoming curved when old. *Margarita*, a pearl; *féro*, to bear.

GENUS 2. ANODON.—Shell equivalve, very inequilateral, convex, concentrically rugose, thin; umbones small; hinge toothless, but with a lamina under the ligament. 'A, without; *òdòs*, a tooth. Lamarck.

1. *Anodon anatinus*.—Shell ovate, moderately convex, thin, rugose, the anterior end short and rounded, the posterior truncato-angulate. *Anatinus*, from *ánas*, a duck.

#### FAMILY IV.—ARCINA.

Animal oblong, or roundish, with the mantle open in its whole length, and destitute of tubes; the foot very

short, thick, truncated; two adductor muscles. Shell equivalve, inequilateral, with an epidermis; the hinge with numerous small interlocking teeth; the ligament partly external.

GENUS 1. *NUCULA*.—Shell ovato-trigonal or oblong, inequilateral; umbones small, contiguous; incurved; hinge with a central oblique cavity, and on each side numerous small, compressed teeth. *Núcula*, diminutive of *Nux*, a nut. Lamarck.

1. *Núcula Núcleus*.—Shell obliquely ovato-triangular, with the margin internally crenate. *Núcleus*, a nut.

2. *Núcula ténuis*.—Shell obliquely ovate, with the margin internally smooth. *Ténuis*, thin.

3. *Núcula rostrata*.—Shell elongated, with the posterior end rounded, the anterior extended, narrowed, and truncate; the surface concentrically rugoso-striate. *Rostrátus*, having a beak.

4. *Núcula mínuta*.—Shell ovato-lanceolate, with the posterior end rounded, the anterior extended, narrowed, and truncate; a depression under each umbo, separating the teeth; the surface concentrically striulate, with a few convex ridges toward the margins. *Mínutus*, very small.

#### FAMILY V.—CYCLADINA.

Animal oval or roundish, more or less compressed, with the mantle-lobes free beneath, united behind, and forming an internally double tube; the foot very extensible, elongated. Shell suboval or roundish, very thin, with a delicate epidermis; the umbones prominent; the hinge with two or three divergent laminar teeth; the ligament external. Name from the Genus *Cyclas*.

GENUS 1. *CYCLAS*.—Shell elliptical or oval, subglobose, very thin; umbones tumid, obtuse, about the middle; siphons separated toward the end. Named from its globular form; *Cyclus*, a circle. Lamarck.

1. *Cyclas flavéscens*.—Shell rhomboido-elliptical, ventricose, somewhat inequilateral; the valves very thin,

finely striate; the epidermis pale greyish-yellow. *Flavescens*, yellowish.

GENUS 2. *PISIDIUM*.—Shell suboval, subtrigonal, very thin; umbones tumid, nearer one end; siphons united. *Pisum*, a pea. Scopoli, Pfeiffer.

1. *Pisidium Joannis*.—Shell broadly ovate, moderately convex, thin, glossy, distinctly concentrically striate, with more marked growth-lines; the umbones tumid, obtuse, smooth at the apex, somewhat nearer the anterior end; the dorsal slope a little convex, both ends rounded; the colour greyish-yellow. Named after Mr. John Macgillivray.

2. *Pisidium Jenynsii*.—Shell obliquely ovate, moderately convex, very thin, glossy, finely but distinctly and regularly concentrically striate, with a few more marked growth-lines; the umbones tumid, obtuse, considerably nearer the anterior end; the dorsal slope about a third longer than the frontal, and convex; the colour yellowish-white. Named by Mr. Gray after the Rev. Leonard Jenyns, of Cambridge.

3. *Pisidium pulchellum*.—Shell obliquely ovate, rather ventricose, very thin, glossy, finely and deeply concentrically striate, with a few more marked growth-lines, and with faint radiating striulæ; the umbones tumid, obtuse, considerably nearer the anterior end; the dorsal slope descending, little convex; the colour pale yellowish-grey, or yellowish-white. *Pulchellus*, small and beautiful.

4. *Pisidium nitidum*.—Shell orbicular-ovate, compressed, thin, glossy, finely and regularly concentrically striate, with a few more marked growth-lines; the umbones obtuse, subcentral, marked with several stronger grooves; the colour greyish-white. *Nitidus*, shining.

5. *Pisidium pusillum*.—Shell orbicular-ovate, rather compressed, thin, glossy, finely concentrically striate; the umbones obtuse, rather prominent, subcentral; the dorsal slope descending and convex; the colour greyish-white. *Pusillus*, dwarfish.

## FAMILY VI.—VENERINA.

Animal roundish or oblong, compressed, with the mantle-lobes free beneath, united behind to form a tube containing two siphons; the foot compressed, extensile; two large adductor muscles. Shell varying from orbicular to oblong, subcordate, convex, concentrically striate, the umbones prominent, the hinge with from two to four divergent teeth, and elongated lateral teeth, the ligament external; the frontal slope with a cordate impression. Name from the Genus *Venus*.

GENUS 1. LUCINA.—Shell suborbicular, subinequilateral; umbones small, hinge generally with two small teeth in each valve; pallial impression entire. *Lucina*, “the goddess of child-bearing.” Bruguiere.

1. *Lucina Rádula*.—Shell orbicular, convex, with numerous concentric narrow rugæ, becoming lamelliform at the two extremities. *Rádula*, a rasp.

2. *Lucina spinífera*.—Shell elliptical-orbicular, compressed, thin, with concentric narrow ridges, becoming lamelliform at the two extremities, and at the anterior especially forming spines. *Spina*, a prickle; *féro*, to bear.

3. *Lucina láctea*.—Shell orbicular, equilateral, convex, with numerous concentric narrow, rather irregular striæ. *Lácteus*, milk-white.

4. *Lucina leucóma*.—Shell roundish, inequilateral, little convex, thin, with numerous concentric deeply impressed striæ, and faint radiating striulæ. *Λευκός*, white or shining.

GENUS 2. CYPRINA.—Shell ovato-orbicular, equivalve, obliquely cordiform, concentrically striate, with a persistent lamellar epidermis, two strong divergent teeth in each valve; the ligament external; the pallial impression entire. *Cyprína*, a title given to Venus, from the Island of Cyprus. Lamarck.

1. *Cyprína Islándica*.—Shell obliquely cordate, roundish-ovate, thick, concentrically rugoso-striate, with the

epidermis dusky, reddish, or yellowish. Named from its being found in Iceland.

GENUS 3. *ASTARTE*.—Shell roundish or elliptical, compressed or moderately convex, with a persistent epidermis, one valve with a thick tooth and two pits, the other with two thick teeth and a triangular pit; the pallial impression entire. *Astárte*, a name of Venus. Sowerby.

1. *Astárte Danmoniénsis*.—Shell rotundato-trigonal or suborbicular, thick, with concentric convex ridges, narrower than their interstices, the margin crenate within. *Danmonia*, Devonshire.

2. *Astárte Scótica*.—Shell rotundato-trigonal or suborbicular, thick, with concentric convex ridges, narrower than their interstices, the margin plain within. *Scoticus*, inhabiting Scotland.

3. *Astárte sulcáta*.—Shell rotundato-trigonal, convex, subangulated behind, the anterior end longer, very thick, with concentric convex ridges, of the same breadth as the interstices, the margin crenate within. *Sulcátus*, furrowed.

4. *Astárte elliptica*.—Shell ovato-elliptical, compressed, the anterior end much shorter, moderately thick, with broad little elevated concentric ridges, becoming obsolete at the two ends, the margin plain. Named from its elliptical form.

5. *Astárte multicostáta*.—Shell trigonal, moderately convex, the anterior end slightly longer, thick, with about forty regular concentric convex ridges, the margin plain. Named from its numerous ribs.

6. *Astárte compréssa*.—Shell ovato-trigonal, compressed, the anterior end shorter, moderately thick, with irregular flattened ridges and shallow grooves, obliterated toward the margins, which are plain. *Compréssus*, flattened vertically.

GENUS 4. *CYTHERÆA*.—Shell suborbicular, moderately convex, concentrically striated; umbones small; three divergent teeth in one valve, four in the other; pallial impression invaded by an oblique tapering sinus. *Cytheræa*, a title given to Venus, from the island of Cythera.

1. *Cytheræa exoléta*.—Shell orbicular, subequilateral, moderately convex, with concentric striæ, dull yellowish or reddish-white, with radiating reddish or purplish bands. *Exolétus*, worn.

2. *Cytheræa línta*.—Shell suborbicular, inequilateral, moderately convex, with fine concentric striæ, glossy, greyish-white. *Líntus*, licked.

3. *Cytheræa undáta*.—Shell suborbicular, convex, thin, with numerous concentric striæ and larger rugæ, the margin sinuous. *Undatus*, wavy.

GENUS 5. VENUS.—Shell suborbicular, subtriangular, or cordato-ovate, moderately convex, concentrically striated; umbones prominent; three divergent teeth in each valve. Named after the goddess *Venus*. Linnæus.

1. *Vénus Casina*.—Shell suborbicular, moderately convex, very thick, with concentric elevated thick entire ridges.

2. *Vénus refléxa*.—Shell suborbicular, compressed, rather thin, with concentric elevated, reflexed, thin-edged ridges. *Refléxus*, bent back.

3. *Vénus Gallína*.—Shell cordato-trigonal, moderately convex, concentrically lamelloso-sulcate. *Gallína*, a hen.

A. *V. Gallína lámínosa*. Covered with plaits.

B. *V. Gallína striátula*. Marked with small streaks.

4. *Vénus Prideauxiána*.—Shell cordato-trigonal, rather compressed, concentrically lamellate. Named after Mr. Prideaux.

5. *Vénus fasciáta*.—Shell roundish-trigonal, compressed, thick, with broad flattened, smooth, concentric ridges, *Fasciátus*, banded.

6. *Vénus ováta*.—Shell ovato-triangular, rather thin, divergently ribbed, and reticulated by numerous concentric striæ. *Ovátus*, egg-shaped.

7. *Vénus trianguláris*.—Shell subtrigonal, smooth, with three teeth in one valve, and two in the other. *Trianguláris*, three-cornered.

GENUS 6. VENERUPIS.—Shell ovate or elliptical, very inequilateral, convex, concentrically striated; umbones



small; three small, prominent divergent teeth in each valve. *Rúpes*, a rock, and *Vénus*: Rock-Venus. Lamarck.

1. *Vénérupis virgínea*.—Shell ovato-oblong, considerably compressed, concentrically striate, yellowish-white, with radiating bands of florid dots or spots. Named from its beauty.

2. *Vénérupis pullástra*.—Shell ovato-oblong, moderately compressed, divergently and concentrically striate, yellowish or whitish, plain, or patched with brown. *Pullástra*, a pullet.

A. *V. Pullástra arenicola*. Living among sand.

B. *V. Pullástra perforans*. Boring.

#### FAMILY VII.—CARDIINA.

Animal roundish, ovate, or oblong, with the mantle closed, but having an opening for the foot, and two extensile tubes; the foot large, compressed, tapering. Shell equivalve, entirely closed, generally very convex; the hinge with central and lateral teeth. Named from the genus *Cardium*.

GENUS 1. *CARDIUM*.—Shell subcordiform, roundish, ventricose, equivalve, inequilateral, with radiating ribs; umbones large; hinge with two central teeth and two deep pits in each valve. *Kapdiov*, the heart.

1. *Cárdium echinátum*.—Shell cordate, obliquely roundish, tumid, with twenty convex, spiniferous ribs. *Echinátus*, with prickles.

A. *C. echinatum vulgare*. Common.

B. *C. echinatum aculeatum*. Prickly.

2. *Cárdium édule*.—Shell cordate, obliquely roundish, or subtriangular, tumid, with twenty-eight flattened, transversely lamellar ribs. *Eduilis*, eatable.

3. *Cárdium fasciátum*.—Shell subcordate, nearly orbicular, convex, with twenty-six little elevated convex, glossy ribs, marked toward the margins with transverse lamellæ, becoming elevated at either end, especially the posterior. *Fasciátus*, banded.

4. *Cárdium exíguum*.—Shell subcordate, suborbicular,

somewhat oblique, convex, with twenty-four little elevated, convex, smoothish ribs, marked toward the margins with transverse lamellæ, becoming elevated into triangular spines at the posterior end, where the interstices are granulate. *Exiguus*, very diminutive.

5. *Cardium lævigatum*.—Shell roundish-oval, much produced behind, moderately convex, with a yellowish epidermis, and very numerous obsolete ribs. *Lævigatus*, smoothed.

6. *Cardium elongatum*.—Shell ovato-orbicular, somewhat oblique, compressed, with the dorsal margin nearly straight, and about twenty-six convex, echinate ribs. *Elongatus*, lengthened.

GENUS 2. DONAX.—Shell subtriangular, compressed, very inequilateral; the posterior end shorter and angulate; umbones small; two small divergent central teeth in both valves. *Dónax*, a kind of shell. Linnæus.

1. *Dónax trunculus*.—Shell oblong, anteriorly prolonged and rounded, posteriorly angulate, smooth, with faint divergent striæ. *Trunculus*, cut short.

2. *Dónax denticulatus*.—Shell crenato-triangular, anteriorly prolonged and semioblong, posteriorly angulate, glossy, with fine radiating striæ, which are punctured or transversely grooved. Named from the denticulated or crenated margin.

#### FAMILY VIII.—TELLININA.

Animal orbicular, roundish, or oblong, compressed, with the mantle open anteriorly for the foot, and bordered with tentacular appendages, closed behind, but with an aperture for the elongated and separated siphons; foot much compressed, sharp-edged; shell orbicular, roundish, or oblong, inequivalve, inequilateral, the posterior end shorter, and flexuous; hinge with one or two small central teeth. Named from the genus *Tellina*.

GENUS 1. KELLIA.—Shell roundish or oval, equivalve, convex, closed, concentrically striate; umbones rather large; hinge with two central teeth in one valve, a tooth

and a depression in the other. Named after Mr. O'Kelly, of Dublin. Turton.

1. *Kéllia suborbiculáris*.—Shell roundish-elliptical, isomeral, convex, very thin, fragile, semitransparent, obsoletely concentrically striate. *Suborbiculáris*, nearly spherical.

2. *Kéllia rúbra*.—Shell ovato-rotundate, anisomeral, convex, moderately thick, obsoletely concentrically striato-sulcate. *Rúber*, red.

GENUS 2. LEPTON.—Shell suborbicular, equivalve, compressed, slightly open at the ends, concentrically striate; umbones small; hinge with a small tooth and two depressions in one valve, a medial depression and two lamelliform lateral teeth in the other. *Λεπτός*, thin, small. Turton.

1. *Lépton nitidum*.—Shell ovato-orbicular, subtrigonal, nearly equilateral, semitransparent, glossy, faintly striated concentrically. *Nitidus*, shining.

GENUS 3. CRYPTODON.—Shell suborbicular, nearly equivalve, inequilateral, concentrically striate; umbones small; hinge with a small tooth in each valve, and thickened margins; two longitudinal plicæ along the posterior margin. *Κρυπτός*, concealed; *ὀδούς*, tooth. Turton.

1. *Cryptodon flexuosus*.—Shell suborbicular, very convex, thin, brittle, transparent, with a deep sinus bounded by two rounded plicæ on the hind part of each valve. *Flexuosus*, bent or winding.

GENUS 4. TELLINA.—Shell roundish, subtrigonal, or oblong, inequivalve, inequilateral, concentrically striated, much compressed, umbones small, hinge with two small teeth in each valve, or two in one, and a single tooth in the other; ligament external and prominent. Name obscure. Linnæus.

1. *Tellina solidula*.—Shell orbiculato-trigonal, convex, obsoletely rugoso-striate, varying in colour from white to pink. *Solidulus*, small and firm.

2. *Tellina crássa*.—Shell ovato-orbicular, compressed,

rather thick, with numerous close concentric small ridges, whitish with pink rays. *Crassus*, thick.

3. *Tellina tenuis*.—Shell ovate, compressed, very thin, glossy, concentrically striate, white, yellow, or pink. *Tenuis*, thin.

4. *Tellina Fíbula*.—Shell ovate, compressed, very thin, glossy, white, with one valve concentrically, the other obliquely striate. *Fíbula*, a small bean.

#### FAMILY IX.—SOLEININA.

Animal much elongated, with the mantle closed, but having an opening in front for the foot, and forming behind a tube, internally double; the foot conical. Shell long, equivalve, extremely inequilateral, thin, gaping at both ends, and covered with epidermis; the hinge with not more than two small, prominent teeth in each valve; the ligament linear and dorsal. Named from the genus *Solen*.

GENUS 1. *SOLEIN*.—Shell extremely elongated, linear or oblong, equivalve, extremely inequilateral; umbones very small, near one end; cardinal teeth very small. *Sólen*, a razor-shell. Linnæus.

1. *Sólen Síliqua*.—Shell extremely elongated, slender, straight, truncate at both ends. *Síliqua*, a pod.

2. *Sólen Ensis*.—Shell extremely elongated, slender, rearcuate, truncato-rotundate at both ends. *Ensis*, a sword.

3. *Sólen pellúcidus*.—Shell much elongated, linear-oblong, slightly recurved, rounded at both ends. *Pellúcidus*, permeable to light.

GENUS 2. *PSAMMOBIA*.—Shell oblong or elliptical, inequilateral; umbones very small; cardinal teeth very small. *Ψάμμος*, sand; *βιώω*, to live. Lamarck.

1. *Psammóbia Feröensis*.—Shell oblong, much compressed, anteriorly rounded, posteriorly obliquely truncate, finely striated concentrically, with a prominent line from the umbo to the posterior angle. Named from its occurring in Feroe.

GENUS 3. *SAXICAVA*.—Shell oblong, very inequilateral, convex, covered with epidermis; umbones prominent; hinge with small divergent teeth; ligament external. *Saxum*, a stone; *cavus*, hollow. Lamarck.

1. *Saxicava rugosa*.—Shell oblong, elliptical, or obovate, regular or variously distorted, rather thick, coarsely rugose; the anterior end short and rounded, the posterior prolonged, with a prominent line from the umbo to the angle. *Rugosus*, wrinkled.

2. *Saxicava arctica*.—Shell oblong or linear-oblong, regular or distorted, thin, coarsely wrinkled; the anterior end very short, angulate, the posterior abrupt or rounded, with two prominent spiniferous ridges on each side. *Arcticus*, northern.

#### FAMILY X.—MACTRINA.

Animal oval or elliptical, compressed, with the mantle closed, but open in front for the foot, and forming behind a tube internally double; the foot large, compressed, bent; shell roundish, oval, or subtrigonal, equivalve, inequilateral, more or less gaping at both ends; the hinge with an oblique triangular depression for the internal ligament; a small external ligament also. Name from the genus *Maetra*.

GENUS 1. *MACTRA*.—Shell oval or subtriangular, compressed, concentrically striated; open a little at both ends; umbones prominent; hinge with a large triangular fossa, and angularly bent thin tooth. *Maetra*, a kneading-trough. Linnæus.

1. *Maetra stultorum*.—Shell ovato-trigonal, thin, subdiaphanous, radiated with pale red and white. *Stultorum*, of fools.

2. *Maetra solida*.—Shell subtrigonal or subelliptical, very thick, subantiquated, white. *Solidus*, solid or thick.

3. *Maetra elliptica*.—Shell subelliptical, very thin, subpellucid, smoothish, with the epidermis greyish-yellow. *Ellipticus*, oblong and equal at both ends.

4. *Maetra subtruncata*.—Shell trigonal, with the

posterior end more produced and angulate, thin, striated, with the epidermis greyish-yellow. *Subtruncátus*, somewhat cut short.

GENUS 2. GOODALLIA.—Shell trigonal, moderately convex, closed at both ends; umbones prominent; hinge with two teeth and an intervening triangular cavity in one valve, a single tooth in the other. Named by Dr. Turton, after Dr. Goodall, Provost of Eton.

1. *Goodállia trianguláris*.—Shell trigonal, with the margin internally denticulate. *Trianguláris*, three-cornered.

2. *Goodállia minutíssima*.—Shell trigonal, with the margin internally even. Named from its small size.

GENUS 3. LUTRARIA.—Shell roundish or oval, inequivalve, much compressed, thin, concentrically striated, open at both ends; umbones small; hinge with a large triangular fossa, and small angularly bent tooth. *Látum*, mud. Lamarck.

1. *Lutrária elliptica*.—Shell elliptical, compressed, thin, with a yellowish-grey or dusky epidermis. *Ellipticus*, of the form of an ellipse.

2. *Lutrária Listéri*.—Shell roundish-triangular, much compressed, thin, dull white. Named after Dr. Lister, an English naturalist.

GENUS 4. AMPHIDESMA.—Shell oval or oblong, compressed, equivalve, inequilateral, very thin, glossy, with a delicate epidermis; umbones very small; hinge with an oblique concave prominence in each valve, for the internal ligament, the external short. Ἄμφι, about; δέσμα, a band. Lamarck.

1. *Amphidésma álbum*.—Shell ovate, very inequilateral, pellucid, white. *Albus*, white.

2. *Amphidésma ténue*.—Shell ovato-triangular, nearly equilateral, pellucid, white. *Tenuis*, thin.

3. *Amphidésma prismáticum*.—Shell ovato-oblong, very inequilateral, very delicate, transparent, hyaline-white. Named from its iridescence, or reflection of colours like those seen in a glass *prism*.

GENUS 5. ANATINA.—Shell oval, inequivalve, inequilateral, very thin, brittle, gaping and more or less truncate behind; umbones small; hinge with an abrupt sinus and a projecting spoon-shaped lamina. *Anas*, a duck; eaten by sea-ducks. Lamarck.

1. *Anatina prætenuis*.—Shell ovate, rather compressed, the anterior end rounded, the posterior subtruncato-rotundate and roughish with minute prominences. *Prætenuis*, very thin.

2. *Anatina truncata*.—Shell subovate, rather compressed, the anterior end rounded, the posterior narrowed, subtruncate, and roughish with minute prominences. *Truncatus*, cut short.

GENUS 6. THRACIA.—Shell ovato-oblong, inequivalve, inequilateral, very thin, brittle, gaping and more or less truncate behind; umbones rather prominent; hinge with a horizontal, oblique, concave tooth. Deshayes.

1. *Thracia declivis*.—Shell oval, convex, very thin, with the posterior end narrowed, compressed, roundly truncate. *Declivis*, sloping.

2. *Thracia pubescens*.—Shell ovato-oblong, somewhat compressed, very thin, with the posterior end truncate, the surface very minutely punctulate, roughish behind. *Pubescens*, downy.

#### FAMILY II.—MYINA.

Animal elliptical, ovate or oblong, compressed, with the mantle closed beneath, open in front for the foot, and forming behind two long united or separated tubes; foot small, compressed, tapering; shell elliptical, oval, or oblong, generally inequivalve, gaping at both ends; the hinge with a concave tooth in one valve, and a corresponding depression in the other for the ligament.

GENUS 1. MYA.—Shell ovate or oblong, inequivalve, inequilateral, convex, gaping at both ends; umbones small; hinge strong, with a horizontal spoon-shaped process; ligament internal. *Mvaξ*, a kind of shell-fish. Linnæus.

1. *Mya truncáta*.—Shell ovate, abruptly truncate behind. *Truncátus*, cut short at one end.

2. *Mya arenária*.—Shell ovate, rounded at both ends. *Arenárius*, living among sand.

3. *Mya ovális*.—Shell ovato-elliptical, rounded and somewhat reflexed behind, the umbones nearly central. *Ovális*, like an egg.

GENUS 2. LYONSIA.—Shell oblong, much compressed, inequivalve, inequilateral, open behind; umbones very small; hinge toothless, but with an intervening calcareous body. Named after Mr. Lyons. Turton.

1. *Lyonsia Norwégica*.—Shell oblong, very thin, pearly within, the anterior end shorter and rounded, the posterior truncate. Named from its occurring in Norway.

GENUS 3. SPHENIA.—Shell oblong, inequivalve, inequilateral, gaping behind; umbones very small; hinge of the left valve with a thin dilated horizontal adnate tooth, that of the right valve with a concave tooth and an anterior minute prominence. Σφήν, a wedge. Turton.

1. *Sphénia Swainsónii*.—Shell oblong, rounded at both ends, much compressed, deeply striated concentrically. Named after Mr. Swainson.

2. *Sphénia costuláta*.—Shell ovato-elliptical, moderately convex, radiatingly costulate, concentrically striulate. *Costulátus*, having small ribs.

GENUS 4. MONTACUTA.—Shell ovate or oblong, rounded at both ends, equivalve, inequilateral, slightly gaping behind, very thin, fragile, glossy; umbones small; hinge with a deep sinus and two prominent diverging teeth, one of which is concave, for the ligament. Named after Montagu, by Dr. Turton.

1. *Montacúta bidentáta*.—Shell ovate, somewhat pellucid, very inequilateral, the posterior end much shorter and narrower. *Bidentátus*, having two teeth.

2. *Montacúta oblónga*.—Shell oblong, very thin, compressed, transparent, inequilateral, rounded at both ends. *Oblóngus*, longer than broad.

3. *Montacúta glábra*.—Shell ovato-oblong, sub-



elliptical, convex, somewhat pellucid, very inequilateral, nearly equally rounded at both ends. *Glaber*, smooth.

4. *Montacuta substriata*.—Shell ovate, semitransparent, faintly striated concentrically, and marked with obsolete radiating striulæ. *Substriatus*, somewhat striated.

GENUS 5. CORBULA.—Shell very inequivalve, inequilateral, little gaping; right valve with the umbo prominent; hinge with a curved pointed tooth and a cavity in the right, and a spoon-shaped tooth in the left valve; ligament internal. *Córbis*, a twig basket. Bruguière.

1. *Corbula inæquivalvis*.—Shell rotundato-trigonal, very inequivalve, concentrically striato-sulcate, the smaller valve with radiating lines. *Inæquivalvis*, having unequal valves.

#### FAMILY XII.—PHOLADINA.

Animal having the mantle closed and more or less tubular, with an anterior aperture for the foot, which is small, and two elongated coherent tubes; the branchiæ elongated, extending into the siphon. Shell generally bare, white, brittle, open at both ends, with the hinge toothless, the ligament external, often with a calcareous plate. Name from the genus *Pholas*.

GENUS 1. PHOLAS.—Shell oval or oblong, equivalve, inequilateral, thin, white, open at both ends; hinge furnished with accessory plates; a curved calcareous process under the umbo. Φωλάς, dwelling in caverns. Linnæus.

1. *Phólas crispáta*.—Shell subovate, widely open at both ends, convex, angulate before, with a ridge from the umbo to the lower margin. *Crispátus*, marked with undulated laminæ.

2. *Phólas cándida*.—Shell ovato-oblong, less open at the anterior end, convex, thin, with radiating elevated lines decussated by concentric lines. *Cándidus*, white.

## ORDER I.—TROPIPODA LAMELLIBRANCHIATA.

Respiratory apparatus of two unequal pairs of very thin expanded branchiæ, on the sides of the body, within the mantle.

## SECTION I.—MONOMYARIA.

*A single large adductor muscle, leaving a rounded impression in each valve.*

## FAMILY I.—PECTININA.

Animal orbicular or roundish, compressed; with the lobes of the mantle disunited beneath, or nearly in their whole extent, their margin thickened, and fringed with several rows of filaments; the foot small or rudimentary, somewhat dilated at the end; the adductor muscles approximated or united; branchiæ large, united in the median line, and decomposed into filaments; mouth rather large, with prominent lips and four pairs of triangular palpi.

Shell regular, inequivalve, auriculate, internally compact; more or less radiatingly costate or striate, with the hinge divergently plicate or toothless, and having a central depression for the ligament, which is thus internal; the muscular impression very large, subcentral.

The Pectinina are all marine, free or affixed to other bodies, and apparently zoophagous. Some of them afford much esteemed articles of food. It is remarkable that the common oyster, so abundant on many parts of the British coasts, is nowhere met with on those of Aberdeenshire.

## GENUS I. PECTEN. SCALLOP.

Animal roundish, compressed. The lobes of the mantle very thin, disunited, thickened on the margins, and furnished with several rows of fleshy filaments, be-

tween which are oculiform tubercles. The mouth rather large, oval, with prominent, deeply cut lips, and on each side a pair of truncated palpi. Branchiæ large, divided into filaments. Adductor muscle very large, subcylindrical, subcentral.

Shell free, regular, inequivalve, roundish, compressed, divergently costate; umbones very small, pointed, direct, contiguous. Cardinal space narrow, elongated into a straight margin, with a triangular pit, and divergent lateral grooves and ridges, in each valve; lateral teeth remote, in one valve an elongated obtuse rib on each side, in the other a notched prominence. Ligament internal, trigonal, received by the cardinal pits. A single very large muscular impression.

#### 1. *Pecten máximus*. *Great Scallop*.

Shell nearly orbicular, inequivalve; the lower valve convex, with sixteen convex ribs, which, with their nearly equal convex interstices, are longitudinally striate; upper valve flat, toward the hinge concave, with sixteen convexo-depressed ribs, which, with their wider concave intervals are finely lamellostriate; the auricles nearly equal, and divergingly costato-rugose; externally the lower valve yellowish-white, the upper chiefly brownish-red; internal surface glossy, smooth, with a large roundish, muscular impression, and toward the margin marked with prominent flattened, marginate ribs, white, the upper valve margined with red; margins of convex valve extending beyond those of the other. Greatest length of the largest specimen obtained by me six inches, height five inches and eight-twelfths. Its greatest diameter however is sometimes nine inches.

In deep water, on hard ground, off the coast. Dead valves very frequently brought up by the lines. In the Winter of 1841, I obtained a recent shell, three inches long; and in the Summer of 1842, a valve of another found on the beach by the preventive-service people, six inches in diameter. Miss Macgillivray procured one measuring four inches and ten-twelfths, by five inches and a quarter, at Gamrie, in September.

*Pecten maximus*, circiter 14 striis. Lister. Anim. Angl. 184. Pl. 5. f. 29.—*Ostrea maxima*. Linn. Syst. Nat. i. 1144.—*Pecten maximus*. Turt. Brit. Biv. 207.—*Pecten maximus*. Flem. Brit.

Anim. 383.—*Pecten maximus*. Lamk. Syst. vi. 163; Ed. 2. vii. 129.—*Pecten maximus*. Penn. Brit. Zool. iv. 99. Pl. 58. f. 61; Ed. 2. iv. p. 219. Pl. 62.—*Pecten maximus*. Mont. Test. Brit. 143.

### 2. *Pecten opercularis*. Common Scallop.

Shell nearly orbicular, inequivalve; the lower valve more convex, with twenty-two convex subcarinate ribs, which, with their concave interstices, are longitudinally striate, and transversely lamelloso-striate; upper valve convex, with twenty-four convex ribs, more rounded than the lower, their intervals more finely striate; the auricles rather unequal, divergingly costatogrooved, and concentrically lamelloso-striate; one of those of the upper valve with a deep notch between it and the margin of the shell, and along the groove is a series of small teeth; internal surface glossy, with flattened ribs, more distinct toward the margin; lower valve externally variegated with red, brown, and white; upper paler; interior white. Diameter three inches or more; but the largest that I have seen from our coasts measures only two inches and one-twelfth in length, two and a fourth in breadth. Variations as to colour are endless; sometimes the inside also tinged. Young shells have the ribs carinate, and smoothish on the ridge.

In deep water, on hard ground, off the coast at Aberdeen, not uncommon; dead shells abundant; also at Cruden, Peterhead, Gamrie, Banff, and Macduff.

*Pecten opercularis*. Test. Brit. Biv. 209.—*Ostrea opercularis*. Linn. Syst. Nat. i. 1147.—*Pecten opercularis*. Mont. Test. Brit. 145.—*Pecten opercularis*. Flem. Brit. Anim. 383.—*Pecten lineatus*. Penn. Brit. Zool. iv. 99. Pl. 59. f. 61. iv. 222.—*Pecten opercularis*. Lamk. Syst. vi. 174; Ed. 2. vii. 142.—*Pecten subrufus*. Penn. Brit. Zool. iv. 102. Pl. 61. f. 64.—*Pecten tenuis subrufus*, maculosus, circiter 20 striis. Lister. Anim. Angl. 185. Pl. 5. f. 30.

### 3. *Pecten varius*. Variegated Scallop.

Shell roundish, somewhat ovate, nearly equivalve; the lower valve a little more convex; both with about thirty-two rounded, somewhat compressed ribs, which are irregularly elevated into concave laminiform prickles, the grooves finely reticulated; the auricles very unequal, one of those of the less convex valve separated by a deep incision; the colour various. Diameter about two inches.

Found by Mr. Alexander Murray, on the coast of Peterhead and St. Fergus, in September, 1842.

*Ostrea varia*. Linn. Syst. Nat. 1146.—*Ostrea varia*. Penn. Brit. Zool. iv. 101. Pl. 61. f. 64.—*Pecten varius*. Mont. Test. Brit. 146.—*Pecten varius*. Lamk. Syst. vi. 175; Ed. n. vii. 147.—*Pecten varius*. Flem. Brit. Anim. 384.—*Pecten varius*. Turt. Brit. Biv. 146.

#### 4. *Pecten Isabellæ*. *Isabella's Scallop*.

Shell ovato-rotundate nearly equivalve, little convex, with twenty-four slender, compressed, rounded ribs, having very numerous elevated thin-edged lamellæ, rising toward the margin into triangular, compressed, pointed spines; the grooves with transverse scalar lamellæ, not extending over the ridges; the ears very unequal being in length as one to two, divergently sulcate, transversely lamellate, and echimate; the margins of the upper valve under the auricular sinus with four free curved conical spinelets, of which a series is continued to the smooth and glossy umbo; the colour white, the lower valve tinged with pink. Length three-twelfths and a fourth, breadth two-twelfths and three-fourths.

The animal yellowish-white, with the margins of the mantle-lobes marked with carmine dots.

Found by me among ascidiæ and corallines in a dead valve of *Cyprina Islandica*, brought from deep water off Aberdeen.

This most beautiful *Pecten* cannot be at all confounded with *Pecten varius*, or *Pecten niveus*, to which it is allied in its mode of echination. I have named it after my daughter Isabella, who has greatly aided me in adding to the number of Mollusca of which my catalogue consists.

#### 5. *Pecten sinuosus*. *Distorted Scallop*.

Shell somewhat orbicular, with the upper valve less convex, both irregularly undulated or distorted, and marked with about forty crowded, unequal, variously distorted, more or less scaly or spinous ribs; the ears generally large, often very unequal, sometimes nearly equal; the colours various, generally red and white. Diameter nearly two inches.

Found by Mr. Alexander Murray in the parishes of Peterhead and St. Fergus, and in Cruden Bay, in September, 1842; by me on the beach, near Don-mouth, in October.

*Pecten minimus* augustior, inæqualis, &c. Lister. Anim. Angl. 186. Pl. 5. f. 31.—*Ostrea sinuosa*. Gmel. Linn. Syst. Nat. 3319.—*Ostrea Pusia*. Penn. Brit. Zool. iv. Pl. 61. f. 65.—*Pecten distortus*. Mont. Test. Brit. 148.—*Pecten sinuosus*. Turt. Brit. Biv. 210.—*Pecten sinuosus*. Lamk. Syst. vi. 175; Ed. n. vii. 148.—*Pecten sinuosus*. Flem. Brit. Anim. 384.

6. *Pecten Púσιο. Dwarf Scallop.*

Shell ovate, or ovato-oblong, equivalve; both valves with about forty alternately large and small, regular, compressed, obtuse, somewhat undulated or nodose ribs, becoming more or less scaly or spinous at the margin; the ears very unequal, one of them being almost obliterated; the colours various, generally red or purplish and white or yellow. The greatest diameter about three-fourths of an inch.

This shell, which is very common in the outer Hebrides, and on some of the western coasts of Scotland, appears to be of rare occurrence in our district, where, on the coast of Buchan, it was found in September, 1842, by Mr. Alexander Murray. It seems to me perfectly distinct from either *Pecten varius*, or *Pecten distortus*, but is much more nearly allied to the latter.

*Ostrea Pusio*. Linn. Syst. Nat. 1146.—*Pecten Pusio*. Turton, Brit. Biv. 215. Pl. 17. f. 2.—*Pecten Pusio*. Flem. Brit. Anim. 385.

7. *Pecten Islandicus. Icelandic Scallop.*

Shell suborbicular, subinequilateral, subequivalve, with about forty crowded, narrow, convex, transversely lamellosostriate, subscabrous ribs, which subdivide as they proceed from the umbones, so as to amount to a hundred and twenty or more at the margins; auricles unequal, similarly ribbed; lower valve externally yellowish-white; upper variously tinged with reddish-yellow, rose-colour, purple, or chestnut; inner surface glossy, pearly, more or less ribbed, with very marked impressions. Diameter four inches or more.

Dead valves very common in deep water, off the coast at Aberdeen and Gamrie. No live individual hitherto found.

*Pecten Islandicus*. Flem. Brit. Anim. 385.—*Pecten Islandicus*. Turt. Brit. Biv. 216.—*Pecten Islandicus*. Lamk. Syst. vi. 258; Ed. 2. vii. 145.

8. *Pecten obsolétus. Striulate Scallop.*

Shell triangular-orbicular, thin, subdiaphanous, with the valves little convex, one less so, with very obsolete longitudinal ridges, and toward the margin numerous striæ, and minutely shagreened all over with longitudinal striulæ, diverging toward either side, and crossed by fainter striulæ; the ears very unequal, the larger with a few prominent straight, longitudinal, and numerous transverse, undulated striæ; the colour various, whitish, pinkish, purple, brown, yellow, orange, transversely banded, or spotted, patched or clouded with red,

brown, or purple of various tints; the inner surface also coloured, conformably or uniformly. Length eleven-twelfths, breadth an inch.

Not uncommon in deep water off Aberdeen. Dead valves frequently brought up from deep water by the lines; live individuals now and then. In the Winter of 1841-42, Mr. Leslie, Mr. Davidson, and others, obtained specimens; in September following Miss Macgillivray obtained a vast number at Gamrie, which had been taken from the stomachs of Flounders.

*Pecten obsoletus*. Penn. Brit. Zool. iv. 102. Pl. 61. f. 66. Ed. 2. iv. 222. Pl. 64. f. 3.—*Pecten obsoletus*. Mont. Test. Brit. 149. Suppl. 57.—*Pecten obsoletus*. Turt. Brit. Biv. 213. Pl. 9. f. 6.—*Pecten obsoletus*. Flem. Brit. Anim. 385.

#### 9. *Pecten lævis*. *Smooth Scallop*.

Shell orbicular, subtriangular, little convex, very thin, fragile, semitransparent, glossy; the valves nearly equal, with the two sides equally angulato-rotundate; the auricles unequal, the larger with its lateral outline vertical, the smaller deeply striated; the external surface smooth, but with obsolete concentric rugæ, the internal obsoletely undulated transversely, with faint divergent striules; the colour various, yellowish or whitish, spotted with red or white. Diameter seven-twelfths of an inch.

This species is perfectly distinct from any variety of *Pecten obsoletus*, or of the following, which it closely resembles in some respects.

Found by me at Aberdeen, in October, 1842.

*Pecten lævis*. Penn. Brit. Zool. iv. 223.—*Pecten lævis*. Mont. Test. Brit. Suppl. 61.—*Pecten lævis*. Turt. Brit. Biv. 213.—*Pecten lævis*. Flem. Brit. Anim. 385.

#### 10. *Pecten similis*. *Laskey's Smooth Scallop*.

Shell orbicular, flattish, very thin, fragile, semitransparent, smooth, glossy; the valves nearly equal, with one side more produced; the umbones nearly central, pointed; hinge-line straight; auricles nearly equal in length, smooth, the larger with its lateral outline sloping; colour various. One individual white, with transverse red bands; another yellowish-white, irregularly variegated with white and brownish-red; another greyish-white or hyaline, with a few very faint red markings. Length three-twelfths, breadth three-twelfths and a quarter.

First found in the Winter of 1841, by Mr. Leslie, at Aberdeen and the Cove.

*Pecten similis*. Laskey, Wern. Mem. i. 387. Pl. 8. f. 8, 8.—  
*Pecten similis*. Flem. Brit. Anim. 385.

### 11. *Pecten tumidus*. Unequal-sided Scallop.

Shell suborbicular, flattish, thin, fragile, smooth, semitransparent toward the margins, opaque-white in the centre; the valves almost equal, with one side bulging; umbones nearly central, pointed, hinge-line straight; auricles about equal in length, smooth, being but faintly marked with growth-lines; colour white. Diameter a quarter of an inch.

This species can hardly be confounded with either of the two last, unless by persons who may suspect all little smooth pectens to be the same. All the specimens seen by me have an opaque white central portion, the margin transparent, the small auricle of the upper valve rounded, the auricles not striated longitudinally, and one of the sides very prominent. Small specimens of the same size as Turton's figure agree perfectly with it, and, although the circumstance is not mentioned in the description, it will be seen to be white in the centre.

First found by Mr. Alexander Davidson in the stomach of a haddock, Aberdeen, in the Winter of 1841; by me, on the beach there, in October, 1842.

## GENUS 2. LIMA. RASP-SCALLOP.

Shell free, regular, oval or oblong, equivalve, anisomeral, divergently costulate or striate; umbones very small, pointed, direct, not contiguous. Cardinal space elongated, with a straight margin, and having externally a somewhat triangular concave depression. Ligament external, trigonal, received by the cardinal pits.

### 1. *Lima Loscömbi*. Loscombe's Rasp-Scallop.

Shell obliquely oval-oblong, tumid, thin, brittle, pellucid; with the hinge auriculate; the umbones small, projecting a little beyond the margin; the valves equal, with fine concentric striulæ, and numerous slightly undulated, radiating costulæ, with intervening striæ, generally two or three between each pair; the colour hyaline-white; the inside glossy, with the radiating markings apparent. Length in the direction



parallel to the hinge six-twelfths, height from the umbo to the margin ten-twelfths.

A single broken valve found among shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842.

*Pecten fragilis*. Mont. Test. Brit. Suppl. 62.—*Pecten bullatus*, Chemnitz, Conch. vii. 342. Pl. 68. f. 649, 3.—*Lima bullata*, Turt. Brit. Biv. 217. Pl. 17. f. 4, 5.—*Lima fragilis*. Flem. Brit. Anim. 388.

### GENUS 3. CRENELLA.

Shell free, subelliptical, convex, equivalve, isomeral, nacreous; the hinge with a single abrupt fold or tooth in each valve, and a sinus under the umbo; the ligament external, in a narrow groove parallel to the hinge-margin; the umbones prominent and contiguous; the valves radiatingly striate, and concentrically striulate.

#### 1. *Crenella decussata*. *Decussated Crenella*.

Shell suborbicular, more extended in the direction from the umbones, being somewhat elliptical, equivalve, isomeral; the valves convex, rather thin, pellucid, nacreous, radiatingly striate, and marked with concentric striulæ, as well as somewhat regularly spaced growth-lines or ridges, producing a decussated appearance; the umbones prominent, a little curved to one side at the point, contiguous, and central; the hinge thin, with a sinus and a thick angular fold in each valve, under the umbo, between which and the margin is a narrow groove for the ligament; the inner surface glossy and nacreous, but not presenting perceptible muscular impressions; the margin thinner and crenulate, especially toward the hinge.

Of this very beautiful shell two specimens, from which the above description has been taken, were found among shell sand, from the Bay of Cruden, sent by Mr. Alex. Murray, in November, 1842. One, entire, but only a third of a twelfth of an inch in diameter, found by Miss Marion Macgillivray, is nearly quite orbicular; the other, a single valve, found by my son, Paul Howard, is a tenth of an inch in diameter, and somewhat elongated, or subelliptical.

The species was discovered in sand near Dunbar, by Captain Laskey. It was accurately described by Montagu, under the name of *Mytilus decussatus*, from a single valve. Being obviously not a *Mytilus*, Captain Brown named it *Crenella elliptica*,

but his figure is very incorrect. It seems to be nearly allied to *Pecten* and *Lima*, and to have a single muscle only, although the impression is not defined.

*Mytilus decussatus*. Mont. Test. Brit. Suppl. 69.—*Mytilus decussatus*. Laskey, Wern. Mem. i. 394. Pl. 8. f. 17.—*Crenella elliptica*. Brown, Illustr. Pl. 31. f. 12, 13, 14.—*Mytilus decussatus*. Flem. Brit. Anim. 411.

#### GENUS 4. ANOMIA. SCALE-OYSTER.

Animal roundish, very much compressed. The lobes of the mantle very thin, their margins furnished internally with a row of tentacular filaments. Foot very small. Mouth with prominent lips, and on each side two pairs of triangular palpi. Branchiæ filamentous. Adductor muscle divided into three portions, of which the largest passes through an opening in the flat valve, and attaches the animal to some solid body by means of a hard lamina.

Shell roundish, irregular, inequivalve, delicate, fragile; the lower valve flat, or having the curves of the surface to which it is applied, with a roundish aperture or notch near the hinge for the attachment of the animal to some hard substance.

The species live affixed to stones, crabs, shells, fuci, and other substances.

##### 1. *Anómia Ephíppium*. *Saddle Scale-Oyster*.

Shell roundish, but variable, thin, somewhat translucent, white; the upper valve little convex, irregularly undulated, squamoso-lamellate, with the beak small; lower valve very thin, uneven, concentrically striated, with the aperture oval; opercular plate thickish, concentrically striated.

It varies greatly in form, thickness, convexity, and markings, as well as in colour, being frequently tinged with green on its inner surface. "Happening to be attached to *Pectens*," says M. Deshayes, "the individuals of this species, as well as of others of the same genus, are impressed upon the ribs, of which their shell takes the form. This is so true, that it is not rare to meet with individuals of which the ribs run transversely, while in others they are oblique, and others have the ribs broad toward their summit, narrow toward their margins, because

they have grown in the opposite direction to that of the Pecten on which they have lived. This property which the Anomiæ have of assuming and retaining the impression of the foreign bodies to which they adhere ought to render us very circumspect in defining species."

Common on stones, live and dead shells, crustacea, and tangles.

*Anomia Ehippium*. Linn. Syst. Nat. i. 1150.—*Anomia Ehippium*. Penn. Brit. Zool. iv. 109. Pl. 62; Ed. 2. iv. 232. Pl. 65.—*Anomia Ehippium*. Flem. Brit. Anim. 395.—*Anomia Ehippium*. Turt. Brit. Biv. 227. Pl. 18. f. 1, 2, 3.—*Anomia Ehippium*. Lamk. Syst. vi. 1, 226; Ed. 2. vii. 273.—*Anomia patellaris*. Lamk. Syst. vi. 2, 227; Ed. 2. vii. 273.—*Anomia Ehippium*. Mont. Test. Brit. 155.

### 2. *Anómia Squamula*. *Thin Scale-Oyster*.

Shell roundish, very thin, semitransparent, white; the upper valve little convex, even, with the beak small, glossy, rather pointed, and projecting beyond the margin; lower valve extremely thin, glossy, uneven, concentrically striated, with the aperture circular; the opercular plate extremely thin. Diameter nearly an inch.

On live and dead shells, crabs, and stones, along the rocky coasts, and often in deep water.

*Anomia Squamula*. Linn. Syst. Nat. i. 1151.—*Anomia Squamula*. Turt. Brit. Biv. 229. Pl. 18. f. 5, 6, 7.—*Anomia Squamula*. Penn. Brit. Zool. iv. 109; Ed. 2. iv. 232.—*Anomia Squamula*. Mont. Test. Brit. 156.—*Anomia Squamula*. Flem. Brit. Anim. 395.—*Anomia Squamula*. Lamk. Syst. vi. 1, 228; Ed. 2. vii. 275.

### 3. *Anómia unduláta*. *Undulated Scale-Oyster*.

Shell roundish, moderately thin, white or reddish; the upper valve convex in various degrees, concentrically squamoso-rugose, radiated with irregular undulated slender ribs, running out a little on the margin, the umbo convex, not projecting, the inside generally greenish, glossy, or somewhat iridescent, with a subcentral opaque white patch; the lower valve irregular, thin, with the aperture large, communicating with the margin by a slit. Diameter about an inch and a-half.

Not uncommon on shells, crustacea, and stones, off Aberdeen. Found also by Mr. Alex. Murray, near Peterhead.

*Anomia undulata*. Gmel. Syst. Nat. 3346.—*Anomia undulata*. Mont. Test. Brit. 157. Pl. 4. f. 6.—*Ostrea striata*. Mont. Test. Brit. 153.—*Anomia undulata*. Turt. Brit. Biv. 230. Pl. 18. f. 8, 9, 10.—*Anomia undulata*. Flem. Brit. Anim. 395.

4. *Anómia aculeáta*. *Prickly Scale-Oyster*.

Shell roundish, thin, opaque, white; the upper valve little convex, with numerous radiating lamelloso-spinous ridges, the umbo glossy, and projecting beyond the margin; the lower valve flat, or slightly convex, frequently costate and spinous like the upper, the aperture roundish. Diameter about half an inch.

Not uncommon on shells, crabs, stones, and fuci; often in deep water; found by me at Aberdeen in September, 1841; at Peterhead by Mr. Alex. Murray, in September, 1842.

*Anomia aculeata*. Mont. Test. Brit. 157. Pl. 4. f. 5.—*Anomia aculeata*. Turt. Brit. Biv. 233.—*Anomia aculeata*. Flem. Brit. Anim. 396.—*Anomia aculeata*. Penn. Brit. Zool. Ed. 2. iv. 233.

5. *Anómia punctáta*. *Pustulated Scale-Oyster*.

Shell orbicular, thin, transparent, white or yellow; the upper valve little convex, undulatingly rugose, with irregularly disposed pustular prominences; the umbo rather small, convex, obtusely pointed, curved, not projecting beyond the margin. Diameter about half an inch.

Found by me, in August, 1842, among shells on the beach, near Don-mouth; and subsequently in various places.

*Anomia punctata*. Gmel. Syst. i. 3346.—*Anomia punctata* Turt. Brit. Biv. 232. Pl. 18. f. 11.

6. *Anómia cylíndrica*. *Lamellate Oval Scale-Oyster*.

Shell subovate, thin, subpellucid, white; the upper valve very convex, concentrically squamoso-rugose, the umbo convex, glossy, narrowed to an obtuse decurved point, projecting far beyond the lower valve; which is flat, irregularly striate or lamellate, with the aperture large, roundish. Length about a fourth of an inch, breadth a third or a fourth less.

It varies considerably in form, being oblong, ovate, or roundish.

First found by me on Sertulariæ on the beach near Tarbathie; afterwards on various corallines, and the roots of fuci. Also at Cruden, Peterhead, and Banff.

*Anomia cylindrica*. Gmel. Syst. Nat. 3346.—*Anomia cylindrica*. Penn. Brit. Zool. iv. 233.—*Anomia cymbiformis*. Mont. Test. Brit. Suppl. 64.—*Anomia cylindrica*. Turt. Brit. Biv. 232.—*Anomia cylindrica*. Flem. Brit. Anim. 396.

7. *Anómia strioláta*. *Striolate Oval Scale-Oyster*.

Shell subovate, thin, subpellucid, white; the upper valve very convex, somewhat gibbous, concentrically squamoso-rugose toward the crenulate margin, with radiating striæ, the ridges between which are scaly or somewhat spinous; the umbo convex, glossy, narrowed to an obtuse curved point projecting a little beyond the lower valve; which is flat, irregularly lamellate, with the aperture small, roundish, and communicating with the margin by a narrow slit. Length about a fourth of an inch, breadth a third less.

It appears to me that this species is truly distinct from *Anomia cylindrica*, which it most resembles in form.

First found by me on *Sertulariæ*, on the beach near Tarbathie.

*Anomia striolata*. Turt. Biv. 233.—*Anomia striolata*. Flem. Brit. Anim. 396.

## SECTION II.—DIMYARIA.

*Two adductor muscles—leaving two impressions in each valve.*

## FAMILY II.—MYTILINA.

Animal obovate or oblong; with the mantle adhering toward the borders, open beneath, coherent behind, and forming a single orifice for the anus; a slender linguiform foot, furnished with a byssus at its base behind, and two pairs of retractor muscles; two adductor muscles, the anterior very small; branchiæ moderate, pectinate; mouth moderate.

Shell regular, equivalve, very inequilateral, calcareous and covered with an epidermis, or horny and bare; with the hinge toothless; the ligament linear and dorsal; the anterior muscular impression very small, the posterior large and roundish.

Marine animals, fixed by means of a byssus or tuft of silky or hair-like filaments to hard bodies. Some of them afford esteemed articles of food, rather dangerous however, as it appears to be in some species poisonous under particular, not yet understood, circumstances.

## GENUS I. MYTILUS. MUSSEL.

Animal oblong. The lobes of the mantle adherent and thickened at the margin, with an internal crenate or fringed edge, united posteriorly only so as to form an anal siphon. Foot slender, linguiform, with a median groove beneath, a pair of cylindrical retractor muscles, two anterior and four posterior muscles, and furnished at its base behind with a silky byssus. On each side a pair of very thin, nearly equal branchiæ. Mouth rather large, with two pairs of thin lanceolate palpi. Anterior adductor muscle very small, posterior larger and cylindrical.

Shell elongated oblong or obovate, equivalve, extremely inequilateral, convex, concentrically striated, often longitudinally grooved. Umbones small, prominulous, somewhat incurved. Hinge toothless, often with small marginal lamellæ. Ligament internal, dorsal, very long, linear. Dorsal margin nearly straight, frontal obsolete, the umbones being terminal, inferior margin much prolonged and nearly straight, posterior rounded.

Attached to rocks or other bodies by the byssus.

1. *Mytilus edulis*. Eatable or Common Mussel.

Shell obovato-oblong, with the dorsal line forming a rather prominent angle behind, the anterior side obsolete, the anterior part of the ventral line nearly straight, the posterior ventral extremity rounded; the epidermis dusky, glossy, generally somewhat iridescent; the surface of the shell blue, or rayed with blue and white, sometimes as well as the epidermis, reddish, or yellowish, the inside bluish-white, with the margin dark blue; three or four small lamellæ or crenatures on the anterior margin close to the hinge. Length four inches, height two inches and two-twelfths.

It varies greatly in form, some individuals being very long and narrow, others broad; some straight, others considerably curved. Young shells often yellowish or reddish and pellucid. In some localities several varieties are intermixed. On exposed parts of the coast they are often stunted, shortened, and incurvate, with the epidermis abraded, and the surface rough.

A. *Mytilus edulis vulgaris*. Common Eatable Mussel.

Shell oval-oblong, rather thick; the umbones curved, approximated, the anterior dorsal slope slightly convex, forming an obtuse angle with the posterior dorsal, which is nearly parallel to the ventral, the latter slightly undulated; the hinge margin with three teeth; the epidermis dusky, the shell blue, plain or radiated with white or yellowish-brown. Length from three to four inches, breadth from an inch and a-half to nearly two, or about half the length.

In the Estuaries of the Ythan and Dee.

Musculus ex cæruleo niger. Lister, Anim. Angl. 182. Pl. 4. f. 182.—*Mytilus edulis*. Linn. Syst. Nat. 1157.—*Mytilus edulis*. Penn. Brit. Zool. iv. 110. Pl. 63. f. 73; Ed. n. iv. 236. Pl. 66. f. 2.—*Mytilus edulis*. Turt. Brit. Biv. 196.—*Mytilus edulis*. Flem. Brit. Anim. 411.—*Mytilus edulis*. Mont. Test. Brit. 159.

B. *Mytilus edulis pellucidus*. Thin-shelled Eatable Mussel.

Shell subovate, thin; the umbones curved, contiguous, the anterior dorsal slope nearly straight, forming a distinct angle with the posterior dorsal, which inclines considerably toward the ventral, the latter slightly undulated; the hinge-margin with two teeth; the epidermis olivaceous or yellowish-brown, the shell whitish with blue rays. Length from two to three inches, breadth more than half the length.

In the Estuaries of the Ythan and Dee.

*Mytilus pellucidus*. Penn. Brit. Zool. iv. 112. Pl. 63. f. 75; Ed. n. iv. 237. Pl. 66. f. 3.—*Mytilus pellucidus*. Mont. Test. Brit. 160.—*Mytilus pellucidus*. Turt. Brit. Biv. 197. Pl. 15. f. 1, 2.—*Mytilus edulis*. Flem. Brit. Anim. 411.

C. *Mytilus edulis incurvatus*. Incurved Eatable Mussel.

Shell subovate, thick, opaque; the umbones curved, separated, the anterior dorsal slope somewhat convex, forming a prominent rounded angle with the posterior dorsal, which is much curved and inclined toward the ventral, the latter straight, or sinuate; the epidermis dusky, abraded, exposing a great part of the shell, which is pale blue and corroded. From an inch and a-half to two inches in length.

In clefts of rocks, on all the rocky coasts; the largest individuals usually solitary in pools.

*Mytilus incurvatus*. Penn. Brit. Zool. iv. 111. Pl. 64. f. 74; Ed. n. iv. Pl. 67. f. 1.—*Mytilus incurvatus*. Mont. Test. Brit. 160.—*Mytilus incurvatus*. Turt. Brit. Biv. 197.—*Mytilus incurvatus*. Lamk. Syst. vi. 127; Ed. n. vii. 48.—*Mytilus edulis*. Flem. Brit. Anim. 411.

D. *Mytilus édulis angulátus*. *Angulate Eatable Mussel*.

Shell ovato-trigonal, rather thick, opaque; the umbones small, rather pointed, somewhat curved, the anterior dorsal slope straight, forming a prominent angle with the posterior dorsal, which is much curved; the ventral nearly straight; the epidermis dusky, usually more or less abraded; the shell dull blue. From an inch to two inches or more in length.

This variety passes directly into the last. It is found in pools left in rocky places by the tide, often under stones, but also in crevices. Common on the Girdleness, at Aberdeen.

*Mytilus angulatus*. Alder.—*Mytilus solitarius*. Mark.—*Mytilus subsaxatilis*. Williamson, Mag. Nat. Hist. vii. 353. f. 48.

E. *Mytilus édulis pusíllus*. *Dwarf Eatable Mussel*.

Shell oblong, thick or thin, opaque or pellucid, convex or compressed, of various colours.

Crowded on rocks, stones, shells, piles, and other objects.

The species is abundant along our coasts: of small size and densely crowded, on the rocky shores; large on hardish-ground at the mouths of rivers; solitary, incurved individuals in fissures of rocks; small oblong, very convex individuals compacted on rocks, stones, and wooden piles. The young clustered on corallines, fuci, rocks, stones, piles, stake-nets, ropes, and other immersed bodies.

The mussel affords a rather pleasant article of food; but in Summer or Autumn, when, from accidental circumstances, it has become diseased, it is apt to cause derangement of the digestive functions, sometimes followed by affection of the nervous system, and even death. It affords good bait for had-docks and other fishes; but is not obtained on the Aberdeenshire coasts in sufficient quantity for that purpose. The Estuary of the Ythan supplies the Collieston fishers; but those of Aberdeen, not finding a sufficient supply at the mouth of the harbour, import mussels from various distant places, especially Hull and Dundee. Small pearls, of very inferior colour and lustre, are often found abundantly in this species.

## GENUS 2. MODIOLA. MODIOLE.

Animal obovate or elliptical, compressed behind, otherwise as in *Mytilus*.

Shell elongated, equivalve, inequilateral, obovate, con-



vex, compressed behind, concentrically striated, often radiatingly grooved. Umbones small, prominulous, somewhat incurved. Hinge toothless. Ligament elongated, linear, dorsal, internal. Dorsal margin straight, or slightly convex, anterior extremely short and rounded, anterior-inferior little convex.

*Modiola* differs from *Mytilus* in little else than the slight projection of the anterior side, which in that genus is wanting. The two genera pass into each other, by insensible gradations, and were the species not very numerous, might with propriety be united.

1. *Modiola barbata*. Great Modiole. Horse Mussel.

Shell obovato-oblong, very convex; with the dorsal line straight and forming a prominent angle behind, the posterior extremity rounded, the frontal side very small and rounded, the anterior part of the ventral margin nearly straight or sinuate; the epidermis dusky, glossy; the surface of the shell purplish, the inside white. Length about six inches, height three.

It is very abundant on the rocky coasts, in crevices, where it never attains a very large size, and is often distorted and crusted.

Individuals often have the margin of the shell incurvate and widely separated at the part where the byssus protrudes. Young individuals are more compressed, thinner, white, with a brownish or reddish-yellow epidermis, from which project numerous shreds or filaments; whence the specific name.

All the individuals obtained by me alive, from deep water, off Aberdeen, agree in every respect with each other, and present characters which, I think, render it very doubtful that *Mytilus Modiolus* and *Mytilus barbatus* of Linnæus are one and the same species. Up to the length of four inches, they may be described thus:

Shell ovato-oblong, with the umbones incurved, a broad tumid ridge running from them to the posterior ventral margin, the dorsal line straight, ascending, forming a wide rounded angle with the posterior dorsal; the anterior end extremely short and rounded; the valves thin, with a glossy thin concentrically striolate epidermis; and divided into three areas; the anterior chestnut-red, separated by an oblique shallow groove from the oblique tumid umbonal band, which is reddish-white,

and covered with filaments projecting from the epidermis; the third area smooth and reddish-brown. The filaments have a flat triangular base, not serrated.

The animal has the mantle-lobes very thin, whitish, thickened and reddish-orange at the margins; the branchiæ, which are very large, also reddish-orange; the foot very small, linguiform, grooved beneath, and of a brighter tint of the same; the byssus attached to the base of the foot behind very large, arising from a large, posteriorly grooved prominence, in the form of a subulate cartilaginous shaft, from the anterior and posterior sides of which arise very numerous horny filaments; the posterior adductor muscle extremely large and round, the anterior very small and thin.

Not uncommon; seldom seen on the beach; young individuals adhering to corallines, shells, and other matters, often taken up by the lines from deep water, off Aberdeen.

*Mytilus Modiolus*. Linn. Syst. Nat. i. 1158?—*Mytilus barbatus*. Linn. Syst. Nat. i. 1156.—*Modiola Modiolus*. Turt. Brit. Biv. 199.—*Mytilus Modiolus*. Mont. Test. Brit. 163.—*Mytilus barbatus*. Mont. Test. Brit. 161.—*Modiola vulgaris*. Flem. Brit. Anim. 412.—*Modiola papuana*. Lamk. Syst. vi. 111; Ed. 2. vii. 17.—*Modiola barbata*. Lamk. Syst. vi. 114; Ed. 2. vii. 22.—*Mytilus Modiolus*. Penn. Brit. Zool. iv. 113. Pl. 66. f. 77; Ed. 2. iv. 238. Pl. 69.—*Mytilus umbilicatus*. Penn. Brit. Zool. iv. 112. Pl. 65. f. 76; Ed. 2. iv. 238. Pl. 68.—*Mytilus barbatus*. Penn. Brit. Zool.; Ed. 2. iv. 238. Pl. 67. f. 2.

2. *Modiola discrepans*. *Compressed Ribbed Modiole*.

Shell ovate, compressed, opaque, with a brown or blackish epidermis; umbones rather tumid; posterior end much broader and rounded; about eight broad grooves from the umbo to the margin, in the middle a smoothish space, and behind a large area with about forty grooves; the margin crenulate, and the grooves apparent on the inner surface, which is bluish-white and pearly. When young, the valves are thin, and semi-transparent, the epidermis yellowish-grey, or greyish-green, or brown; but ultimately they become thick and opaque, and the epidermis black.

A young individual, from deep water, off Aberdeen, was shewn to me, in March, 1842, by Mr. Alexander Martin, one of my pupils; a large valve found by Mr. Davidson, in December, 1842.

On the 26th December, 1842, when on an excursion with my class, I found a great number of individuals in tufts of *Corallina officinalis* growing in pools, at the Cove, four miles

south of Aberdeen. I have also minute specimens found in shell sand from Cruden Bay, and Ugie-mouth.

*Mytilus discrepans*. Mont. Test. Brit. 169; Suppl. 65. Pl. 26. f. 4.—*Modiola discrepans*. Turt. Brit. Biv. 202.—*Modiola discrepans*. Flem. Brit. Anim. 413.

### 3. *Modiola discors*. *Tumid Ribbed Modiole*.

Shell ovate, tumid, very thin, transparent; with a yellowish-grey epidermis, under which it is irregularly concentrically banded with reddish; umbones tumid, incurved; anterior end broader, the other obliquely angulate; about sixteen fine grooves from the umbo to the anterior margin; toward the middle a smoothish space; a larger posterior area with about fifty grooves; the margins crenulate, and the grooves apparent on the inner surface. Length eight-twelfths of an inch, height five-twelfths.

Common in the leathery envelope of *Ascidia*; frequently brought up by the lines.

*Mytilus discors*. Linn. Syst. Nat. i. 1159.—*Mytilus discors areis tribus distinctis*. Walker, Test. Brit. 167.—*Modiola discors*. Turt. Brit. Biv. 201.—*Modiola discors*. Flem. Brit. Anim. 413.—*Modiola discrepans*. Lamk. Syst. vi. 114; Ed. 2. vii. 23.

### GENUS 3. PINNA. FAN-MUSSEL.

Animal elongated, obovato-triangular. The lobes of the mantle united on the dorsal margin, separated in the rest of their extent, generally ciliated on the edges. Mouth between two very elongated lips, terminated by two pairs of short palpi. Foot slender, conical, vermiform, furnished at the base behind with a very copious silky byssus. Abdominal mass moderate. On each side a pair of nearly equal, semilunar branchiæ. Anterior adductor muscle small; posterior rather large, subcylindrical, and nearly central.

Shell elongated, obovato-triangular equivalve, inequilateral, moderately convex, compressed behind, concentrically striated, often longitudinally costate, and muricate, thin, horny, semitransparent, fragile. Umbones very small, terminal. Hinge toothless, with transverse internal lamellæ in the angle of the umbones. Ligament very long, linear, in a very narrow, marginal groove, subinternal, occupying more than half of the

dorsal margin of the shell, which is straight, the anterior margin obsolete, anterior inferior much produced and nearly straight, inferior rounded.

1. *Pinna ingens*. *Great Fan-Mussel*.

Shell obovato-triangular, moderately convex; with the dorsal line straight for more than half its length, then rounded; the anterior ventral line sinuate, the posterior rounded; the valves thin, semitransparent, greenish-grey, or dusky, with several longitudinal narrow obtuse ridges on the half next the ligament, and transverse striæ, which become more prominent, irregular and undulated, on curving along the inferior side; the ribs obsolete or terminating toward the broader rounded extremity, where the transverse striæ are laminar or scaly; inside shining, with a thin, pearly and iridescent layer. Length about ten inches, breadth toward the end six.

In young individuals the shell is thin, semitransparent, and yellowish-green. There is great difference in the form of individuals, some being oblongo-triangular, others obovate.

In deep water, on a hard bottom, off Aberdeen; not very unfrequently brought up by the lines. In the Winter of 1841-42, half-a-dozen specimens were obtained by my pupils, one of them with the animal alive. In October, 1842, Mr. Murray obtained for me, at Fraserburgh, a specimen a foot long, which had been taken up at the distance of forty miles from land.

*Pinna ingens*. Penn. Brit. Zool. iv. 115?—*Pinna fragilis*. Penn. Brit. Zool. iv. 115?—*Pinna ingens*. Mont. Test. Brit. 180.—*Pinna ingens*. Flem. Brit. Anim. 406.—*Pinna ingens*. Lamk. Syst. vi. 134; Ed. 2. vii. 66.—*Pinna ingens*. Turton, Brit. Biv. 221. Pl. 20. f. 1.—*Pinna fragilis*. Turton, Brit. Biv. 222. Pl. 20. f. 2.

FAMILY III.—UNIONINA.

Animal oblong, ovate, elliptical, or roundish; with the mantle open beneath, coherent behind, and forming two orifices, the upper small and simple, the lower large and barbate on the margin; a large compressed, tapering foot; two adductor muscles, both large, widely separated.

Shell regular, equivalve, inequilateral, covered with a hard laminated epidermis; the hinge toothless, or with irregular teeth; the ligament linear, dorsal, external;

the anterior muscular impression large, and close to the hinge anteriorly, the posterior larger. All the species live in fresh water.

### GENUS 1. ANODON. MUD-MUSSEL.

Animal ovate or oblong, thick, with the mantle open beneath and before, adherent, and having thickened, often fringed, margins; a posterior orifice for the anus, and a short, incomplete, respiratory tube, of which the mouth has two rows of tentacular papillæ. Labial appendages triangular. Branchiæ rather long, unequal. Foot very large, thick, compressed, of a quadrangular form.

Shell ovate or oblong, generally thin, regular, equi-valve, inequilateral, closed, umbones small convex and with the dorsal slope more or less decorticated. Hinge toothless, but presenting a lamina under the ligament, which is external, and elongated. Muscular impressions widely separated, very distinct.

This genus differs little from *Alasmodon*, the animal being nearly the same in both. The species reside in lakes, pools, and rivers.

#### 1. *Anodon anatinus*. Duck Mud-Mussel.

Shell ovate, inequilateral, moderately convex, with the anterior end short and rounded, the posterior truncato-angulate, the umbones very small, the dorsal line nearly straight as far as the ligament extends, then declinate to the upper posterior angle; the valves thin, brittle, semitransparent, concentrically rugoso-striate, with conspicuous growth-lines, the epidermis glossy, dull green, more or less tinged with dusky, and slightly radiated; the space about the hinge generally decorticated; the inside bluish-white, pearly in young, yellowish-white in old shells. Length about four inches, height a third less.

Found by Mr. Alexander Murray in the St. Fergus Canal, and near Fraserburgh; by Mr. Gray, near Peterhead.

"Crows," says Pennant, "feed on these mussels, and also on different shell-fish. It is diverting to observe, that when the shell is too hard for their bills, they will fly with it to a great

height, drop the shell on a rock, and pick out the meat, when the shell is fractured by the fall."

*Mytilus anatinus*. Linn. Syst. Nat. i. 1158.—*Mytilus anatinus*. Penn. Zool. iv. 113. Pl. 68; Ed. n. iv. 239. Pl. 71.—*Mytilus anatinus*. Mont. Test. Brit. 171.—*Anodonta anatina*. Lamk. *Anodon anatinus*. Turt. Biv. 240.—*Anodon anatinus*. Flem. Brit. Anim. 415.

## GENUS 2. ALASMODON. PEARL-MUSSEL.

Shell regular, equivalve, ovate or oblong, very inequilateral, compressed, concentrically rugose, with a dense epidermis. Umbones small, incurved, carious. Hinge with an irregular prominent crenate tooth in the right valve, entering between two similar teeth in the left. Ligament external, linear, elongated, strong. Anterior margin rounded; posterior subangulate.

The species reside in mud or gravel, in rivers.

### 1. *Alasmodon margaritiferus*. Oblong Pearl-Mussel.

Shell transversely ovato-oblong, rather compressed, thick, finely striate longitudinally, transversely rugose, with the posterior margin sloped; the umbones carious; the teeth strong, conical, compressed, somewhat lobed; the epidermis blackish-brown; the inside bluish-white, and pearly. Length six inches, height three.

It varies much in size, form, and colour. Young individuals are ovato-oblong, or ovate, with the epidermis olivaceous. Middle-aged individuals are of nearly the same form, but longer in proportion to their height, with the valves thick, the umbones decorticated or corroded, the epidermis dark-brown. In old individuals, some of which are from five to six inches in length, the lower margin is widely sinuate, so as to give the shell a curved appearance. The valves are very thick in old shells, their interior pearly, bluish, or sometimes tinged with red, the epidermis nearly black. Pearls of various sizes, forms, and colours, are found in this species: spherical, hemispherical, binate, roundish, oblong; from a twelfth or less to half an inch in diameter; white, bluish, pink, or dusky.

Common in the Dee, the Don, the Ythan, the Ugie, and the Doveran, in muddy and gravelly places.

*Mya margaritifera*. Muller, Verm. Terrest. et Aquat. ii. 210.—*Mya margaritifera*. Linn. Syst. Nat. i.—*Mya margaritifera*. Mont.

Test. Brit. 33.—*Alasmodon margaritiferum*. Flem. Brit. Anim. 417.—*Alasmodon margaritiferus*. Gray's Turt. Man. 293.—*Mya margaritifera*. Penn. Brit. Zool. iv. 80. Pl. 43. f. 18.—*Unio margaritiferus*. Turt. Brit. Biv. 242. Pl. 16. f. 1.

#### FAMILY IV.—ARCINA.

Animal oblong, or roundish; with the mantle open in its whole length, unless on the back, and destitute of tubes; a very short, thick, truncated foot; two adductor muscles, of which the posterior is larger.

Shell regular, equivalve, inequilateral, covered with an epidermis; the umbones generally widely separated; the hinge with numerous small interlocking teeth, disposed in an elongated straight or curved series; the ligament partly external; the muscular impressions submarginal, the anterior smaller.

#### GENUS 1. NUCULA. NUCULE.

Animal roundish, subtriangular, or oblong, compressed. The lobes of the mantle disunited. The mouth with two pairs of very narrow and elongated palpi. Foot compressed, slit at the end. Abdominal mass rather thin, with the foot attached to it in its whole length; on each side a pair of elongated, very narrow, filamentous branchiæ. Anterior adductor muscle small, posterior moderate.

Shell oval, ovato-trigonal, or oblong, equivalve, inequilateral, concentrically striated. Umbones small, contiguous, incurved. Hinge with a central oblique cavity, and on each side a series of small, compressed, projecting teeth. Ligament chiefly internal, in the cavity of the hinge.

##### 1. *Nucula Nucleus*. Common or Pearly Nucule.

Shell obliquely ovato-triangular, moderately convex, smoothish, obsoletely striated transversely, with smaller and more obscure longitudinal striæ; the surface whitish, with transverse irregular reddish markings, the epidermis olivaceous: the umbones prominent, the anterior slope abruptly descending, with an elongated impression, the dorsal slope descending

and convex; the hinge with twenty, erect, compressed, obtuse teeth on the dorsal margin, ten on the anterior; the inner surface pearly and shining; the margin crenulate. Length six-twelfths, height five-twelfths.

Young shells are more elongated, paler, almost white, with the inner surface iridescent.

Common off Aberdeen, Peterhead, and Banff, and frequently brought up by the lines.

Arca Nucleus. Linn. Syst. Nas. i. 1143.—Nucula Nucleus. Turt. Brit. Biv. 176. Pl. 13. f. 4.—Nucula Nuclea. Flem. Brit. Anim. 401.—Arca Nucleus. Mont. Test. Brit. 141.—Nucula margaritacea. Lamk. Syst. vi. 59; Ed. 2. vi. 506.

### 2. *Núcula ténuis*. *Thin Nucule*.

Shell obliquely ovate, compressed, glossy, smoothish, obsoletely striated transversely, with distinct growth-lines, and extremely faint indications of minute longitudinal striæ, the epidermis yellowish-green; the umbones rather prominent, small; the anterior slope abruptly descending, convex, with a large ovato-oblong impression, the dorsal slope elongated, convex, the posterior extremity somewhat angulate; the hinge with twelve erect, slightly recurved, compressed teeth on the dorsal margin, five on the anterior; the inner surface somewhat pearly, highly iridescent, reflecting the most lively tints of purple, green, and blue, in zones; the margins entire. Length six-twelfths, height four and a-half.

Young shells are more elongated, paler, and semitransparent. More elongated, more compressed, and thinner than *Nucula Nucleus*, and further distinguished by having the margin not crenulate.

Not very uncommon off Aberdeen, and sometimes brought up by the lines.

Arca tenuis. Mont. Test. Brit. Suppl. 56. Pl. 29. f. 1.—Nucula tenuis. Turt. Brit. Biv. 177.—Nucula tenuis. Flem. Brit. Anim. 402.

### 3. *Núcula rostráta*. *Beaked Nucule*.

Shell elongated, oblongo-lanceolate, moderately convex, thin, concentrically striated, with the posterior end rounded, the anterior extended, narrowed, and truncate; the surface of the shell whitish, the epidermis yellowish-grey; the umbones very small, scarcely curved; the cardinal teeth compressed, pointed, oblique, twenty on one side, eighteen on the other;



inner surface glossy white ; margin plain. Length nine-twelfths, height four-twelfths.

Not uncommon off Aberdeen, and frequently brought up by the lines.

*Arca rostrata*. Gmel. Syst. Nat. 3308.—*Nucula rostrata*. Turt. Brit. Biv. 178.—*Nucula rostrata*. Flem. Brit. Anim. 402.—*Nucula rostrata*. Lamk. Syst. vi. 58 ; Ed. 2. vi. 504.

#### 4. *Núcula minúta*. *Minute Nucule*.

Shell elongated, ovato-lanceolate, compressed, very thin, minutely striulate and with several large concentric convex ridges toward the margin ; the posterior end rounded, the anterior extended, narrowed, and truncate ; the umbones very small, somewhat curved ; two faint nodulose ridges from each umbo to the angles of the truncation ; a distinct cavity under each umbo, and on one side five compressed teeth, on the other seven ; the margin plain ; the outside greyish-white, the anterior glossy, hyaline. Length two-twelfths of an inch, height a twelfth and a-quarter.

This species is very distinct from *Nucula rostrata*, to which however it is nearly allied. Independently of other characters, the cavity under each umbo is sufficient to distinguish it.

The specimen from which the above description has been taken was found by Miss Anne Macgillivray, in shell sand collected by Mr. Alexander Murray, in December, 1842, at the mouth of the Ugie.

*Arca oblonga striata*, *antice angulata*. Walker, Test. Min. Rar. Pl. 3. f. 81.—*Arca minuta*. Mont. Test. Brit. 140.—*Nucula minuta*. Turt. Brit. Biv. 178.—*Nucula minuta*. Brown, Illustr. Pl. 25. f. 18.—*Nucula minuta*. Flem. Brit. Anim. 402.

#### FAMILY V.—CYCLADINA.

Animal ovate or roundish, more or less compressed ; with the mantle lobes free beneath, united behind, and forming a single tube, which is internally double ; a compressed elongated, very extensile foot ; two roundish, widely separated adductor muscles.

Shell subovate, or roundish, subcordate, very thin, concentrically striate, covered with a thin, generally olivaceous, epidermis ; the umbones prominent, obtuse ; the hinge with two or three divergent laminar and thin lateral teeth ; the ligament external, inconspicuous.

The Cycladina inhabit fresh water exclusively, residing in the mud or among the roots of plants. They are scarcely entitled to rank as a family distinct from the Venerina ; but being all inhabitants of fresh water, and having for the most part a peculiar aspect, they may without much impropriety be kept apart.

#### GENUS 1. CYCLAS. CYCLE.

Animal elliptical or subglobose ; with the mantle open anteriorly and beneath, united behind into a tube, internally double, the two siphons separated toward the end and exsertile ; foot tongue-shaped, very extensile.

Shell elliptical and convex, or subglobose, equivalve, very thin, concentrically striated, with a thin, persistent epidermis. Umbones tumid, obtuse, approximated, little curved, about the middle. Hinge with one tooth in the right, and two in the left valve, besides two lateral, elongated, lamelliform teeth.

The species occur in pools, lakes, and rivers, generally inhabiting muddy places. They are viviparous.

##### 1. *Cyclas flavescens*. Yellowish Cycle.

Shell rhomboido-elliptical, ventricose, somewhat inequilateral ; the valves very thin, semitransparent ; glossy, finely and regularly concentrically striate, with distant, stronger growth-marks ; umbones very obtuse, bulging ; frontal slope about a fifth shorter than dorsal, both convex ; anterior end more rounded and somewhat narrower, posterior slightly angulate, or truncato-rotundate ; colour pale greyish-yellow or brown, inside in part white. Length five-twelfths of an inch, height about four-twelfths, thickness three-twelfths.

The hinge is very thin ; in the right valve are two very small, much compressed oblique teeth, of which the posterior is bifid, and on each side are two elongated pliciform lateral teeth, less elevated than the very thin margin ; in the left valve is a single lamiform tooth, having two denticles, and on each side an elongated lamina, having a deep groove between it and the elevated very thin margin. The ligament although elongated is very thin and inconspicuous.

Considerable variations in form are presented. Thus, when very young, the shell is broadly elliptical, or ovato-elliptical,

compressed, the valves meeting at a very acute angle, extremely thin, transparent, greyish-yellow. Gradually the valves become more convex, so as to be ventricose in the upper part, and the angle of their meeting at the lower margin becomes less. The umbones are always depressedly convex, and frequently capped, having, like many other species of *Cyclas* or *Pisidium*, a strongly marked growth-margin separated by a depression from the succeeding part. The colour is always more yellow than grey, sometimes approaching to dull lemon-yellow; the inner surface white. In old shells, exceeding four-twelfths in length, the convexity is greater toward the umbones, and sometimes considerable toward the inferior margin; which however never forms more than an angle of  $45^{\circ}$ , the form is more rhomboidal, the posterior extremity being more truncate, although never decidedly so; the valves are thicker, and often have an olivaceous tinge; but still the colour is properly yellowish-grey. Some individuals however are brownish-yellow, some of that colour zoned with paler, and some are of an olivaceous-brown.

The animal is yellowish-white, or of the same dull pale yellow as the shell; but no observations respecting its habits have been made.

First found by two of my pupils, Mr. Nicol and Mr. Beveridge, in June, 1842, in the Loch of Skene, ten miles to the west of Aberdeen. Having gone there, on the 2d July, with my class, I found it in the greatest profusion along the shores and on the sandy bottom of the lake, which is about two miles in length, and a mile in breadth, with very few plants growing in it, *Lobelia Dortmanna*, which however is abundant, being the most conspicuous. Intermixed with the *Cyclades* were equally numerous shells of *Physa fontinalis*, and some of a very short-spined variety of *Linnaeus pereger*. The only other shell found was *Planorbis contortus*.

With reference to specimens transmitted by me, Mr. Jenyns says, "About No. 1. I will not speak positively: I can hardly distinguish it from certain of the many varieties of *Cyclas cornea*, and some specimens approach very nearly to that which I have called *stagnicola*; but both that species and *cornea* call for further examination, in reference to specimens from different localities, it being questionable whether some of the supposed varieties of each be not true species. The animal and its habits require to be attended to as well as the shell for the purpose of investigating this matter."

## GENUS 2. PISIDIUM.

Animal subovate, with the mantle open anteriorly and beneath, united behind into a tube, internally double; foot tongue-shaped at the end, very extensile.

Shell subovate, subtrigonal, equivalve, very thin, concentrically striated, with a very thin persistent epidermis. Umbones tumid, approximated, little curved, nearer the anterior end. Hinge with one tooth in the right, and two in the left valve, besides two lateral, elongated, lamelliform teeth.

The species occur in lakes, pools, mill-ponds, brooks, rivers, ditches, and marshes, generally inhabiting muddy places, among the roots of plants. They are viviparous, and the young, with the shell developed, attain an enormous size, before they are expelled.

The distinctive characters of *Pisidium* and *Cyclas* are by many, not without reason, deemed inadequate; the *Pisidia* merely having the posterior syphons longer and not separated at the end, and the shell generally more inequilateral. The form of the shell in the same species varies with age, it being more orbicular and compressed when young.

1. *Pisidium Joannis*. *John's Pisidium*.

Shell broadly ovate, well rounded at both ends, moderately convex, thin, glossy, distinctly concentrically striate, the intervening ridges broader, smooth, and polished, with more marked growth-lines; the umbones tumid, obtuse, smooth at the apex, placed somewhat nearer the anterior end; the dorsal slope a little convex; the colour greyish-yellow. Length two-twelfths and a-half, height two-twelfths.

The animal is of a greyish-white colour; with the foot compressed, but, when exerted, cylindrical or a little depressed, obtuse, and capable of being extended to one and a-half times the length of the shell; the siphon very short, abrupt, and plain on the margin.

The shell varies little in outline, but greatly in the degree of convexity, young individuals being much compressed, others moderately so, and few very convex. The colour scarcely varies.

First found by me in September, 1842, in a ditch near the Links of Old Aberdeen, where it is extremely abundant among the roots of grasses and other plants. Individuals kept in water for some days presented the same habits as those described in *Pisidium Jenynsii*, with the exception of not extending the foot nearly so far.

With reference to specimens of this shell, Mr. Gray, to whom I sent them, remarks: "The *Pisidium* is very like one I have lately received from Yorkshire, without a name, and appears distinct from any others I have." Supposing it to be new, I have named it after my son, a young naturalist of some promise. But, although I am persuaded that it equally merits specific distinction with *Pisidia Jenynsii*, and *pusilla*, I think that they all differ as little from each other as the numerous varieties of *Linnæi pereger*, *palustris*, and *truncatulus*, or of *Mytilus edulis*, or *Venus Gallina*.

In still water, full of decayed vegetable matter, in a small neglected pond, and especially in a ditch near it, in the garden of the Professor of Medicine of King's College, where it was first observed by Mr. Leslie, in June, 1842, it presents a somewhat different appearance, so that one might at first sight consider it a distinct species. Although more or less crusted, it is pale greyish-yellow when cleaned. Most of the old individuals resemble those above described; but are more convex, and the largest, which attain a length of two-twelfths and a quarter, are ventricose, with the nates considerably elevated, often capped, and the inferior margin meeting at a much wider angle. Many of the individuals have a slight tinge of grey, and the animal is often greyish-white.

Respecting specimens from this locality, Mr. Jenyns has favoured me with the following remarks:—"This I believe to be the *P. pulchellum*, var. *a* of my monograph, which I have since considered distinct from the above (*P. pulchellum*, var. *β*), and which Gray (p. 285) proposes should be named *P. Jenynsii*; but they are much larger than any specimens in my possession before, with the umbones more prominent, and the valves less deeply striated; but these differences may be owing to water and locality. If it is not what I suppose it to be, it is new."

## 2. *Pisidium Jenynsii*. *Jenyns's Pisidium*.

Shell obliquely ovate, rather tumid, very thin, glossy, finely but distinctly and regularly concentrically striate, with a few more marked growth-lines, and with very faint radiating

striulæ; the umbones tumid, obtuse, considerably nearer the anterior end; frontal end forming about a third of the segment of a circle, dorsal slope about a third longer than frontal, and convex; the colour yellowish-white. Length a twelfth and three-fourths, height a twelfth and an eighth, breadth three-fourths of a twelfth.

The animal is yellowish-white, or reddish-white, semitransparent.

It resides among the roots of aquatic plants, especially Junceæ, Cyperaceæ, Gramineæ, Spargania, Epilobia, Veronica Beccabunga, Callitriche verna and Sphagna; generally among the fibres, clear of the mud, but sometimes immersed in the latter. As it inhabits lakes, pools, and ditches, clear, running, stagnant, or muddy water, marshy places, and peat bogs, it varies in size, form, and colour. Some individuals are less inequilateral than others; some ventricose, others compressed. Frequently the umbones are somewhat capped, or present a distinct separation, as it were, from the rest of the shell, by a sudden depression. Among specimens collected in a single spot, a small pond, for example, many such varieties are to be seen. They depend partly upon age, and partly upon local circumstances.

In the clear running water of a ditch, filled with plants, and especially Callitriche verna, near Old Aberdeen, for example, it presents the characters given above; the largest individuals being obliquely ovate, with the posterior end twice the length of the anterior, the concentric striæ regular and delicate, the umbones moderately prominent, but always very obtuse, the shell rather compressed, although tumid at the umbones, and the valves meeting below so as to form an acute angle, of about forty degrees. Younger individuals are proportionally less elongated, more compressed, with less tumid umbones; very young ones are ovato-orbicular, much compressed, and with the umbones scarcely prominent. The shell is always yellowish-white, when cleaned, and when the animal is in it, it is pale hyaline-yellow; but it is often crusted with brown or reddish matter. When dead it is whitish and opaque. The greatest size in such places is two-twelfths in length, a twelfth and a-half in height, and nearly a twelfth in breadth or thickness.

In clear, but stagnant water, in a ditch, in gravelly ground with peaty soil, between Aberdeen and the Spital, along with Planorbis Vortex, I found in July, 1842, a most beautiful variety: oval, ventricose, with prominent obtuse nates, the

valves convex, and meeting at a more obtuse angle; the surface shining, the striæ faint; the shell transparent, yellowish-white, and allowing the reddish-white animal to be dimly seen through it. All the individuals, even the young, are oval and convex. The greatest length a twelfth and a-half, the height almost a twelfth.

In the clear still water of lakes and pools where, among the roots of Cyperaceæ and other plants, there is little mud, and where it also occurs among Sphagna, and in wet places in moorish ground and on heaths it is equally beautiful, and nearly of the same form, but less convex. There it does not attain a greater length than a twelfth and a-half.

With reference to specimens of this kind, and especially from the Bishop's Loch, Mr. Jenyns says: "These appear *identical* with the *Pisidium Jenynsii*, and in every respect accord with specimens from Battersea Fields and Cambridgeshire Fens."

Such being the case, and the gradations being traced up to the large individuals, there can be no doubt that all belong to *Pisidium Jenynsii*; which however presents greater differences among individuals of its own species, than those usually seen in what might be considered characteristic individuals of *P. Jenynsii* and *P. pulchellum*, both which, and all their varieties, I am almost persuaded, are of one single species.

I have found the small and moderate, very clear, pinkish or yellowish-white kind, very abundant, and most extensively distributed in Aberdeenshire and Kincardineshire. It is in fact one of the most common of all our fresh-water mollusca. Miss Macgillivray has also brought it from Banffshire, and Mr. Murray has found it in the district of Buchan.

On the 22d July, the following observations were made on numerous individuals found in the ditch mentioned above, between Aberdeen and the Spital:—

When advancing in the water, the animal opens its valves a little, places itself erect by means of the foot, which it gradually protrudes, until it considerably exceeds the shell in length. When thus extended it is of a linear-oblong form, very little flattened, narrowed but rounded at the end. It then contracts, and drags the shell quickly forward; after which it is again extended, and again contracts. It is not always stretched out in a direct line, but is moved in an undulating manner, often from side to side, and appears to act as a tentaculum, as well as an organ of motion. The siphonal tube, which is at the same time extended, and kept so, is short, cylindrical, truncate, and undergoes little alteration. A current

is seen passing out of it, and minute dark particles frequently escape. In this manner the animal advances with considerable speed, by jerks. At other times it ascends to the surface, where it proceeds in the same manner, with the shell reversed, the umbones being beneath. The valves being partially opened, the foot is gradually elongated, until it assumes a linear, sub-cylindrical form; it then suddenly contracts and the shell is jerked forward. Usually the foot extends to a length and a-half of the shell, but often to twice its length. The syphon changes little, being generally cylindrical, sometimes however nearly elliptical, but always abrupt. It never extends beyond a sixth of the length of the shell. The animal can advance equally with the shell inclined to either side. It can creep in any direction, on a level or inclined surface, ascend or descend a perpendicular plane. The colour of the protruded parts is greyish-white. On opening an individual in which young ones were seen, I found six lodged in the umbonal region. They were very large, a third of a twelfth long, much compressed, elliptical, with the umbones nearly central, and scarcely elevated above the general curve, the colour white, the surface beautifully glossed, and almost perfectly smooth, the striæ being scarcely apparent. On being removed and placed in the water, some of them soon began to move in the same manner as the adults, but with the shell inclined on one side.

Individuals taken from the Canal near Aberdeen, of a more ovato-triangular form, and less bulging, presented no differences in the foot and syphon, or in the mode of progression.

*Pisidium Jenynsii*. Gray, Turt. Man. 2d Ed. 285.—*Pisidium pulchellum*. Var. *Jenyns*.

### 3. *Pisidium pulchellum*. Beautiful *Pisidium*.

Shell obliquely ovate, rather ventricose, very thin, glossy, finely and deeply concentrically striate, with a few more marked growth-lines, and with faint radiating striulæ; the umbones tumid, obtuse, considerably nearer the anterior end; frontal end forming about the third of a circle; dorsal slope descending, little convex; the colour pale yellowish-grey, or greyish-white. Length a twelfth and three-fourths, height nearly a twelfth and a-half, breadth a twelfth and a-fourth.

The animal reddish-white.

Adult individuals vary little, unless in colour, some being of a darker or olivaceous tint, others tinged with grey, many crusted with reddish, brownish, or blackish matter. Young



individuals are more elliptical, with the anterior end less shortened.

Found in abundance in the mud and sand of a mill-pond near the New Bridge of Don. First seen by Mr. John Macgillivray there in the Autumn of 1841.

*Pisidium pulchellum*, Var.  $\beta$ . Jenyns, Monogr. 18. Pl. 21. f. 1.—*Cyclas pusilla*. Turt. Brit. Biv. 251. Pl. 11. f. 16, 17.—*Cyclas fontinalis*. Brown, Edinb. Journ. of Nat. and Geogr. Sc. I. 11. Pl. 2. f. 5, 7.

#### 4. *Pisidium nitidum*. *Shining Pisidium*.

Shell orbicular-ovate, compressed, thin, glossy, finely but distinctly and regularly concentrically striate, with a few more marked growth-lines; the umbones obtuse, subcentral marked with several stronger concentric grooves; the frontal end semi-circular, the dorsal slope convex; the colour greyish-white. Length a twelfth of an inch; height a fifth less.

The animal greyish-white.

First found by me in July, 1842, in a mill-pond, near the New Bridge of Don, where it occurs rarely, along with *Pisidium pusillum*, and *P. pulchellum*.

The most obvious distinctive character consists of the strong concentric ridges on the umbonal region.

*Pisidium nitidum*. Jenyns, Monogr. 16. Pl. 20. f. 7, 8.—*Pisidium nitidum*. Gray's Turton, 283. Pl. 12. f. 150.

#### 5. *Pisidium pusillum*. *Dwarf Pisidium*.

Shell orbicular-ovate, rather compressed, thin, glossy, finely concentrically striated; the umbones obtuse, rather prominent, subcentral; the frontal end forming the fourth of a circle, the dorsal slope descending and convex; the colour greyish-white. Length a twelfth and a-fourth, height nearly a twelfth.

The animal greyish-white.

First found by me, in the Summer of 1841, in a mill-pond, near the New Bridge of Don; in April, 1842, gathered there in abundance by Mr. Leslie and me.

This species differs from the last chiefly in being less compressed, and in wanting the prominent ridges on the umbonal region.

*Cyclas pusilla*. Turt. Brit. Biv. 251. Pl. 11. f. 16, 17.—*Cyclas fontinalis*. Drap. Moll. 130. Pl. 10. f. 8, 11.—*Pisidium pusillum*. Jenyns, Monogr. 14. Pl. 20. f. 4, 6.—*Pisidium pusillum*. Gray's Turton. 284. Pl. 12. f. 151.

## FAMILY VI.—VENERINA.

Animal orbicular, roundish, ovate, or oblong, more or less compressed; with the mantle-lobes free beneath, united behind to form a tube containing two siphons; a compressed, extensile foot; two roundish, widely separated adductor muscles.

Shell orbicular, roundish, ovate, or oblong, generally convex, subcordate, thick, concentrically striate, seldom with an epidermis; the umbones prominent, approximated; the hinge with from two to four divergent strong teeth, and elongated lateral teeth; the ligament external, prominent; anterior slope with a cordate or ovate impression.

All the species marine.

## GENUS 1. LUCINA.

Animal orbicular, compressed; the margins of the mantle fringed; the foot elongated, cylindrical; tubes short, united in their whole length, and entering into a replication of the mantle.

Shell suborbicular, subinequilateral, concentrically striated. Umbones small, oblique, rather pointed. Hinge variable, generally the right valve with two divergent, moderately prominent teeth, leaving between them a triangular depression; toward the posterior border under the ligament an elongated little-elevated lamina, succeeded by a shallow groove, and along the anterior margin a slight ridge; the left valve with two divergent teeth, and an intermediate depression, an elongated ridge along the posterior margin, and a shallow groove along the anterior. Muscular impressions widely separated, the anterior generally with a narrow prolongation. Pallial impression entire. Ligament external and rather elongated.

There seems no reason for separating *Lucina* and *Loripes*. It will however be obvious to any one who compares the shells of any true *Lucina* with that of "*Lucina undata*," that this latter, having the pallial

impression not "entire," but invaded by a deep sinus, must be excluded from the genus, and either referred to *Cytherea* or kept apart.

1. *Lucina Rádula*. *Wrinkled Lucina*.

Shell orbicular, convex, with numerous concentric narrow rugæ, becoming lamelliform at the two extremities; before the umbones an ovato-lanceolate impression; the ligament of moderate length and sunk; the internal surface subgranulate, dull, white, toward the margin smooth and glossy, with faint radiating striæ; the colour white.

On the Western coasts of Scotland it attains a diameter of two inches; but the specimens seen by me on the Aberdeen coasts have been much smaller.

Not very common, in shallow and rather deep water, off the coast. A specimen found by Miss Marion Macgillivray has supplied the above description.

Venus spuria. Gmel. Syst. Nat. 3284.—*Tellina Radula*. Penn. Brit. Zool.; Ed. 2. iv. 181.—*Tellina Radula*. Mont. Test. Brit. 68. Pl. 2. f. 1, 2.—*Lucina Radula*. Turt. Brit. Biv. 116.—*Lucina Radula*. Flem. Brit. Anim. 441.—*Lucina Radula*. Lamk. Syst. v. 541; Ed. 2. vi. 225.

2. *Lucina spinifera*. *Spinous Lucina*.

Shell elliptico-orbicular, compressed, thin, with distinct concentric narrow ridges, which at both ends become more prominent, compressed, and at the anterior especially project in the form of short spines; two little-elevated divergent teeth, with elongated convex lateral laminæ, in both valves; inner surface minutely and obscurely granulated, toward the margin glossy and obscurely striated; the colour white.

A specimen, four and a-fourth twelfths long, three and a-half twelfths high, from deep water, obtained by me in the Winter of 1841-2.

It seems to me almost certain that this is only the young of *Lucina Radula*.

Venus spinifera. Mont. Test. Brit. Pl. 17. f. 1.—*Myrtea spinifera*. Turt. Biv. Brit. 133.—*Myrtea spinifera*. Flem. Brit. Anim. 443.

3. *Lucina láctea*. *Milk-white Lucina*.

Shell orbicular, equilateral, convex, with numerous concentric narrow, rather irregular striæ; the umbones medial, rather pointed, a little incurved; the dorsal slope nearly straight and

declinate; the anterior a little concave near the umbones, where there is a small oblong impression; a faint sinus from the umbo to the posterior margin; in the right valve a single entire tooth, with a depression on either side, in the left valve two teeth; the interior smooth; the anterior muscular impression extremely narrow and elongated, the posterior oblong; the colour white or yellowish-white; frequently interrupted crack-like radiating streaks, sometimes tinged red, as if in the substance of the shell. Length eight-twelfths of an inch, height seven-twelfths.

Single valves found by me on the Belhelvie Sands, in September, 1842.

Very nearly allied to *Lucina Radula*, from which it differs in having the dorsal line more sloping, the frontal less rounded, the striæ more numerous, the anterior muscular impression longer.

*Tellina lactea*. Linn. Syst. Nat. 1119.—*Tellina lactea*. Mont. Test. Brit. 70. Pl. 2. f. 4.—*Lucina lactea*. Turt. Brit. Biv. 112.—*Lucina lactea*. Lamk. Syst. v. 542; Ed. 2. vi. 228.—*Lucina lactea*. Risso, Eur. Merid. iv. 343.

#### 4. *Lucina Leucóma*. *White Lucina*.

Shell roundish, inequilateral, little convex, thin, with numerous concentric regular deeply impressed striæ, and faint and minute radiating striulæ; the umbones much curved; the dorsal slope very convex, the anterior deeply concave close to the umbones, afterwards convex, the ventral outline semicircular, forming a rounded angle with the frontal; anterior impression cordate, rather deep, striate; in the right valve a single entire tooth, with a depression before it, in the left, two thick teeth, of which the anterior is cleft; the interior roughish, smooth and glossy at the margin, the pallial impression invaded by a very narrow, straight mark, a deep groove from near the umbo; the colour dull white. Length of an individual eight-twelfths, height seven and a-half twelfths.

The above description from an individual brought up by the lines at Aberdeen, and found by Miss Marion Macgillivray, in October, 1842.

*Lucina Leucoma*. Turt. Brit. Biv. 113. Pl. 7. f. 8.

#### GENUS 2. CYPRINA.

Shell equivalve, anisomeral, obliquely cordiform, ovato-orbicular, thick, concentrically costate or striate, with a persistent lamellar epidermis. Umbones promi-

ment, approximated, curved forwards. Frontal slope concave, with a faint ovate or cordate depression. Hinge very strong; the right valve with an anterior depression near the margin, two diverging cardinal teeth, separated by a deep depression, the posterior tooth thick and bifid, an oblique groove, succeeded by a long submarginal ridge, externally of which is an elongated groove extending far along the posterior slope; the left valve with an anterior crenulate tooth, two thin diverging cardinal teeth, separated by a broad triangular depression, and succeeded by an elongated groove and a long ridge. Ligament external. Muscular impressions rather small, submarginal; pallial impression entire.

### 1. *Cyprina Islándica*. *Icelandic Cyprina*.

Shell obliquely cordate, roundish-ovate, thick, rounded before and behind, concentrically rugoso-striate, with a sublamellate epidermis; umbones prominent, obliquely incurved; a broadly ovate but undefined depression; inner surface dull chalky, with a broad glossy margin; epidermis brownish-olive, abraded on the umbones; inner surface white. Length five inches and three-fourths, height five inches.

Young individuals are longer in proportion to their height, and have a pale yellowish-grey or brownish-red epidermis.

Not uncommon along the sandy coast, and frequently cast on the beach.

*Venus Islandica*. Linn. Syst. Nat. ii. 1131.—*Concha e maximis, admodum crassa, &c.* Lister, Anim. Angl. 173. Pl. 4. f. 22.—*Venus mercenaria*. Penn. Brit. Zool. iv. 94. Pl. 53. f. 47.—*Cyprina Islandica*. Flem. Brit. Anim. 443.—*Cyprina Islandica*. Turt. Brit. Biv. 135.—*Cyprina Islandica*. Lamk. Syst. v. 557; Ed. 2. vi. 290.—*Venus Islandica*. Mont. Test. Brit. 114.

### GENUS 3. ASTARTE. SOWERBY.

Shell equivalve, anisomeral, moderately convex or compressed, subtriangular, roundish or elliptical, concentrically sulcate, with a dense olivaceous epidermis. Umbones prominent, approximated, curved forwards. Anterior dorsal slope concave, with a distinct cordato-oblong depression, of which the sides slope inwards.

Hinge very strong, the right valve with a thick prominent triangular tooth, and two triangular pits; left valve with two prominent diverging teeth, and an intervening triangular pit; lateral teeth merely forming a thickened margin. Ligament external, short, and rather inconspicuous. Muscular impressions rather large, elliptical. Pallial impression entire.

The species of this genus are readily known by their transverse or concentric scaliform rugæ, olivaceous epidermis, and thick shell. They live in mud, gravel, or sand, in rather deep water. The genus was first named *Astarte* by Sowerby, afterwards *Crassina* by Lamarck.

1. *Astarte Danmoniënsis*. *Devonshire Astarte*.

Shell rotundato-trigonal or suborbicular, moderately convex; with the anterior end shorter, the umbones pointed and approximated; the dorsal slope very slightly convex, with a narrow-lanceolate, obliquely striated impression, of which the sides slope inwards; the anterior slope somewhat concave, with a lanceolate, obliquely striated impression having similarly inclined sides; the valves thick, with twenty or more concentric, convex ridges, narrower than their interstices, which, as well as they, are concentrically striated; the epidermis yellowish-brown; two strong teeth in the left valve, a medial stronger tooth, and two slight teeth in the right; inner surface white; margin crenate. Length an inch and a-quarter, height an inch.

Young individuals more compressed, with pale brownish-yellow epidermis.

Not uncommon in deep water, on hard ground, off the coast, and now and then brought up by the lines.

Venus *Danmonia*. Mont. Test. Brit. Suppl. 46. Pl. 29. f. 4.—*Crassina sulcata*. Turt. Brit. Biv. 131. Pl. 11. f. 1, 2.—*Astarte Danmonia*. Flem. Brit. Anim. 440.—*Crassina Danmoniënsis*. Lamk. Syst. v. 554; 2d Ed. vi. 257.

2. *Astarte Scôtica*. *Scottish Astarte*.

Shell rotundato-trigonal or suborbicular, rather compressed; with the anterior end shorter, the umbones pointed and approximated; the dorsal slope very slightly convex, with a narrow-lanceolate, obliquely striated impression, of which the sides slope inwards; the anterior slope somewhat concave,

with a lanceolate, obliquely striated impression of which the sides slope inwards; the valves moderately thick, with twenty or more concentric, convex ridges, narrower than their interstices, which, as well as they, are concentrically striated; the epidermis yellowish-brown; two strong teeth in the left valve, a medial stronger tooth, and two slight teeth in the right; inner surface white; margin plain. Length an inch, height ten-twelfths.

Almost precisely similar to *Astarte Danmonia*, in every respect, unless in having the valves thinner, and the margins without crenatures.

Not uncommon off Aberdeen, and sometimes brought up by the lines. Found also at Gamrie, Banffshire, by Miss Macgilivray.

*Venus Scotica*. Mont. Test. Brit. Suppl. 44.—*Crassina Scotica*. Turt. Brit. Biv. 130.—*Astarte Scotica*. Flem. Brit. Anim. 440.—*Crassina Scotica*. Brown, Illustr. Pl. 18. f. 9?—*Crassina compressa*. Brown, Illustr. Pl. 18. f. 4, 5.

### 3. *Astárte sulcáta*. *Roundish Grooved Astarte*.

Shell rotundato-trigonal subangulated posteriorly, convex; with the anterior end longer, the umbones pointed and contiguous; the dorsal slope convex, with a lanceolate, obliquely striated impression, of which the sides slope inwards; the anterior slope somewhat concave, with an ovato-lanceolate obliquely striated impression with concave sloping sides; the valves very thick, with twenty-five or more concentric convex ridges, of the same breadth as the interstices, which, as well as they, are concentrically striated; the epidermis olive-brown; two strong teeth in the left valve, a median stronger tooth and two small teeth in the right; inner surface white, dull, glossy toward the margin, which is crenate. Length an inch, height ten-twelfths.

Very similar to *Astarte Danmoniensis*, but with more numerous rugæ, which are of about the same breadth as their interstices, whereas in it they are considerably narrower.

Not uncommon in deep water, and on hard ground, off Aberdeen.

*Venus sulcata*. Mont. Test. Brit. 131.—*Crassina incrassata*. Desh. Lamk. Syst.; Ed. n. vi. 257.—*Venus sulcata*. Lamk. Syst. v. 592; Ed. n. vi. 349.

### 4. *Astárte elliptica*. *Elliptical Astarte*.

Shell ovato-elliptical, compressed; with the anterior end

much shorter; the umbones pointed, contiguous, and curved forwards; the dorsal line nearly straight, elongated, with a linear-lanceolate, obliquely striated impression, of which the sides slope inwards, the anterior slope concave, with a narrow-lanceolate obliquely striated impression with concave sloping sides; the valves moderately thick, with about twenty-two broad, little elevated ribs, which toward either end become obsolete, and, as well as their interstices, which are about the same breadth, are concentrically striated; the epidermis light yellowish-brown or umber-brown; two divergent strong teeth in one valve, a strong central tooth in the other; inner surface white or bluish-white, glossy toward the margin, which is not crenate. Length an inch and four-twelfths, height an inch.

This species is easily distinguished by its being elliptical, more compressed, especially toward the ventral margin, with the teeth more divergent, and the concentric ridges evanescent at both ends.

*Crassina elliptica*. Brown, Illustr. Pl. 18. f. 3.— *Crassina ovata*. Brown, Edinb. Journ. of Nat. and Geogr. Sc. I. 12. Pl. f. 8.— *Crassina depressa*. Brown, Illustr. Pl. 18. f. 2.

##### 5. *Astarte multicosтата*. *Many-ribbed Astarte*.

Shell trigonal, moderately convex; with the anterior end slightly longer; the umbones contiguous, rather pointed and somewhat curved forwards; the dorsal slope slightly convex, with a narrow lanceolate, obliquely striated impression, of which the sides slope inwards, the anterior slope somewhat concave, with an oblongo-lanceolate, obliquely striated impression, with concave sloping sides; the valves thick, with about forty concentric convex ridges, which are rather broader than the interstices, and, as well as they, faintly concentrically striated; the epidermis yellowish-brown, or olive-brown, and glossy, usually patched with a black crust; two strong teeth in the left valve, a median stronger tooth and two small teeth in the right; inner surface white, dull, glossy toward the margin, which is not crenate. Length half an inch, height nearly the same.

Easily distinguished from *Astarte sulcata* by its much more numerous rugæ, more trigonal form, and smooth margins. The young are much compressed, with a very thin margin, and brownish-yellow epidermis, and have some faint resemblance to those of *Cyprina Islandica*.

Common in deep water, and on hard ground, off Aberdeen; frequently brought up by the lines.



*Crassina convexiuscula*. Brown, Illustr. Pl. 18. f. 7?—*Cyprina compressa*. Turt. Brit. Biv. 136. Pl. 11. f. 22, 23?—*Crassina multicostata*. Smith, Wern. Mem. viii. 104. Pl. 1. f. 20.

6. *Astarte compressa*. *Compressed Astarte*.

Shell ovato-trigonal, compressed; with the anterior end shorter, the umbones pointed and approximated; the dorsal slope straight for half its length, then convex, with a linear-oblong, obliquely striated impression, of which the sides slope inwards; the anterior slope nearly straight to the end of the oblong impression; the valves moderately thick, with irregular flattened concentric ridges and shallow sulci, obliterated toward the margins; the muscular impressions very large, the anterior obovato-lunate; the margin plain, with a broad flat space between it and the pallial impression; the epidermis yellowish-brown. Length an inch and a-half, height an inch and a-quarter.

This species comes nearest in form to *Astarte elliptica*, but has little affinity to *Astarte multicostata*, which has by several authors been strangely confounded with it. No two species could be more distinct than one which is ovato-trigonal, with obsolete irregular ridges and sulci, and one rotundato-trigonal with most regular, small, very numerous well-marked ridges and sulci. Dr. Fleming's *Astarte compressa* is the same as this species, in so far as the "dead valves from St. Andrew's Bay upwards of an inch and three-twelfths in length," are concerned, as I have compared them with an Aberdeen specimen. The description and figure of Montagu agree with the species here described. Brown's *Crassina sulcata*, (Pl. 18. f. 10.) cannot be Montagu's *Venus sulcata*, the margin in the former being crenate, in the latter plain.

*Venus compressa*. Mont. Test. Brit. Suppl. 43. Pl. 26. f. 1, 1.—*Astarte compressa*. Flem. Brit. Anim. 440.

GENUS 4. CYTHEREA.

Shell equivalve, inequilateral, moderately convex, sub-orbicular, concentrically striated. Umbones small, approximated, curved forwards. Frontal slope concave, with a distinct cordate depression. Hinge strong; the right valve with three divergent teeth, and three depressions, and an anterior elongated obtuse ridge, succeeded by a marginal groove; left valve with four divergent

teeth, four depressions, and an anterior obtuse ridge. Ligament external, considerably sunk by an elevation of the margins. Muscular impressions rather small, submarginal; pallial impression invaded by a very long, oblique tapering sinus.

1 *Cytheræa exolæta*. *Worn Cytherea*.

Shell orbicular, subequilateral, moderately convex, with concentric regular striæ, and stronger growth-lines, somewhat obsolete along the middle of the valves; the depression cordate, sublamellate, abruptly defined; inner surface dull, but with the muscular impressions, oblique mark, and margins glossy; the colour yellowish-white or reddish-white, with radiating purplish or reddish bands; inside white. Diameter two inches and a-half.

The form varies little, but the colouring presents considerable difference, it being sometimes uniform, without bands, sometimes blotched or spotted.

Very uncommon, occurring along the coast, in sand. I have never met with it alive.

Venus exoleta. Linn. Syst. Nat. i. 1134.—Venus exoleta. Penn. Brit. Zool. iv. 94. Pl. 54. f. 49. A; Ed. 2. iv. 209. Pl. 57. f. 3.—Venus exoleta. Mont. Test. Brit. 116.—Cytherea exoleta. Flem. Brit. Anim. 445.—Cytherea exoleta. Turt. Brit. Biv. 162. Pl. 8. f. 7.—Cytherea exolæta. Lamk. Syst. vi. 572; Ed. 2. vi. 314.

2. *Cytheræa linctæ*. *Glossed Cytheræa*.

Shell orbicular, inequilateral, moderately convex, with fine concentric regular thin striæ, more prominent at either end, and a few stronger growth-lines; the surface glossy; the depression cordate, striato-lamellate, abruptly defined; the colour greyish-white, without markings; the inside dull-white. About an inch and a-half in diameter.

Closely allied to *Cytheræa exoleta*, but with the dorsal slope longer, the surface glossy, the concentric lines finer, thin-edged, and more elevated at either end.

Young shells are rather longer than high, but in older individuals the height considerably exceeds the length.

On the sandy coasts, common. Sometimes brought up on the fishing-lines.

Cytherea linctæ. Flem. Brit. Anim. 445.—Cytherea linctæ. Lamk. Syst. v. 573; Ed. 2. vi. 315.—Venus exoleta. Penn. Brit. Zool. iv. 94. Pl. 56. f. 49.—Cytherea sinuata. Turt. Brit. Biv. 163.

3. *Cytheræa undata*. *Waved Cytheræa*.

Shell suborbicular, convex, thin, subdiaphanous, with numerous concentric striæ, and larger rugæ, which are more or less sinuous, as is the very thin inferior margin of the valves; no distinct impression before the umbones; two middle cardinal teeth of the last valve prominent and thin; three teeth in the right valve, the middle tooth larger and cleft; the external surface glossy; the internal smooth, with the submarginal space glossy, and faintly marked with marginal striæ; the muscular impressions oval, the pallial invaded by a deep obtuse sinus running upwards beyond the middle of the shell; the exterior white, or yellowish or reddish-white, sometimes ferruginous toward the umbones, the anterior of a paler reddish-white. Length an inch and a-half, height about the same.

Not very uncommon in rather deep water off Aberdeen; sometimes brought up by the lines, and not unfrequently cast on the beach. Found also at Gamrie, in Banffshire, by Miss Macgillivray, and at Cruden by Mr. Murray.

Venus undata. Penn. Brit. Zool. 95. Pl. 55. f. 51.—Lucina undata. Turt. Brit. Biv. 115.—Venus undata. Mont. Test. Brit. 117.—Venus undata. Flem. Brit. Anim. 448.—Lucina undata. Lamk. Syst. v. 543; Ed. 2. vi. 229.

## GENUS 5. VENUS.

Shell equivalve, inequilateral, moderately convex, suborbicular, subtriangular, or cordato-ovate, concentrically striate or laminate. Umbones prominent, approximated, curved forwards. Frontal slope concave, with a distinct cordate depression. Hinge strong; the right valve with three divergent teeth; the two anterior smaller, separated by a narrow depression, the posterior elongated separated by a wide triangular depression, and succeeded by an elongated marginal groove; the left valve with three divergent teeth, of which the medial is largest, three depressions, and submarginal grooves. Ligament external, considerably sunk and inconspicuous. Muscular impressions moderate, roundish, submarginal; pallial impression invaded by an oblong sinus.

In sand, gravel, or clay, near the shore, or in deep water.

1. *Venus Casina*. *Thick-ridged Venus*.

Shell suborbicular, moderately convex, very thick, with concentric elevated thick rather thin-edged entire ridges; the frontal slope rather convex, the posterior longer, convex; the anterior impression cordate, lamelloso-striate, the posterior linear-oblong; the margin crenate; the colour dull white. Diameter an inch and eight-twelfths.

First found in September, 1842, by Miss Isabella Macgillivray, in December by me, brought up from deep water off Aberdeen, but only decayed valves.

It is not uncommon on some of the Western coasts of Scotland, where it attains a diameter of two inches. The ridges vary greatly in number, regularity, and thickness.

*Venus Casina*. Linn. Syst. Nat. 1130.—*Venus Erycina*, a worn shell. Penn. Brit. Zool. iv. 94. Pl. 54. f. 48. A.—*Venus Cassina*. Mont. Test. Brit. Suppl. 47.—*Venus Casina*. Turt. Brit. Biv. 141. Pl. 9. f. 1.—*Venus Cassina*. Flem. Brit. Anim. 446.

2. *Venus refléxa*. *Thin-ridged Venus*.

Shell suborbicular, compressed, rather thin, with distant concentric elevated, reflexed, broad, but thin-edged entire ridges; the intervals finely striulate in a radiating manner; the frontal slope slightly concave, the posterior longer, little convex; the anterior impression cordate, obliquely lamellate, the posterior linear-oblong; the margin marked internally with very small grooves and ridges; the colour yellowish-white, often faintly radiated with reddish. Diameter an inch and a-half.

This species is nearly allied to *Venus Casina*, from which it differs in being more compressed, with the concentric ridges thinner, more elevated, and reflexed, especially toward the anterior end.

A small individual from off Aberdeen, found by me on the 4th of October, 1842; a larger single valve, by Mr. Alex. Murray, at Gamrie; and a large individual in January, 1843, at the Cove, by Mr. Fergusson, one of my pupils.

*Venus refléxa*. Mont. Test. Brit. Suppl. 40, 168.—*Venus refléxa*. Laskey, Wern. Trans. 1, 384. Pl. 8. f. 1.—*Venus refléxa*. Turt. Brit. Biv. 142. Pl. 10. f. 1, 2.—*Venus refléxa*. Flem. Brit. Anim. 446.

3. *Vénus Gallina*. *Hen Venus*.

Shell cordato-trigonal, moderately convex, concentrically lamelloso-sulcate, with the ridges reflexed; the frontal slope short and concave, the posterior slightly convex; the anterior impression cordato-oblong, obliquely striate, the posterior elongate-lanceolate; the margins crenulate; the colour white, or reddish, plain or radiated with red. Greatest length an inch and a-half.

This species varies greatly in size, form, convexity, the closeness of its lamellæ, and its colour. It is on this account one of the most instructive, its variations affording indications of similar changes in other shells. Individuals occur with the shell very thick, the ridges broad and approximated or crowded, or even nearly obsolete, and the colour dull white; others are of moderate thickness, with the ridges more or less separated, the colour reddish or whitish, with numerous red markings, and generally three radiating bands of the same colour; others are thin, more elongated, with thin distant ridges, pale with radiating interrupted bands. Authors, ever anxiously on the search for new species, have thus found occasion to invent a few; and, accordingly, the present species figures at the present day, under the names of *Gallina*, *Laminosa*, and *rugosa*, besides several more, not generally adopted. On comparing a vast number of shells of these alleged species, I find that they so run into each other that, although as a whole the species can be easily distinguished, it is often impossible to say to which of the alleged species an individual belongs. Our two principal varieties are the following.

A. *Vénus Gallina laminosa*. *Laminated Hen Venus*.

Shell cordato-trigonal, very thick, convex, concentrically sulcate, with the ridges reflexed, thin-edged, generally crowded and imbricated, more distinct toward the umbones, where their intervals are more or less marked with radiating striæ; the frontal slope short and concave, with a sunk cordate, sulcate impression; the posterior slope half as long again as the anterior, somewhat convex, with the impression lanceolate, smooth and glossy on the left valve, rugoso-striate and dull on the other; the muscular impressions deeply sunk, the margin crenulate; the colour dull-white, but the left side of the posterior or dorsal impression always more or less variegated with

red. Length an inch and a-half, height an inch and a-fourth, thickness ten-twelfths.

*Venus rugosa*. Penn. Brit. Zool. iv. 95. Pl. 56. f. 50.—*Venus laminosa*. Mont. Test. Brit. Suppl. 38.—*Ortygia subcordata*. Leach, Brown, Illustr. Pl. (19) 36. f. 14, 15.—*Venus laminosa*. Laskey, Wern. Mem. I. 384. Pl. 8. f. 16, 16.—*Venus cancellata*. Donovan. Brit. Sh. Pl. 4. f. 115.—*Venus rugosa*. Flem. Brit. Anim. 446.—*Venus Pennantii*. Forbes, Malac. Mon. 52.

#### B. *Venus Gallina striatula*. Common Hen Venus.

Shell cordato-trigonal, thick, moderately convex, concentrically sulcate, with the ridges reflexed, rather crowded and imbricated, thick-edged or rounded, more distinct toward the umbones, where their intervals are concentrically, and more or less radiatingly striate; the frontal slope short and concave, with a sunk cordato-oblong impression; the posterior slope half as long again as the anterior, somewhat convex, with the impression lanceolate, flattened, glossy, and finely striulate on the left valve, rugoso-striate and dullish on the other; the muscular impressions moderately sunk; the colour reddish-white, with numerous interrupted red lines, giving the ridges a reticulated appearance, and generally three darker radiating bands; the anterior slope variegated with red on both sides. Length an inch and a-fourth, height an inch, thickness from seven to eight-twelfths.

*Venus Gallina*. Linn. Syst. Nat. 1130.—*Venus rugosa*. Var. Penn. iv.—*Venus striatula*. Donovan. Brit. Sh. Pl. 68.—*Venus Gallina*. Turt. Brit. Biv. 149. Pl. 9. f. 2.—*Ortygia Gallina*. Leach, Brown, Illustr.—*Venus striatula*. Mont. Test. Brit. 113.—*Venus Gallina*. Lamk. Syst. v. 591; Ed. 2. vi. 348.—*Venus Gallina*. Forbes, Malac. Mon. 52.

#### 4. *Venus Prideauxiana*. Prideaux's Venus.

Shell cordato-trigonal, subovate, rather thin, or thin, concentrically sulcate, with the ridges thin, reflected, thin-edged, distinct, being separated by intervals of about their own breadth, which are more or less concentrically and radiatingly striate; the frontal slope short and very concave, with a sunk cordato-oblong, sulcate impression; the posterior slope straight, more than half as long again, with the impression narrow-oblong, smooth and glossy on the left valve, rugoso-striate on the other; the muscular impressions faint; the colour generally white, with three dark purple radiating, usually inter-

rupted bands. Length an inch and two-twelfths, height nine or ten-twelfths, thickness four or five-twelfths.

This species differs from *Venus Gallina* chiefly in having the valves thinner, the anterior slope shorter, the posterior longer, the form more ovate, and the laminae thinner and widely separated. It is perhaps only a variety of that species.

The young are of a more roundish form, but otherwise similar. They have been represented in Brown's Illustrations, Pl. 35. f. 13. by a characteristic figure, to which the name of *Ortygia costata* is appended.

This species is not uncommon along the coast, often cast on the beach, and frequently brought up by the lines from deep water off Aberdeen; also found at Cruden, Peterhead, Gamrie, Banff, and Portsoy.

*Venus laminosa*. Turt. Brit. Biv. 148. Pl. 10. f. 4.—“*Ortygia Prideauxiana*. Leach.”—*Ortygia sulcata*. Brown, Illustr. Pl. 34. f. 12.

#### 5. *Venus fasciata*. *Banded Venus*.

Shell roundish-trigonal, compressed, thick, with broad, flattened, smooth, concentric ridges; the frontal line rather concave, with the impression narrow-oblong, the dorsal line a little convex; the teeth thin, the margin crenulate; the colour white or reddish, with reddish-brown, crimson or pink radiating bands, and smaller markings. Length and height about ten-twelfths of an inch.

Very rare, and only single valves met with, from off Aberdeen. Found also at Fraserburgh, by Mr. Alexander Murray. In January, 1843, a perfect specimen found at the Cove by Mr. Fergusson.

*Venus fasciata*. Donovan. Brit. Sh. v. Pl. 170.—*Pectunculus fasciatus*. Da Costa. 188. Pl. 13. f. 3.—*Venus fasciata*. Flem. Brit. Anim. 447.—*Venus fasciata*. Turt. Brit. Biv. 146. Pl. 8. f. 9.—*Venus fasciata*. Brown, Illustr. Pl. 35. f. 10.—*Venus paphia*. Mont. Test. Brit. 110.

#### 6. *Venus ovata*. *Ribbed Venus*.

Shell ovato-triangular, moderately convex, rather thin, divergingly ribbed; the ribs crenulated, being crossed by numerous concentric striæ; the ligament scarcely apparent externally; the dorsal slope much longer, slightly convex, the anterior convex; the depression oblong, not distinct; the margin finely crenulated; the colour brownish-white, of the inside white. Length nine-twelfths, height seven-twelfths.

Frequently taken up by the lines at Aberdeen, and sometimes cast on the beach; found at Cruden by Mr. Alexander Murray; at Gamrie by Miss Macgillivray.

*Venus ovata*. Penn. Brit. Zool. iv. 97. Pl. 56. f. 56.—*Cardium striatum radiatum*. Walker, Test. Min. Rar. Pl. iii. f. 82.—*Cytherea ovata*. Flem. Brit. Anim. 445.—*Venus pectinula*. Lamk. Syst. v. 592; Ed. 2. vi. 348.

#### 7. *Venus triangularis*. *Triangular Venus*.

Shell subtrigonal, thick, opaque, smooth, with some faint concentric striæ, yellowish-white; the umbones very prominent; in one valve three central teeth, and a lateral tooth, in the other two central teeth and a curved lateral tooth; the inner surface glossy, white or yellowish, with the muscular impressions moderate. Length about five-twelfths, height nearly the same.

Several valves found in shell sand, from the Bay of Cruden, sent by Mr. Murray, in November, 1842.

*Venus triangularis*. Mont. Test. Brit. 577. Pl. 17. f. 3.—*Cyprina triangularis*. Turt. Brit. Biv. 136. Pl. 11. f. 19, 20.—*Cyprina triangularis*. Flem. Brit. Anim. 444.

#### GENUS 6. VENERUPIS. ROCK-VENUS.

Shell equivalve, very inequilateral, convex, ovate or elliptical, concentrically striated. Umbones small, approximated, curved forwards. Anterior slope nearly straight, short, with a faint oblong impression. Hinge moderately strong; the right valve with three close divergent teeth, of which two are bifid, an anterior groove, and a posterior convex grooved ridge; left valve with three close divergent teeth, of which the central is bifid, an anterior and a posterior ridge. Ligament external long, Muscular impressions moderate, submarginal; pallial impression invaded by a large obtuse sinus parallel to the margin.

This genus contains those elongated species of the genus *Venus* of Lamarck which have three small approximated teeth in each valve, and which Sowerby has proposed to unite with the species of Lamarck's genus *Venerupis*. That name however, besides being awkwardly constructed, is not applicable to the greater number of



them, they not living in holes in rocks, but simply in sand or mud. Others have proposed as the generic name *Pullastra*, used to designate one of the species, and still more objectionable.

1. *Venérupis virgínea*. *Virgin Rock-Venus*.

Shell ovato-oblong, considerably compressed, rather thick, concentrically regularly striate, with rather marked growth-lines; the anterior slope short, with an elongated depression, the posterior margin obtusely subangulate; cardinal teeth erect, two in each valve bifid; inside smooth and glossy; pallial sinus tapering; colour of the exterior yellowish-white, with radiating bands of florid dots or spots; inner surface white, tinged with red or yellow toward the hinge. Length two inches, height an inch and a-quarter.

In sand along the coast, not common. Small live individuals sometimes brought up on the fishing-lines. Found at Banff by Mr. Clark, on the Buchan coast by Mr. Murray, at Peterhead by Mr. Gray.

*Venus virgínea*. Linn. Syst. Nat. i. 1136.—*Venus virgínea*. Penn. Brit. Zool. iv. 97. Pl. 55. right hand figure.—*Venus virgínea*. Flem. Brit. Anim. 452.—*Venus virgínea*. Turt. Brit. Biv. 156. Pl. 8. f. 8.—*Venus virgínea*. Lamk. Syst. v. 600; Ed. 2. vi. 360.—*Venus virgínea*. Mont. Test. Brit. 128.

2. *Venérupis Pullástra*. *Pullet Rock-Venus*.

Shell ovato-oblong, moderately compressed, rather thick, divergently and concentrically striate, the divergent striæ obsolete, the concentric striæ sublamellar and somewhat waved toward the anterior margin; the frontal slope short, with an oblong faint depression, the posterior margin subtruncate; the three cardinal teeth in each valve close, small, erect, and pointed, one only cleft; the inner surface glossy, the pallial sinus large, and rounded; the exterior dull yellowish-white, subferruginous, patched with brown in irregular radiating bands; interior white, sometimes with a purple spot or patch. Length two inches, height an inch and a-half.

In sand along the coast from Aberdeen to Banff; not unfrequently cast ashore; small individuals sometimes brought up on the lines.

Testa quasi rhomboides, &c. Lister, Anim. Angl. 171. Pl. 4. f. 20.—*Venus pullastra*. Mont. Test. Brit. 125.—*Venus pullastra*. Turt. Brit. Biv. 159.—*Venus pullastra*. Maton and Rackett. Trans. Linn. Soc. viii. 88. Pl. 2. f. 7.—*Venus pullastra*. Penn. Brit. Zool.;

Ed. 2. iv. 210.—*Venus Senegalensis*. Gmel. Syst. Nat. i. 3282.—*Venus pullastra*. Lamk. Syst. v. 598; Ed. 2. vi. 357.—*Venerupis pullastra*. Flem. Brit. Anim. 451.

*Venus perforans* of Montagu differs from *Venus Pullastra* only in being abbreviated or distorted. Specimens presenting this character are often brought up from deep water off Aberdeen, and have been found by Mr. Alexander Murray at Fraserburgh, and intermediate gradations occur, there being individuals which one could not with certainty refer to the one or the other so-called species.

*Venus perforans*. Mont. Test. Brit. 127.—*Venerupis perforans*. Turt. Brit. Biv. 29. Pl. 2. f. 15, 16, 17, 18.—*Venerupis perforans*. Flem. Brit. Anim. 451.—*Venerupis perforans*. Lamk. Syst. v. 506; Ed. n. vi. 163.

#### FAMILY VII.—CARDINA.

Animal roundish, ovate, or oblong; with the mantle closed, but having a considerable antero-inferior opening for the foot, and presenting behind two extensile tubes, the lower for respiration, the upper for the fœces; the foot large, compressed, tapering; two adductor muscles, distant and nearly equal.

Shell regular, equivalve, entirely closed, often longitudinally ribbed, generally very convex; the hinge with central and lateral teeth; the ligament rather short, external, prominent; the muscular impressions large, roundish, submarginal.

#### GENUS 1. CARDIUM. COCKLE.

Animal roundish. The lobes of the mantle bordered with papillæ, and forming behind two short siphons. Foot very large, subcylindrical, with a subconical, compressed termination, bent above the middle, and directed forwards. Branchiæ short, unequal. Mouth transverse, funnel-shaped, with small triangular appendages. Adductor muscles nearly equal.

Shell subcordiform, roundish, ventricose, equivalve, inequilateral, with radiating costæ. Umbones large, prominent, curved inwards and a little forwards, or direct. Hinge strong, with two conical central teeth

and two deep pits in each valve, in the right two distant elongated lateral teeth and two submarginal grooves, two prominent lateral teeth in the left valve, with two pits for the teeth of the other. Ligament short, external, prominent. Muscular impressions large.

They live in sand, gravel, or mud, in shallow or deep water. By the action of the large foot, they can shift their position, and even leap to a considerable distance, but it does not appear that they habitually move thus from place to place. Their position is with the broader or anterior end downward.

### 1. *Cardium echinatum*. Prickly Cockle.

Shell cordate, obliquely roundish, subequilateral, tumid; with the dorsal margin short, but forming an angle behind; the umbones very prominent, curved a little forwards; each valve with twenty rather thick, convex ribs, which have a medial thin lamina, serrated for some way from the umbones, but from about the middle of their length presenting numerous spines, which, on the anterior side of the shell, are curved backwards, somewhat spatulate, but acute, on the other parts straight and acute; the interstices between the ribs transversely rugous; the colour whitish, often blotched or banded with reddish; the inner surface white, with the ribs apparent, and the margins serrato-plicate; two approximated tapering teeth in each valve; the lateral teeth prominent. Length two inches and a-half, breadth two inches and eight-twelfths.

It varies considerably. Sometimes, the form being the same, the valves are much thicker, with the same number of ribs, which are much stronger, with a medial, little elevated lamina, or even grooved, and only marked toward the margin with spines or tubercles, which are induplicate, tubular, or cochleariform, fewer than in the variety above described, and not so prominent. This variety attains a diameter of four inches, and is the *Cardium aculeatum* of authors.

Young shells are very thin, transparent, white, with the medial laminae of the ribs forming compressed eminences. They are the *Cardium ciliare* of some authors.

Not very uncommon off the sandy coast. The individuals found in sand, and near the shore, are of the second variety; those from deep water always of the first.

*Pectunculus echinatus*. Lister, Anim. Angl. 188. Pl. 5. f. 33.—*Cardium echinatum*. Linn. Syst. Nat. ii. 1122.—*Cardium echinatum*. Mont. Test. Brit. 78.—*Cardium echinatum*. Penn. Brit. Zool. iv. 90.—*Cardium echinatum*. Turt. Brit. Biv. 183.—*Cardium echinatum*. Flem. Brit. Anim. 421.—*Cardium echinatum*. Lamk. Syst. vi. 7; Ed. 2. vi. 396.—*Cardium aculeatum*. Linn. Syst. Nat. ii. 1122.—*Cardium aculeatum*. Turt. Brit. Biv. 180. Pl. 13. f. 6, 7.—*Cardium aculeatum*. Penn. Brit. Zool. iv. 90. Pl. 50. f. 37.—*Cardium aculeatum*. Flem. Brit. Anim. 420.—*Cardium aculeatum*. Mont. Test. Brit. 77.—*Cardium aculeatum*. Lamk. Syst. vi. 7; Ed. 2. 397.—*Cardium ciliare*. Linn. Syst. Nat. i. 1122.—*Cardium ciliare*. Mont. Test. Brit. 79.—*Cardium ciliare*. Penn. Brit. Zool. iv. 90. Pl. 50. f. 39.—*Cardium ciliare*. Lamk. Syst. vi. 6; Ed. 2. vi. 394.

### 2. *Cárdium édule*. *Eatable Cockle*.

Shell cordate, obliquely roundish, or subtriangular, tumid; with the dorsal margin short, and either forming a slight angle behind, or sloping; the umbones very prominent and directly incurved; each valve with twenty-eight flattened ribs, marked with numerous little elevated, transverse lamellæ; the interstices between the ribs narrow; the colour whitish, or tinged with red or brown; the inside white, but frequently with a brown or blackish patch toward the posterior margin of each valve; the margins serrato-plicate. Length an inch and three-fourths, height an inch and a-half.

It varies greatly: sometimes much elongated behind, sometimes roundish; white, brownish, or reddish-white. Young individuals whiter and more rounded.

As an article of food this cockle is among the best of the Malacozoa. It may be eaten raw, like the oyster, to which, I think, it is much superior, when found in pure sand.

Occurs plentifully, and of large size, in the Estuary of the Ythan.

*Pectunculus rotundus, albidus, vulgaris*. Lister, Anim. Angl. 189. Pl. 5. f. 34.—*Cardium edule*. Linn. Syst. Nat. i. 1124.—*Cardium edule*. Mont. Test. Brit. 76.—*Cardium edule*. Penn. Brit. Zool. iv. 91. Pl. 50. f. 41.—*Cardium edule*. Turt. Brit. Biv. 188.—*Cardium edule*. Flem. Brit. Anim. 422.—*Cardium edule*. Lamk. Syst. vi. 12; Ed. 2. vi. 405.—*Cardium rusticum*. Lamk. Syst. vi. 12; Ed. 2. vi. 406.—*Cardium crenulatum*. Lamk. Syst. vi. 12; Ed. 2. vi. 407.

### 3. *Cárdium fasciátum*. *Banded Cockle*.

Shell subcordate, nearly orbicular, convex; with the dorsal margin very short, and forming a slight angle; the valves

thin with twenty-six little elevated, convex, glossy ribs, which toward the margins are marked with transverse lamellæ, becoming elevated on the anterior end, and still more so on the posterior, where they sometimes resemble flattened spines; the colour white, with irregular bands or spots of red, more especially at the posterior end; the inside white, the margins plicato-crenate. Length four-twelfths and a-half, height four-twelfths.

Not very uncommon off the sandy coast; sometimes brought up by the lines: Aberdeen, Peterhead, and Gamrie.

*Cardium fasciatum*. Mont. Test. Brit. Suppl. 30. Pl. 27. f. 6.—*Cardium fasciatum*. Turt. Brit. Biv. 189.—*Cardium fasciatum*. Flem. Brit. Anim. 422 —*Cardium fasciatum*. Penn. Brit. Zool.; Ed. 2. iv. 191.

#### 4. *Cárdium exiguum*. *Diminutive Cockle*.

Shell subcordate, suborbicular, somewhat oblique, convex; with the dorsal margin longer than the anterior, which is rounded, the posterior end obliquely subtruncate; the valves thin, with twenty-four little elevated, convex, smoothish ribs, which, toward the anterior end, are marked with transverse lamellæ, and at the posterior with prominent tubercles; the grooves between the ribs very narrow, toward either end of the shell, but especially at the anterior, transversely striate or marked with minute compressed papillæ; the colour white, sometimes with reddish markings; the inside white, often reddish or brownish near the posterior end; the margins plicato-crenate. Length about four-twelfths of an inch, height somewhat less.

Not very uncommon off the sandy coast; found at Aberdeen first by Mr. Davidson, and afterwards by Miss Anne Macgillivray.

*Cardium exiguum*. Gmel. Syst. Nat. 3255.—*Cardium exiguum*. Mont. Test. Brit. 82.—*Cardium exiguum*. Turt. Brit. Biv. 187.—*Cardium exiguum*. Flem. Brit. Anim. 422.

#### 5. *Cárdium lævigátum*. *Smooth Cockle*.

Shell roundish-oval, much produced behind, moderately convex, covered with a yellowish-brown or greenish-grey epidermis; the valves rather thin, marked with very numerous obsolete ribs, the interstices between which are faintly striated longitudinally; the colour beneath the epidermis reddish-white; the inside glossy white; the margin crenato-sulcate. Length two inches, height two inches and a-half.

Very young individuals are nearly orbicular, with the epidermis transparent, the colour of the shell white or reddish-white, beautifully spotted or patched with red.

Apparently very rare. I have found only one very small, finely variegated specimen, which was brought up by a fishing-line, from the Bay of Aberdeen.

*Cardium lævigatum*. Linn. Syst. Nat. i. 1123?—*Cardium lævigatum*. Turt. Brit. Biv. 190.—*Cardium lævigatum*. Flem. Brit. Anim. 423.—*Cardium lævigatum*. Mont. Test. Brit. 80.—*Cardium serratum*. Lamk. Syst. vi. 11; Ed. 2. vi. 401.—*Cardium lævigatum*. Penn. Brit. Zool. iv. 91. Pl. 51. f. 40.

### 6. *Cárdium elongátum*. *Oval Cockle*.

Shell ovato-orbicular, somewhat oblique, compressed; with the dorsal margin nearly straight, and about twice as long as the frontal; the anterior end rounded, the posterior subtruncate; the valves thin, with twenty-six close convex ribs, echinate, especially toward the margins, with direct, thin, pointed spines; the colour yellowish-white, with some faint reddish markings. Length a twelfth of an inch, height a sixth less.

This beautiful species differs from the young of *Cardium fasciatum*, in having the dorsal margin much longer, the ribs more numerous, the prominences upon them not in the form of transverse lamellæ, but of short, thin, pointed spines.

Found by me among shell sand, from the Bay of Cruden, sent by Mr. Alexander Murray, in November, 1842. The description is from a single individual of small size. Montagu says it attains a quarter of an inch in diameter.

*Cardium elongatum*. Mont. Test. Brit. 82.—*Cardium elongatum*. Turt. Brit. Biv. 185.—*Cardium elongatum*. Flem. Brit. Anim. 422.

## GENUS 2. DONAX.

Animal oblong or subtriangular, compressed. The lobes of the mantle very thin, disunited in front and beneath, with the margins fringed with tentacular appendages, united behind, but forming an orifice for the tubes, which are separate and elongated. Mouth small, with large labial appendages. Branchiæ very unequal. Foot compressed, thin-edged, angulate. Adductor muscles large.

Shell more or less triangular, compressed, regular,

equivalve, very inequilateral; the posterior side shorter, and angulate. Umbones small, rather pointed, curved a little backwards. Hinge generally with two small divergent teeth in both valves; lateral teeth elongated and inconspicuous. Ligament external, short, and tumid. Muscular impressions oblong, distant.

1. *Dónax Trúnculus. Oblong Donax.*

Shell oblong, anteriorly prolonged and rounded, posteriorly sloping rapidly and angulate, moderately convex, smooth, with faint divergent striæ; yellowish-white, with radiating lines or bands, and some concentric markings of purple or brown; epidermis thin, pale brown or olivaceous; inside purple, reddish, or white; margin striato-crenulate. Length an inch and a-half, height eight-twelfths.

It varies little in form, but greatly in its colours.

Along the sandy shores, not uncommon.

*Donax Trunculus.* Linn. Syst. Nat.—*Donax Trunculus.* Penn. Brit. Zool. iv. 93. Pl. 55. f. 45.—*Donax Trunculus.* Turt. Brit. Biv. 123.—*Donax Trunculus.* Mont. Test. Brit. 103.—*Tellina intus ex viola purpurascens.* Lister, Anim. Angl. 190. Pl. 5. f. 35.—*Donax Trunculus.* Flem. Brit. Anim. 433.—*Donax anatinum.* Lamk. Syst. v. 551; Ed. 2. vi. 249.

2. *Dónax denticuláta. Denticulated Donax.*

Shell crenate, triangular, anteriorly prolonged and semi-oblong, posteriorly truncato-declinate and angulate, moderately convex, thick, glossy, with fine radiating striæ, which are punctured or transversely grooved; a narrow space along the dorsal margin smooth; two angular ridges from the umbo to the posterior angle, the space between which is striated and punctured, that between the posterior ridge and the margin marked with oblique undulating striæ; the internal surface highly glossed, smooth, the margin crenate; the central teeth strong, the lateral prominent; the colour white, with purple or violet rays, the inside white. Length nine-twelfths of an inch, height six-twelfths.

A specimen found in Cruden Bay, by Mr. Alex. Murray, in September, 1842.

*Donax denticulata.* Linn. Syst. Nat. 1127.—*Donax denticulata.* Turton, Brit. Biv. 124.—*Donax denticulata.* Penn. Brit. Zool. iv. 93.—Mont. Test. Brit. 104.—*Donax denticulata.* Flem. Brit. Anim. 483.—*Donax denticulata.* Lamk. Syst. v. 550; Ed. n. vi. 246.

## FAMILY VIII.—TELLININA.

Animal orbicular, roundish, or oblong, more or less compressed; with the mantle open at its anterior and inferior border, for the passage of the foot, and bordered with tentacular appendages, united behind, but with an aperture for the siphons, which are separated and much elongated; the foot very much compressed, sharp-edged, and pointed; two distant adductor muscles.

Shell orbicular, roundish, or oblong, more or less inequivalve, inequilateral, the posterior end shorter, flexuous; the hinge with one or two small teeth, and generally obsolete lateral teeth; the ligament dorsal, short, prominent; the muscular impressions widely separated.

## GENUS 1. KELLIA.

Shell roundish or oval, convex, equivalve, closed; the valves thin, concentrically striate. Hinge of the right valve with two approximated, small teeth, and a remote thin anterior lateral tooth; that of the left valve with a concave tooth, and a remote lateral tooth; ligament internal; umbones small, rather obtuse; muscular impressions large, distant.

This genus, instituted by Turton, is nearly allied to *Amphidesma* and *Cryptodon*.

1. *Kellia suborbicularis*. *Suborbicular Kellia*.

Shell roundish-elliptical, nearly equilateral, convex; with the valves very thin, fragile, semitransparent, obsoletely striate concentrically; the umbones small, rather pointed, incurved; the hinge with two small teeth and a lateral, in one valve, a concave tooth and a remote lateral in the other; the colour white, hyaline-white, or yellowish-white, often opalescent. Length about five-twelfths of an inch, height a fifth less.

According to Montagu, the animal, which is of a very pale colour, has a long siphon with only one aperture, and about the middle of the shell beneath a slender foot, half the length of the siphon, and by means of which it can adhere to the smoothest surface. "We first discovered it," he says, "in hard limestone at Plymouth, fragments of which were thrown upon



the beach, perforated in all directions. It is sometimes dredged up in Salcomb Bay, detached from any other substance, so that it does not seem to be a borer in all situations; perhaps it does not enter anything but limestone, which is not to be found in this last place. A variety is highly glossed, with a resplendent pearly hue." It is of this kind that all the specimens which I have seen on the Aberdeenshire coast are.

Found by me, in August, 1842, among shells on the beach, near Aberdeen. It is occasionally not uncommon there, and is one of the most beautifully delicate of our bivalve shells, in this respect resembling *Cryptodon flexuosus*, and in form not unlike *Cyclas cornea*, as Montagu has remarked. Found also in September, on the Buchan coast, near Peterhead, by Mr. Alex. Murray.

*Mya suborbicularis*. Mont. Test. Brit. 39. 564. Pl. 26. f. 6. Penn. Brit. Zool. Ed. n. iv. 166.—*Kellia suborbicularis*. Turt. Brit. Biv. 57. Pl. 11. f. 5, 6.—*Kellia suborbicularis*. Flem. Brit. Anim. 430.

## 2. *Kellia rubra*. Red *Kellia*.

Shell ovato-rotundate, inequilateral, equivalve, convex, glossy; with the valves moderately thick, little transparent, obsoletely striato-sulcate concentrically; the umbones small, rather obtuse, a little curved; the hinge with two small teeth under the umbo in the right valve, a concave tooth and a remote lateral in the other; the colour deep purplish-red toward the umbones, fading toward the margins, or hyaline-grey tinged with purple, or purplish-white; the inside deep purple, glossy. Length from a twelfth to a twelfth and a-half, height a fourth less.

First observed by me, in January, 1843, among shell sand from Ugie-mouth, and Cruden Bay, sent by Mr. Alexander Murray.

*Cardium rubrum*. Mont. Test. Brit. 83. Pl. 27. f. 4.—*Kellia rubra*. Turt. Brit. Biv. 58. Pl. 11. f. 7, 8.—*Kellia rubra*. Flem. Brit. Anim. 430.

## GENUS 2. LEPTON.

Shell suborbicular, compressed, equivalve, nearly equilateral, slightly open at the ends. Hinge of one valve with a small medial prominent tooth, on each side of which is a depression, succeeded by an elongated lamelliform lateral tooth, having a prominence at its umbonal

end; in the other valve a medial impression, and two lamelliform lateral teeth, with a parallel groove and prominent margin. Ligament internal. Muscular impressions moderate, remote.

1. *Lepton nitidum*. *Shining Lepton*.

Shell ovato-orbicular, subtrigonal, moderately compressed, nearly equilateral, slightly broader at one end, more rounded at the other; the umbones very small, pointed; the valves thin, semitransparent, externally glossy, faintly concentrically striate, internally shining. Length a twelfth and a-half, height nearly a fourth less.

Found by me, in September, 1842, among shell sand, from the beach between the mouths of the Dee and the Don.

*Lepton nitidum*. Turt. Brit. Biv. 63.—*Lepton nitidum*. Flem. Brit. Anim. 429.

GENUS 3. CRYPTODON.

Shell suborbicular, nearly equivalve, inequilateral, very thin, concentrically striated. Umbones small, oblique, rather obtuse. Hinge extremely narrow, with a small tooth in each valve, and thickened margins. Two longitudinal plicæ along the posterior margin. Muscular impressions small and submarginal. Ligament external.

1. *Cryptodon flexuosus*. *Flexuous Cryptodon*.

Shell suborbicular, very convex, thin, brittle, transparent, with rather distinct irregular concentric striæ; a deep sinus or wide groove bounded by two rounded plicæ from the umbo of each valve along its posterior margin, which is obtusely angulate; an ovate impression before the umbones; a single inconspicuous tooth in each valve, without lateral teeth, the margins being merely thickened; the muscular impressions distant; the inner surface glossy, faintly striate; the outer less glossy; the colour white. Length four-twelfths, height four-twelfths and a-fourth.

Brought up from deep water, off Aberdeen, frequently adhering to Ascidiæ and especially Actiniæ.

*Cryptodon flexuosus*. Turt. Brit. Biv. 121. Pl. 7. f. 9, 10.—*Tellina flexuosa*. Mont. Test. Brit. 72.—*Lucina sinuata*. Lamk. Syst. v. 543; Ed. 2. vi. 230.—*Amphidesma flexuosa*. Lamk. Syst. v. 492; Ed. 2. vi. 128.

## GENUS 4. TELLINA.

Animal roundish, subtrigonal, or oblong, generally much compressed. The lobes of the mantle thin, free before, and bordered with tentacular appendages, united behind, but with an aperture for the very elongated tubes. Mouth small. Branchiæ unequal. Foot much compressed, sharp-edged, pointed. Adductor muscles large, and widely separated.

Shell suborbicular or elongated, more or less inequivalve, inequilateral, concentrically striated. Umbones small, rather pointed. Hinge generally with two small divergent teeth, leaving between them a triangular depression, in one valve, and a single small tooth, but sometimes two teeth in the other; the lateral teeth obsolete, merely forming a thickened margin. Anterior end larger and rounded, posterior short, angular, and bent to the right. Muscular impressions widely separated. Ligament external and prominent.

The Tellinæ reside in sand or mud, along the shores.

1. *Tellina solidula*. *Little Thick Tellina*.

Shell orbiculato-trigonal, convex, thick, transversely absolutely rugoso-striate, pinkish, with redder concentric bands, the inside carmine; the umbones behind the middle, the frontal slope convex, the dorsal slightly so, and forming an angle with the lower outline; the cardinal margin thick; two very small cardinal teeth in each valve. Length ten-twelfths, height nine-twelfths.

The form varies, some individuals being longer and thinner, others nearly orbicular, very thick and convex. The colour also varies, individuals being white, yellowish-white, or dull yellow, with deeper bands, the inside white, yellow, or red.

Common in sandy and gravelly places near low-water mark. Frequent, of large size, very convex, but with the surface dull and coarse, in the muddy Estuary of the Ythan; also in that of the Dee, where however it is confined to a few spots. Very frequently cast on the beach.

*Tellina carnaria*. Penn. Brit. Zool. iv. 88. Pl. 49. f. 32.—*Tellina solidula*. Mont. Test. Brit. 63.—*Psammobia solidula*. Flem. Brit. Anim. 438.—*Tellina solidula*. Lamk. Syst. v. 533; Ed. 2. vi. 206.—*Psammobia solidula*. Turt. Brit. Biv. 95. Pl. 8. f. 2.

2. *Tellina crassa*. *Thick Tellina*.

Shell ovato-orbicular, compressed, rather thick, strong, semitransparent, with numerous close concentric, convex, ridgelets, and very minute radiating striulæ; yellowish-white, with longitudinal pink rays, or plain; the inside glossy, faintly streaked toward the margin; the siphonal impression very large and oval; one valve more convex than the other, each with two teeth; the umbones considerably behind the middle, the frontal slope convex, the dorsal slightly convex, both ends rounded. Length an inch and eight-twelfths, height an inch and three-twelfths.

A single valve found by Mr. Alexander Murray, at Frasersburgh, in October, 1842; an entire shell, by Mr. Fergusson, at the Cove, in January 1843.

*Tellina crassa*. Penn. Brit. Zool. iv. 87. Pl. 48. f. 58.—*Tellina fausta*. Mont. Test. Brit. 64.—*Tellina crassa*. Mont. Test. Brit. 65.—*Tellina crassa*. Lamk. Syst. v. 529.—*Tellina crassa*. Turt. Brit. Biv. 109. Pl. 7. f. 2.—*Tellina crassa*. Flem. Brit. Anim. 436.

3. *Tellina tenuis*. *Thin-shelled Tellina*.

Shell ovate, compressed, very thin, white tinged with pink; both valves a little bent behind, glossy, with concentric striæ, the right a little more convex anteriorly; the umbones behind the middle, the frontal slope convex, the dorsal descending, somewhat angular; two small cardinal teeth in each valve. Length an inch and two-twelfths, height nine-twelfths.

The colour varies considerably, some being yellowish-white, others tinged with pink, and having the interior yellow.

Common along the sandy shores; often cast on the beach; frequently brought up by the fishing-lines.

*Tellina planata*. Penn. Brit. Zool. iv. 87. Pl. 48. f. 29.—*Tellina tenuis*. Mont. Test. Brit. 59.—*Tellina tenuis*. Turt. Brit. Biv. 107.—*Tellina tenuis*. Flem. Brit. Anim. 436.—*Tellina tenuis*. Lamk. Syst. v. 526; Ed. 2. vi. 197.

4. *Tellina Fábula*. *Streaked-shelled Tellina*.

Shell subovato-oblong, narrowed behind, compressed, very thin, yellowish-white; both valves a little bent behind toward the right, the left being convex, the right concave at that part; the right valve obliquely striate, and more convex anteriorly, the left smooth and glossy; a single cardinal tooth in one valve, two in the other. Length eleven-twelfths of an inch, breadth seven-twelfths.

When very young, the valves are extremely delicate, transparent, milky white, or opaline, with splendid iridescent tints.

Not uncommon on the sandy coast, and often cast ashore; also brought up by the fishing-lines.

*Tellina Fabula*. Gmel. Syst. Nat. 3239.—*Tellina Fabula*. Mont. Test. Brit. 61.—*Tellina Fabula*. Turt. Brit. Biv. 101.—*Tellina Fabula*. Flem. Brit. Anim. 435.—*Tellina Fabula*. Lamk. Syst. v. 526; Ed. 2. vi. 197.

#### FAMILY IX.—SOLEININA.

Animal much elongated; with the mantle adhering toward the borders, closed, open in front for the passage of the foot, and forming behind a single tube, internally double, and having two simple orifices; a stout conical foot terminating the body anteriorly; two adductor muscles, the anterior longitudinally extended, the posterior roundish.

Shell long, equivalve, extremely inequilateral, thin, gaping at both ends, and covered with epidermis; the hinge with not more than two small prominent teeth in each valve; the ligament linear and dorsal; the anterior muscular impression long, the posterior elliptical.

They live immersed in sand or mud, with the anterior end lowest.

#### GENUS 1. SOLEN.

Animal much elongated. The mantle adhering by its borders, closed throughout its length, posteriorly forming a single extensile tube, internally divided into two, of which the orifices are simple, the anal smaller. Foot stout, cylindrical, very extensile. Branchiæ long, narrow, pointed backwards, posteriorly united. Mouth small, with two pairs of elongated triangular labial palpi. Anterior adductor muscle longitudinally extended, posterior smaller.

Shell much elongated, linear or oblong, equivalve, very inequilateral, concentrically striated, with a thin persistent horny epidermis, and open at both ends. Umbones with the cardinal teeth small, generally two in

one valve, one in the other. Ligament external, elongated.

The Solens reside in sand or mud, in a perpendicular position, with the posterior end uppermost. They are among the most agreeable of all shell-fish as food. From a fancied resemblance of the shell to the case of a razor, they are commonly named Razor-shells.

### 1. *Sólen Siliqua*. *Razor-case Solen*.

Shell extremely elongated, slender, straight, truncate at both ends, with a thin olivaceous epidermis; the valves convex, anteriorly slightly rounded, posteriorly obliquely truncate, each with an elongated triangular space extending from the hinge to the posterior margin, and on which the epidermis is generally abraded; the surface of the shell white, more or less variegated with reddish, and striated transversely to the general direction; the hinge close to the anterior extremity, with two incurved teeth in the left valve, a small compressed tooth received between them in the right, and a posterior elongated obsolete tooth in each valve. Length about nine inches, breadth an inch and a-quarter.

Common along the sandy coast, and frequently cast on the beach.

*Concha fusca longissima, angustissimaque*. Lister, Anim. Angl. 192. Pl. 5. f. 37.—*Solen Siliqua*. Linn. Syst. Nat. i. 1113.—*Solen Siliqua*. Penn. Brit. Zool. iv. 83. Pl. 45. f. 20.—*Solen Siliqua*. Flem. Brit. Anim. 459.—*Solen Siliqua*. Turt. Brit. Biv. 80. Pl. 6. f. 5.—*Solen Siliqua*. Lamk. Syst. v. 451; Ed. 2. vi. 55.—*Solen Siliqua*. Mont. Test. Brit. 46.

### 2. *Sólen Ensis*. *Sabre-case Solen*.

Shell extremely elongated, slender, subrearcuate, truncat-rotundate at both ends, with a thin olivaceous epidermis; the valves convex, anteriorly rounded, posteriorly subtruncate, each with an elongated triangular space extending from the hinge to the posterior margin, and on which the epidermis is generally abraded, the surface of the shell white, more or less variegated with reddish, and having the striæ transverse to the general direction; the hinge close to the anterior extremity, with two small, but thick, approximated, incurved teeth in the left valve, a small compressed tooth received between them in the other, and in each valve a posterior elongated tooth, that

in the left more prominent. Length four inches, breadth about six-twelfths.

Not very uncommon on the sandy coast. I have not seen specimens of larger dimensions than those given above, although in the Hebrides it nearly equals *Solen Siliqua* in size.

*Solen Ensifer*. Linn. Syst. Nat. i. 1114.—*Solen Ensifer*. Turt. Brit. Biv. 82.—*Solen Ensifer*. Penn. Brit. Zool. iv. 84. Pl. 45. f. 22.—*Solen Ensifer*. Mont. Test. Brit. 48.—*Solen Ensifer*. Flem. Brit. Anim. 459.—*Solen Ensifer*. Lamk. Syst. v. 452; Ed. 2. vi. 55.

### 3. *Solen pellucidus*. *Pellucid Solen*.

Shell much elongated, linear-oblong, slightly recurved, rounded at both ends, with a delicate olivaceous epidermis; valves thin, pellucid, each with an elongated subtriangular space, not readily distinguishable unless on being compared with the other species; the surface glossy, white, faintly variegated with reddish; the hinge close to the anterior extremity, with two teeth in the left valve, one in the other, and in each a posterior elongated marginal tooth. Length an inch and three-fourths, breadth half an inch.

Sometimes cast on the sandy beaches, and single valves found adhering to *Actiniæ* from deep water.

*Solen pellucidus*. Penn. Brit. Zool. iv. 84. Pl. 46. f. 23; Ed. 2. iv. 173. Pl. 49. f. 2.—*Solen pellucidus*. Mont. Test. Brit. 49.—*Solen pellucidus*. Flem. Brit. Anim. 459.—*Solen pellucidus*. Turt. Brit. Biv. 83.—*Solen pygmaeus*. Lamk. Syst. v. 452; Ed. 2. vi. 56.

## GENUS 2. PSAMMOBIA.

Shell oblong or elliptical, equivalve, inequilateral, concentrically striated, a little open at both ends. Umbones very small. Hinge with two small, erect, forked teeth in the right valve, a single forked entering tooth in the left, and frequently another smaller simple tooth behind, the lateral teeth obsolete, merely forming a thickened margin. Anterior end rather larger and rounded, posterior longer, with a triangular space defined by a ridge from the umbo to the lower posterior angle, and slightly bent to the right. Muscular impressions widely separated. Ligament external, and prominent.

*Psammobia* differs very little from *Solen* on the one hand, and from *Tellina* on the other. From the latter

it differs more especially in having the posterior end more elongated, and in being more open at both ends; and from the former in having the ends less open. Lamarck's observation that the *Psammobiæ* "n'ont point le pli irregulier du côté antérieur des Tellines," is incorrect.

1. *Psammobia Feroënsis*. *Feroese Psammobia*.

Shell oblong, much compressed, anteriorly rounded, posteriorly obliquely truncate and angular, finely striated concentrically, with a prominent line from the umbo to the posterior angle, and several less distinct lines between it and the dorsal margin, the striæ more elevated on these lines; the colour reddish-white with radiating pink bands; the epidermis yellowish-brown; the inside pinkish-white. Length an inch and three-fourths, height ten-twelfths.

Young individuals lamelloso-spiniferous on two bands in each valve, from the umbo to the angles of the posterior truncation.

Not very uncommon along the sandy shores, from Aberdeen to Collieston; sometimes cast on the beach, and occasionally brought up by the fishing-lines: Gamrie, Banffshire, Miss Macgillivray; Cruden, Mr. Murray.

*Tellina Feroensis*. Gmel. Syst. Nat. 3255.—*Psammobia Feroensis*. Turt. Brit. Biv. 94. Pl. 8. f. 1.—*Tellina incarnata*. Penn. Brit. Zool. iv. Pl. 47. f. 31.—*Tellina Feroensis*. Mont. Test. Brit. 55.—*Psammobia Feroensis*. Flem. Brit. Anim. 438.—*Psammobia Feroensis*. Lamk. Syst. v. 512; Ed. 2. vi. 172.

GENUS 3. SAXICAVA.

Animal oblong, subcylindrical. The mantle closed, prolonged behind into a tube, internally double. Foot small, elongated, compressed, pointed. Branchiæ very unequal. Mouth moderate, with four small labial appendages. Adductor muscles moderate, anterior smaller, cylindrical.

Shell oblong, convex, very inequilateral, rather thick, covered with an epidermis; the umbones rather prominent, curved a little forwards; the anterior end shorter and rounded; the posterior prolonged, and angulate or rounded. Hinge with very small divergent teeth,



which are often obliterated in old individuals. Ligament external. Muscular impressions distant, roundish, the anterior smaller.

Individuals of the same species vary exceedingly in form.

The *Saxicavæ* live immersed in sand, mud, clay, fragmentary masses, and cavities in rocks.

### 1. *Saxicava rugosa*. *Wrinkled Saxicava*.

Shell oblong, elliptical, or obovate, regular or variously distorted, thick, coarsely and irregularly rugose, covered with a greyish-brown or yellowish epidermis; the umbones rather prominent; a triangular space behind bounded by a prominent line from the umbo to the posterior angle; the anterior end short and rounded, the posterior prolonged, and angulate or rounded; ligament large and prominent.

Young individuals have the posterior end angulate, the ridge from the umbo to the angle, and the dorsal margin lamello-spinous. The older the shell, the more prolonged and rounded the posterior end. Often also variously distorted.

From the variety of appearances which it thus assumes, it has been described under various names. Its variableness, as to form and thickness however, have, I think, caused it by later authors to be confounded with a species which appears to me to be perfectly distinct.

*Mytilus rugosus*. Linn. Syst. Nat. i. 1156. Penn. Brit. Zool. iv. 110. Pl. 63. f. 72.—*Saxicava rugosa*. Turt. Brit. Biv. 20. Pl. 2. f. 10.—*Saxicava rugosa*. Lamk. Syst. v. 501; Ed. 2. vi. 152.—*Saxicava gallicana*. Lamk. Syst. v. 501; Ed. 2. vi. 152.—*Saxicava pholadis*. Lamk. Syst. v. 502; Ed. 2. vi. 152.—*Saxicava pholadis*. Turt. Brit. Biv. 21. Pl. 2. f. 11.—*Hiatella rugosa*. Flem. Brit. Anim. 461.—*Mytilus rugosus*. Mont. Test. Brit. 164.

### 2. *Saxicava arctica*. *Arctic Saxicava*.

Shell oblong, or linear-oblong, regular or distorted, thin, coarsely and irregularly rugose, covered with a yellowish-grey epidermis; the umbones rather prominent; the frontal end very short, angulate; the dorsal line elongated, straight, the posterior end abrupt or rounded; an elongated triangular space behind and above, with two prominent spiniferous ridges, from the umbo to the two angles; ligament short and little prominent.

Although individuals of this species may resemble those of

*Saxicava rugosa* in form, yet I cannot but consider the two species to be distinct. When much abbreviated, it is *Mytilus præcisus* of Montagu.

Frequently brought up by the lines from deep water, and often cast on the beach.

*Solen minutus*. Linn. Syst. Nat. i. 1115.—*Solen minutus*. Mont. Test. Brit. 53. Pl. 1. f. 4.—*Mytilus præcisus*. Mont. Test. Brit. 165. Pl. 4. f. 2.—*Hiatella minuta*. Turt. Brit. Biv. 24. Pl. 2. f. 12.—*Solen minutus*. Lamk. Syst. v. 453; Ed. 2. vi. 57.—*Saxicava rhomboides*. Desh. Lamk. Syst. Ed. 2. vi. 153.—*Hiatella arctica*. Lamk. Syst. v. 29; Ed. 2. v. 443.—*Hiatella arctica*. Flem. Brit. Anim. 461.

#### FAMILY X.—MACTRINA.

Animal oval or elliptical, compressed, with the mantle adhering toward the borders, closed, open in front for the passage of the foot, and forming behind a single tube, internally double, or two distinct tubes; a large, bent, compressed, tapering foot; two distant, large, rounded adductor muscles.

Shell roundish, oval, or elliptical, equivalve, inequilateral, more or less gaping at both ends, generally covered with an epidermis; the hinge always with an oblique triangular depression in each valve, for the internal ligament, and a plicate laminar tooth in the left valve; the external ligament small; the muscular impressions distant, the posterior roundish.

#### GENUS 1. MACTRA.

Animal oval, compressed. The mantle with the borders thick and simple, posteriorly forming two united, little elongated tubes. Foot oval, compressed, thin-edged, very long. Branchiæ small, nearly equal. Adductor muscles distant, strong, roundish.

Shell equivalve, inequilateral, oval or subtriangular, compressed, concentrically striated; open a little at both ends, but especially the posterior. Umbones moderately prominent. Hinge strong; the left valve with an elevated, thin, angularly bent tooth under the umbo, leaving a vacant triangular space, behind it a large ob-

lique triangular fossa, for the ligament; lateral teeth elongated, thin, crested, with a groove between them and the margin; the right valve similar, but with the plicate cardinal tooth nearer the umbo, and an additional thin lamina in each of the lateral submarginal grooves. Internal ligament trigonal, rather large; external small, close to the umbones. Muscular impressions rather large, oval, submarginal; pallial impression with a sinus behind.

1. *Máctra stultórum*. *Simpleton's Mactra*.

Shell ovato-trigonal, thin, subdiaphanous, with delicate obsolete concentric striæ, more prominent on the posterior slope; the internal surface glossy; umbones purplish-red, the general colour light yellowish-red or carneous, radiated with lines and bands of dull white; the posterior slope paler, with a lanceolate dull-red medial patch; inner surface of a delicate bluish-purple tint. Length two inches, height an inch and a-half; the largest I have met with two inches two-twelfths, an inch and eight-twelfths.

It varies in its markings, and is sometimes of a nearly uniform yellowish-grey. Old individuals frequently have the epidermis rather thick toward the margin.

The animal elliptical, compressed; with the mantle extremely delicate, but thickened toward the margins, which are simple, united anteriorly, and posteriorly, in the latter situation forming a short, compressed siphon, of two tubes, the lower larger for respiration. The branchiæ large, nearly equal, very thin, striolate. The mass of the body enclosed in a muscular envelope, thin at the sides, thick anteriorly and posteriorly, and continuous with the foot; which is very large, bent forward, much compressed, tapering, thin-edged. At the anterior part of the body is the small, cylindrical mouth, with four long, compressed, tapering tentacular appendages: the œsophagus short, cylindrical; the stomach moderate, with a long tapering cœcal appendage; the intestine convoluted round the liver, then ascending to near the hinge, passing through the heart, and terminating in the upper siphonal aperture. The liver forms a very large mass of a brownish colour, occupying half the body anteriorly. The heart oblong, situated under the hinge. Over the mouth is a small ganglion, and at the commencement of the rectum a large nervous mass.

The adductor muscles large, the anterior above and before the mouth, the posterior below the rectum, both submarginal.

Common along the sandy coast, and frequently cast on shore alive.

*Mactra stultorum*. Linn. Syst. Nat. i. 1126.—*Tellina radiata*. Penn. Brit. Zool. iv. 87. Pl. 49. f. 80.—*Mactra stultorum*. Mont. Test. Brit. 94.—*Mactra cinerea*. Mont. Test. Brit. Suppl. 35.—*Mactra stultorum*. Penn. Brit. Zool. Ed. n. iv. 193. Pl. 52. f. 1.—*Mactra cinerea*. Penn. Brit. Zool. Ed. n. iv. 196.—*Mactra stultorum*. Turt. Brit. Biv. 72.—*Mactra cinerea*. Turt. Brit. Biv. 73.—*Mactra stultorum*. Flem. Brit. Anim. 427.—*Mactra stultorum*. Lamk. Syst. v. 474; Ed. n. vi. 99.

### 2. *Mactra sólida*. *Thick-Shelled Mactra*.

Shell subtrigonal, ovato-trigonal, or subelliptical, very thick, smoothish, the concentric striæ being obsolete, but sub-antiquated, with strongly marked growth-lines, white, more or less tinged with grey or reddish, the umbones prominent, recurved, nearer the anterior end; the anterior slope more abrupt; the internal surface dull white, the margin and very deep muscular impressions glossy greyish-white. Length two inches and a-half, height two inches.

Individuals vary in form. Generally the young shells are elliptical, but not so thin as to be partially diaphanous, like those of *Mactra elliptica*. Very old shells are almost as high as long, and extremely thick. Some are more triangular than others; some have the umbones nearly central, others have the anterior slope much shorter. When long exposed on the beach, the shells become banded with bluish or reddish.

Common along the sandy coast, and frequently cast on shore.

*Mactra solida*. Linn. Syst. Nat. i. 1126.—*Mactra solida*. Penn. Brit. Zool. iv. 92. Pl. 51. f. 43. A. Pl. 52. f. 43.—*Mactra solida*. Mont. Test. Brit. 92.—*Mactra solida*. Turt. Brit. Biv. 67.—*Mactra solida*. Flem. Brit. Anim. 426.—*Mactra solida*. Lamk. Syst. v. 477; Ed. n. vi. 104.

### 3. *Mactra elliptica*. *Elliptical Mactra*.

Shell subelliptical, very thin, subpellucid, smoothish, somewhat glossed, with faint and very delicate concentric striæ, moderately conspicuous growth-lines, and slight indications of radiating striulæ; umbones prominent, pointed, recurved, nearly central; the anterior slope convex, the posterior less so, and forming an obtuse angle with the arched inferior mar-

gin; the epidermis very delicate, greyish-yellow; the shell yellowish-white, internally glossy, with the muscular impressions faint. Length an inch, height seven-twelfths.

Much more delicate, more elongated, and of a more yellow, or yellowish-grey tint, than young individuals of *Mactra solida*.

Very abundant off Aberdeen, and frequently brought up by the lines.

*Mactra elliptica*. Brown, Illustr.—*Mactra elliptica*. Forbes, Malac. Mon. 48.

#### 4. *Máctra subtruncáta*. *Small Triangular Mactra*.

Shell trigonal, inequilateral, rather thin, yellowish-grey or greyish-white, with pale olivaceous epidermis; the valves convex, smoothish, with distant growth-lines; the umbones prominent, pointed, not central, the dorsal margin being shorter; both slopes obliquely striated; the anterior end rounded, the posterior angulate; the inner surface glossy. Length an inch, height ten-twelfths.

Varies considerably in form and tint.

Not uncommon along the sandy coasts; often cast on the beach, and young individuals frequently brought up by the lines.

*Mactra stultorum*. Penn. Brit. Zool. iv. 92. Pl. 52. f. 42.—*Mactra subtruncata*. Mont. Test. Brit. 93.—*Mactra subtruncata*. Penn. Brit. Zool. Ed. n. iv. 194. Pl. 55. f. 1.—*Mactra subtruncata*. Turt. Brit. Biv. 70.—*Mactra subtruncata*. Flem. Brit. Anim. 427.—*Mactra deltoides*. Lamk. Syst. v. 479; Ed. n. vi. 107.

### GENUS 2. GOODALLIA.

Shell equivalve, inequilateral, trigonal, moderately convex, closed at both ends. Umbones prominent. Hinge strong; one valve with a single central tooth, the other with two teeth and an intermediate depressed space, for the ligament; lateral teeth elongated, with corresponding grooves in the other valve. Muscular impressions large, submarginal; pallial impressions entire.

#### 1. *Goodállia trianguláris*. *Denticulate Goodallia*.

Shell trigonal, thick, opaque, smoothish, with some distant growth-lines, dull white, with little gloss; the umbones very prominent, nearer the anterior end; in one valve a prominent

bifid tooth, in the other two small teeth and a large triangular depression; the inner surface glossy, with the muscular impression suboval, large, and rather deep; the ventral margin with about thirty teeth. Length about two-twelfths, height a little more.

Found by me among shell sand, gathered in the Bay of Cruden, by Mr. Alex. Murray, in November, 1842.

*Mactra triangularis*. Mont. Test. Brit. 99. Pl. 3. f. 5.—*Goodallia triangularis*. Turt. Brit. Biv. 77. Pl. 6. f. 14.—*Goodallia triangularis*. Flem. Brit. Anim. 429.

## 2. *Goodallia minutissima*. *Edentulate Goodallia*.

Shell trigonal, thick, opaque, smooth, with some faint concentric striæ, dull white, with little gloss; the umbones very prominent; in one valve a single large bifid tooth, in the other two small teeth and a triangular depression; the lateral teeth thin and simple; the inner surface glossy, yellowish, with the muscular impressions moderate, and the margin destitute of teeth. Length about two-twelfths, height rather less.

Found among shell sand, from the Bay of Cruden, sent by Mr. Alex. Murray, in November, 1842.

*Mactra minutissima*. Mont. Test. Brit. Suppl. 37.—*Goodallia minutissima*. Turt. Brit. Biv. 77.—*Goodallia minutissima*, Flem. Brit. Anim. 429.

## GENUS 3. LUTRARIA.

Animal oval or roundish, much compressed. The mantle with the borders thick and simple, united below, posteriorly forming two long, distinct or united tubes. Foot small, compressed.

Shell oval or roundish, thin, equivalve, inequilateral, concentrically striate, covered with a thin, dense epidermis, and more or less open at both ends. Hinge strong, the left valve with a small, angularly bent tooth under the umbo, leaving a vacant triangular space, behind it a large oblique triangular fossa for the ligament; lateral teeth elongated, little elevated, with a shallow groove between them and the margins; the right valve similar, but with the plicate tooth obsolete, the lateral teeth forming a thickened margin. Internal ligament trigonal, large; external small, close to the umbones. Muscular

impressions large, distant, the anterior elongated, the posterior roundish.

The Lutrariæ, so named on account of their living in mud, *lutum*, differ little from the Mactræ.

1. *Lutraria elliptica*. *Elliptical Lutraria*.

Shell elliptical, compressed, thin, concentrically striated, with a yellowish or dusky grey epidermis; the surface of the valves brownish-white; both ends rounded and gaping, the anterior much shorter; the plicate tooth of the left valve prominent; the inside white, smooth, with a very large sinus in the pallial impression. Length five inches, height three.

Young shells are extremely delicate, hyaline-white, and transparent.

Not very uncommon along the sandy shores; also in the Estuary of the Ythan.

Mactralutraria. Linn. Syst. Nat. i. 1126.—Concha longa lataque, &c. Lister, Anim. Angl. 170. Pl. 4. f. 19.—Mactra lutraria. Penn. Brit. Zool. iv. 92. Pl. 52. f. 44.—Lutraria elliptica. Lamk. Syst. v. 468; Ed. n. vi. 90.—Lutraria elliptica. Turt. Brit. Biv. 65.—Mactra lutraria. Penn. Brit. Zool. Ed. n. iv. 195. Pl. 55. f. 3.—Lutraria vulgaris. Flem. Brit. Anim. 464.—Mactra lutraria. Mont. Test. Brit. 100.

2. *Lutraria Listéri*. *Lister's Lutraria*.

Shell roundish-triangular, compressed, thin, smoothish, the concentric striæ being prominent only toward the posterior margin, which is longer, but the lines of growth conspicuous, and the surface farther marked with faint divergent striæ; umbones small, rather pointed; the colour dull white, tinged with grey or reddish. Length two inches, height an inch and three-fourths.

In the muddy Estuary of the Ythan, opposite and above Newburgh, where it was gathered by Mr. Leslie and myself in April, 1842; and in the Estuary of the Dee, where it was found by Miss Isabella Macgillivray, along with *Tellina solidula*, and *Amphidesma album*, in September.

According to Montagu, "the animal has two slender tubes of a yellowish colour, placed near together at the anterior end; one, about three inches long, is thrown about in search of food, such as insects; which may be seen passing up this transparent syphon, with the current of water it is continually taking in, and discharging at the shorter tube, placed nearer to the hinge, retaining only the nutritious matter; but it occasionally ejects

the superabundant water with considerable velocity from both tubes, particularly the longest.

*Mactra Listeri*, and *Mactra piperata*. Gmel. Syst. Nat. 3261.—*Venus borealis*. Penn. Brit. Zool. iv. 96.—*Listera compressa*. Turt. Brit. Biv. 51. Pl. 5. f. 1, 2.—*Mactra compressa*. Mont. Test. Brit. 96.—*Lutraria compressa*. Lamk. Syst. v. 469; Ed. n. vi. 91.—*Lutraria piperata*. Lamk. Syst. v. 469; Ed. n. vi. 92.—*Mactra Listeri*. Penn. Brit. Zool. Ed. n. 194.—*Amphidesma compressum*. Flem. Brit. Anim. 432.

#### GENUS 4. AMPHIDESMA.

Animal oval or oblong, much compressed; the lobes of the mantle united behind for about a third of their extent, and forming a short siphon-tube, from which emerge the anal and respiratory siphons, the former smaller and cylindrical, the latter somewhat compressed; the branchial laminae unequal; the foot very large, compressed, bent, obtuse.

Shell elongated, equivalve, inequilateral, very thin, rounded anteriorly, shorter, narrowed, and more gaping behind, glossy, with a delicate epidermis projecting beyond the margins. Umbones very small, little prominent. Hinge with a dilated oblique, concave prominence in each valve, and in one the margins grooved to receive the thickened edges of the other. Ligament double; the internal occupying the cardinal fossa, the external small. Muscular impressions rather small, distant.

##### 1. *Amphidésma álbum*. *White Amphidesma*.

Shell ovate, compressed, pellucid, very inequilateral, its anterior portion rounded, and half as long again as the posterior, which is narrower and subangulate, somewhat gaping, and slightly bent; the umbones very small, obtuse; the valves very thin, delicately striated concentrically, with the surface glossy, very minutely shagreened; the inner surface also glossy, very minutely punctulate, delicately radiatingly striulate, and iridescent; the right valve with a thick concave, oblique, adnate tooth, behind the shallow infraumbonal sinus, a minute erect triangular thin toothlet immediately anterior to the umbo, and on each side an elongated thin laminar plate rising in an



angulate form and bordering the elongated marginal groove ; in the left valve a corresponding concave tooth, and a similar umbonal toothlet, with an anterior sinus, the margins plain. When free of epidermis, it is glossy white ; that membrane, which is very delicate, being yellowish-grey, and when present giving that tint to the shell.

The shell is not very unlike *Tellina tenuis* of the same size, but much more convex, and with the external ligament not a fourth of the size of the ligament of that species.

Found by my daughter, Anne, while with me, on the sands at Don-mouth, cast ashore in considerable numbers, along with *Tellinæ tenuis* and *Fabula*, after a heavy ground-swell, which destroyed the greater part of the stake-nets from the Dee to the Ythan, in September, 1842. Two days after gathered there by me, along with Dr. Fleming and Mr. Leslie. Afterwards found alive by my daughters, Isabella, and Anne, and my son, Paul Howard, in the mud of the estuary of the Dee.

The animal is of a yellowish-white colour, with the foot very large, compressed, broad, bent, obtuse at the lower margin and tip, minutely scrobiculate, and subcartilaginous, the siphon-tube short, the upper siphon very small, cylindrical, and at the end free from the lower, which is three times the size and somewhat compressed ; the branchiæ very unequal ; the mantle open unless behind, with the margin crenato-denticulate.

*Mactra Boysii*. Mont. Test. Brit. 98. Pl. 3. f. 7.—*Amphidesma Boysii*. Turt. Brit. Biv. 53. Pl. 5. f. 4, 5.—*Amphidesma album*. Flem. Brit. Anim. 433.—*Mactra alba*. Wood, Linn. Trans. vi. 174. Pl. 16. f. 9-12.—*Amphidesma Boysii*. Lamk. Syst. v. 491 ; Ed. n. vi. 128.

## 2. *Amphidésma ténue*. *Triangular Amphidesma*.

Shell ovato-triangular, nearly isomeral, obsolete striated concentrically ; the valves thin, semitransparent, hyaline-white ; the umbones prominent, small, direct ; in one valve, a cleft toothlet, and two lateral laminar teeth, besides the oblique concave space ; in the other valve a simple toothlet and two marginal grooves ; the inner surface glossy, with faint radiating striulæ, and a deep sinus in the pallial impression. Length half an inch, height four-twelfths and three-fourths.

Several single valves found in shell sand, from Cruden Bay, sent by Mr. Murray, in November, 1842.

*Mactra tenuis*. Mont. Test. Brit. 572. Pl. 17. f. 7.—*Amphidesma tenue*. Turt. Brit. Biv. 53.—*Amphidesma tenue*. Flem. Brit. Anim. 433.

3. *Amphidésma prismaticum*. *Iridescent Amphidesma*.

Shell ovato-oblong, much compressed, pellucid, very inequilateral, anteriorly prolonged and rounded, posteriorly narrowed, angular, somewhat gaping, and laterally bent; delicately striated concentrically, with the surface very minutely shagreened and faintly iridescent; the inner surface highly glossed and iridescent, smooth toward the margin, elsewhere granulated; in the right valve a thick concave adherent tooth, behind the narrow infraumbonal sinus, and a small, generally bifid prominence before it, the anterior and posterior margins with a deep groove; in the left valve a corresponding concave tooth, with a small anterior sinus, the margins plain. Length an inch, height half an inch.

Common in deep water, off Aberdeen, and frequently brought up by the lines, adhering to Actiniæ. Plentiful also occasionally on the beach.

*Ligula prismatica*. Laskey, Wern. Mem. i. 377.—*Ligula prismatica*. Mont. Test. Brit. Suppl. 23. Pl. 26. f. 3.—*Amphidesma prismatica*. Lamk. Syst. v. 492; Ed. n. vi. 128.—*Amphidesma prismaticum*. Turt. Brit. Biv. 52. Pl. 5. f. 3.—*Amphidesma prismaticum*. Flem. Brit. Anim. 432.

## GENUS 5. ANATINA.

Shell oval, inequivalve, inequilateral, thin, brittle, gaping, and more or less truncate at the posterior end. Umbones small, directed a little backwards. Hinge with an abrupt sinus and a concave spoon-shaped lamina projecting vertically downwards, in each valve; internal ligament received into the spoon-shaped cavities; external very small. Muscular impressions small, submarginal.

This genus is so very nearly allied to the last that there is scarcely sufficient reason for separating them.

1. *Anatina prætenuis*. *Delicate Anatina*.

Shell ovate, rather compressed, very thin, brittle, pellucid, with the anterior end larger and rounded, the posterior sub-truncato-rotundate, the anterior dorsal outline convex, the posterior concave; concentrically faintly striate; the surface slightly glossy, very minutely punctulate, at the posterior end roughish with minute prominences; an obtuse ridge from the

umbo to the posterior-inferior margin; the cardinal laminae elliptical, concave, very thin, projecting vertically, and strengthened by an oblique fold and a narrow plait, running backwards and downwards, with a glossy pearly space near the hinge; the colour white. The pearly space is more conspicuous in dead shells, in which it retains its lustre, while the rest of the shell has become dull. I have seen a pearl or pearly protuberance formed in it. Length nearly an inch and a-half, height an inch.

Frequently brought up by the fishing-lines, from deep water, off Aberdeen. Found by me in December, 1841, afterwards by Mr. Leslie, and in October, 1842, by Miss Marion Macgillivray.

*Mya prætenuis*. Penn. Brit. Zool. Ed. n. iv. 160. Pl. 50. f. 1.—*Mya prætenuis*. Mont. Test. Brit. 41. Pl. 1. f. 2.—*Anatina prætenuis*. Turt. Brit. Biv. 48. Pl. 4. f. 4.—*Amphidesma prætenuis*. Flem. Brit. Anim. 432.

## 2. *Anatina truncata*. *Truncated Anatina*.

Shell subovate, rather compressed, very thin, brittle, pellucid, with the anterior end much larger and rounded, the posterior narrowed and subtruncate, the anterior dorsal outline little convex, the posterior nearly straight; concentrically rugoso-striate; the surface slightly glossy, very minutely punctulate, at the posterior end roughish with minute prominences; an obscure ridge from the umbo to the posterior-inferior margin; the cardinal laminae oval, concave, thick, projecting vertically, and strengthened by an oblique fold (but no narrow plait) running backwards near the margin, with a glossy pearly space near the hinge; the colour white. Length of an individual an inch and a-twelfth, greatest height seven and a-half twelfths.

This species differs from *Anatina prætenuis* in being larger, in having the anterior part higher, the posterior shorter, narrower, and more truncate, the cardinal lamina much thicker, without a narrow plait supporting it.

First found by me in October, 1842, among shells and coralines from deep water, off Aberdeen.

*Mya declivis*. Mont. Test. Brit. Pl. 1. f. 2.—*Anatina declivis*. Turton, Brit. Biv. 47.—*Amphidesma declivis*. Flem. Brit. Anim. 432.—*Anatina truncata*. Linn. Syst. Ed. 2. vi. 77.

## GENUS 6. THRACIA.

Shell ovato-oblong, inequivalve, inequilateral, very thin, brittle, rounded anteriorly, more or less truncate

and more gaping behind. Umbones small, rather prominent. In each valve a horizontal, oblique, concave tooth, receiving an internal ligament, of which the posterior side gives attachment to a semiannular calcareous spiculum; the ligament appearing externally. Muscular impressions small, submarginal.

This genus is very nearly allied to *Amphidesma*, as well as to *Anatina*.

### 1. *Thracia declivis*. *Sloping Thracia*.

Shell oval, convex, very thin, brittle, subdiaphanous, with the anterior end larger and rounded, the posterior narrowed, compressed, roundly truncate, somewhat gaping; umbones prominent, recurved, pointed, and meeting; frontal slope nearly straight, dorsal much declinate, straightish; an obtuse ridge from the umbo to the lower angle of the truncation; the surface concentrically rugoso-striate, with a very thin greyish-yellow epidermis; the cardinal lamina very narrow, adnate, anteriorly rounded, a deep sinus under the umbo, and before it a narrow, posteriorly rounded, concave, adnate lamina; the inner surface dull, white, with a narrow pearly space from the umbo backwards. Length about two inches and a-half, height an inch and a-half.

A fractured single valve found on the 27th of September, 1842, by Mr. Leslie at Footdee, brought from deep water, off Aberdeen, by the lines.

*Mya declivis*. Penn. Brit. Zool. iv. 79.—*Mya declivis*. Donovan. Brit. Sh. iii. Pl. 82.—*Anatina convexa*. Turt. Brit. Biv. 44. Pl. 4. f. 1, 2.—*Anatina myalis*. Lamk. Syst. v. 464; Ed. 2. vi. 80.—*Amphidesma convexum*. Flem. Brit. Anim. 431.

This species has been singularly misunderstood by authors. The above references however are all certain. Pennant's short description is perfectly correct: "Mya with a brittle, half-transparent shell, with a hinge slightly prominent; less gaping than the *truncata*; near the open end sloping downwards." He adds, "Frequent about the Hebrides; the fish eaten by the gentry;" but these statements are incorrect.

### 2. *Thracia pubescens*. *Roughish Thracia*.

Shell ovato-oblong, somewhat compressed, very thin, brittle, pellucid, with the anterior end larger and rounded, the posterior truncate; concentrically faintly striate; the surface

slightly glossy, very minutely punctulate, at the posterior end roughish, especially in the triangular space formed by a ridge from the umbo to the lower angle of the truncation; the cardinal lamina or tooth rather thick, running obliquely forward, and rounded at the anterior end, beyond which is a deep sinus; the colour white, the inside glossy. Length about an inch and a-half, height an inch.

A perfect individual found by me in the Spring of 1842 adhering to a fishing-line at Footdee.

*Mya pubescens*. Mont. Test. Brit. 40.—*Tellina fragilis*. Penn. Brit. Zool. iv. 86. Pl. 47. f. 26.—*Anatina pubescens*. Turt. Brit. Biv. 45. Pl. 4. f. 3.—*Amphidesma pubescens*. Flem. Brit. Anim. 431.—*Thracia pubescens*. Lamk. Syst. Ed. n. vi. 83.

#### FAMILY XI.—MYTINA.

Animal oblong or elliptical, compressed; with the mantle closed beneath, open in front for the passage of the foot, and forming behind two long tubes, united or separated; a small, compressed, tapering foot.

Shell oval, elliptical, or oblong, generally inequivalve, inequilateral, gaping at both ends, frequently covered with an epidermis; the hinge with a concave projecting process or tooth in one valve, and a corresponding depression in the other, for the internal ligament; the muscular impressions distant, large.

The Myinæ have no external ligament, but yet differ little essentially from the Mactrinæ, the hinge being formed on the same plan in both families.

#### GENUS 1. MYA. GAPER.

Animal ovate or oblong, a little compressed. The lobes of the mantle very delicate, but thick at the borders, which cohere, and forming behind a broad compressed muscular double tube enveloped by a membranous layer, and having its orifices radiated. Foot very small, much compressed, tapering, emerging by a small slit in the mantle. Branchiæ moderate, unequal, striate. Mouth small, with two pairs of striated appendages.

Shell ovate or oblong, inequivalve, inequilateral, convex, gaping at both ends, concentrically striated, covered

with an epidermis, which is prolonged upon the mantle and tubes. Umbones small. Hinge strong, with a horizontal spoon-shaped process in the right valve, and a corresponding fossa in the other. Ligament internal, inserted between the fossa and spoon-shaped cavity. Muscular impressions distant, large; pallial impression with a deep sinus behind.

The *Myæ* live immersed in sand, gravel, or mud, with the broader or anterior end downwards.

1. *Mya truncata*. *Abrupt Gaper*.

Shell ovate, abruptly truncate behind, moderately thick, rugose, covered with a strong yellowish-grey epidermis, which extends over the mantle-tube to a great length; the right valve with a broad, thick, concave tooth projecting backwards; the left with a deep triangular depression; the colour of the shell dull white, or reddish, the inside white. Length three inches and a-half, height two inches and a-half.

In the estuary of the Ythan, near its mouth; at Aberdeen, Peterhead, Fraserburgh; Gamrie in Banffshire. In some parts of Scotland, where this species is abundant, it is occasionally used as food.

*Mya truncata*. Linn. Syst. Nat. i. 1112.—*Mya truncata*. Penn. Brit. Zool. iv. 78. Pl. 41. f. 14; Ed. n. iv. 159. Pl. 44.—*Mya truncata*. Mont. Test. Brit. 32.—*Mya truncata*. Turt. Brit. Biv. 31.—*Mya truncata*. Flem. Brit. Anim. 462.—*Mya truncata*. Lamk. Syst. v. 461; Ed. 2. vi. 73.

2. *Mya arenaria*. *Sand Gaper*.

Shell ovate, rounded at both ends, but elongated and narrowed behind, moderately thick, rugose, covered with a thin yellowish-brown epidermis, which extends over the mantle-tube to a great length; the right valve with a broad, thick, concave tooth, and a small tooth-like projection from the posterior side; the left valve with a deep triangular depression; the colour of the surface white, reddish-white, or ferruginous. Length about five inches, height three inches and a-half.

In some parts of Scotland, as in the outer Hebrides, where this species is abundant, it is sometimes used as food. It is however inferior in this respect to *Mya truncata*.

At Ythan-mouth, in the mud and gravel; often very coarse, distorted, with the epidermis abraded, the colour of an inky black, which disappears on being exposed to the atmosphere.

It occurs also in the Harbour of Aberdeen. It forms a soft bed, communicating with the surface by a narrow passage, by which the tube is protruded, and sinks to the depth of from nine to fifteen inches.

*Mya arenaria*. Linn. Syst. Nat. i. 1112.—*Mya arenaria*. Penn. Brit. Zool. iv. 79. Pl. 42; Ed. n. iv. 161. Pl. 45.—*Mya arenaria*. Mont. Test. Brit. 30.—*Mya arenaria*. Turt. Brit. Biv. 32.—*Mya arenaria*. Lamk. Syst. v. 461; Ed. n. vi. 74.—*Mya arenaria*. Flem. Brit. Anim. 463.

### 3. *Mya ovalis*. *Oval Gaper*.

Shell ovato-elliptical, rounded and somewhat reflexed behind, convex, moderately thin, rugose, covered with a greyish-yellow epidermis extending over the mantle-tube; the right valve with a broad, abruptly terminated, concave tooth; the left with a small depression, having anteriorly a rather thin prominence, and posteriorly two oblique ridges ending in a rather pointed prominence; the umbones nearly central; the colour of the shell dull white, of the interior glossy white. Length ten-twelfths of an inch, height six-twelfths.

Brought up by fishing-lines from the Bay of Aberdeen; also sometimes found on the beach.

As Turton observes, "it has the convexity of *Mya truncata*, with the rounded anterior end of the *Mya arenaria*, but not so much produced." He gives Clontarf in Dublin Bay, and Torbay in Devonshire, as localities.

Although Dr. Fleming says, "it seems nothing more than the young of *Mya arenaria*," I think it much more resembles the young of *Mya truncata*, which is not truncated like the adult.

*Mya ovalis*. Turt. Brit. Biv. 33. Pl. 3. f. 1, 2.—*Mya arenaria*. Young. Flem. Brit. Anim. 463.

## GENUS 2. LYONSIA.

Shell oblong, much compressed, inequivalve, inequilateral, open at the posterior end, concentrically striated, covered with an epidermis which is prolonged upon the mantle and tubes. Umbones very small. Hinge toothless, but with an intervening calcareous body connected with the ligament, which is internal, and in each valve an oblique sinus under the umbo. Muscular impressions distant, large; inner layer pearly.

1. *Lyonsia Norwégica*. Pearly *Lyonsia*.

Shell oblong, much compressed, with the valves very thin and brittle; the umbones small; the anterior end shorter and rounded, the posterior truncate; the dorsal line nearly straight, the ventral margin arcuate; the surface white, with concentric obsolete striæ, becoming distinct and irregular at the posterior end, and numerous divergent striæ, the slender ridges between which are more prominent and nodulose in the space between the dorsal line and an inconspicuous ridge or fold from the umbo to the lower angle of the truncation; the epidermis pale greyish-yellow; the inside pearly and iridescent. Length about an inch and a-half, height about ten-twelfths of an inch.

A portion of a valve found by Mr. Davidson, brought from deep water off Aberdeen, in the Spring of 1842.

Dr. Fleming makes this shell a *Mya*; but I think its characters are quite prominent enough to render it generically distinct.

*Mya Norwegica*. Gmel. Syst. Nat. 3222.—*Mya striata*. Mont. Linn. Trans. xi. 188. Pl. 13. f. 1. A.—*Mya pellucida*. Brown, Worm. ii. 105. Pl. 24. f. 1.—*Lyonsia striata*. Turt. Brit. Biv. 34. Pl. 3. f. 6, 7.—*Mya Norwegica*. Flem. Brit. Anim. 463.

## GENUS 3. SPHENIA.

Shell oblong, inequivalve, anisomeral, gaping behind. Hinge of the left valve with a thin dilated horizontal plate-like tooth, anteriorly abrupt, sloping backwards and adnate; that of the right valve with a concave tooth, and an anterior minute prominence; ligament internal; umbones small, pointed, curved a little forwards, nearer the anterior end; muscular impressions moderate; siphonal impression very deep, broad, and obtuse.

Animal oblong, compressed; with the mantle closed, leaving only a rather small opening for the foot, and forming behind a compressed very extensile tube, containing two siphons, which are united to the end; foot very small, oblong, compressed, obtuse.

This genus, instituted by Turton, is closely allied to *Mya*, from which it in fact does not differ very essentially. The species occur imbedded in rocks, and other hard substances, among corallines and the roots of fuci, as well as in mud and sand.



1. *Sphénia Swainsóni*. Swainson's *Sphenia*.

Shell oblong, with the anterior end rounded and closed, the posterior longer and gaping, the umbones rather prominent, both valves considerably convex, thin, concentrically rugoso-striate; the laminiform tooth of the right valve oblongo-angulate, narrower behind; the concave tooth of the left curved downwards and outwards beneath the umbo; the colour white, the thin epidermis yellowish-grey; the inside bluish-white, glossy behind, anteriorly dull. Length about half an inch, height half the length.

It varies considerably in form, being oblong, oval, or sub-cuneate.

Common off the coast of Aberdeen, among the roots of algæ and corallines. First observed by me, in August, 1842, among shells cast on the sands near the mouth of the Dee, and in September, at Don-mouth alive. Also among shells sent by Mr. Alexander Murray from Cruden. After storms, it is sometimes very abundant on the sands. Some suppose it to be the young of *Mya arenaria*.

*Sphenia Swainsoni*. Turt. Brit. Bir. 37. Pl. 19. f. 2.—*Sphenia Swainsonii*. Flem. Brit. Anim. 466.—*Mya Swainsoni*. Forbes, Malac. Mon. 54.

2. *Sphénia costuláta*. Ribbed *Sphenia*.

Shell ovato-elliptical, both ends being equally rounded, the anterior much shorter, the umbones small and slightly prominent; the valves convex, very thin, semitransparent, glossy, concentrically striulate, and with (about) fifteen radiating little elevated ribs; the tooth in the form of an elongated thin lamella of small extent; the colour hyaline-white. Length a twelfth and a-half, height one-twelfth.

This most delicate and beautiful shell is decidedly a *Sphenia*, and obviously very different from any of the smaller species of other genera with which it might, from its form, be confounded. I have seen only a single valve, picked by Miss Macgillivray from among shell sand, from the Bay of Cruden, sent by Mr. Murray, in November, 1842.

## GENUS 4. MONTACUTA.

Shell ovate or oblong, equivalve, inequilateral, closed, or very slightly gaping, very thin, glossy, concentrically striulate. Umbones very small, little prominent. Hinge

with a thin prominent oblique marginal tooth, a sinus under the umbilicus, and an adnate concave tooth, in each valve. Ligament internal occupying the cavities of the concave teeth.

This genus differs from *Amphidesma* in having no external ligament. The species are all very small, reside in sand, or mud, or among corallines, and may frequently be found on the sandy beaches.

1. *Montacúta bidentáta*. *Bidentate Montacuta*.

Shell ovate, very thin, somewhat pellucid, very inequilateral, rounded at both ends, the posterior end much shorter and rather narrower; the valves rather convex, glossy, delicately marked with concentric lines, whitish or tinged with brown; inner surface highly glossed, obscurely scrobiculate; in the right valve an oblique adherent deflexed tooth behind, a wide sinus, an anterior lamellar tooth, the margins channelled for a short space; in the left valve a wide sinus, the margins thickened and divergent. Length two-twelfths, height a twelfth and a-half.

Found by me, in July, 1842, among shell sand on the beach near Aberdeen, and afterwards on dead shells and corallines from deep water. Cruden Bay, Mr. Murray.

As Montagu observes, "the hinge of this species does not strictly belong to any one of the present genera in conchology; the teeth, though large, and standing very high in proportion, have not the appearance of what are usually termed *primary*; they are broad, flat, more than usually distant for central teeth, and equally diverge; the opposite valve is destitute of either primary or lateral teeth, and has only a slight cavity under the beak." The hinge however is essentially similar to that of the three following species.

*Mya bidentata*. Mont. Test. Brit. 44. Pl. 26. f. 5.—*Montacuta bidentata*. Turt. Brit. Biv. 60.—*Mya bidentata*. Penn. Brit. Zool.; Ed. n. iv. 166.

2. *Montacúta oblónga*. *Oblong Montacuta*.

Shell oblong, rounded at both ends, little convex, with the umbones nearer the larger end, the dorsal line straight and direct; the valves very thin, transparent, glossy, very faintly striated concentrically; the teeth horizontally prominent; the colour hyaline-white, the interior highly glossy. Length two-twelfths of an inch, height a twelfth.

Found by Miss Anne Macgillivray, in September, 1842, in shell sand, from near the mouth of the Dee.

*Montacuta oblonga*. Turt. Brit. Biv. 61. Pl. 11. f. 11, 12.

3. *Montacuta glábra*. *Smooth Montacuta*.

Shell ovato-oblong, subelliptical, very thin, somewhat pelucid, very inequilateral, nearly equally rounded at both ends, convex, delicately marked with concentric lines, and slightly punctulate toward the margins; white or tinged with brown; the inner surface highly glossed, slightly granulated, toward the margin smooth, and somewhat iridescent; in the right valve an oblique deflexed, adherent, concave tooth, and a wide sinus, with a conical tooth, the margins channelled for a short space; in the left valve a sinus with a concave tooth, the margins plain. Length five-twelfths of an inch, height three-twelfths.

Not uncommon in deep water off Aberdeen; often brought up on the lines adhering to actiniæ, ascidiæ, and other objects; frequently also cast on the beach.

In shell sand from Ugie-mouth, and Cruden Bay.

*Tellimya glabra*. Brown, Illustr. Pl. 14. f. 19.

4. *Montacuta substriáta*. *Substriated Montacuta*.

Shell ovate, rounded at both ends, rather convex, with the umbones nearer the broader end; the dorsal line sloping; the valves thin, semitransparent, faintly striated concentrically, and marked with obsolete radiating striæ; the teeth obscure in the right valve; the colour pale yellowish-grey, internally white and shining. Length a twelfth of an inch, height a fifth less.

Found by Miss Marion Macgillivray, in September, 1842, in shell sand, from near the mouth of the Dee.

*Montacuta substriata*. Turt. Brit. Biv. 59. Pl. 11. f. 9, 10.

GENUS 5. CORBULA.

Shell inequivalve, inequilateral, closed, or little gaping. Right valve much longer, convex, with the umbo prominent; left valve less convex. Hinge strong, with a curved pointed tooth and a cavity in the right, a spoon-shaped tooth in the left valve. Internal ligament received into these cavities.

1. *Córbula inæquiválvis*. *Common Corbula*.

Shell rotundato-trigonal, very inequivalve; the right valve

very convex, with the umbo prominent; both valves concentrically striato-sulcate, the left, or smaller, with radiating raised lines; the epidermis yellow or brown; the hinge nearly central, both margins sloping; the anterior end rounded, the posterior narrowed, and truncato-angular. Length five-twelfths of an inch, height four-twelfths.

Not uncommon on hard ground in rather deep water; frequently brought up by the lines.

*Mya inaequalis*. Mont. Test. Brit. 38. Pl. 26. f. 7.—*Mya inaequalis*. Penn. Brit. Zool.; Ed. n. iv. 166.—*Corbula Nucleus*. Lamk. Syst. v. 496; Ed. n. vi. 139.—*Corbula Nucleus*. Turt. Brit. Biv. 39. Pl. 3. f. 8, 9, 10.—*Corbula striata*. Flem. Brit. Anim. 425.—*Cardium striatum*. Walker, Test. Min. 24. f. 85.

## FAMILY XII.—PHOLADINA.

Animal spherical, oblong, or vermiform, having the mantle closed and more or less tubular, with an anterior aperture for the foot, which is small; two generally elongated tubes, coherent, the upper for the passage of the excrement, the lower for respiration; the labial appendages small; the branchiae elongated, extending into the siphon.

Shell generally bare, white, more or less elongated, sometimes nearly spherical, often truncated, equivalve, inequilateral, open at both ends, more widely before; hinge toothless; ligament seldom conspicuous, sometimes replaced by appendages of the mantle; muscular impressions well marked, connected by a distinct pallial impression, which is deeply excavated behind.

The species, which are marine, reside in rocks, stones, wood, sand or mud, in cavities from which they are incapable of emerging. They have frequently a calcareous tube, which is prolonged backwards, or sometimes have the shell furnished with accessory pieces for closing it more completely.

### GENUS 1. PHOLAS. BORER, OR PIDDOCK.

Animal subovate or oblong, with the mantle reflected above to connect the valves and accessory pieces, there being no ligament; its anterior aperture rather small;

the foot short, oblong, flattened; the tubes united, very extensile; the mouth small, with very small labial appendages; the branchiæ elongated, narrow, somewhat unequal, united above nearly in their whole length, and prolonged into the siphon.

Shell subovate or oblong, equivalve, inequilateral, generally thin and white, open at both ends, more widely at the anterior; the umbones concealed by a callosity; the hinge toothless, and without ligament, but usually furnished with several accessory calcareous pieces; a curved, flattened, calcareous process in each valve, under the umbo; muscular impressions distant, submarginal, the posterior large and elongated; pallial impression distinct, with a deep sinus behind.

The species reside imbedded in rocks, wood, clay, and other more or less firm substances; and the genus takes its name, as Pennant remarks, from  $\Phi\omega\lambda\epsilon\omega$ , to sink in cavities; or from  $\phi\omega\lambda\alpha\varsigma$ , residing in caves.

It might be supposed that on a coast composed chiefly of primary and igneous rocks, few or no boring Mollusca could find a suitable place of abode; but the following extract from the Statistical Report of the Parish of Bellhelvie will shew that such an opinion would not be correct:—"It is probable that this moss extends a considerable depth out to sea, and that there is a submarine forest somewhere in this bay at no great distance; for on Christmas 1799, when there was perhaps the most dreadful tempest that any person remembered to have seen on this part of the coast, several cubical blocks of peat moss were cast by the sea upon the sandy beach, some of them containing upwards of 1700 cubic feet. Pieces of wood, like branches of oak trees, apparently converted to a consistence like moss, passed through these blocks in every direction. Both moss and wood were perforated by a number of Auger worms of a large size, and most of them alive in their holes." I have also been informed that, many years ago, after a great easterly storm, the beach at Aberdeen was covered with a vast quantity of shells, among which were numberless

Pholades, few or none of which have been seen there since. Single valves of *Pholas crispata*, however, I have myself met with, on the sands between the Don and the Ythan; and Dr. Fleming informs me that he has seen valves of *Pholas candida* on the same beach.

1. *Phólas crispáta*. *Curled Piddock*.

Shell subovate, widely open at both ends, very convex; the valves rather thick, rounded behind, angulate before, with a ridge from the umbo to the lower margin, the portion anterior to which is marked with strong muricate concentric ridges, and obsolete radiating grooves, the posterior with plain and less prominent striæ; the infra-umbonal process linear, flattened, curved; the colour dull white. Length about three inches, height a third less.

Single valves of this species occur not very unfrequently on the sandy beach, from the mouth of the Dee to that of the Ythan; and are sometimes taken up from off Aberdeen by the fishing-lines. I have not however seen the animal entire; but there is reason to believe that it occurs off the coast.

Concha altera parte dimidiata, striis unvatun crispatis donata. Lister, Anim. Angl. 192. Pl. 5. f. 38.—*Pholas crispata*. Linn. Syst. Nat. 1111.—*Pholas crispatus*. Penn. Brit. Zool. iv. 77. Pl. 40. f. 12; Ed. n. iv. 157. Pl. 43. f. 2.—*Pholas crispata*. Mont. Test. Brit. 23.—*Pholas crispata*. Turt. Brit. Biv. 6.—*Pholas crispata*. Lamk. Syst.—*Pholas crispata*. Flem. Brit. Anim. 456.

2. *Phólas cándida*. *White Piddock*.

Shell ovato-oblong, open at both ends; the valves very thin, fragile, rounded before, and less open there than at the anterior end, which is narrowly rounded; the surface marked with radiating elevated lines, decussated by concentric lines, and papillate at the intersections; the infra-umbonal process linear, flattened, curved; the accessory piece oblong; the colour white. Length about two inches, height nearly one.

Found by Mr. Alexander Murray near Peterhead and at St. Fergus. Dr. Fleming informs me that he has seen it, as well as *Pholas crispata*, in masses of peat cast on the beach near Don-mouth.

Concha candida. Lister, Anim. Angl. 193. Pl. 5. f. 39.—*Pholas candida*. Linn. Syst. Nat. 1111.—*Pholas candidus*. Penn. Brit. Zool. iv. 78. Pl. 39. f. 11.—*Pholas candida*. Mont. Test. Brit. 24.—*Pholas candida*. Turt. Brit. Biv. 10.—*Pholas candidus*. Flem. Brit. Anim. 457.

## CLASS V.—BRACHIOPODA.

Body covered by a two-lobed, open mantle, and enclosed in a bivalve shell; head not distinct; mouth with two fleshy, extensile arms or filaments; no foot.

*Brachiopoda*, Cuvier. Βραχιων, an arm; πούς, a foot.

No species of this comparatively small class has occurred to me, although it is probable that some exist in the district.

## CLASS VI.—APODA.

Body enclosed in a dense sac, having two small apertures; head not distinct; mouth and anus connected with the external apertures; branchiæ diversiform, but not divided into four laminæ, and always contained in the interior of the body.

*Ascidia*, Linnæus. *Acéphala in-testacea*, Cuvier. *Heterobranchiata*, Blainville. Ἄ, without; ποδα, feet.

The sixth class of the Malacozoa is composed of animals presenting considerable affinity to those of the class of Tropiopoda, but differing so much from them as to merit a separate section for themselves, and even in such a degree as, in the estimation of many naturalists, to render their position doubtful. They are destitute of a head and special organs of sense, and are placed in an inverted position, or with the mouth below, and the anal

and respiratory apertures above. They are however generally fixed by attachment to other bodies, and being thus incapable of locomotion, are destitute of any organ analagous to the muscular foot or arms of the other Malacozoa; for which reason, and to preserve a uniformity of nomenclature, I have named them Apoda or Footless. Some of them, however, are free, and move by the contractions of their body or its covering. They may be defined as animals having two mantles or tunics, of which the outer sometimes forms a tube open at both ends, but is generally a closed sac, of a leathery or cartilaginous consistence. Within this external sac is a delicate, soft internal tunic or mantle, enclosing the body, or the various organs. This inner mass is not in contact with the inner walls of the outer sac, there being between them a space filled with water. In the upper part of the outer sac are two apertures, leading by two canals into the interior of the inner sac. Of these apertures, the upper leads into a cavity, on the inner surface of which the branchiæ are expanded in the form of a net-work. The water which enters carries with it the particles of nutritious matter, which are received by the mouth, placed at the lower part of the branchial cavity, and presenting a simple aperture, without any labial or lingual appendages; the stomach is generally large, the intestine wide and curved in the form of the letter s, and terminates in the lower of the two external apertures. There is a liver of large size, and the genital organs, similar to those of the Malacozoa Lamellibranchiata, terminate in the anal aperture. The branchiæ vary in form, but are always small, and not divided into laminæ. These animals are all marine, most of them living affixed



to stones, shells, algæ, or other bodies, some however being free.

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SYNOPSIS OF THE ABERDEENSHIRE SPECIES.

ORDER I.—APODA HETEROBRANCHIATA.

Branchiæ adherent internally to the tube extending from the upper part of the body to the mouth.

‡ Ἐτερος, different or diversiform; Βράγχια, gills. Blainville.

FAMILY I.—ASCIDIINA.

Body enveloped in a thick skin, fixed in a reversed position, and terminated above by two orifices, placed near each other. Name from the genus *Ascidia*.

GENUS 1. *CYNTHIA*.—External sac sessile, fixed by a broad base, coriaceous, with two quadriradiate apertures. *Cynthia*, a name of Diana. Savigny.

1. *Cynthia tuberosa*.—Subovate or hemispherical, cartilaginous, with irregular, rough prominences, greyish-white. *Tuberosus*, with prominences.

GENUS 2. *ASCIDIA*.—External sac oval, conical, or cylindrical, fixed by a broad base, with the upper aperture octoradiate, the lower sex-radiate. Ἀσκιδίων, “a small leathern bottle.” Linnæus.

1. *Ascidia Prinum*.—Subovate, compressed, or diversiform, softish, rugose, transparent, hyaline tinged with blue; the apertures with reddish rays. *Prinum*, a prune or plum.

2. *Ascidia opalina*.—Subovate, or somewhat square, compressed, very dense, cartilaginous, opalo-hyaline or bluish-white; the apertures not coloured. *Opalinus*, like opal.

3. *Ascidia intestinalis*.—Subovate, when extended subcylindrical, softish, smooth, transparent, hyaline,

greenish-grey, or bluish-green, the orifices with red spots. *Intestinalis*, like a piece of gut.

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### ORDER I.—APODA HETEROBRANCHIATA.

Branchiæ varying in form, but always contained in the tube leading from the posterior or upper part of the body to the mouth; the body anomalous or irregular in form, enveloped in a strong sac, perforated with two apertures, and destitute of shell, external or internal; the mouth situated in the interior, destitute of labial appendages.

#### FAMILY I.—ASCIDIINA.

Body diversiform, enveloped in a thick, more or less rugous, contractile skin, adherent or fixed in a reversed position, or with the mouth downwards, at the other or upper extremity terminated by two tubes or orifices, placed not far from each other; the upper larger orifice leading to the branchial cavity, at the lower part of which internally is the mouth, the other aperture leading to the tube continuous with the termination of the intestinal canal and that of the genital organs; the branchiæ, which are equal and broad, expanded like a network on the inner surface of the two lateral valves of the branchial cavity, its orifice furnished internally with a denticulate membranous ring, or a circle of filaments.

#### GENUS I. CYNTHIA.

Body sessile, fixed by a broad basis in a reversed position; outer sac cartilaginous or coriaceous, with two quadriradiate apertures; inner sac coriaceous; branchial cavity longitudinally plicate, its reticulations without papillæ; abdomen lateral; ovary multiple.

1 *Cynthia tuberósa*. *Tuberous Cynthia*.

External sac sessile, subovate, or hemispherical, very dense, cartilaginous, covered with irregular prominences or tubercles of various sizes, its colour greyish-white or grey. It is terminated above by a little-prominent aperture, surrounded by irregular radiating hard corrugated obtuse ridges, and presents on the side, about a third down, a prominent wart-like, quadrisulcate, tubercular anal aperture. The substance of this outer tunic is thick, and firm throughout, its inner surface of an opaline white. The inner sac, closely applied to the outer, is ovato-globose, thick, firm, externally smooth, yellowish, toward the upper part carmine; its branchial aperture rugose; the anal cylindrical, rather long. Internally, this sac presents, on the branchial surface, eight longitudinal thick, semicylindrical ribs, and numerous longitudinal elevated white lines decussated by smaller transverse lines, without papillæ at the intersections. This branchial membrane extends to the base, and bears a great resemblance to that of the Actiniæ. Its colour is yellow or pinkish. In the abdominal space, the internal surface of the sac is formed of irregular roundish soft prominences of a red colour. The anal tube extremely firm, at the end cartilaginous, with four rugous lobes, and four conical papillæ. Length about an inch.

First found by Miss Isabella Macgillivray in September, 1842, having been brought up by a fishing-line from deep water off Aberdeen.

This, the most extraordinary-looking of our species, presents the appearance of an aggregation of very hard Ascidiæ, its protuberances being so numerous and prominent, that there is difficulty in finding among them the quadripartite apertures. It is crusted, like the rest, but I have not found *Modiolæ* imbedded in it.

## GENUS 2. ASCIDIA.

Body oval, conical or cylindrical, contained in an external leathery, cartilaginous, or subgelatinous skin, fixed by its enlarged base, and terminated by two tubes or apertures, the upper with eight lobes or rays, the lower with six; inner sac smooth; branchial cavity even, its reticulations papillate; abdomen lateral; no liver; ovary single.

The Linnæan genus *Ascidia* has been variously divided

by authors. M. Savigny has instituted several sub-generic groups, founded on differences of organization; and gives to the present group the name of Phallusia, derived from Phallus, in allusion to the form of some of the species, but objectionable for several reasons. As the Linnæan generic name ought to be given to some group of the series, I think it may as well be applied to this.

### 1. *Ascidia Prunum*. Plum-like *Ascidia*.

External sac subovate, compressed, or diversiform, extensile, but not capable of being much elongated, softish, rugose, transparent, hyaline, with a tinge of blue; the upper or branchial aperture forming a hemispherical prominence, with eight granulated papillæ, separated by eight reddish rays; the lower aperture similar, with six rays; the inner sac is oval, of a yellowish colour; the intestine very wide, curved, its contents dusky; the ovary large, placed on one side, and of a yellowish colour; the branchial cavity extending to the end of the body; the upper prominence of the body communicating with the external branchial aperture of a bright orange-red, as are the parts around it, that colour extending downwards in streaks, but not on the anal prominence. Length about an inch, breadth a fourth less.

Generally the external tunic is so transparent that the internal parts can be seen through it. It varies in form, being oval, and sessile by a broad base, or oblong and somewhat pedunculate.

Common on dead shells, especially *Cyprina islandica* and *Cardium echinatum*, from deep water off Aberdeen. Often partially covered with *Discorbis lobatulus*.

*Ascidia prunum*. Lamk. Syst.; Ed. 2. iii. 529.—*Ascidia Prunum*. Muller, Zool. Dan. 1, 42. Pl. 34. f. 1, 2, 3.—*Pirena Prunum*. Flem. Brit. Anim. 468.

### 2. *Ascidia opalina*. Opaline *Ascidia*.

External sac suboval, or somewhat square, compressed, very dense, cartilaginous, transparent, of an opaline-hyaline, or bluish-white tint, its inner surface glossy and smooth. It is terminated above by two, little-prominent, apertures, not far distant from each other, the upper with eight radiating, irregular, tuberculate lobes, the lower with six similar lobes. The inner sac ovato-oblong, very thin, its upper half bright scarlet,

the ventral portion white, more or less dotted with yellow and scarlet, or tinged with blue. The tubes short, the upper eight-lobed, the lower six-lobed. The ridges do not run far down the tubes, and the rest of the sac is plain. The branchial cavity extends to the base of the sac, and is lined by a delicate membrane, generally of a scarlet colour, beautifully reticulated with whitish filaments crossing each other and having prominent papillæ at the intersections. The œsophagus very short, the stomach very large, ovato-globose, the intestine very wide, sigmoid, of a brown colour when filled, otherwise whitish; the inner surface of the intestinal canal villosopapillate.

This species, although the individuals vary in form, does not in individuals present much variation, the external sac being rigid and little capable of extension. It is easily distinguishable by the hyaline appearance of the outer sac, through which the bright red of the inner is apparent.

Abundant in deep water, off Aberdeen, adhering to dead shells, stones, agglutinated sand, and the like. Corallines, small shells, and other bodies, often adhere to it, and *Modiola discors* is sometimes found imbedded in its outer coat.

### 3. *Ascidia intestinalis*. *Intestinal Ascidia*.

External sac subovate when contracted, and somewhat compressed, oblong or subcylindrical when extended, softish, rugose or even, smooth, transparent, hyaline, greenish-grey, or bluish-green, composed of a dense fibrous external layer, numerous thinner cellular laminæ, and an inner subgelatinous transparent layer. It is terminated above by two short tubes, the upper larger eight-lobed, the lower six-lobed. The free internal space, filled with water, is very large, but the fluid also occupies the gelatinous cellular tissue, which forms the inner membranes of the outer sac. The latter is thin, so transparent that the organs can be easily seen through it. In the ordinary state this sac is ovate, narrowed above; but when contracted, its upper part is cylindrical, narrow, longitudinally furrowed, transversely rugose, and terminates in two contractile tubes placed near each other, the upper longer, with eight grooves, and having at the aperture a bright yellow margin folded into eight lobes, on the middle of each of which externally is a bright red spot, sometimes prolonged into a ray; the lower tube similar, with six lobes and longitudinal grooves. Between the tubes is a small hemispherical white glandular body. On being handled, the animal contracts the external sac to less than half its length, throwing it into transverse rugæ. An individual lived

and moved for half an hour, after being deprived of its outer sac, contracted the upper half of the inner sac into a longitudinally ribbed and transversely rugose firm cylinder, turned it slowly in various directions, and moved the siphons separately. This inner sac has about twelve, longitudinal muscular bands of a whitish colour, crossed by smaller muscular bands. From the upper orifice, a tube passes into the branchial cavity, which extends nearly to the bottom of the sac, and is lined by a delicate longitudinally striate and transversely striulato-granulated membrane, the respiratory organ; the mouth is a simple aperture about a fifth from the bottom of the sac; the œsophagus is short, narrower than the intestine; the stomach ovato-oblong, three-twelfths of an inch in width; the sigmoidally curved intestine a twelfth and a-half in width, ascending, and terminating in the lower, six-lobed orifice. The whole length of the intestinal canal is four inches. Attached to the stomach is a thin reddish soft glandular mass, apparently analagous to the liver. Between the stomach and the first curve of the intestine is an oblong white ovary, which sends off a slender tube of the same colour, running along the intestine to the aperture. The length of the individual described is, when extended, three inches, its breadth at the base one and a-fourth; length when contracted one and a-half.

Very abundant in deep water, off Aberdeen, adhering to dead shells, stones, agglutinated sand, and other substances. Corallines, small shells, and other bodies, often adhere to it; and *Modiola discors* is very frequently found imbedded in its outer coat.

*Ascidia intestinalis*. Linn. Syst. Nat. 1087.—*Ascidia intestinalis*. Lamk. Syst. iii. 126; Ed. 2. iii. 533.—*Phallusia intestinalis*. Savigny, Mem. 107, 115, 169. Pl. 11. f. 1.—*Ciona intestinalis*. Flem. Brit. Anim. 468.—*Phallusia intestinalis*. Riss. Eur. Merid. iv. 275.

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A few other species have been met with; but the difficulty of determining them induces me for the present to leave them undescribed.

## SUPPLEMENT.

### ADDITIONAL SPECIES OF MALACOZOA.

A CONSIDERABLE number of species having occurred, while the preceding pages were at press, a supplementary account of them has been found necessary. The Foraminiferous Cephalopoda have unexpectedly increased, so as to render it expedient to present the characters of their principal families. The additions are owing partly to a last strenuous effort on the part of the author, and partly to the renewed exertions of his friends, especially Mr. Murray and Mr. Gray.

CLASS I.—CEPHALOPODA. Page 20.

ORDER III.—CEPHALOPODA FORAMINIFERA. P. 23, 33.

FAMILY I.—DISCORBINA.

Shell many-celled, with the cells disposed in a single series, curved in a spiral form. Name from the genus *Discorbis*. *Helicostega* of D'Orbigny.

GENUS 1. POLYSTOMELLA. P. 23.

2. *Polystomella Guelminæ*. *Williamina's Polystomella*.

Shell orbicular-disciform, considerably compressed, with the sides equally convex, bevelled to a thin sub-

carinate margin ; the cells of the last turn about fifteen, elevated narrow, convex, and with the concave interstices transversely sulcate ; the centres elevated ; the end moderately raised, semilunar, convex, with its sides embracing the previous turn. Named after Miss Williamina Macgillivray.

Shell almost orbicular, the termination of the last turn rising less than in the other species ; the sides equally convex, and sloping from the centre to the margin, which is thin and subcarinate ; the cellules in the form of rays, elevated, thin but convex, glossy, smooth ; the interstices, in which are the dissepiments, concave, transversely sulcate ; the end of the last cell broadly semilunar, with a thick margin, which embraces the preceding turn, and extends to the centres ; the aperture small, roundish ; the colour greyish-white. Diameter about the sixtieth of an inch.

Found by me, on the 7th January, 1843, on *Pectinariæ* and *Terebellæ*, on the beach near Aberdeen.

### 3. *Polystomella crenulata*. *Crenulated Polystomella*.

Shell discoid, considerably compressed, with the sides somewhat convex, the margin rounded ; the cells of the last turn about twenty, prominent, curved, and regularly transversely crenated, as are their concave interstices. *Crenulatus*, with small crimples.

Shell roundish, discoid, with the sides somewhat convex, the margin rounded, the centres slightly depressed ; the rays formed by the cells about twenty, curved, convex, and regularly crenato-sulcate, as are their interstices, being marked with concentric grooves and ridges ; the end of the last cell semilunar, narrow, convex ; the colour pale bluish-grey. Diameter about the fiftieth of an inch.

This most beautiful species is much smaller than *Polystomella crispa*, from which it differs in having the whole surface, ridges as well as grooves, crenated, and the margin not thin, but convex. In this last character it also differs from *Polystomella Guelminæ*.

Found by me, in December, 1842, in shell sand, from Cruden Bay, sent by Mr. Alexander Murray ; and in January, 1843, adhering to *Terebella conchilega*, on the beach at Aberdeen.



4. *Polystomella umbilicátula*. *Umbilicated Polystomella*.

Shell discoid, compressed, with the sides nearly flat, the margin rounded; the cells of the last turn ten or twelve, curved, broadly convex, smoothish, glossy, the interstices depressed, granulato-sulcate; the centres depressed, little concave, somewhat granulated; the end of the last cell large, cordate, somewhat convex. *Umbilicátulus*, small and with a conspicuous umbilicus.

Shell roundish, thin, with the margin rounded and lobulate; the centres slightly depressed, rather large, nearly flat, granulated; the last turn with ten or twelve cells, which are a little curved, convex, smooth, and glossy, sometimes minutely granulated, the interstices sunk, and granulated; the end of the last turn large, cordate, embracing the previous turn, and having a convex granulated cover, near the centre of which is a minute pore; the colour hyaline-white, with the dissepiments opaque-white, the centre opaque. Diameter about the twenty-fifth of an inch.

Found by me in December, 1842, in shell sand from Cruden Bay, sent by Mr. Alexander Murray; and on the 7th January, 1843, common, on *Terebellæ*, on the beach at Aberdeen.

*Nautilus spiralis umbilicatus, geniculis sulcatis*. Walker, Test. Min. Rar. Pl. 3. f. 69.—*Nautilus umbilicátulus*. Mont. Test. Brit. 191; Suppl. 78. Pl. 18. f. 1.—*Nautilus umbilicátulus*. Flem. Brit. Anim. 229.

5. *Polystomella nautilina*. *Nautiline Polystomella*.

Shell nautiliform, with the sides somewhat convex, the margin rounded, the cells of the last turn about ten or twelve, little convex, narrow, smooth, glossy, but granulated toward the umbilicus, which is small, the interstices depressed, curved, and somewhat striate; the end of the last cell large, cordate, nearly flat, with two series of pores. *Nautilinus*, like a *Nautilus*.

Shell somewhat of the form of *Nautilus Pompilius*, having the last turn of about ten cells, which gradually enlarge, until near the mouth, when they increase in size much more rapidly; the sides somewhat convex, the margin rounded; the dissepiments a little sunk and curved; the cells convex, and glossy, unless toward the small, depressed, distinct umbilici, where

they are granulated; the end of the last cell very large, cordate, embracing the preceding turn, and having a nearly flat cover, with two medial ridges, and two lateral series of pores; the colour greyish-white. Diameter about the fiftieth of an inch.

Found by me on the 9th January, 1843, not uncommon, on *Terebella conchilega*, gathered on the beach near Aberdeen.

6. *Polystomella depréssula*. *Smooth Polystomella*.

Shell nautiliform, with the sides flattened, the margins rounded, the cells of the last turn about ten, slightly convex, and with the interstices smooth, the centres transparent. *Depréssulus*, small and flattened.

Shell nearly of the form of *Nautilus Pompilius*, having the last turn of about ten cells, which gradually enlarge; the sides little convex, nearly even, glossy, smooth, the dissepiments being little sunk, and radiating from a central pellucid space, which is somewhat depressed; the end of the last turn lunate, little convex; the colour greyish-white. Diameter about the fiftieth of an inch.

*Nautilus spiralis subumbilicatus geniculis depressis plurimis*. Walker, Test. Min. Rar. 19. Pl. 3. f. 68.—*Nautilus depressulus*. Mont. Test. Brit. 190; Suppl. 78. Pl. 18. f. 9.—*Nautilus depressulus*. Flem. Brit. Anim. 228.

GENUS 2. NUMMULINA. P. 24, 34.

GENUS 3. DISCORBIS. P. 24, 34.

2. *Discorbis pulchéllus*. *Delicate Discorbis*.

Shell orbicular, depressed, convex above, with a central prominence rounded by a depression, rather convex, smooth, and glossy beneath, the margin rather thin, but rounded; of two and a-half oblique lobate turns, the last with about fifteen lobes, which are little convex, smooth, and glossy. *Pulchéllus*, small and beautiful.

Shell orbicular, depressed, spiral, of numerous rather small, somewhat oblique, regular cells, in three and a-half turns; the lower surface rather convex, even, glossy; the margin thin, but rounded, and very slightly lobate; the upper surface convex, but with a central depression, in the middle of which is a roundish knob; the turns distinctly visible on the lower disk, although neither they nor the cells are separated by sulci; on the upper surface, which is occupied, excepting the central

part, by the last turn, the cells are a little convex, with slight separating depressions; the colour hyaline-white, the dissepiments opaque-white. Diameter nearly half a twelfth of an inch.

This very beautiful species is so regular in its cells, and so transparent, that for some time I thought it a *Polystomella*, until the inequality of its sides or disks led me to examine it more closely. Montagu's *Serpula concamerata* seems to be nearly allied to it, but that species has in its "exterior whorl about nine glossy and tumid cells, of unequal size, but usually a larger and smaller alternate."

Found by me on the 10th January, on *Terebella conchilega*, gathered on the beach near Aberdeen.

GENUS 4. *ROTALIA*. P. 24, 35.

GENUS 5. *SPIROLOCULINA*. P. 24, 36.

GENUS 6. *VERMICULUM*. P. 24, 36.

4. *Vermiculum disciforme*. *Disciform Vermiculum*.

Shell disciform, very thin, carinate, of four turns, with a large, linear, oblong aperture, and a very thin medial dentiform simple lamina. *Disciformis*, round and flat.

Shell orbicular, very thin, of four arcuate, flattened turns, which are opaque, greyish or reddish-white, moderately glossy, faintly rugoso-striate in the transverse direction, the outer margined with a bluish white keel; on one side all the four turns apparent, on the other three; the aperture large, direct, oblong, or even linear, with the margins parallel, and having a rather thick, generally reddish-brown rim, and a medial, erect tooth, extending to more than half the height of the mouth. Diameter a twelfth of an inch, thickness a fourth of the breadth.

This species is nearly allied to *Vermiculum intortum*, from which it differs in its orbicular outline, in not being half so thick, in its thinner keel, and much narrower mouth.

Found by me, in December, 1842, among shell sand from the Bay of Cruden, and from Ugie-mouth, sent by Mr. Alex. Murray.

5. *Vermiculum planatum*. *Flattened Vermiculum*.

Shell disciform, very thin, not carinate, of four turns, with an ovato-oblong aperture, and a thick medial tooth,

enlarged and emarginate at the end. *Planátus*, flattened.

Shell roundish, very thin, of three arcuate, much compressed turns, which are opaque, yellowish-white, moderately glossy, faintly rugose in the transverse direction, the outer margins thin, but not carinate; all the turns apparent on both sides, the last very large; the aperture large, obovato-oblong, with a slightly thickened and somewhat spreading margin, and a medial erect tooth, extending to two-thirds of its height, and enlarged and emarginate at the end. Diameter nearly a twelfth of an inch.

It differs from *Vermiculum disciforme* in not being carinate, and in having the tooth of quite a different form. In this respect it approaches *Vermiculum oblongum*, which differs in shape, is not flattened, and has the tooth, although divided at the end, otherwise dissimilar.

Found by me, in January 1843, in shell sand from Ugie-mouth, sent by Mr. Murray, in December, 1842.

## FAMILY II.—TEXTULARIINA.

Shell many-celled, with the cells disposed alternately in two or three parallel series. Name from the genus *Textularia*. *Enallostega*, D'Orbigny.

### GENUS 1. POLYMORPHINA.

Shell oblong or oval, of several oblong cells, disposed obliquely and alternately in two series, with the aperture round, at the summit of the last cell. Πολυς, many; μορφη, form. D'Orbigny.

1. *Polymorphinaláctea*. *Vermiculum lacteum*. P. 25, 37.

### GENUS 2. TEXTULARIA. P. 25, 37.

2. *Textularia obtúsa*. *Blunted Textularia*.

Shell oblong, rounded at the end, compressed, with the margins thin, of two alternate vertical series of horizontal, rather convex, glistening, prominently granulated, reddish-white cellules. *Obtúsus*, blunt.

Shell rather broadly oblong, subtruncate at the base, rounded at the apex, much compressed, sloping to the margins, which are thin and subcarinate; of about sixteen alternating cellules, disposed in two series, and horizontal, unless at the commencement or apex, where they are vertical or radiating; their surface convex, strongly granulate, and glistening; the colour reddish-white. Length nearly half a twelfth of an inch, breadth rather more than half the length.

Found by me, in December, 1842, among shell sand from Cruden Bay, sent by Mr. Alexander Murray.

### FAMILY III.—VAGINULINA.

Shell many-celled, with the cells disposed in a single series, so as to present an elongated form, with the axis gently curved. Name from the genus *Vaginula*. *Stichostega*, D'Orbigny.

#### GENUS 1. DENTALINA. P. 26, 40.

##### 2. *Dentalina Davidsonii*. *Davidson's Dentaline*.

Shell subarcuate, considerably tapering, somewhat compressed, marked in its whole length with longitudinal crenulated furrows, and convex frosted ridges, of twelve somewhat oblique cells, the last much larger, with a small circular aperture; the colour hyaline. Named after Mr. Alexander Davidson.

Shell elongated, very slightly bent, somewhat compressed, tapering considerably toward the lower end, which is rounded, and longitudinally grooved in its whole length; the grooves crenulated by transverse striulæ, and the convex ridges frosted, or very minutely granulated; of twelve flattened, transparent, slightly oblique cells; the last or uppermost cell much larger, ovate, oblique, with a small circular aperture, having a thickened margin, and directed somewhat toward the concave side of the shell; the colour hyaline-white. Length two-twelfths of an inch, greatest diameter a fifth of the length.

In one specimen the dissepiments are brownish-red.

Very nearly allied to *Dentalina linearis*, from which it differs chiefly in having the grooves and ridges, which are not oblique, crenulated, and extending over its whole length, excepting the last cell, which also differs in form. Supposing it

to be distinct and undescribed, I have named it after Mr. Alexander Davidson.

Found by me, in December, 1842, in shell sand, from Cruden Bay, sent by Mr. Alexander Murray.

### 3. *Dentalina rectiuscula*. *Straightish Dentaline*.

Shell subarcuate, slightly tapering, somewhat compressed, of twelve slightly convex, smooth, even, somewhat oblique cells, the uppermost much larger, with a small circular aperture. *Rectiusculus*, straightish.

Shell arcuate in various degrees, somewhat compressed, tapering a little toward the lower end, which is rounded; of twelve slightly convex, smooth, transparent, somewhat oblique cells; the uppermost cell much larger, oblong, oblique, narrowed anteriorly, and having a small circular aperture directed somewhat toward the concave side of the shell; the colour hyaline-white. Length two-twelfths of an inch, breadth a fifth of the length.

All the species of *Dentalina* are essentially more or less curved, and the present, not being by any means straight, cannot with propriety be named "recta." A discoverer, it seems to me, has no right to misname an object; and therefore I have modified the specific name given by Montagu.

Found by me, in December, 1842, among shell sand from Cruden Bay, sent by Mr. Alexander Murray.

*Nautilus rectus*. Mont. Test. Brit. 197. Pl. 19. f. 4, 7.—*Nodosaria Dentalina*. Lamk. Syst. vii. 596.—*Orthocera recta*. Flem. Brit. Anim. 236.

## GENUS 2. VAGINULA. VAGINULE.

Shell linear, much compressed, somewhat tapering, straight or slightly arcuate, composed of numerous oblique cells, disposed in a single series, the last cell a little elevated; aperture small, submarginal. *Vaginula*, a little sheath or scabbard. D'Orbigny.

This genus differs so little from *Dentalina*, that the two might well be united.

### 1. *Vaginula Legumen*. *Common Vaginule*.

Shell subarcuate, considerably tapering, compressed, of nine slightly convex, smooth, oblique cells; the upper

end marginate; the uppermost cell little elevated, oblique, with a small circular aperture. *Legúmen*, a pod.

Shell subarcuate, compressed, tapering considerably toward the lower end, which is rounded; of nine slightly convex, more or less oblique, smooth, transparent cells; the uppermost end marginate, being surrounded by an oblique, opaque, white rim, beyond which is a convex, oblique, little elevated cell, having a small rounded aperture, directed toward the concave side of the shell; the colour hyaline-white. Length a twelfth and a-half, or two-twelfths of an inch, greatest breadth a fourth of the length.

Found by me, in December, 1842, among shell sand from Cruden Bay, sent by Mr. Alexander Murray.

It varies as to its curvature and degree of compression. One specimen, having only seven cells, is bent in two directions.

*Nautilus Legumen*. Linn. Syst. Nat. 116.—*Nautilus Legumen*. Mont. Test. Brit. Suppl. 82. Pl. 19. f. 6.—*Nautilus rectus geniculis depressis*. Walker, Test. Min. Rar. Pl. 3. f. 74.—*Orthocera Legumen*. Flem. Brit. Anim. 237.—*Vaginula Legumen*. Risso, Eur. Merid. iv. 16.

To these may be appended the genera *Lagenula* and *Cœcilium*, already described.

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### CLASS III.—GASTEROPODA. Page 41.

#### ORDER I.

#### GASTEROPODA PULMOBRANCHIATA. P. 42, 72.

#### FAMILY II.—HELICINA. P. 43, 79.

#### GENUS 2. ZONITES. ZONE-SNAIL. P. 45, 87.

#### 10. *Zonites pygmæus*. *Pygmy Zone-Snail*.

Shell depressed, considerably convex above, faintly striate, semitransparent, rather glossy, umber-brown, of four convex whorls, the suture deep, the umbilicus large. *Pygmæus*, very diminutive.

Shell depressed, rather convex below, considerably convex above, faintly striate, little glossed, obscurely semitransparent; the whorls four, rounded, and very distinctly separated by the suture, the last turn not angulate, nor proportionally larger; aperture placed obliquely, semilunar, rather wider than long, with the margin thin and direct; the colour umber-brown, deeper beneath, paler toward the apex. Diameter about half a twelfth of an inch, height a fourth less.

A single specimen found by me, in shell sand, from Ugiemouth, sent by Mr. Alexander Murray in December, 1842. Being thus in the company of marine shells, one might readily pass it over as a *Skenea*. Many land and fresh-water Gasteropoda however occur in the same situation, as at the mouths of our other rivers. The species is easily distinguishable from the other *Zonitæ*; and specimens presented to me by Mr. Thompson of Belfast and Dr. Fleming, render the identity of my specimen certain. It is perfectly fresh.

*Helix pygmæa*. Drap. Moll. Ten. et Fluv. 114. Pl. 8. f. 8, 9, 10. —*Zonites pygmæus*. Gray's Turton, 167. Pl. 5. f. 46.—*Helix pygmæa*. Alder, Mag. Zool. and Bot. ii. 109.

## ORDER II.

## GASTEROPODA PECTINIBRANCHIATA. P. 50.

## FAMILY III.—TURBININA. P. 52, 130.

## GENUS 1. TROCHUS. P. 53, 131.

*Trochus umbilicatus*. *Umbilicated Pyramid-Shell*.

Shell umbilicate, depressedly conical, of five sulcated little convex turns, of a reddish-white colour, with radiating, undulated reddish-purple stripes; the umbilicus rather wide, the apex perforated. *Umbilicatus*, having an umbilicus.

Shell suborbicular, subdiscoid, or depressedly conical; with a rather wide umbilicus, pervious to the tip, in which is a small aperture; the turns five, nearly flat, or little convex, striato-sulcate; the suture distinct, but very narrow, margined above by a slightly prominent rim; the last turn angulate, but rounded toward the mouth; which is very oblique, roundish, and pearly; the lower surface flattened; the colour reddish-white, with radiating undulated purplish-red stripes. Diameter nine-twelfths of an inch, height five-twelfths.

An extended examination and comparison has induced me



to alter my opinion as to the identity of *Trochus cinerarius* and *Trochus umbilicatus*. The latter is always more depressed, larger, with only half the number of grooves on its last turn, and with the radiating undulated stripes or bands much more widely set and broader.

Common about Slains, Peterhead, and Banff; rarer on the Kincardineshire coast.

*Trochus crebris striis fuscis*. Lister, Anim. Angl. Pl. 3. f. 15.—*Trochus umbilicatus*. Mont. Test. Brit. 286.—*Trochus umbilicatus*. Flem. Brit. Anim. 322.

## GENUS 2. MONODONTA. *After Trochus*. P. 53, 131.

Shell imperforate, conoid, or subovato-conical, with the spire moderately elevated or low; the last turn very large, convex; the aperture roundish, the peristome incomplete behind, the outer lip thin-edged, the columella subtruncate, or ending in a dentiform prominence. *Μονος*, one; *ὀδους*, tooth. Lamarck.

As Lamarck observes, *Monodonta* is intermediate between *Trochus* and *Littorina* or *Turbo*, the aperture differing from that of *Trochus* in being more rounded, and from that of *Littorina* in having the columella truncated.

### 1. *Monodonta crassa*. *Solid Monodonta*.

Shell conical, with the spire shorter than the last turn, which is very convex; the colour whitish, densely undulated with dusky lines, the mouth and part of the lower surface white. *Crassus*, thick.

Shell conical, thick; with the spire much shorter than the last turn, convex in outline, and pointed; the turns five, the upper little convex, the last very large, convex, very faintly angulate, all obliquely striate; the suture small, but distinct; the base convex, the umbilicus covered; the aperture oblique, roundish, with the outer lip thin, the inner incomplete behind, reflexed on the umbilicus, with the columella straight, at the end truncato-dentiform; the apex decorticated; the colour greyish or reddish-white, closely undulato-reticulated with very numerous slender acutely flexuous purplish-black lines;

the mouth white, but not pearly, and a white worn space extending from it to the margin; when decorticated however either on the exterior or interior, the surface nacreous and shining. Length nine-twelfths of an inch, diameter ten-twelfths.

The above description from two specimens, found near Peterhead, in January, 1843, and sent by Roderick Gray, Esq.

*Trochus crassus*. Mont. Test. Brit. 281.—*Trochus crassus*. Flem. Brit. Anim. 323.

#### GENUS 4. LITTORINA. P. 54, 135.

##### *Littorina jugosa*. *Ridged Periwinkle*.

Shell subovato-conical, thick, with the spire a third of the length of the last turn, which is tumid in the middle, and marked with ten or twelve elevated, thin, spiral ridges; the aperture roundish, purplish-brown, the outer lip thin. *Jugosus*, ridged.

Shell somewhat ovato-fusiform, thick; with the spire from a fourth to a third of the whole length, and tapering to a small point; the whorls four, rather flat on the spire, with the suture distinct; the last turn very large, ventricose, with ten or twelve prominent, sharpish, spiral ridges, and inconspicuous transverse striæ, the colour dusky, yellow, or whitish; the aperture roundish, with the outer lip bevelled, and marked externally by the spiral grooves, the inner reflexed, the interior purplish-brown. Length four twelfths of an inch, breadth three and a-half twelfths.

It differs from *Littorina littorea* in its form, and especially its strong grooves and ridges; but it is more allied to that species than to *Littorina rudis*, and differs, I think, from both species, its characters being in fact more prominent than those of most species of its genus.

On the rocky coasts, near low-water mark; and in shell sand on the beaches; not uncommon.

*Turbo jugosus*. Mont. Test. Brit. 586. Pl. 20. f. 2. *Turbo jugosus*. Turt. Dict.

#### GENUS 6. TURBONILLA.

Shell turrite, with the spire very elongated, tapering to a fine point; the aperture subovate, entire, with the peristome incomplete behind, the outer lip thin, the inner nearly straight, reflexed, leaving a small umbilicus. *Turbonilla*, diminutive of *Turbo*. Risso.

1. *Turbónilla reticuláta*. *Reticulated Turbonilla*.

Shell turrite, acuminate, with about twelve convex reticulated turns; aperture subovate, subangulate anteriorly, inner lip straight, reflexed, outer lip crenulated by the spiral grooves. *Reticulátus*, marked like net-work.

The only specimen obtained is scarcely half-grown, and has but eight volutions, which are rounded, and marked with four strong spiral ridges, crossed by transverse grooves; the suture distinct; the last turn proportionally large, without striæ on its anterior part, the spire tapering to a very fine point; the aperture subovate, with the inner lip nearly straight, a little reflexed, and leaving exposed a small umbilicus, the outer lip thin, somewhat crenated by the spiral grooves, and at its junction with the inner forming a rounded angle, or slight canal; the colour reddish-brown, becoming paler toward the apex. Length two-twelfths of an inch, breadth three-fourths of a twelfth; but it attains the length of half an inch or more.

Found by me among shell sand from Ugie-mouth, sent by Mr. Alexander Murray, in December, 1842.

*Murex reticulatus*. Mont. Test. Brit. 272.—*Cerithium reticulatum*. Brown, Illustr. Pl. 48. f. 63.

## GENUS 8. RISSOA. P. 56, 149.

14. *Rissoa puncturáta*. *Punctured Rissoa*.

Shell ovato-conical, of five or six very convex, thin, semitransparent, glossy turns, marked with transverse and spiral ridges, leaving in their interstices spiral series of depressed dots; aperture ovate. *Puncturátus*, marked with small impressions.

Shell ovato-conical, of five or six well-rounded turns, which are thin, semitransparent, glossy, finely reticulated with transverse and spiral striæ, more conspicuous near the suture, and forming at their intersection small impressions of a squarish form; the spire rather obtuse; the aperture ovate, rather rounded behind, with the outer lip somewhat thickened externally, the inner scarcely reflexed, leaving a slight groove behind; the colour hyaline, with three reddish bands toward the outer lip; or destitute of markings. Length a twelfth of an inch, breadth half the length.

Found by Miss Anne Macgillivray, in sand, from Stonehaven, procured by Mr. Alexander Mitchell, in December,

1842; and in January, 1843, by myself in sand from Cruden Bay, sent by Mr. Alexander Murray.

*Turbo punctura*. Mont. Test. Brit. 320. Pl. 12. f. 5.

15. *Rissoa rubra*. *Red Rissoa*.

Shell ovato-conical, rather thin, pellucid, with the spire short, the turns five or six, smooth, little convex, the suture distinct, the last turn well rounded. *Ruber*, red.

Shell ovate, with the spire shorter than the last turn, rather thin, somewhat pellucid, of six little convex, smooth or faintly transversely striate volutions, well separated by the narrow but distinctly impressed suture, the last turn well rounded or rather ventricose; the aperture rather more than a third of the whole length, ovate, acute behind, with the peristome complete, the outer lip thin, the inner slightly reflected on the columella, and leaving a slight umbilical groove; the colour varying from reddish-brown to reddish-yellow, or white. Length a twelfth and a-half, breadth half the length.

Found by me in shell sand, sent from the Buchan coast, by Mr. Alexander Murray, in November, 1842.

This species is somewhat allied to *Rissoa ulvæ* and *muricata*, from which it is distinguished by being shorter, ovate, with the last turn quite rounded.

*Turbo ruber*. Adams, Linn. Tr. iii. Pl. 13. f. 21, 22.—*Turbo ruber*. Mont. Test. Brit. 320.—*Cingularubra*. Flem. Brit. Anim. 308.

16. *Rissoa cingillata*. *Banded Rissoa*.

Shell ovato-conical, of five or six little-convex, thin, semitransparent, glossy, faintly spirally striated, horn-coloured turns, with two brown bands on the last; the aperture ovate. *Cingillatus*, having bands or hoops.

Shell ovato-conical, of five or six turns, which are moderately convex, very thin, semitransparent, glossy, with faint spiral striæ, and of a greyish or yellowish-grey colour, with two rather faint brownish-red bands, sometimes partially interrupted, on the last turn, but disappearing on the upper; the apex rather pointed; the suture distinct; the aperture ovate, angulate behind, with the outer lip very thin, and but little rounded in outline, the inner also thin, and little reflexed; no umbilicus or groove. Length a twelfth and a-half, breadth nearly half the length.

Two specimens found by Miss Anne Macgillivray, in December, 1842, in sand from Stonehaven, procured by Mr. Alex. Mitchell.

*Turbo trifasciatus*. Adams, Linn. Tr. ii. Pl. 1. f. 12—*Turbo cingillus*. Mont. Test. Brit. 328. Pl. 12. f. 7.—*Turbo graphicus*. Brown, Wern. Mem. ii. 521. Pl. 24. f. 6.—*Cingula cingilla*. Flem. Brit. Anim. 309.

### 17. *Rissoa vitrea*. *Glassy Rissoa*.

Shell oval-oblong, subcylindrical, of four rounded, thin, smooth, glossy, white turns; the suture distinct; the aperture oval, narrowed behind. *Vitreus*, glassy.

Shell oval-oblong, subcylindrical, of four thin, semitransparent, smooth, glossy turns, faintly marked with growth-lines, convex; with the suture deep, the apex rather obtuse; the last turn very oblique; the aperture large, oval, narrowed behind, with the outer lip rather thin, the inner reflexed, forming a small cavity behind; the colour white. Length a twelfth and a-half of an inch, breadth a third of the length.

Somewhat similar in form, as well as in the aperture, to *Rissoa striata*; but less elongated, and destitute of spiral striæ.

Found by me among shell sand, from Ugie-mouth and Cruden Bay, sent by Mr. Alexander Murray, in December, 1842.

*Turbo vitreus*. Mont. Test. Brit. 321. Pl. 12. f. 3.—*Cingula vitrea*. Flem. Brit. Anim. 309.

## FAMILY IV.—TORNATELLINA. P. 58.

### GENUS 2. ODOSTOMIA. P. 58, 153.

#### *Odostomia insculpta*. *Engraved Odostomia*.

Shell oblongo-turrite, with five moderately convex, pellucid, spirally striated turns; the apex obtuse; the aperture oval, with a small plait on the columella. *Insculptus*, engraved.

Shell oblong, tapering to an obtuse apex, with five or six moderately convex, thin, pellucid, spirally striated turns; the suture distinct; the aperture ovate, acute behind, nearly half the entire length, the inner lip a little reflexed, and ending in a small plait; the colour white. Length nearly a twelfth of an inch, breadth nearly half the length.

Found by me among shell sand, from Ugie-mouth, collected by Mr. Alexander Murray, in December, 1842.

*Turbo insculptus*. Mont. Test. Brit. 324. Pl. 12. f. 10.—*Odos-tomia insculpta*. Flem. Brit. Anim. 310.

## FAMILY VII.—FUSINA. P. 62, 167.

### GENUS 5. TRICHOTROPIS.

Shell ovato-fusiform, with the spire pointed; the aperture ovate, with a short, oblique, narrow canal, the outer lip thin, denticulate, the inner reflexed, but leaving exposed a rather large umbilical groove. Intermediate between *Fusus* and *Rostellaria*.

#### 1. *Trichotropis umbilicata*. *Umbilicated Trichotropis*.

Shell ovato-turrite, of seven convex, spirally-ribbed turns, the last very large, the spire abruptly tapering to a small point, the aperture subovate, with the canal very short, the inner lip reflexed, but leaving a distinct umbilicus, the outer very convex and dentated by the spiral ribs. *Umbilicatus*, perforated.

Shell ovato-turrite, of seven convex turns, which are obliquely flattened above, spirally ribbed, and transversely marked with fine but deeply impressed striæ; the last turn very large, ventricose, with six or seven strong, compressed, rounded spiral ribs, of which only two appear on the upper turns; between each pair of these ribs a smaller, and in the flattened sloping space between the uppermost rib and the suture three small ribs; the whole surface beautifully and regularly marked with fine deeply impressed oblique striæ; the suture deep; the spire slender, and tapering to a small point; the aperture ovate, broader behind, the outer lip crenated by the ribs, the canal very small and oblique, the inner lip reflexed, but not concealing the umbilicus, from which a groove extends nearly to the canal; the colour white, or reddish-white. Length seven-twelfths of an inch, breadth four-twelfths.

This species, of which I have before me four specimens, the most perfect found by myself in January, 1843; the rest by Mr. Alex. Davidson, in February and December of the previous year, is undoubtedly the same as that described at pp.

63 and 170 as *Fusus Laskeyi*. It varies considerably in the form of the outer lip, which however is always very convex, and in the number of its spiral ribs, as well as their breadth. In one specimen the large ribs are all duplicate, or broad, with a groove along the middle. The shell seems remarkably liable to fracture of the outer lip, as that part is perfect in only one of my specimens, and in all shews previous injuries, in one very rudely repaired. It has been found on the West coast of Scotland, at Rothesay, and Oban, as well as in Shetland, and at Dunbar, and appears to be not very uncommon on the Aberdeenshire coast.

*Fusus umbilicatus*. Brown, Smith, Wern. Mem. viii. 98. Pl. 1. f. 2.—*Trichotropis acuminatus*. Jeffreys, Malac. and Conch. Mag. N. ii. 36; Ann. and Mag. Nat. Hist. viii. 166.

#### ORDER IV.—GASTEROPODA SCUTIBRANCHIATA. P. 6.

##### FAMILY I.—FISSURELLINA. P. 64, 176.

##### GENUS 1. EMARGINULA. P. 65, 177.

##### 2. *Emarginula curviróstris*. *Curved-tipped Slit-Limpet*.

Shell conical, oval, with the summit revolute and inclined to one side, a vertical slit extending from the anterior margin half-way up. Named from its form. *Róstrum*, a beak; *cúrvus*, bent.

Shell conical, with the aperture ovato-elliptical; a vertical median slit extending externally from its anterior part to two-thirds of its height, but internally only to about half its height, and there bordered at its termination with a prominent margin of considerable transverse extent, the anterior median outline convex, the posterior concave; the apex recurved so as to make a complete revolution, at first inclined to the left, then to the right; the surface with twenty-four prominent nodalose ribs, and concentric striæ; the margin externally crenated by the ribs, not extending behind much beyond the apex. Length a tenth of an inch, height a fourth less.

The above description from a single decayed specimen found by me adhering to an Actinia at Aberdeen. It differs from *Emarginula Fissura* in having the apex contorted and turned aside. It appears that in full-grown shells the ribs

ultimately bifurcate. It is said to occur in the Mediterranean.

*Emarginula curvirostris*. Deshayes, Lamk. Syst. vii. 586.—  
*Emarginula conica*. Blainv. Malac. Pl. 48. f. 4.

## FAMILY II.—CALYPTRÆINA.

Animal conical, not spiral, or only in a slight degree; head broad, depressed; tentacula large, pointed; eyes on small prominences at their outer base; foot thin, nearly circular; branchial cavity very large, opening widely before, and containing filamentary branchiæ. Shell subconical, not symmetrical, sometimes with the apex spiral. Name from the genus *Calyptræa*.

### GENUS 1. CAPULUS.

Animal conical, slightly spiral at the summit; with the head distinct, the mouth probosciform; the tentacula thick, subcylindrical; the eyes on small prominences at their base externally; the foot large and thin; the branchial cavity open anteriorly, and furnished with numerous narrow and longitudinal laminae, adhering by a single transverse line to its floor.

Shell irregular, conical, with the apex more or less inclined or spiral, and placed behind; the aperture roundish, with the margin simple, and continuous; the cavity deep, with a muscular impression in the form of a horse-shoe.

Name from the cap-like form of the shell. Montfort.

#### 1. *Capulus Hungáricus*. *Fool's-cap Capulus*.

Shell conoidal, rather thin, longitudinally sulcated, concentrically rugose, and covered with a pilose epidermis; the apex recurved, involute, much nearer the posterior end; the aperture roundish-oval, thin-edged, sinuous. Named from its resemblance to a Hungarian cap.

A small individual, five-twelfths of an inch in diameter, was found in January, 1843, by one of my pupils, Mr. William Robertson. It is slightly decayed, with the epidermis abraded, the colour dull white externally, yellowish-white within. When



perfect, the shell is covered with a pilose yellowish or brownish epidermis, and presents the form of a cone, tapering to a fine point, which is curved back so as to form two volutions, sometimes inclining to one side. It is rather thin, divergently striato-sulcate, with some concentric rugæ; the exterior reddish-white or pink; the inside highly glossed, and reddish, or yellowish, or white. Diameter about an inch, height three-fourths. Another individual, found at Aberdeen, in February, 1842, by Mr. Alex. Beaton.

*Patella Ungarica*. Linn. Syst. Nat. i. 1259.—*Patella Hungarica*. Penn. Brit. Zool. iv. 143. Pl. 90. f. 147.—*Patella Ungarica*. Mont. Test. Brit. 486.—*Capulus Hungaricus*. Flem. Brit. Anim. 363.—*Capulus Hungaricus*. Lamk. Syst.

### 2. *Cápus militáris*. *Military-Bonnet Capulus*.

Shell conoidal, rather thick, decussated with longitudinal and concentric striæ, and covered with a thin epidermis; the apex elongated, very slender, recurved, involute, inclined to the right, and extending beyond the margin; the aperture roundish, thin-edged, even. Named from its resemblance to a pointed cap.

A small individual, only a twelfth of an inch in diameter, found by me among shell sand, from Ugie-mouth, sent by Mr. Alexander Murray, in December, 1842. It is of a conoidal form, suddenly tapering to a long slender point, which is involute and turned considerably to the right; the surface reticulated, white, glossy on the apex; the inside also white.

*Patella militaris*. Linn. Maut. 553.—*Patella militaris*. Pult. Dorset. 51.—*Patella militaris*. Mont. Test. Brit. 488. Pl. 13. f. 11.—*Capulus militaris*. Flem. Brit. Anim. 364.

### 3. *Cápus antiquátus*. *Antiquated Capulus*.

Shell conical, rather thick, with strong annular imbricated rugæ; the apex blunt, somewhat compressed, rather nearer the posterior end; the aperture nearly circular, thin-edged, somewhat irregular. *Antiquátus*, old-looking.

A small individual, two-twelfths of an inch in height, and nearly the same in the diameter of the aperture, was found by me in a cavity among *Serpulæ*, on a dead shell of *Fusus antiquus*, sent from Bantf, by Mr. John Clark, in the end of December, 1842. It was of a greyish-white colour, and contained the animal. From its singular appearance, I had at first sus-

pected it might prove something else, as I had formerly mistaken the half of a vertebra of a cartilaginous fish for a new Fissurella. There is nothing else, however, I believe, that closely resembles it, excepting the basal cup of "*Balanus spongiosus*," from which the presence of the animal, although shrivelled, distinguishes it. The species grows to a much larger size, and varies in the form of the apex.

*Patella antiquata*. Linn. Syst. Nat. i. 1259.—*Patella antiquata*. Mont. Test. Brit. 485.—*Capulus antiquatus*. Flem. Brit. Anim. 364.

## ORDER VII.

## GASTEROPODA TECTIBRANCHIATA. P. 67.

## FAMILY I.—BULLÆINA. P. 67.

## GENUS 2. BULLA. P. 68, 188.

3. *Bulla minuta*. *Minute Bulla*.

Shell ovato-cylindrical, truncato-mammillate, very thin, transparent, glossy, with the aperture oblong, moderately narrowed behind, the outer lip forming a rounded projection there. *Minutus*, very small.

Shell ovato-cylindrical, of two very thin, transparent, hyaline-white, glossy turns, very faintly marked with growth-lines; the upper extremity broadly truncate, with a wide suture-groove, and a central rounded mammilliform prominence, which protrudes a little; the aperture oblong, anteriorly wide and rounded, moderately narrowed behind, extending the whole length of the shell; the outer lip projecting considerably behind in the form of a small lobe; the inner with a thin lamina folded back so as sometimes to form a false umbilicus; the colour hyaline-white. The animal can withdraw itself entirely within the shell. Length one-twelfth of an inch, breadth a third less.

Found by me alive, on *Corallina officinalis*, at the Cove, four miles South of Aberdeen, on the 26th December, 1842; also among shell sand from Ugie-mouth, and Cruden Bay, collected by Mr. Alexander Murray.

*Diaphana minuta*. Brown, Illustr. Pl. 38. f. 7, 8.

## GENUS 4. BULLINA... P. 69, 190.

4. *Bullina pellucida*. *Pellucid Bullina*.

Shell subcylindrical, thin, transparent, glossy, faintly

striulate in its whole length, and having the posterior extremity truncate, with a wide and shallow umbilicus. *Pellucidus*, pervious to light.

Shell very similar in form to *Bullina truncata*, but differing in being destitute of sulci in its upper half, it being glossy and very faintly striulate in its whole length. It is subcylindrical, a little wider anteriorly, where it is rounded; at the upper end truncate, with the spire sunk, forming a wide and shallow umbilicus; the aperture very narrow, but becoming oblong anteriorly, and at its hind part projecting a little in the form of a sinus beyond the extremity of the shell; the colour hyaline-white. Length two-twelfths, breadth half the length.

Not very unfrequent adhering to Actiniæ from the Bay of Aberdeen. I have also found it on *Terebella conchilega* there.

*Volvaria pellucida*. Brown, Illustr. Pl. 38. f. 45, 46.

#### 5. *Bullina producta*. Produced *Bullina*.

Shell oblongo-cylindrical, thin, transparent, glossy, with faint growth-lines, the apex slightly umbilicate, the aperture extremely narrow, the outer lip forming a narrow sinus projecting considerably beyond the apex.

Shell more elongated than *Bullina pellucida*, and having the apex narrowed and rounded, but slightly umbilicate; the aperture very narrow, the outer lip projecting in the form of a narrow sinus considerably beyond the apex, the anterior end narrower and rounded; the colour hyaline-white. Length nearly three-twelfths of an inch, breadth nearly half the length.

Found by me in January, 1843, adhering to Actiniæ, from the Bay of Aberdeen.

*Bulla producta*. Brown, Illustr. Pl. 38. f. 15, 16.

### ORDER VIII.

#### GASTEROPODA NUDIBRANCHIATA. P. 69.

#### FAMILY II.—TRITONIINA. P. 70, 195.

#### GENUS 2. SPHEROSTOMA.

Body oblong, much compressed, flat beneath, convex above in both directions, terminating obtusely behind,

anteriorly with a thick, narrow, crenulated margin, nearly encircling the mouth. Two obtuse tentacula, retractile into tubular sheaths. The mouth in the form of a very large subglobose, somewhat compressed mass, of greater diameter than the body, with a thick margin, forming a vertical slit, and furnished with two very large, convex, thin teeth, with semicircular margins; its floor divergently striato-sulcate, with a medial groove. Branchial prominences gelatinous, caducous, ramose, distant, arranged along the sides in a single series, in sinuses formed by the dorsal margins; orifices of the intestine and genital organs separated.

The genus differs from *Tritonia* in the form of the mouth, the separation of the lateral orifices, and the compression of the body. It differs equally from *Melibœa*, and all the other genera, of which I have seen descriptions. *Σφαῖρα*, a globe; *στόμα*, mouth.

1. *Sphærostoma Jamesonii*. Jameson's *Sphærostoma*.

Body oblong, much compressed, tapering behind to a rounded point. The foot linear-oblong, extending along the entire length of the body, anteriorly abrupt, narrowed and rounded behind, with the surface rugose, and the margins undulated. The sides erect, flat, smooth, at the middle higher than the breadth of the foot. The upper part or back arched in both directions, little broader than the foot, covered with soft, unequal, granulated, convex prominences; the margin slightly projecting beyond the sides; the anterior margin thick, narrow, rugoso-granulate, extending over two-thirds of the kind of neck that supports the mouth. Immediately behind it are two short tubes or sheaths, having a rather firm circular margin, and in each is a conico-convex gelatinous darkish-grey tentaculum. Terminating the body anteriorly is a large, subglobose mass, of cartilaginous consistence, and yellowish-white colour. It is attached by a very short neck, and has the surface longitudinally and transversely striato-rugulose. Anteriorly it presents an oblong vertical slit, or mouth, having the margin thick and rounded; within which are seen two large horny, brownish-yellow teeth, one on each side, externally convex, with a thin semicircular margin. These teeth meet above and beneath. The floor of the mouth is formed of a soft, white, convex mass, having a medial groove, and

marked with fine parallel, oblique grooves, and crenulated ridges. The genital aperture is on the right side, at about a-fourth of the length of the body; and that of the alimentary canal about the middle. The foot and sides are hyaline-white, and semitransparent, the sides minutely dotted with opaque white; the upper surface pale greyish-brown, with a broad umber-brown band on each side, the whole dotted with white, most of the tubercles being tipped with a flocculent substance of that colour. Along each side, in sinuses formed by the margin, are six pale-grey, very soft, ramose branchiæ, most easily separable, being merely of the consistence of mucus. The whole body was enveloped in a tenacious greyish-white mucus. Length two inches and four-twelfths; length of the foot an inch and eight-twelfths; its breadth five-twelfths; height of the body anteriorly four and a-half twelfths, at the middle eight-twelfths; length of the head six-twelfths, its height nine-twelfths, its breadth seven and a-half twelfths.

The above description is taken from an individual, in perfect condition, obtained on the 30th December, 1842. It had been brought up by a fishing-line from the Bay of Aberdeen.

I have great pleasure in dedicating this remarkable animal to my esteemed friend and master in science, Professor Jameson.

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#### CLASS IV.—TROPIOPODA.

##### ORDER I.—TROPIOPODA LAMELLIBRANCHIATA.

##### FAMILY IV.—ARCINA. P. 207, 243.

##### GENUS 1. PECTUNCULUS. PECTUNCLE.

Shell suborbicular, equivalve, somewhat anisomeral; the valves convex, thick, concentrically striate, often divergently striulate and obscurely costate, with a pilose or velvety epidermis; the umbones pointed, incurved, contiguous, but ultimately separated; the hinge margin thick, broad, with an external flattened, striate space for the ligament, and a curved series of alternate teeth and depressions; muscular impressions oval, distant. *Pectunculus*, diminutive of *Pecten*.

1. *Pectunculus Glycimeris*. *Ribbed Pectuncle*.

Shell suborbicular, oblique, anisomeral, slightly angulate at the longer end, obscurely ribbed, with minute divergent striæ decussated by concentric striæ; the exterior whitish with diversiform subundulated red markings, the interior white, the margin crenato-dentate.

Shell subovato-orbicular, somewhat oblique; with the umbones incurved and pointed, the valves moderately convex, the anterior end subangulate; the surface covered, especially toward the margin with short dense silky dark-brown hairs, under which it is marked with faint divergent ribs, with intervening sulci so narrow as to resemble chinks or cracks in the shell, and very numerous minute, undulated striulæ, decussated by concentric striæ; the colour whitish, variegated with angular and undulated light-red markings; the hinge margin broad, with about twenty-two oblique teeth and corresponding depressions; the margin dentato-crenate, the teeth and interspaces corresponding to the costæ. Length two inches and a twelfth and a-half, height an inch and eleven-twelfths.

A single valve, from the Bay of Peterhead, sent in January, 1843, by Roderick Gray, Esq. This appears to be the true *Glycimeris* of Linnæus, not *Pectunculus pilosus*, which is much more convex, and differently marked.

Arca *Glycimeris*. Linn. Syst. Nat. 1143.—Arca *Glycimeris*. Penn. Brit. Zool. iv. Pl. 58. f. 58.—*Pectunculus Glycimeris*. Turt. Brit. Biv. 171. Pl. 12. f. 1.

FAMILY V.—CYCLADINA. P. 208, 245.

GENUS 2. *PISIDIUM*. P. 209, 248.

*Pisidium amnicum*. *River Pisidium*.

Shell obliquely ovate, ventricose, thin, glossy, deeply concentrically striate, with more marked growth-lines; the umbones tumid, obtuse, striated at the apex, much nearer the anterior end; the dorsal slope declinate, a little convex; both ends rounded, the anterior much narrower; the colour olivaceous. *Amnicus*, living in rivers.

Shell ovate, somewhat oblique, broadly rounded anteriorly, narrowly rounded behind; very convex, with the umbones large, convex, striated, and placed much nearer the anterior

end; the valves very thin, brittle, distinctly or deeply striated concentrically, with stronger growth-lines; the hinge with two central and two lateral teeth in one valve, two central and on each side a groove with two parallel laminæ, in the other; the exterior olivaceous brown, or inclining to green, or yellow, in bands, the interior bluish. Length two-twelfths and a-half, height two-twelfths.

Found by me in the Summer of 1841, in the Inverury Canal.

*Tellina amnica*. Muller, Verm. Terr. et Fluv. ii. 205.—*Cardium amnicum*. Mont. Test. Brit. 14.—*Cyclas amnica*. Turt. Brit. Biv. 250. Pl. 11. f. 15.—*Cyclas palustris*. Drap. Moll. Terr. et Fluv. 131. Pl. 10. f. 17, 18.—*Cyclas amnicus*. Flem. Brit. Anim. 453.—*Pisidium amnicum*. Gray's Turton, 286, 285. Pl. 1. f. 5.

#### FAMILY VI.—VENERINA. P. 210, 254.

##### GENUS 6. VENERUPIS. P. 212, 268.

##### *Venerupis decussata*. *Decussated Venerupis*.

Shell ovato-oblong, subrhomboidal, moderately compressed, reticulated with divergent and concentric striæ, papillate behind, yellowish or reddish, with numerous small, generally angular brown markings. *Decussatus*, cut crosswise.

Shell ovato-oblong, subrhomboidal, narrower or rounded anteriorly, subtruncate behind, considerably compressed, rather thick, reticulated with deep but narrow divergent and concentric striæ, leaving by their intersection small tubercular prominences especially at the posterior end; the frontal slope short, with an oblong faint, obliquely striate depression; the three cardinal teeth in each valve close, small, divergent, erect, the middle tooth cleft, the posterior slightly so; the umbones small, a little curved; the inner surface glossy; the siphonal sinus oblong, large, extending obliquely to the middle of the shell; the exterior reddish-white, with numerous small irregular brownish-red markings, darker and more numerous toward the dorsal margin; the interior yellow, toward the margin white. Length an inch and seven-twelfths, height an inch and a-twelfth.

The above description is that of an individual found alive, in February, 1843, by Mr. Alexander Beaton, it having been brought up by a fishing-line, from off Aberdeen. It is the only individual that has occurred to me.

This species attains a much larger size, being sometimes from two to three inches in length. It is very nearly allied to *Venerupis Pullastra*, but easily distinguishable, its divergent striæ being much more deeply impressed, the transverse striæ also more distinct, and its siphonal sinus, not parallel to the pallial margin, but passing obliquely to the middle of the valves. It varies in colour from white to reddish-brown, and has the interior yellow or reddish, sometimes with purple markings toward the dorsal margin or posterior extremity.

*Venus decussata*. Linn. Syst. Nat. 1135.—*Venus litterata*. Penn. Brit. Zool. iv. 96. Pl. 57. f. 53.—*Venus decussata*. Mont. Test. Brit. 124.—*Venus decussata*. Turt. Brit. Biv. 158. Pl. 8. f. 10.—*Venerupis decussata*. Flem. Brit. Anim. 451.—*Venus decussata*. Lamk. Syst. v. 597; Ed. 2. vi. 356.

FAMILY VIII.—TELLININA. P. 214, 276.

GENUS 4. TELLINA. P. 215, 279.

4. *Tellina próxima*. *Brown Tellina*.

Shell subovate, compressed, with the umbones very small and nearer the posterior end; the frontal slope little convex, the anterior end rounded; the dorsal slope, rapidly declinate, nearly straight, the posterior end subangulate; the surface with irregular concentric striæ. *Proximus*, very near (to *Tellina tenuis*).

Shell subovate, compressed; the umbones very small, pointed, and slightly turned backwards; the anterior end much longer and rounded, the posterior subangulate; the dorsal slope rapidly declinate, convex toward the end, the frontal slope little convex; the valves thin, with irregular concentric striæ; the hinge margin rather thick; the right valve with a triangular cardinal depression, and two small teeth; the muscular impressions oblong; the colour of the exterior dull brown. Length an inch, height nine-twelfths.

Only a single decayed valve, brought up by the lines, off Aberdeen, in the Spring of 1842, found by Mr. Alexander Davidson. It is said by M. Deshayes to occur alive in the North Sea. It is also found in the fossil state in Sweden, and at Helensburgh, on the Clyde.

*Tellina proxima*. Smith, Wern. Mem. viii. 105. Pl. 1. f. 21.



## FAMILY X.—MACTRINA. P. 217, 286.

## GENUS 7. ERVILIA.

Shell suboval, equivalve, anisomeral, closed; hinge with two divaricate teeth and an intervening sinus in one valve, a single erect tooth in the other; ligament internal. Name from *Ervm*, a tare. Turton.

1. *Ervilia pellúcida*. *Pellucid Ervilia*.

Shell ovato-elliptical, compressed, very inequilateral, with both ends rounded, the umbones prominent, the dorsal line concave, the hinge with two narrow divaricate teeth, the valves transparent, concentrically sulcato-striate. *Pellúcidus*, permeable to light.

Shell ovato-elliptical, with the umbones very prominent, and placed near one end; the dorsal outline concave, double the length of the ventral; both ends rounded; the hinge with two divaricate slender teeth, separated by a triangular space; the valves thin, semitransparent, little convex, concentrically sulcate, glossy, hyaline-white; the inner surface highly glossed. Length three-fourths of a twelfth, height a third less.

Very similar in form to *Montacuta substriata*, but less convex, and without diverging striæ. Captain Brown refers it to the genus *Tellina*; but its generic characters seem to me to be rather those of *Ervilia*.

First found by me, on an *Actinia*, from the Bay of Aberdeen, in January, 1843.

*Tellina pellúcida*. Brown, Illustr. Pl. 16. f. 22.

## GENUS RISSOA. P. 56, 146.

18. *Rissoa Bryérea*. *Bryer's Rissoa*.

Shell oblongo-turrite, obtuse, thick, subpellucid, of six little-convex turns, with numerous transverse costæ, scarcely interrupted by the suture; the last turn with about twenty costæ; the aperture less than a-third of the whole length, ovate, acute behind, with the outer lip thickened. Named by Montagu after Mr. Bryer.

This very beautiful, and easily distinguishable shell, is similar in form to *Rissoæ truncata* and *striata*, being oblong, obtuse, of six turns, which are flattened, thick, semitransparent, glossy, pure white, without striæ, and traversed by strong, closely-set, obtuse ribs, of which there are about twenty on the last turn; the ribs almost continuous, being but slightly separated by the very small suture; the aperture rather more than a fourth of the whole length, ovate, narrowed behind, patulous, with the outer lip thick and having an external smooth rim, the inner lip thick, reflexed, leaving a slight curved groove. Length rather more than two-twelfths of an inch, breadth nearly a third of the length.

The above description from two fine specimens, found by Mr. Alexander Beaton on *Actiniæ* from the Bay of Aberdeen, in February, 1843.

*Turbo Bryereus*. Mont. Test. Brit. 313. Pl. 15. f. 8.—*Cingula Bryerea*. Flem. Brit. Anim. 307.

19. *Rissoa subumbilicata*. *Subumbilicated Rissoa*.

Shell ovato-turrite, thick, opaque, the turns six, indistinctly separated, slightly convex, faintly striate transversely, glossy, the last well rounded, the aperture roundish-oval, the inner lip reflexed, leaving an umbilical groove. *Subumbilicatus*, somewhat umbilicated.

Shell ovato-oblong, subturrite, of six thick, opaque, glossy, faintly striated, little-convex turns, indistinctly separated by the suture; the spire tapering, rather obtuse, shorter than the last turn when viewed on the side of the aperture, which however is little more than a third of the whole length, roundish-oval, not acute behind, with the peristome rather thick, reflexed on the columella, and leaving a distinct umbilical groove; the colour greyish-white. Length two-twelfths of an inch, breadth nearly half the length.

This species differs from *Rissoa ulvæ* in not having the aperture acute behind, nor the last turn angulate; from *Rissoa muriatica* in being thicker, and from both it and *Rissoa ventricosa*, in having the aperture rounded behind.

Found by me among shell sand, near Don-mouth, in August, 1842.

*Turbo subumbilicatus*. Mont. Test. Brit. 316.—*Cingula subumbilicata*. Flem. Brit. Anim. 308.

GENUS *STYLINA*. *After Lacuna*. P. 56.

Shell subglobose, spiral, thin, with the spire short, convex, but with a prominent apex; the aperture large, roundish, with the outer lip thin, the inner incomplete. Named from the styliform apex. Fleming.

1. *Stylina stylifera*. *Acuminate Stylina*.

Shell nearly globose, very thin, transparent, glossy, yellowish-brown, of four convex turns, the last ventricose; the spire very short, convex, but with a conspicuous styliform apex; the suture distinct; the aperture very large, roundish, the peristome incomplete; the columellar lip thin, reflexed, the outer lip semicircular, very thin; no umbilicus. Length two-twelfths of an inch, breadth nearly as much.

This remarkable shell has an extremely delicate texture, of a horny appearance, with apparently very little lime in its substance, and presenting numerous regular cracks. In this respect it resembles *Helix fusca*, and *Coriocella flexilis*. Were it not marine, it might be considered as belonging to the genus *Helix*, which it further resembles in being, as is stated, destitute of operculum. Otherwise it appears to be allied to *Phasianella*. The species was discovered by Dr. Turton, who found it at Torbay, attached to *Echinus esculentus*.

The specimen described above was found by Mr. Alexander Beaton, at Aberdeen, adhering to an *Actinia*, brought up by the lines, in February, 1843.

*Phasianella stylifera*. Turt. Zool. Journ. i. 367. Pl. 13. f. 11.—  
*Velutina stylifera*. Flem. Brit. Anim. 326:

GENUS *EULIMA*. P. 55, 141.*Eulima decussata*. *Decussated Eulima*.

Shell oblongo-turrite, tapering to a rather blunt point, of about eight slightly convex, subpellucid turns, which are transversely plicato-striate, and marked with fine, distinct, spiral striæ. *Decussatus*, with intersecting grooves or ridges.

Shell turrite, oblong, uniformly tapering to a rather obtuse point, of eight little-convex, glossy, subpellucid, white turns, which are distinctly separated by a not-deeply impressed suture, and decussated by transverse rather faint ridges or

plicæ, and delicate, rather distant, punctulate spiral striæ, of which there are about fifteen on the last turn; the aperture nearly a third of the whole length, oval, with the outer lip convex, slightly thickened externally, the inner reflexed, leaving a small umbilical groove. Length three-twelfths and a-fourth, breadth one-twelfth.

An individual, considerably worn, found in February, 1843, adhering to an Actinia, from off Aberdeen, by Mr. Alexander Beaton.

*Helix decussata.* Mont. Test. Brit. 399. Pl. 15. f. 7.—*Phasianella decussata.* Flem. Brit. Anim. 302.

### GENUS BUCCINUM.

#### *Buccinum minimum.* Little Brown Buccine.

Shell oblongo-conical, rather thin, with six moderately convex, transversely-ribbed, and longitudinally sulcato-striate turns, the notch of moderate width, and somewhat oblique. *Minimum*, very small.

Shell oblong, with six turns, of which the upper two are smooth and glossy, the rest transversely ribbed, and longitudinally sulcato-striate; the ribs nearly straight, fifteen on the last turn, on the anterior part of which they are nearly obsolete; the apex obtuse; the suture distinct; the aperture much less than half the whole length, narrow-oval, the pillar twisted, the outer lip thin and plain, the notch little oblique, and of moderate width; the colour uniform dull olive, that of the aperture greyish-white. Length two-twelfths and a-third, breadth nearly one-twelfth.

A single specimen found by me in February, 1843, at Aberdeen.

*Buccinum minimum.* Mont. Test. Brit. 247. Pl. 8. f. 2.—*Buccinum brunneum.* Donovan. Brit. Sh. v. Pl. 179. f. 2.—*Fusus minimus.* Flem. Brit. Anim. 350.

### FAMILY FISSURELLINA. P. 176.

#### GENUS 4. FISSURELLA.

Animal oblong or oval, covered by a univalve shell; head distinct, with two short, conical tentacula, bearing the eyes on prominent tubercles at their base externally; mouth probosciform, foot very large, oval or oblong, margined externally with tubercular or tentacu-

liform appendages; mantle very large, widely open in front, and also communicating by a fissure with a corresponding aperture in the apex of the shell; two large equal, pectinated branchiæ; intestinal aperture at the extremity of a small tube opening into the respiratory cavity.

Shell oblong, conical, destitute of spire, having the base oblong, with the margin continuous, the summit truncate and perforated by an oblong aperture.

1. *Fissurella Nubécula*. *Red-rayed Fissurella*.

Shell oblong, conical, little elevated, with about fifteen broad ribs, alternating with smaller, and somewhat reticulated with inconspicuous concentric lines; the colour brownish-red rayed with reddish-white.

Shell ovato-oblong, somewhat translucent; with the sides of the aperture or base nearly straight, its margin plain, the posterior extremity narrower; conical, little elevated, with the apex a little behind the centre, obliquely truncate, with an elliptical aperture, having the margin smooth; the exterior rayed with alternate dark brownish-red and white bands, and raised into fifteen thick ribs, with smaller intervening ridges, and concentric elevated lines, decussating the rays, but not very conspicuous; the interior smooth, purplish-white, and with a ring of pale-reddish purple around the thick whitish marginal rim. Length three-twelfths and a-half, breadth a little less than two-twelfths, height a twelfth and a-fourth.

The above description from an individual found by Mr. Alex. Beaton, in February, 1843, adhering to an Actinia from off Aberdeen.

"Patella Nubecula. Lister. Conch. Pl. 59."—Patella Nubecula. Turt. Conch. Dict. 142.—Fissurella Nubecula. Risso. Eur. Merid. iv. 257.

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*Natica monilifera*. P. 51, 125.

A great number of fine specimens of this animal having been cast alive on the beach near Aberdeen, in

the end of February, 1843, I have been enabled to give the following particulars :—

Operculum very thin, horny, transparent, yellowish-brown, semicircular, externally concave, broader and more rounded anteriorly, rugoso-striate, with a small spiral turn at the anterior end. Foot very large, roundish-elliptical, thick, with very thin margins, rugose, with very large oblique undulated rugæ in its anterior half, its colour dull yellow. Head indistinct, broad; over the mouth a thin-edged rugose flap, having three rounded crenatures, and continuous with the tentacula; which are rather small, rugose, much depressed or flattened, and taper to a fine point; externally of the tentacula, on each side, a thin rounded lobe, on which are placed in other species the eyes, of which, however, I cannot perceive any traces. Between the mouth and the foot, and parallel to the supraoral flap, is a larger, thin, smooth, somewhat undulated flap, extending on each side nearly to the middle of the foot, in a semicircular manner. The mouth small, probosciform, with a large roundish, bright red lingual or pharyngeal mass. The mantle very thin, opening very widely in front, where it forms a thin, dense, yellowish flap, covering the branchial cavity, of which the surface is smooth; the branchia large. The intestine convoluted, terminating on the right side of the respiratory cavity, the liver dull olive, forming the last, very slender turns of the spire; the ovary pale yellow.



Among the numberless Mollusca cast on the beach at the period mentioned above, I found a specimen of a very remarkable species, which, I think, must be referred to the Genus *Tritonia*, although the respiratory organs had been almost entirely destroyed.

*Tritonia atrofusca.* *Brownish-black Tritonia.*

Body oblong, convex above, rugose, the veil repand, plain, the branchiæ in six tufts on each side; the colour above brownish-black, beneath dull white, on the sides livid purple. *Atro-fuscus*, black tinged with brown.

Body oblong, somewhat prismatic, tapering behind to a blunt point. The foot oblong, extending the whole length of

the body, anteriorly abrupt, rather narrowed behind, with the surface smooth, and the margins indistinct, unless before and behind. The sides erect, flat, smoothish, being but faintly rugoso-reticulate, and at the middle nearly as high as the breadth of the foot. The upper part arched in both directions, little broader than the foot, rugoso-reticulate, the margin slightly projecting. The anterior margin or veil somewhat semicircular in its direction, widely repand in the middle, thin, and rather narrow. Behind it are two obtuse tentacula, in two short sheaths. The mouth presents the appearance of a vertical, thick-lipped slit, and is furnished internally with two horny dull-yellow plates of great size. Six ramose branchiæ on each side, of which only some portions remain. The genital and anal apertures on the right side, separated to a considerable distance, the anterior in the form of an oblique slit, the other circular, and with a smaller circular aperture above it. The colour of the upper part black, paler and tinged with brown in the middle, of the sides livid purple, of the foot purplish-white. Length an inch and three-fourths, breadth seven-twelfths, height eight-twelfths.

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It is probable that were I to continue my efforts, objects would daily or weekly occur for months to come; but the time which I can with propriety devote to the Mollusca of Aberdeenshire is now ended, and other subjects of investigation present themselves. The beach is thickly covered with the sweepings of the ocean, amid which are thousands of crustacea, annulata, actinozoa, and zoophyta—all of which present objects of interest to the zoologist. The fishermen and their children are engaged in collecting the Lugworms that have been cast ashore; and as there are at least two hundred baskets, and in each probably about five hundred worms, besides Mollusca, one may calculate what a destruction of animal life has resulted from the late easterly gale. Of our more common bivalve Mollusca one might gather as many specimens as would supply all the cabinets of Europe, and of the rarer and more delicate, some are here and there to be seen among the seaweed. No doubt, in this mass are many not hitherto

known to science ; but I must content myself with picking up a few, and hasten to complete my labours. Not a single naturalist is to be seen around ; my pupils are engaged at this moment in electing a Rector, and the few idlers who are strolling on the sands, know as little about Mollusca, as the sheep on the links know about the comparative merits of the systems of Linnæus and Jussieu.

On this very beach, and on such an occasion as the present, commenced my endeavours to cultivate an acquaintance with the Mollusca ; and among the more remarkable objects which it then presented, was this *Maetra stultorum*, so abundant now. Little did I then imagine that, after twenty-five years of toil and trouble, I should return, to find more beautiful specimens of a shell, no doubt often gathered by the sort of persons whose name it bears, but also, I trust, by some who may, through courtesy at least, obtain a more creditable designation.

As I was pondering on these things, and, like a gull among sand-eels, picking up what caught my eye, I was most agreeably surprised by the well-known accents of a most zealous and very celebrated naturalist, who, attracted from afar by the unusual bustle, had come to gratify his curiosity. In his most pleasant company was conducted the last scramble for the Mollusca, which I now resign to those possessed of more time and talents.



## EMENDATIONS.

## ETYMOLOGIES OMITTED OR INCORRECT.

*Anomia*. A, not; *νομος*, rule: irregular in form. P. 205.

*Antiquus*, old. P. 63.

*Buccinum*. A kind of shell, resembling a trumpet. P. 61.

*Buchanensis*. Occurring in the District of Buchan.

*Coriocella*. From *Corium*, skin, or membrane. P. 61.

*Imbricatus*. As if covered with tiles. P. 50.

*Interstinctus*. Divided or separated. P. 59.

*Modiola*. Modiolus, a water-bucket. P. 207.

*Pleurotoma*. Πλευρον, the side; τεμνω, to cut.

*Tornatilis*. Fashioned in a turner's wheel. P. 60.

*Zizyphinus*. Incorrectly Sisyphinus. Zizyphum, jujube, a kind of fruit. P. 53.

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For "1822," read "1842." P. 92.

*Trochus Martini*. P. 53, 132.

Mr. Thompson of Belfast informs me that this, so named by Mr. Smith, as indicated, is *Trochus millegranus* of Philippi.

Several very beautiful live specimens, brought up by the fishing-lines, from the Bay of Aberdeen, in February, 1843, were found by Mr. Beaton, Mr. Fergusson, and others of my pupils. They are pure white, slightly transparent, but otherwise as described; the largest seven-twelfths of an inch in diameter, and about the same height. It is remarkable that they were accompanied by several specimens of the beautiful white variety of *Trochus zizyphinus*, which they closely resemble in form. Two specimens found by Mr. Alexander Mitchell, about the same time, are more strongly granulated, and prettily marked with red dots along the spiral striæ. The apex in all the specimens is somewhat tinged with blue.

Delete "Turbo jugosus. Mont Test. Brit. 586." P. 138.

For "Lacuna variabilis," pp. 144, 145, read *Lacuna cincta*.

*Rissoa reticuláta*, p. 50. For "shell ovato-turrite," read "broadly ovato-conical."

*Rissoa tristriáta*. P. 58. 151.

I am aware that this species is considered by Dr. Johnston and Mr. Thompson as identical with *Rissoa semistriata*, but the numerous specimens of the latter in my possession agree in the characters assigned, and differ from those which seem to me to represent the other species, in being much more broadly ovate, as well as in their colour-markings and striæ. They may however be all of one species.

*Odostómia interstincta*. P. 155.

By some accident, this species has been inaccurately described. The following are its true characters:—

Shell oblongo-turrite, of five rather thick, transparent, glossy, flattened, finely plicato-striate turns, the aperture roundish-oval, nearly a third of the whole length, with a very small plait.

Shell oblongo-turrite, obtuse, rather thick, of five glossy turns, which are distinctly separated, rather flat, finely plicato-striate; the aperture ovato-rotundate, nearly a third of the whole length, with the incomplete peristome rather thick, the pillar-lip not reflexed, but ending in a very small tooth-like plait, and leaving exposed a narrow umbilical groove; the colour white. Length a twelfth of an inch, breadth a third of the length.

Found by me, in August, 1842, in shell sand, between the mouths of the Dee and the Don; also in sand from Cruden Bay, sent by Mr. Murray.

*Turbo interstinctus*. Mont.—*Odostomia interstincta*. Flem.

For *internally*, read *externally*; fourth line of generic character of *Emarginula*. P. 177.

For *Cytheræa*, read *Cytheréa*. Pp. 211, 212, 262.

For *denticulatus*, read *denticulata*. P. 214.

For *Rimula Flemingii*, read *Rimula Noachina*. Pp. 65, 178. So named, in allusion to the Deluge. Add *Fisurella Noachina*. Lyell, Lamk. Syst. vii. 604.—"Patella Noachina. Linn. Mant. 551."

## MALENTOZOA. CIRRIPIEDIA.

SOFT, symmetrical, articulated animals, enveloped in a mantle and shell; with the body reversed, attenuated at the upper or posterior end, and terminated by a somewhat articulated tail, furnished on either side with long, horny, jointed, and ciliated cirri; and having a complete double circulation, with white blood; branchial respiration; an intestinal canal with two apertures; and a nervous system composed of a double series of ganglia. The shell, in some, formed of five distinct, contiguous or imbricated pieces, constituting a conical coronary body, closed below by a membrane or calcareous plate, open above, with four opercular pieces in the aperture; in others, of several pieces disposed in two lateral plates, with a medial narrow piece, and a basal fleshy peduncle.

Genus *Lépas*, Linnæus. Part of *Maléntozoa*, Blainville. *Cirrhípodæ*, Lamarck, Cuvier. Μαλακός soft; Εντομος, divided or jointed; Ζῶον, animal.

The Malentozoa, commonly known by the name of Barnacles, are marine animals, which, until of late years, were usually considered as Mollusca, but which a minute examination of their structure shews to differ essentially from that great series, and to approach more nearly to the Entomozoa, or Articulata. They are, in fact, intermediate between the two series, and may be placed with either, or considered as a distinct group. They vary in form, some being much compressed, others conical, convex, or cylindrical. The body, which is soft, but more or less articulated, curved, and placed with the back beneath, and the hind part above, is enclosed in a thin mantle, which is open only behind, and protected by a kind of shell, composed of several pieces. The mouth, situated at the lower end of the body, is furnished with mandibles and maxillæ, resembling those of certain crustacea. The head is not distinct, and there are no eyes or tentacula. The abdominal face of the body is occupied by two series of fleshy lobes, each bearing two long curved horny appendages, formed of numerous joints, and furnished with ciliæ or bristles. These organs, by some named cirri, by others arms, or tentacula, appear to be rudimentary limbs, and are constantly in motion, now protruded from the sheath, then withdrawn, it being apparently by means of them that the food is seized. At the end of this series of organs is an elongated ovarian tube, at the base of which is the intestinal aperture. The heart is lodged in the dorsal part of the body, and respiration is performed by branchiæ placed at the base of the lower cirri. The nervous system is a double series of ganglia, as in the crustacea, which they further resemble in their articulated limbs, and in other circum-

stances, while their being enveloped in a soft mantle, and covered with a shell, resembling those of several Mollusca, place them in connection with these animals. It is alleged that in their earliest stages they are free, and bear a great resemblance to certain crustacea of the lowest orders, but soon affix themselves to bodies, to which they ever after adhere, and undergo a complete change of form.

They are naturally arranged under two orders: the PEDUNCULATA, and the SESSILIA; those of the former section having a soft cylindrical stalk, continuous with the mantle, the others being attached to objects through the medium of a thin membrane or a plate of calcareous matter.

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SYNOPSIS OF THE ABERDEENSHIRE SPECIES.

ORDER I.—MALENTOZOA PEDUNCULATA.

The mantle prolonged beneath, and forming a fleshy contractile peduncle.

*Cirripèdes pedunculés*, Lamarck; *Anatifes*, Ferussac.  
*Pedunculus*, a stalk.

FAMILY I.—LEPADINA.

Animal much compressed, oval or oblong, with the hind part uppermost; the branchiæ numerous, pyramidal, at the base of the lower cirri; the mantle generally covered with testaceous plates of a triangular form. Name from the genus *Lepas*.

GENUS 1. *LEPAS*.—Animal compressed, with twelve pairs of cirri; shell subtriangular, of four lateral pieces, and an elongated dorsal piece; with a cylindrical fleshy peduncle. *Λεπας*, a limpet, or barnacle-shell. Linnæus.

1. *Lépas anatifera*.—Shell ovato-triangular, obtuse, much compressed; the lateral valves faintly striate, the dorsal linear, arcuate, smooth or denticulate along the middle, sulcate on the sides. *Anas*, a duck; *féro*, to bear or produce.

2. *Lépas striata*.—Shell ovato-triangular, obtuse, or biangulate at the tip, much compressed; the lateral valves distinctly striate, and decussate, the dorsal linear, arcuate, convex, subcarinate, deeply sulcate on the sides. *Striatus*, streaked.

3. *Lépas sulcata*.—Shell ovato-triangular, acute, compressed; the lateral valves deeply sulcato-striate, the inferior with a distinct rib toward the margin, the dorsal linear-lanceolate, arcuate, convex, carinate, sulcate on the sides. *Sulcatus*, furrowed.

GENUS 2. SCALPELLUM.—Animal much compressed, with twelve pairs of much curved cirri; shell oblong, acuminate, gibbous on the dorsal margin, of thirteen pieces. *Scalpéllum*, a small knife. Leach.

1. *Scalpéllum vulgare*.—Shell oblongo-acuminate. *Vulgáris*, common.

## ORDER II.—MALENTOZOA SESSILIA.

Shell conical or cylindrical, directly affixed. *Sessilis*, sitting, or not supported by a stalk.

### FAMILY I.—BALANINA.

Animal subcylindrical, convex, or depressed, suspended in a testaceous covering; the branchiæ two, laminar, attached to the inner surface of the mantle; the shell of one or several pieces, united by their sides, open above, but having there a pyramidal operculum of two or four valves. Name from the genus *Balanus*.

GENUS 1. BALANUS.—Shell conical or cylindrical, of six pieces; operculum of four triangular valves. *Balanos*, an acorn.

1. *Bálanus balanoídes*.—Shell conical, truncate, with the valves smooth, or faintly striate, the opercular valves

acute, transversely rugoso-striate; the base a thin calcareous, divergingly striate plate. *Balanoïdes*, resembling an acorn.

2. *Bálanus pusillus*.—Shell conical, truncate, with the valves separated by narrow grooves, and longitudinally rugose, with the surface roughish or punctured; the opercular valves striate, the dorsal with their tips incurvate and rather obtuse. *Pusillus*, diminutive.

3. *Bálanus commúnis*.—Shell conical, truncate, with the valves often indistinct, longitudinally sulcate, with prominent, compressed, obtuse, rugose ridges. *Commúnis*, common.

4. *Bálanus costátus*.—Shell conical, truncate, with the aperture small, the valves indistinct, with prominent, compressed, strong, ribs. *Costátus*, ribbed.

5. *Bálanus elongátus*.—Shell conical, cylindrical, clavate, or diversiform, with the base membranous, the pieces close or united, transversely rugose at the base and summit, longitudinally striate or costate. *Elongátus*, lengthened.

A. *B. elongátus rugosus*. Wrinkled.

B. *B. elongátus angulósus*. Angulated.

C. *B. elongátus fistulósus*. Pipe-like.

D. *B. elongátus clavátus*. Club-shaped.

6. *Bálanus candidus*.—Shell conico-cylindrical, with the valves distinct, separated by wide depressed, longitudinally striated areas. *Cándidus*, white.

GENUS 2. CLITIA.—Shell orbicular, depressed, convex, of four radiatingly ridged, interlocking valves. *Κλισια*, a tent, or cottage? Leach.

1. *Clítia Verrúca*.—Shell of two very large and two very small valves, all with large radiating, transversely striated ridges. *Verrúca*, a wart.

GENUS 3. CETOPIRUS.—Shell hemispherical, of six pieces, with six elevated, longitudinally sulcate areas, and six depressed minutely striated spaces; operculum of four inarticulated valves. *Κητος*, a whale; *πέιρω*, to pierce.

1. *Cetopírus balenáris*.—Shell subhemispherical, with the elevated areas deeply sulcate, and having from three

to six transversely striated ribs, the depressed areas triangular, finely striated transversely. *Balanidris*, attached to whales.

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### ORDER I.—MALENTOZOA PEDUNCULATA.

The mantle prolonged beneath, so as to form a fleshy contractile peduncle.

The species adhere to timber, ships, and other objects, floating on the sea, or to fixed submersed substances, as corallines or shells; but are very uncommon on our coasts, although plentiful on the west side of Scotland.

#### FAMILY I.—LEPADINA.

Animal oval or oblong, much compressed, suspended in its testaceous envelope, to which it adheres by a transverse muscle situated near the aperture; mantle open behind only, and at the other end prolonged to form a fleshy contractile stalk, which adheres to submarine bodies; branchiæ numerous, pyramidal, at the base of the lower cirri.

Sometimes the mantle almost or entirely cartilaginous, but generally covered with five testaceous plates of a triangular form; two large superior lateral, receiving the transverse muscle, two smaller lateral, and a narrow medial piece connecting the rest; but often a greater or less number of accessory pieces at the base.

These animals, essentially carnivorous, seize their prey by means of the articulated appendages with which the hind part of the body is furnished.

#### GENUS 1. LEPAS. BARNACLE.

Animal ovate or subtriangular, compressed, enveloped in a very thin mantle; cirri curved at the end, in twelve pairs; peduncle fleshy.

Shell subtriangular, formed of four lateral pieces, and an elongated dorsal piece, completely covering the mantle; operculum quadrivalve.



These animals are found adhering in great numbers to floating timber, the bottoms of ships, and other objects. They are abundant in warm latitudes, and frequently occur on drift wood on the western coasts of Britain, but are very seldom seen in our district.

As the Linnæan generic name ought to be retained, especially if the family is to be named Lepadina, "Lepadidæ," or "Lepades," it ought to be given to the present group, which has been called Pentalasmis by Dr. Leach.

I. *Lépas anatifera*. *Common Barnacle*.

Shell ovato-triangular, obtuse, much compressed, of five bluish-white pieces; the inferior-lateral very large, subtriangular, convex anteriorly, sloping and flattened behind, longitudinally rugose, and marked with faint striæ radiating from the lower anterior angle; the upper valve oblong, tapering downwards, similarly marked; the dorsal valve linear, arcuate, convex, smooth or denticulate along the middle, sulcate on the sides; the peduncle usually very long, soft, rugose, brownish-grey or dusky, generally red at the base of the shell. Length of the shell about an inch and a-half, breadth an inch; the peduncle from four to ten or twelve inches.

The specific name, anatifera, or duck-bearing, was given in allusion to the long-popular belief that the Lepades produce ducks and geese, the cirri having been taken for feathers.

A single specimen found by Mr. Alexander Murray, on the Cruden coast, in September, 1842. Others have been found at various times.

*Lepas anatifera*. Linn. Syst. Nat. 1109.—*Lepas anatifera*. Penn. Brit. Zool. iv. 74. Pl. 38. f. 9.—*Lepas anatifera*. Mont. Test. Brit. 15.—*Anatifa lævis*. Lamk. Syst. v. 405.; Ed. 2. v. 675.—*Pentalasmis anatifera*. Leach. Encycl. Brit. Suppl. iii. 170.—*Pentalepas lævis*. Blainv. Malacol. Pl. 84. f. 3.

2. *Lépas striâta*. *Striated Barnacle*.

Shell ovato-triangular, compressed, with the apex truncato-angulate, of five bluish-white pieces; the inferior-lateral very large, subtriangular, convex anteriorly, sloping and flattened behind, marked with distinct striæ radiating from the lower anterior angle, decussated by fainter striæ, and having an obsolete ridge from the anterior-inferior to the anterior-superior angle; the upper valve oblong-triangular, tapering downward to a slender point, and similarly marked; the dorsal valve

linear, arcuate, carinate, plain or denticulate, with the sides flattened and sulcate, the base enlarged, incurvate, and emarginate; the peduncle short, soft, rugose, grey, brown, or red, the connecting membranes of the valves yellowish-red. Length of the shell in the largest specimen nine-twelfths, breadth six-twelfths and a-half; but it attains a larger size.

The above description from numerous recent specimens found by myself adhering to a piece of cork on the sands near Aberdeen, on the 3d March, 1843; two days before which, several small specimens adhering to a cork net-float, found in the same place, were presented to me by Mr. Alexander Beaton, who is therefore the discoverer.

There seems no very decided reason for supposing this to be *Lepas anserifera* of Linnæus, which he represents as "*semine Lini minor*:" I prefer Lamarck's name.

*Lepas anserifera*. Mont. Test. Brit. 16.—*Anatifa striata*. Lamk. Syst. Ed. 2. v. 676.

### 3. *Lépas sulcata*. Grooved Barnacle.

Shell ovato-triangular, acute, compressed, but at the base rather bulging, of five yellowish-white pieces; the inferior-lateral very large, subquadrangular, convex inferiorly, sloping and flattened above, with numerous deeply impressed narrow sulci, radiating from the lower anterior angle, and toward the anterior margin a slender convex prominent rib; the upper valve triangular, elongated, tapering below to a very acute point, and sulcato-striate; the dorsal valve linear-lanceolate, arcuate, carinate, with the sides convex and sulcate, the base incurvate, expanded, semilunar; the peduncle very short, dusky. Length six-twelfths, breadth four-twelfths and a-fourth.

The above description from specimens presented to me by Mr. William Robertson, who found them on a piece of cork on the beach near Aberdeen, on the 1st of March, 1843, and from specimens subsequently found by myself, in the same place, intermixed with the preceding species. They vary considerably in form, and while some of the smaller agree with Montagu's description, in having few sulci, others have double the number.

*Lepas sulcata*. Mont. Test. Brit. 17. Pl. 1. f. 6.

## GENUS 2. SCALPELLUM. LANCET-BARNACLE.

Animal oblong, much compressed, enveloped in a delicate mantle, open before and above; cirri much curved,

in twelve pairs; peduncle short, roundish, rugoso-annulate.

Shell oblong, acuminate, much compressed, with the dorsal outline gibbous, subangulate, formed of thirteen pieces, there being an elongated dorsal, and on each side three small basal, a large ventral, a smaller medial, and an elongated pointed terminal.

1. *Scalpellum vulgare*. Common *Lancet-Barnacle*.

Shell oblongo-acuminate, with the ventral outline nearly straight, the dorsal gibboso-angulate; the anterior basal piece very small, transversely oblong, the middle basal roundish, the posterior basal oblong, longitudinal, recurved, forming a protuberance behind; the ventral piece subrhomboidal, forming an acute angle above, the medial roundish-oblong, the terminal trigonal, elongated into an acute tip, the dorsal oblong, compressed, incurved, with an obtuse keel forming an angular prominence beyond its middle. Peduncle short, rugoso-annulate. The whole surface sparsely covered with minute short filaments. Cirri much curved, compressed, horny, transparent, with slender straight filaments.

A single specimen found by me, in the Winter of 1841, attached to a Tubularia, from deep water, off Aberdeen; another in Spring, 1842, by Mr. John Macgillivray; a third, in October, by Mr. Leslie.

Lepas Scalpellum. Linn. Syst. Nat. 1109.—Lepas Scalpellum. Mont. Test. Brit. 18. Pl. 1. f. 3.—Pollicipes Scalpellum. Lamk. Syst. v. 407.; Ed. 2. v. 679.—Scalpellum vulgare. Leach. Encycl. Brit. Suppl. iii. 170.

ORDER II.—MALENTOZOA. SESSILIA.

Shell conical or cylindrical, affixed without the intervention of a fleshy peduncle.

FAMILY I.—BALANINA.

Animal cylindrical conical, convex, or depressed, suspended in a testaceous envelope with the hind part uppermost, and in other respects constructed as in the Lepadina; but having the branchiæ in the form of two fringed laminæ attached to the inner surface of the mantle, which is not prolonged to form a peduncle.

Shell more or less cylindrical, or conical, solid, internally porous, adhering by its base, and composed of one or of several pieces, united by their sides, and either open at the base, or closed by a membranous or calcareous piece, by which it adheres; always open at the summit, but there having a pyramidal operculum of two or four valves, analogous to the shell of the Lepadina, and opening so as to allow the cirri to protrude.

These animals are always affixed to rocks, stones, shells, crustacea, wood, or other objects, and often so crowded as to alter the normal forms of each other, so that a species may present itself under very different aspects, a circumstance which has given rise to an undue multiplication of species by authors. The genera are founded upon the peculiarities of the operculum, the coronary part or calcareous tube, and the nature of the support.

#### GENUS 1. BALANUS. ACORN-SHELL.

Animal subconical or cylindrical; with the mantle open above and before only; the branchiæ in the form of two fringed laminæ attached to the inner surface of the mantle.

Shell conical, formed of six pieces, a ventral, a dorsal, and two pairs of lateral; operculum in the form of a somewhat oblique pyramid, of four triangular pieces, two smaller than the rest.

The species adhere to rocks, stones, wood, shells, and other bodies crowded together.

##### 1. *Balanus balanoides*. Smooth Acorn-Shell.

Shell conical, truncate, with the six valves distinctly separated by narrow grooves, which are wider at the upper part; the ventral valve generally largest, the ventro-lateral nearly equal, the dorso-lateral very small, the dorsal about half the size of the ventral; all nearly smooth, being but faintly striulate longitudinally and transversely, but often rugose or crenato-sulcate at the base; ventral opercular valves triangular, acute, transversely striato-rugose, with a groove and projecting thin lamina on their articular margin; dorsal valves tri-

angular, striate, rather acute, induplicate at the end, and with a deep groove on their articular margin; the colour white, sometimes tinged with yellow or pink; the base a thin calcareous plate, divergingly striate, and with some faint concentric lines.

It varies considerably in form, being variously distorted by being crowded, sometimes elongated and claviform, often irregularly rugose, but not ridged. It adheres very firmly, so as to be with some difficulty detached, and is strong, so as not to be capable of being crushed by the fingers. The elongated forms may be distinguished from those of *Balanus elongatus* by the smoothness of the valves, and the different form of the operculum, as well as by the calcareous bases.

It adheres to mussels, limpets, crabs, and shells of various other animals, as well as rocks, and piles; and is very common on many parts of our coasts, as well as in deep water.

As *Balanus balanoides* is tautological, Lamarck's name seems preferable.

*Lepas balanoides*. Linn. Syst. Nat. 1108.—*Lepas balanoides*. Penn. Brit. Zool. iv. 72. Pl. 37. f. 5.—*Lepas cornubiensis*. Penn. Brit. Zool. iv. 73. Pl. 37. f. 6.—*Balanus balanoides*. Mont. Test. Brit. 7.—*Balanus ovularis*. Lamk. Syst. v. 392; Ed. 2. v. 660.—*Balanus ovularis*. Brown, Illustr. Pl. 6. f. 4. Pl. 7. f. 17.

## 2. *Balanus Cornubiensis*. Dwarf Acorn-Shell.

Shell conical, truncate, with the six valves distinctly separated by a narrow groove, which is not wider at the upper part; the ventral valve largest, the ventro-lateral nearly equal, the dorso-lateral small, the dorsal rather large; all more or less longitudinally rugose, often transversely wrinkled, the rugæ rib-like at the base, and the surface roughish or punctured; ventral opercular valves triangular, transversely rugose, rather acute, with their marginal outline somewhat convex; dorsal opercular valves triangularly striate, with their marginal outline convex, the tips incurved and rather obtuse, and a sinus on the articular margin, receiving a convex process of the other valves; the colour white, greyish, or brownish, the base membranous.

Easily distinguishable from *Balanus balanoides* by its rugosity, diminutive size, the convexity of the operculum, and its mode of articulation, yet nearly allied to it, this species varies considerably in form, being sometimes nearly cylindrical, but never shooting up to any great height. Its base being membranous, it is easily detached, although the shell is rather

strong. When on shells, it corrodes a cavity into their substance.

Abundant on rocks, and frequently on limpets and mussels.

Although named *punctatus* by Montagu, the puncturation of the coronary tube and operculum is not essential to it; and an Indian species being so named by Chemnitz, we must take Pennant's name.

*Balanus punctatus*. Mont. Test. Brit. 8. Pl. 1. f. 5.—*Balanus punctatus*. Brown, Illustr. Pl. vii. f. 13.—*Lepas Cornubiensis*, Penn. Brit. Zool. iv. Pl. 40. f. 3.

### 3. *Balanus communis*. Common Acorn-Shell.

Shell conical, truncate, with the six valves often indistinct, longitudinally sulcate, with prominent, compressed, obtuse, rugose ridges, rendering the base very angular; the interstices transversely striate; the aperture ovate, subpentagonal, moderate; the ventral opercular valves triangular, acute, with strong transverse rugæ; the dorsal narrow, triangular, acuminate, considerably curved, much longer than the others, similarly striato-rugose, with finer striæ toward the end, a wide longitudinal groove on each side, and a dorsal keel; the base calcareous; the colour white, tinged with yellow or grey.

It occurs on rocks, shells, crustacea, algæ, and other objects, often on *Fusus antiquus*, *Buccinum undatum*, and other shells, from deep water, but also along the shores. When crowded, it is often considerably modified, but is always easily distinguishable. It is very strong, and adheres more firmly than any other species.

*Lepas Balanus*. Linn. Syst. Nat. 1107.—*Balanus communis*. Mont. Test. Brit. 6.—*Lepas Balanus*. Nat. and Rach. Linn. Tr. viii. 23.—*Balanus sulcatus*. Lamk. Syst. v. 390; Ed. 2. v. 657.—*Balanus communis*. Brown, Illustr. Pl. 6. f. 1, 13.

### 4. *Balanus costatus*. Ribbed Acorn-Shell.

Shell conical, truncate, with the six valves united, longitudinally marked with straight, prominent, compressed, convex, strong ribs, running out upon the base, and rendering it angular; the surface also concentrically striulate; the aperture small, ovato-pentagonal; the ventral opercular valves triangular, acute, with transverse rugæ; the dorsal narrow, triangular, striated; the base calcareous; the colour white. Diameter from half an inch to an inch.

On shells from off Aberdeen; not common.

*Lepas costatus*. Donovan. Brit. Sh. i. Pl. 30. f. 2.—*Lepas costata*. Turt. Dict. 78.—*Balanus angulosus*. Lamk. Syst. v. 390; Ed. 2. v. 657.

### 5. *Balanus elongatus*. *Elongated Acorn-Shell*.

Shell conico-truncate, cylindrical, clavate, or diversiform, with the base membranous, the pieces close or united, transversely rugose at the base and summit, longitudinally striate or costate; the aperture large, subrhomboidal; the interior transversely striate; the posterior opercular valves triangular, oblique, transversely striato-rugose, acute or obtuse; the dorsal erect, triangular-oblong, obtuse, also transversely striate, articulated with the others by a groove, and having near the end a sinus and a protuberance locking into corresponding parts of the others.

This species, which adheres to rocks, stones, wood, shells, and crustacea, exhibits great diversity of form. In its early stage, it is elliptical, membranaceous, continuous, of a brownish colour, with an elliptical convex longitudinally slit operculum, and presents the form of an oval dish with its cover. Presently, by the deposition of calcareous matter within the membranes, the valves of the coronary body and operculum become distinguishable. As it enlarges, the shell spreads at the base, and assumes a conical form, with the six pieces more or less distinct. When the individuals are crowded, they elongate in various degrees, and young individuals adhering to the upper parts, clusters are formed having a proliferous appearance. Sometimes they are simply conical, or cylindrical, or they enlarge from the base upwards, or are clavate, or cylindrical below and ovate or campanulate above. The shell is sometimes thick, frequently very thin and fragile; the colour greyish-white, yellowish-white, or pure white. Generally the pieces are united, so as to be indistinguishable, unless at the top, where they run out in a pointed form, but are soon abraded. The opercular pieces ultimately become smooth, or present few striæ. The walls being thin at the base, and the attachment membranous, this species is easily detached, and even readily crushed by the fingers.

The following are the principal varieties of form:—

#### A. *Balanus elongatus rugosus*.

Shell conico-cylindrical, thin; the valves united at the lower part, without any indication of separation; the opercular valves striated, rather acute.

B. *Bálanus elongátus angulósus.*

Shell cylindrical, subangular ; the valves united, separating at the top, and running out into thin, more or less acute points ; the opercular valves striated, rather obtuse, with the sinuosities of their junction apparent.

C. *Bálanus elongátus fistulósus.*

Shell cylindrical, subangular, the valves united, separated toward the end, which is much wider than the base ; the opercular valves rather obtuse, thick, with the striæ obsolete.

D. *Bálanus elongátus clavátus.*

Shell very elongated, narrow at the base, cylindrical or enlarging upwards, at the end much expanded, or cup-shaped, or clavate, with the valves separated, thin-edged, rounded or acute ; opercular valves thin, distinctly striated, elongated, divaricate, and more or less pointed at the end.

It occurs profusely on piles and stakes, as well as on rocks, stones and shells. It is the most common species on the stakes of the salmon nets from Aberdeen to Newburgh ; on the stones at Don-mouth, and the Black Dog stone.

*Lepas elongata.* Gmel. Syst. Nat. 3213.—*Lepas balanoides*, var. Penn. Brit. Zool. iv. 72. Pl. 37. f. 5.—*Balanus clavatus.* Mont. Test. Brit. 10.—*Balanus rugosus.* Mont. Test. Brit. 8.—*Lepas elongata.* Chemn. Conch. viii. Pl. 98. f. 838.—*Balanus fistulosus.* Lamk. Syst. v. 396 ; Ed. 2. vi. 665.—*Balanus rugosus.* Brown, Illustr. Pl. 6. f. 6. Pl. 7. f. 1, 2, 3, 4, 20.—*Balanus fistulosus.* Brown, Illustr. Pl. 7. f. 21.

6. *Bálanus cándidus.* *White Acorn-Shell.*

Shell conico-cylindrical, with the six thin valves distinct, separated by wide depressed areas, which are longitudinally striated ; the elevated areas transversely rugose or striate, and longitudinally striulate ; the aperture very large ; the ventral opercular valves transversely sulcate and longitudinally striulate, acute ; the dorsal transversely striate, and longitudinally sulcate toward the suture-margin, in which is a groove, to receive the ventral valves ; a space bounded by two sulci running out at the base into a prominence ; the hind part of the base sloping rapidly upwards ; the tip acute. Internally, the shell is continuous, and longitudinally striated. The individual described is white, with a delicate greyish-yellow epidermis ; its diameter at the base an inch and four-twelfths, its height ten-twelfths.



This species is easily distinguishable by the longitudinal striæ on its depressed areas.

The above description is that of an individual presented to me by one of my pupils, Mr. Alexander Mitchell, who found it, in January, 1843, adhering to a shell, brought from deep water.

*Balanus candidus*. Brown, Illustr. Pl. 6. f. 9, 10.

## GENUS 2. CLITIA. WART-SHELL.

Shell orbicular, convex or subconical, depressed, adhering by its base, and composed of four pieces, of which two are very large, the operculum of two unequal valves, and two small fixed valves.

### 1. *Clitia Verruca*. Common Wart-Shell.

Shell orbicular, depressed, convex, of two very large and two small and little elevated valves; all with large radiating obtuse, transversely striated ridges, which are interlocked at the margins and generally run out at the base, rendering it angular; the aperture large; the operculum of two unequal horizontal valves, striated in the same manner, and two smaller fixed valves. Diameter two-twelfths of an inch.

The form varies exceedingly, one or other valve being often much enlarged, or sometimes almost suppressed, this arising from the irregularities of the surface to which they are attached. The base is membranous, and generally sunk considerably into the substance of the calcareous body to which it adheres.

Very common on *Pectens*, *Buccina*, *Fusi*, and other shells, as well as *Crustacea*, on all parts of the coast; abundant in deep water, off Aberdeen, Peterhead, Banff, and Portsoy.

*Lepas Verruca*: Gmel. Syst. Nat. 3212.—*Lepas striata*. Penn. Brit. Zool. iv. 73. Pl. 38. f. 7.—*Lepas intertexta*. Donovan. Brit. Sh. I. Pl. 36. f. 1.—*Balanus striatus*. Mont. Test. Brit. 12.—*Lepas striatus apertura obliqua*. Walker, Test. Min. Rar. f. 87.—*Creusia Verruca*. Lamk. Syst. v. 400; Ed. 2. v. 671.—*Creusia Verruca*. Brown, Illustr. Pl. 7. f. 30.—*Clitia striata*. Leach, Encycl. Brit. Suppl. iii. 171.

## GENUS 3. CETOFIRUS. WHALE-BARNACLE.

Shell hemispherical, formed of six pieces, and presenting six elevated, longitudinally sulcate areas, and an equal number of intervening depressed minutely striated

spaces ; the walls extremely thick, with very large internal radiating cells, divided by strong partitions ; operculum quadrivalve.

The species adhere to cetaceous animals.

1. *Cetopirus balænaris*. *Common Whale-Barnacle*.

Shell orbicular in its basal outline, subhemispherical, of six united valves, of which the elevated areas are larger, triangular, deeply sulcate, with from three to six obtuse, transversely striated ribs ; the depressed intervals triangular, finely striated transversely ; the internal lamina smooth, extending nearly to the base, and forming a cup-shaped cavity with a circular aperture below, and a wider aperture above, in which are four thin, inarticulated valves connected by a membrane ; the parietes of the shell exceedingly thick, with very large cells formed by strong radiating partitions ; the colour yellowish-white. Diameter of an individual an inch and a-half, height eight-twelfths ; but it attains a much larger size.

Specimens seen with Mr. Arbuthnot, in Peterhead, in August, 1842 ; the above description from one in the collection of Andrew Murray, Esq., Advocate, Aberdeen.

From the skin of a cetaceous animal killed at Peterhead.

*Lepas balænaris*. Gmel. Syst. Nat.—*Cetopirus balænaris*. Ranzaire, Mem. di Stor. Nat. 52.—*Coronula balænaris*. Lamk. Syst. v. 387 ; Ed. 2. v. 653.—*Coronule rayonnée*. Blainv. Malac. Pl. 86. f. 3?—*Coronula balænaris*. Penny Cyclopædia. Cirripoda.

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Very large valves of a species of *Balanus*, agreeing with that named *candidus*, in having the intervening spaces transversely striated, but differing in many respects, are frequently brought up by the lines from off Aberdeen and Peterhead. I had referred them to *Balanus Scoticus* ; but not having the means of clearing up my doubts respecting them, I must be content with merely indicating their existence. They are remarkably thick, internally cellulo-fistular, externally rugose, generally of a dusky or brown colour.

## CONCLUDING REMARKS.

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IN the present state of our knowledge of the distribution of the Mollusca in Scotland, it would answer no reasonable purpose to institute a comparison between those of our and of other districts. The Friths of Forth and Clyde, with the adjacent land, the neighbourhood of Berwick-on-Tweed, and the Outer Hebrides, are, in so far as I know, the only parts of the country that have been subjected to a diligent search. The Aberdeenshire district, forming a very natural zoological region, has now, for the first time, been examined with reference to its Mollusca; but although it has been found to be more productive than its north-eastern situation, granitic nature, and exposed coast, could have led us to expect, a search continued by an individual, aided by his friends, for only twenty-two months, cannot be supposed to exhaust so wide a field. Very many species, no doubt, remain to reward the zeal of future observers.

Premature generalizations, and comparative lists drawn up from imperfect researches, scarcely forward science, but give rise to erroneous ideas; as is well exemplified by that portion of Mr. Forbes's Report on the Distribution of the British Pulmoniferous Mollusca, which refers to our district, and which, however correct, according to his knowledge, is inaccurate in fact. The species said by him to occur in the ninth district of Britain, which

extends from the edge of the Grampians northward, do not exceed thirty; and yet those which I have found in our Aberdeenshire portion of it alone, amount to forty-two, or a fourth more. According to him also, no species of *Planorbis* or of *Physa*, occur in the North of Scotland; yet five species (taking *Spirorbis* as one) of the former, and one of the two British species of the latter, are found abundantly in Aberdeenshire, within a circle of two miles diameter. But, although there is some inaccuracy in the statements relative to Scotland, the essay alluded to is remarkably interesting, and indicates an extensive knowledge of the subject.

The Terrestrial Mollusca of our district increase in the number of species, and in that of individuals, from the mountainous parts of the interior, toward the lower tracts bordering on the sea, and are especially abundant by the larger rivers, and on the grassy slopes of the coast. *Helix aspersa* nowhere occurs far inland, and *Helix arbustorum* and *hortensis* have not been found by me extending beyond thirty miles from the sea-coast. Although the nature of the rock may influence the number of individuals, it does not, with us, affect the number of species. It is remarkable that our sandy links or downs are entirely destitute of *Helix ericetorum* and *Bulimus acutus*, which in similar tracts, are abundant on some of the western coasts of Scotland.

The Fresh-water Mollusca also increase in frequency from the interior toward the coast; but in low tracts, they are as abundant far inland as near the sea, which thus appears to have no influence upon them. *Limnææ*, *Planorbis*, *Ancylus fluviatilis*, and several species of *Pisidium*, are very abundant in the lower tracts, and some of the latter genus are plentiful among the sphagna and other plants of wet moors. The nature of the subjacent rock appears not to have any direct influence upon them.

Our estuaries are less productive than might be expected. Those of the Dee and Don are remarkably sterile; but that of the Ythan, which is larger, and more

favourably situated, affords a considerable number of species, among the most remarkable of which are *Littorina tenebrosa* and *Rissoa ulvæ*.

Of the Cuttle-fish tribe only five species have as yet occurred; but the Foraminifera have presented themselves in considerable number, our list being more extended than that of any other district in Scotland, although species, no doubt, remain to be added, and other districts are probably at least as prolific. The marine Gasteropoda are comparatively numerous; and among them have occurred several species supposed to be new. Of the Nudibranchiate series, of which only twelve have occurred, there must be at least three times as many in our seas. Nothing general, I think, can be said respecting the Tropiopoda, of which more than a hundred species have been met with, besides the few which are fluviatile. Several unexpected species have occurred, and at least one that might have been looked for, the Common Oyster, does not appear to exist anywhere along our coasts, although shells of it are found on the beaches near Peterhead, where, as Mr. Gray informs me, it was introduced some years ago, but where no live individual has been met with of late. The Ascidiæ I have not sufficiently searched for. They do not seem to be very numerous about Aberdeen at least.

It may be useful to say a few words to collectors of Mollusca. As to shells, the best specimens are to be selected, including all the varieties. The animal is to be killed with hot water, and carefully removed. But frequently univalve shells crack under this treatment; and therefore the heat should be gradually applied to them. Substances adhering to shells should be removed with a penknife, but so as not to injure the surface, or with a hard brush and water. The valves of the Tropriopoda are to be kept closed by a thread wound round them until dry. Most shells are improved in their appearance, and their epidermis is preserved, by the application of a very little oil to them either with a bit of soft leather or a brush.

Shells may be kept in various ways. Most collectors place them in small open cases made of common white card. But a better method, I think, is to affix them to pieces of thick pasteboard, covered with paper of some light tint, and cut uniformly of the breadth of three inches, the length varying from a quarter of an inch to several inches. They are fastened with a little thick paste, made of gum, brown sugar, water, and flour. Very minute or very delicate shells may be kept in small glass-tubes. This latter method I cannot recommend too strongly, it being greatly preferable to any other that I have seen used.

The animals can be properly preserved only in spirits. Although seldom seen in collections, they are much more interesting to the zoologist than shells.

I need scarcely say that my collection, including the specimens described in this work, will always be accessible to any individual who is desirous of inspecting it. Nor need I refrain from intimating that specimens of any species not hitherto found by me, would prove very acceptable; and that it will afford me pleasure to be permitted to assist beginners by naming the objects which they may find, or by supplying them with duplicates.

Finally, if I have omitted the name of any individual from whom I have received assistance, it has been done unwittingly. My best thanks are due to Mr. Shier, who has recently allowed me to inspect a small collection of shells made by two of his pupils, in which, however, I have found nothing new to me. Nor ought I to forget the Footdee fishermen, whom I have always found most obliging. It is pleasant to meet anywhere with unpurchased civility, and to know that there are men whose benevolence prompts them to lend their aid to the prying naturalist.

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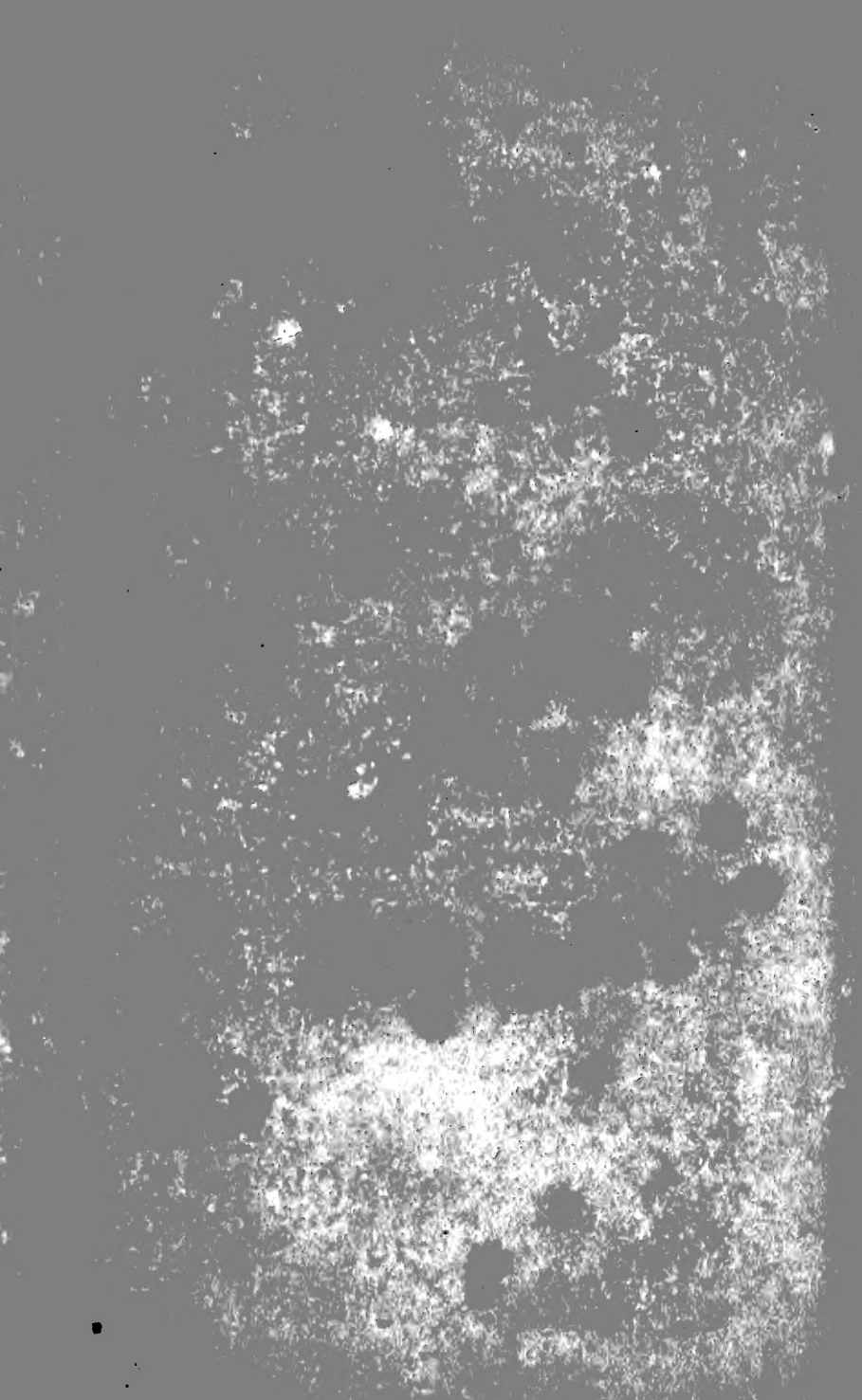
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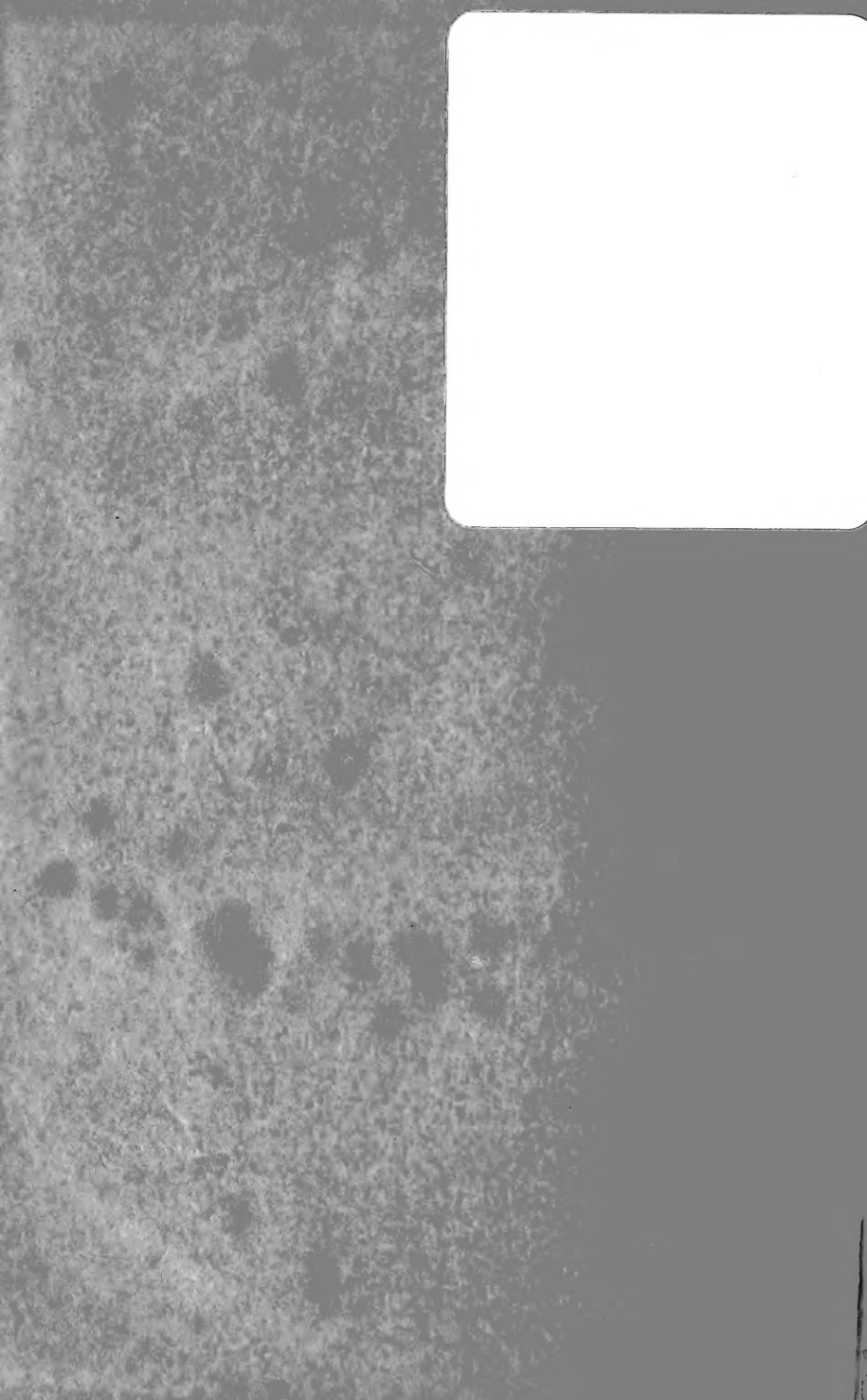
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