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Algae Britannicae

Robert Kaye Greville



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Dr. Asa Gray

With the Author's kind regards

Edinburgh.

Jan^y. 9. 1830.

ALGÆ BRITANNICÆ,

OR

DESCRIPTIONS OF THE MARINE AND OTHER
INARTICULATED PLANTS

OF THE

BRITISH ISLANDS,

BELONGING TO THE ORDER ALGÆ;

WITH

PLATES ILLUSTRATIVE OF THE GENERA.

BY

ROBERT KAYE GREVILLE,

LL. D. F. L. S. F. R. S. & F. A. S. E.

HONORARY MEMBER OF THE ROYAL IRISH ACADEMY; OF THE LYCEUM OF NATURAL HISTORY AT NEW YORK; OF THE CAMBRIDGE AND YORKSHIRE PHILOSOPHICAL SOCIETIES; AND OF THE LIVERPOOL INSTITUTION; MEMBER OF THE WERNERIAN NATURAL HISTORY SOCIETY OF EDINBURGH; OF THE IMPERIAL ACADEMY NATURÆ CURIOSORUM; OF THE NATURAL HISTORY SOCIETY OF LEIPSIK; OF THE PHYSIOGRAPHICAL SOCIETY OF LUND; CORRESPONDING MEMBER OF THE NATURAL HISTORY SOCIETY OF PARIS; OF THE LINNEAN SOCIETY OF NORMANDY; OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, &c.



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All things were made by Him; and without him was not any thing made that was made.

JOHN I. 3.

O LORD, how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches.

PSALM CIV. 24.

The works of the LORD are great, and sought out of all them that have pleasure therein.

PSALM III. 2.

NEILL & CO. PRINTERS.

TO

MISS CURRER,

OF BIERLEY AND KILDWICK, IN THE COUNTY OF YORK,

THE FOLLOWING SHEETS ARE INSCRIBED,

AS A TRIBUTE OF ESTEEM FROM HER AFFECTIONATE COUSIN,

THE AUTHOR.

INTRODUCTION.



IN preparing materials for this Work, it was my original intention to do nothing more than give a faithful description of the British inarticulated *Algae*, and present the arrangement of my excellent friend Professor AGARDH, in an English dress. In the course of my progress, however, it became necessary to alter my plan. To account for this, it will be sufficient to state, that, from a wish to render the work as accurate as possible, a very considerable portion of time intervened between the commencement of the undertaking and the printing of the first sheet. To accumulate materials, mostly by personal investigation, much of my leisure during the last three years has been devoted; and though the result may appear to be compressed into a small compass, the habits of most of the species have been patiently watched on their native rocks, and their progress from their first appearance to their perfect state diligently marked. The structure also of the frond, and the phenomena of fructification, have been rigidly examined by means of the microscope, with a view to elucidate ordinal and generic affinity, and sketches made of the several parts.

While thus occupied in verifying the discoveries of others, or confirming my own observations, several individuals were engaged in Algological researches on the Continent. Two Essays, in particular, were published in France, the one by M. GAILLON, forming the article *Thalassiphytes*, in the *Dictionnaire des Sciences Naturelles*—the other by M. BORY DE ST VINCENT, in the Botanical part of DUPERREY'S Voyage

a

round the World, accompanied by very beautiful plates. Whatever be the merits of these authors, they concur in warmly advocating the opinions of their late countryman Professor LAMOUROUX, in opposition to those of the learned Swedish Algologist. In order, therefore, to do justice to my subject, an examination of the rival arrangements was now absolutely necessary; and as this could not be done, by passing under review the productions of a single country, I had no resource but carefully to investigate the structure and affinities of the orders, genera and species, of all inarticulated *Algæ*. It is hardly necessary to mention, that my materials for this purpose were not so complete as for my original undertaking, but they were nevertheless of such a nature as to enable me to proceed, in most instances, with considerable confidence. Very much, however, remains to be done; we are quite ignorant of the fructification of numerous species, and that of many others is very partially understood. Systematic relations are consequently in such cases only indicated or conjectured by the structure of the frond, or the mere habit of the plant. Differing, as I find reason for doing, both from Agardh and the French Naturalists, I still offer my own arrangement—the result of my inquiry—as one necessarily imperfect, and perhaps containing errors, to be attributed to the absence of fructification in some of my specimens. A synopsis of the known genera in the Latin tongue, with a systematic enumeration of all the better known species, with authoritative references, will be found at the end of this introduction. The more detailed portion of the work, devoted to the British Species, forms an integral part of my general arrangement.

As it is not my object, in this place, to give an historical sketch of the progress of this department of botanical science, I shall allude very briefly to those who have mainly contributed towards it. LINNÆUS, it is well known, divided the aquatic *Algæ* into four great genera, *Tremella*, *Fucus*, *Ulva*, and *Conferva*. The subject was then in its veriest infancy, and for a long time botanists were more intent upon describ-

ing new species, than in classing or arranging those already known. Any systematic division of the *Algæ* is in fact so recent, that, while some have endeavoured to construct genera, others continued, till very lately, to call them by their old names. Such being the case, we shall, in the first instance, enumerate the more systematic Algologists.

The earliest attempt towards a division of the *Algæ* into a greater number of genera, is one in manuscript by Dr JOHN WALKER, Professor of Natural History in the University of Edinburgh, and contained in the sixth volume of his *Adversaria*, dated 1771. He divides them into fourteen genera, and it is remarkable, that, according to his views, the genus *Fucus* is very nearly the same as restricted at the present moment; while *Laminaria*, as defined by AGARDH, is exactly represented by his *Phasgonon*. Dr WALKER was followed by Dr ROTH and Mr STACKHOUSE, who wrote about the same time. The former inserted his remarks in his *Catalecta Botanica*, published at Leipsic in 1797. The latter proposed six genera in his *Nereis Britannica*, a folio work, with indifferent plates, published at Bath: these genera are, *Fucus*, *Palmaria*, *Chondrus*, *Sphærococcus*, *Chorda*, and *Codium*. By DECANOLLE, the marine *Algæ* are described in the *Flore Française*, under the three genera, *Ulva*, *Fucus*, and *Ceramium*; and it may be remarked, that, while he rendered *Fucus* somewhat more natural, by retaining only the tuberculated and capsuliferous species, *Ulva* became an assemblage of individuals, without similarity in structure or reproductive function.

Up to this period, all the changes that had been proposed, were made either upon vague, uncertain or artificial principles, or upon local and imperfect materials. The excellent LAMOUREUX must therefore be considered as having, not only laid the foundation-stone of an uniform system, but as having carried up the edifice to a considerable elevation. His *Essai sur les Genres de la Famille des Thalassiophytes non-articulées*, was read before the Institute of France in 1812, and published in the twentieth volume of *Mémoires du Muséum d'Histoire Naturelle*. It may also be had in a separate

form; and to the Essay itself, those who desire to see M. LAMOUROUX's views in detail, are referred. An excellent account also of this system, along with an equally excellent general Essay upon Marine inarticulated *Algæ*, excluding the *ULVACEÆ*, may be found in the Edinburgh Encyclopædia, under the word *Fuci*,—an article contributed by my much valued friend Mr P. NEILL. Professor AGARDH, of Lund, in Sweden, succeeded the French Algologist, in his *Synopsis Algarum Scandinaviæ, adjecta dispositione universali Algarum*: a work which has been since followed by his more important *Species Algarum* and *Systema Algarum*. Of these works, the least that can be said is, that they are more perfect, and contain a greater mass of information and research, than is to be found in any other publication on the same subject, and they must ever deserve to retain an eminent place in the algological library. AGARDH has followed the grand outline chalked out by LAMOUROUX, but differs widely from him in the constitution of his genera, which are formed upon infinitely more philosophical principles.

Two years subsequently to the appearance of the first of the works of Professor AGARDH, above mentioned, HANS CHRISTIAN LYNGBYE, a Danish clergyman, drew up a system of his own, artificial in its very nature, and, as a general one, founded upon too local and scanty materials. His work is in quarto, entitled *Tentamen Hydrophytologiæ Danicæ*, and was published at Copenhagen in 1819, at the expense of the Crown. Notwithstanding the imperfections we have mentioned, it does him high credit, being full of minute research and valuable observation, and accompanied by a great number of useful plates. It likewise contains the most complete catalogue of algological works and essays hitherto assembled together. This Catalogue, rendered more perfect, and brought down to the year 1829, will be inserted in the present work.

The article on *Thalassiphytes*, by GAILLON, already alluded to, is little more than a skeleton of LAMOUROUX's system, with some alterations; while the Essay by BORY DE ST VIN-

CENT, in DUPERREY'S Voyage, is, with the exception of some introductory matter, confined to the description of the species brought home by the naturalists of the expedition.

Having thus enumerated the principal systematic writers, let us retrace our steps, and, in an equally brief manner, pay a just tribute to those who, by their industry and correct observations, as well as by faithful descriptions and representations, have furnished most of the materials of which methodical writers have availed themselves. First in the list, in point of time, stand GMELIN and ESPER, the first of whom published an *Historia Fucorum*, the last *Icones Fucorum*. The *Flora Danica*, also, which commenced in 1766, at present conducted by my friend Professor HORNEMANN, contains characteristic figures of numerous *Algæ*. The "English Botany," conducted by Sir JAMES EDWARD SMITH and Mr SOWERBY, exhibits in its unrivalled volumes nearly a complete series of the British *Algæ*.* Last, but not least, among illustrated algological works, is the splendid *Historia Fucorum* of Mr DAWSON TURNER, extending to four volumes in quarto. To the ample descriptions and numerous observations in the work of this excellent botanist, and the beautiful figures contributed to it by the pencil of Professor HOOKER, the modern classification is indebted for much of its accuracy.

We must not, however, content ourselves with a catalogue *raisonnée* of those only who have been so favourably situated as to be able to give their experience to the world in a distinct form—or even to those who availed themselves of the Transactions of learned societies, or the periodical journals of the day, to communicate their discoveries. In our own country, LIGHTFOOT, and particularly HUDSON, contributed many species to the Marine Flora of the British Islands. Dr GOODENOUGH and Mr WOODWARD, by their papers in the Linnean Transactions, and Mr DAWSON TURNER, by the same channel, as well as by his Synopsis of the British Fuci, did much to clear away many difficulties, besides adding va-

* We are happy to observe, that a Supplement to this Work has been just commenced by Messrs J. D. C. and C. E. SOWERBY.

rious novelties. In the mean time, collectors, who took delight in studying these beautiful productions in their living state,—Mr BRODIE, Mr BORRER, Mr DILLWYN, Dr HOOKER, Mr WIGG, Mr TEMPLETON, Dr DRUMMOND, Captain CARMICHAEL, Mrs GRIFFITHS, Miss HUTCHINS, Miss HILL,—made practical observations, infinitely more valuable than even the new acquisitions which from time to time rewarded their assiduity. It is not without a feeling of extreme pleasure that, by means of the present Work, I shall place in the hands of my fair and intelligent countrywomen, a guide to some of the wonders of the Great Deep; nor need I be ashamed to confess that I have kept them in view throughout the whole undertaking. To them we are indebted for much of what we know upon the subject. The very beauty and delicacy of the objects have ever attracted their attention; and who will deny the rationality of that admiration which is expended on the works of an Almighty Hand—or censure as trifling the collecting of things, even in the absence of information concerning them, which, if contemplated as they ought to be, can only tend to refine the mind, and raise its sentiments. To Mrs GRIFFITHS, Miss HUTCHINS, Miss HILL, Miss CUTLER, and Mrs HARE, we owe very many discoveries: the first mentioned lady has received the highest honour that one botanist can bestow on another, in her name having been conferred on a new genus of *Algæ* by Professor AGARDH, and the following sheets will prove sufficiently how much advantage I have derived from her assistance and experience. Miss HUTCHINS has been similarly distinguished by Mr ROBERT BROWN, who has attached the name of *Hutchinsia* to a genus of Cruciferous plants. This lady has passed away from the scene of her usefulness, and I cannot resist the satisfaction of transcribing an elegant and affectionate tribute to her memory, from the pen of Mr DAWSON TURNER, in the concluding page of his *Historia Fucorum*:—"The length of time already bestowed upon it (his work) has given rise to other and more serious sources of regret: among them none is so great as the loss of my friends, whose communications

have chiefly enabled me to render it what it is; and among these friends there is assuredly none whom I have, in every point of view, so much reason to lament as Miss HUTCHINS. That I have by her untimely death been deprived of a most able assistant, and that Botany has lost a votary, as indefatigable as she was acute, and as successful as she was indefatigable, this work bears abundant testimony; and the *Licheno-graphia Britannica*, should it ever be published, will do so no less unequivocally. But few, if any, except myself, can appreciate her many amiable qualities; her liberality, her pleasure in communicating knowledge, her delight in being useful, the rapture she felt in tracing the works of the Divine Hand, and the union in her of those virtues, which embellish and improve mankind. Three years have now elapsed since she died, and every succeeding year makes me more deeply feel what I have lost, and how with her is gone a great part of the pleasure I derived from these pursuits."

" In every season of the beauteous year
Her eye was open, and with studious love
Read the divine Creator in his works.
Chiefly in thee, sweet Spring, when every nook
Some latent beauty to her wakeful search
Presented, some sweet flower, some virtual plant.
In every native of the hill and vale
She found attraction, and, where beauty fail'd,
Applauded odour or commended use."

To return from this digression, it remains for me to mention, that, during the continuance of Mr DAWSON TURNER'S work, many rare and new species, which were brought from the shores of New Holland by Mr ROBERT BROWN, were contributed by him—and a number of others, of equal novelty and interest, by the EARL of MOUNTNORRIS and by Mr SALT, from the Red Sea.

On the Continent the *Algæ* have never been without admirers, belonging to the class of those who communicated their discoveries to others, or published them in general Floras or in the form of articles or memoirs. Among them may be mentioned in a particular manner VAHI, CLEMENTE, FORSKÄL,

DESFONTAINES, BARON WULFEN, WEBER and MOHR, GRATELOUP, Professor MERTENS, termed by Weber and Mohr the most able algologist of their time, VAUCHER, LINK, JÜRGENS, and M. CHAUVIN. M. JÜRGENS has published Fasciculi of dried specimens of *Algæ* from Jever and the coast of East Friesland. And my friend M. CHAUVIN of Caen (Keeper of the Museum of Natural History), is engaged upon a most useful work of a similar nature, containing the *Algæ* of Normandy, four or five fasciculi of which have made their appearance.

Like the great natural groups of Lichens, Mosses and Ferns, the Marine *Algæ*, or, as they are popularly denominated, *Sea-weeds*, have a wide geographical range. To a considerable extent they seem to obey the same laws as the higher orders of vegetable forms. But it is doubtful if we are at present acquainted with all the agents which influence the growth of plants in a medium so different from air as that of water. The very existence of Botanical Geography as a science, is of recent origin; and though the labours of such men as HUMBOLDT, BROWN, WAHLENBERG, DE CANDOLLE, SCHOUW and others, have reduced it to form, and established some of its leading principles as far as the ordinary vegetation of the earth is concerned, little has been done for the cryptogamic tribes. The distribution of the Marine *Algæ* engaged the attention of the late Professor LAMOUROUX, whose essay upon the subject was published posthumously, in the seventh volume of the *Annales des Sciences Naturelles*. M. BORY DE ST VINCENT has also added some observations, but mixed up with a good deal of extraneous matter, in the botanical part of DUPERRY'S Voyage round the world.

It is very clear, and well known to the practical botanist, that marine plants are much influenced by the nature of the soil, not merely in regard to species, but in luxuriance and rapidity of development. A few yards is in some instances sufficient to create a change, and the space of three or four miles a very striking one. Thus, calcareous rocks favour the production of some species, sandstone and basalt that of others; and it would appear that the soil has an effect even upon

those *Algae* which grow parasitically upon the stems of the larger species. But sometimes, to all appearance independently of this cause, peculiar forms predominate in certain localities, both in regard to genera and species, which, as we approach their boundaries, gradually disappear, and often give place to others equally characteristic.

Phænogamous plants have furnished botanists with several grand vegetable regions, and a marked difference (not to specify more examples) has been recognised between the plants of America, Africa, Asia, Australia, and Europe. LAMOUROUX endeavoured to trace these great divisions among marine plants, and observed that the polar Atlantic basin, to the fortieth degree of north latitude, presents a well-marked vegetation. The same may be said of the West Indian sea, including the Gulf of Mexico—of the eastern coast of South America—of the Indian Ocean and its gulfs, and of the shores of New Holland, and the neighbouring islands. The Mediterranean possesses a vegetation peculiar to itself, extending as far as the Black Sea, and notwithstanding the geographical proximity of the port of Alexandria and the coasts of Syria to those of Suez and the Red Sea, the marine plants of the former, in regard to species, differ almost entirely from those of the latter. BORY DE ST VINCENT characterizes each of his Mediterranean Seas by a vegetation different from that of the Arctic, Atlantic, Antarctic, Indian, and Pacific Oceans, and, to a certain extent, he is probably correct, as such seas are of less depth, often of a higher temperature, and more directly influenced by the countries which more or less enclose them. The seas which he considers as Mediterranean, are the Mediterranean properly so called, the Baltic Sea, the Red Sea, the Persian Gulf, the Chinese Sea, the Seas of Okhotsk and Bhering, and the West Indian Sea, along with the Gulf of Mexico, denominated by him The Columbian Mediterranean.

Every great zone presents a peculiar system of existence: and it is said, that after a space of twenty-four degrees of latitude, a nearly total change is observed in the species of or-

ganized beings, and that this change is mainly owing to the influence of temperature. LAMOUROUX remarks, that if this holds good, as we know it to do, to a wonderful extent in phænogamous plants, it should also exert some corresponding force upon marine vegetation. It is unquestionable that the *Algæ* are found on our own coasts, in the greatest abundance, during the summer months, and in unusual luxuriance in hot seasons. It is probable also, observes the same author, that these plants may be acted on by the temperature of the water at greater or less depths; and that the species which grow at the bottom of the ocean may have some resemblance to those of the Polar Circle. On the shores of the British Islands it is easy to perceive that some species, *Gelidium corneum*, *Phyllophora rubens*, and *Sphærococcus coronopifolius*, for example, become more plentiful and more luxuriant as we travel from north to south; and, on the other hand, that *Ptilota plumosa*, *Rhodomela lycopodioides*, *Rhodomenia sobolifera*, and several others, occur more frequently, and in a finer state, as we approach the north. *Odonthalia dentata*, and *Rhodomenia cristata*, are confined to the northern parts of Great Britain, while the *Cystoseiræ*, *Fucus tuberculatus*, *Haliseris polypodioides*, *Rhodomenia jubata*, *R. Teedii*, *Microcladia glandulosa*, *Rhodomela pinastroides*, *Laurencia tenuissima*, *Iridæa reniformis*, and many others, are confined to the southern parts. Others again, such as the *Fuci* in general, the LAMINARIÆ, many *Delesseriæ*, some *Nitophyllæ*, *Laurentiæ*, *Gastridia* and *Chondri*, possess too extended a range to be influenced by any change of temperature between the northern boundary of Scotland and the south-western point of England. The researches and calculations of LAMOUROUX have demonstrated satisfactorily, that the great groups of *Algæ* do affect particular temperatures or zones of latitude, though some genera may be termed cosmopolite. Setting aside the great division of articulated *Algæ*, of which we know but little, the SIPHONÆ, or at least the genus *Codium*, and the ULVACEÆ, are scattered over every part of the world. *Codium tomentosum* is found in the Atlantic, from the shores of Eng-

land and Scotland to the Cape of Good Hope; in the Pacific from Nootka Sound to the southern coast of New Holland. It abounds in the Mediterranean, on the shores of France, Spain, and Africa, and is common in the Adriatic. More recently it has been also brought from the coasts of Chile and Peru. This plant, however, is not a social one—to make use of a term that HUMBOLDT has applied to some phænogamous plants. It grows even in the same locality, in a solitary and scattered manner. The ULVACEÆ, on the contrary, are strictly social, and preserve this character in every part of the world. They appear, however, to attain the greatest perfection in the polar and temperate zones, although I have very fine *Porphyra* from the Cape of Good Hope. That they are capable of sustaining very extreme cold, is proved by the fact, that fine specimens of *Enteromorpha compressa* were picked up in high latitudes of the Arctic Ocean, by some of the gentlemen who accompanied Captain Sir EDWARD PARRY in his second Voyage of Discovery. The DICTYOTEÆ, of which we have eight representatives in Scotland, and thirteen in England, increase both in quantity and number of species, as we approach the Equator. The FUCOIDEÆ, in a general sense, increase as we leave the polar zone, especially in the variety of species. But the natural groups into which they are separated, are strongly marked in their distribution. The *Fuci* flourish between the latitudes 55° and 44°, and, according to LAMOUREUX, are rarely seen nearer to the Equator than 36°. *Fucus serratus* is entirely confined to Europe. If the imperfectly known *Macrocystis comosa* and *Menziesii* should prove to be true *Fuci*, the latter will be an exception to the rule, as it is said to be found at Trinidad, as well as on the western coast of North America. The large genus *Cystoseira* is found between the 50th and 25th degrees of latitude, becoming more plentiful as the *Fuci* diminish. In New Holland, remarkable alike for its vegetable and animal productions, a distinct group of *Cystoseiræ* predominates, as singular in the water as the aphyllous *Acaciæ* are on the land. Their stems are compressed, often appearing to be

jointed; the branches spring from the flat side, and not from the angles, and are deflexed at their insertion; besides which, their vesicles are solitary and pedicellate. This most extraordinary and local group, including some new species kindly communicated to me by Mr FRASER, the Colonial Botanist at Sidney, is already known to consist of twenty species. The genus *Sargassum*, the most extensive of the FUCOIDEÆ, comprising above seventy species, is nearly confined to the two Tropics, and examples rarely occur beyond the 42d degree in either hemisphere. The Red Sea is full of *Sargassa*. It is principally to one or two species of *Sargassum* that the popular name of *gulf-weed*, has been applied by mariners. The prodigious accumulations of these plants were first encountered by the early Portuguese navigators: COLUMBUS and LERIUS compare them to extensive inundated meadows, and state, that they absolutely retarded the progress of the vessels, and threw the sailors into consternation. Such accumulations occur on each side of the Equator, in the Atlantic, Pacific and Indian Oceans; but the sea, particularly denominated *Mar do Sargasso* by the Portuguese, stretches between the 18th and 22d parallels of north latitude, and the 25th and 40th meridians of west longitude. HUMBOLDT, in his Personal Narrative, describes the two banks of sea-weed that occur in the great basin of the Northern Atlantic Ocean; but not having the passage at hand, I transcribe it in the words of Mr NEILL. "The most extensive is a little west of the meridian of Fayal, one of the Azores, between latitude 25° and 36°. Violent north winds sometimes prevail in this space, and drive the sea-weed to the low latitudes, as far as 24° or even 20°. Vessels returning to Europe, either from Monte Video or the Cape of Good Hope, cross the bank nearly at an equal distance from the Antilles and Canaries. The other occupies a much smaller space between 22° and 26°, eighty leagues west of the meridian of the Bahama Islands. It is generally traversed by vessels on the passage from the Caicos to the Bermudas." That these plants are produced within the tropics, there can hardly be a question,

but at what depth they vegetate is still involved in obscurity. Neither is it clearly ascertained why the banks of weed should always occur in the same places. The supposition that they proceed with the Gulf-Stream from the Gulf of Mexico—whence the original name of gulf-weed—is now exploded. Mr NEILL justly observes, that the Gulf-Stream would convey them rather to the banks of Newfoundland than to the latitudes in which they usually occur; and it could not in any case accumulate them to the south of the Azores. In the genus *Sargassum* is observed a small group, as local and almost as peculiar as that we have shewn to exist in *Cystoseira*. This occurs in the seas of China and Japan, and consists of *Sargassum fulvellum*, *microceratium*, *macrocarpum*, *sisymbrioides*, *Horneri*, *pallidum*, and *hemiphyllum*, distinguished from the rest by terminal fructification, a slender habit, small nerveless leaves, and often elongated vesicles.

The LAMINARIÆ, among which are the giants of the marine flora, exhibit, in a broad view, a tolerably decided geographical distribution. The *Laminariæ* predominate from the 40th to the 65th degree of latitude; while the *Macrocytes* seem, as far as we know, to exist from the Equator to about 45° of south latitude.

The only order of any extent remaining to be noticed is FLORIDÆ. This order, *generally* speaking, belongs, according to LAMOUREUX, to the Temperate Zones; and in this conclusion I think he is correct. But, as might be anticipated, in an order which contains so large a number of genera and species, there are many exceptions. The genus *Amansia* is exclusively tropical. *Hypnæa* and *Acanthophora* belong also, rather to the tropical than the neighbouring zones. It is worthy of notice, that, comparatively speaking, the southern temperate zone contains much fewer FLORIDÆ than the northern: a fact that LAMOUREUX thinks may be accounted for by the inferior extent of the temperate zone in that hemisphere.

From the number of species known to LAMOUREUX, he calculated that the FLORIDÆ predominate greatly over the

FUCOIDEÆ; the latter over the ULVACEÆ, and these last again over the DICTYOTEÆ. He estimated the number of species known to botanists (including the articulated *Algæ*) to be 1600, which is certainly considerably exaggerated. The total amount of species supposed to exist was conjectured by the same author to be at least five or six thousand. If this be an approximation to the truth, we cannot be said to be well acquainted with a fifth part of the subaqueous vegetation of the globe.

Enlargement of mind, and juster views of physical as well as of moral subjects, is one of the many blessed effects of Christianity. God, who created all things, pronounced them, as they proceeded from his hands, to be "very good." We are taught to consider external nature as composed of an innumerable assemblage of created beings, animate and inanimate, all dependent one upon the other, and forming one grand and beautiful whole, no part of which is deficient, none superfluous. Individuals do unquestionably exist, who, in the pride of their philosophy, pronounce Botany to be a frivolous pursuit—or a profitless science, whose chief feature is a lexicon of barbarous terms—or a pretty lady-like amusement. Others, again, are ready to confess, that it may be very proper for a medical man to study it professionally, but look down with contempt upon that mind which can devote its energies (as they sarcastically express it) to pulling asunder the petals of a rose, or counting the stamens of a lily; and were we to look to nothing farther, it must be confessed they would have much reason on their side. Such individuals who regard the vegetable kingdom itself, or at least certain parts of it, as beneath investigation, have authorities on their side. The Romans, when they wished to pronounce any thing utterly worthless, said it was *alga projecta vilior*. HORACE could see nothing in the *alga inutilis*, and would probably have sincerely pitied the man who attempted to study the economy of that which he had denominated useless. It is gratifying to perceive how rapidly all such prejudices are fading away. DR JOHNSON observes, that, "he that enlarges his curiosity

after the works of Nature, demonstrably multiplies the inlets to happiness." Sir HUMPHREY DAVY, too, inspired with the same feeling, remarks, "Many of the sciences are evidently pursued and considered as proper objects of study for all refined minds, merely on account of the intellectual pleasure they afford; merely because they enlarge our views of Nature, and enable us to think more correctly with regard to the beings and objects surrounding us." Botany is now becoming a favourite study and an elegant recreation, without meeting with more than an occasional sneer from the class above mentioned, or a faint ejaculation from the matron of the old school, who remembers to have been told in her early days, that young ladies, at least, were more profitably employed in adding to the family receipt-book, and confining their natural history to indescribable performances in cross-stitch.

The more we extend our researches into the vegetable kingdom, the more will every susceptible mind be excited to proceed. We shall find the most delicate and elaborate processes in ceaseless progression on the mountains and in the valleys—the meadows and the recesses of our woods, all subject to immutable laws. We shall find colours unrivalled, odours inimitable, and forms exhaustless in variety and grace, daily developed in the grand laboratory of Nature, demanding only to be seen to extort our unqualified admiration, and leading us irresistibly to contemplate the glory of that Almighty Being from whom so many wonders emanate; and,

“ who, not content

With every food of life to nourish man,
Hath made all nature beauty to his eye
And music to his ear.”

“ Not a flower

But shews some touch in freckle, streak, or stain,
Of his unrivalled pencil. He inspires
Their balmy odours, and imparts their hues,
And bathes their eyes with nectar, and includes,
In grains as countless as the sea-side sands,
The forms, with which he sprinkles all the earth.
Happy who walks with Him! Whom what he finds

Of flavour, or of scent in fruit or flower,
 Or what he views of beautiful or grand
 In Nature—from the broad majestic oak
 To the green blade, that twinkles in the sun,
 Prompts with remembrance of a present God.
 His presence, who made all so fair, perceived,
 Makes all still fairer.”

The botanist finds speculations for the truest philosophy in what he used to tread without reflection under his feet. He begins to see how admirably plants are adapted to every kind of soil and situation, so as to leave no spot absolutely uncovered. He perceives, perhaps, with all the vividness of a first impression, that

“ The bleakest rock upon the loneliest heath
 Feels in its barrenness some touch of spring ;
 And in the April dew and beam of May,
 Its moss and lichen freshen and revive !”

He finds the most exposed rocks, rearing their lichen vegetation, scarcely to be distinguished without a magnifier, from the surface on which they grow. The trunks of living trees are never without their parasites, and often exhibit a miniature botanic garden of mosses and lichens:—the most rapid and the most sluggish streams—the pure and ice-cold rivulet of the Alps, down to the turbid canal of the plains—the crystal lake and the stagnant pool, nay, the very hot-baths of Switzerland and the volcanic Geysers of Iceland, swarm with their peculiar vegetation. The flat and dreary shores of the icy sea, presenting every where a level and marshy prospect, are densely carpeted with numerous mosses, which, though frozen from season to season, revive and flourish during their short-lived summer. The decay of one plant furnishes an immediate and proper nutriment for thousands of minute tribes, and the trunk of a dead tree gives birth to millions. We know that we cannot keep our bread many days without finding its cavities garnished with blue mould, shewn by the microscope to be composed of myriads of perfect and beautiful plants. So likewise with the surface of our cheeses, which not only produce the blue mould—so esteemed by many—

but several other species of minute *fungi*, of a white, red, or yellow colour.

To proceed, however, to the subject more immediately before us,—but to which, it is hoped, the preceding observations form no inappropriate introduction,—we find the vegetation of the Ocean no less conspicuous for beauty and variety of form, than splendour of colour; admirably fitted for the place it is designed to occupy, and of direct utility to mankind. The marine *Alga* is no longer the *Alga inutilis*. Viewing these tribes in the most careless way—as a system of subaqueous vegetation, or even in a merely picturesque light—we see the depths of ocean shadowed with submarine groves, often of vast extent, intermixed with meadows, as it were, of the most lively hues; while the trunks of the larger species, like the giant-trees of the tropics, are loaded with innumerable minute kinds, as fine as silk, or transparent as a membrane. Nor must we forget, that, while thousands and tens of thousands of quadrupeds, birds, and insects, depend upon the vegetation immediately surrounding us for their very existence, a countless host of creatures derive protection and nourishment from the plants of the Deep, appropriated to their use by that merciful POWER in whom they live, move, and have their being—whose goodness is over all his works. Some of the *Algæ*, placed on account of the simplicity of their structure at the bottom of the scale, are so small as to be invisible to the naked eye, except by the appearance they give to other species on which they happen to be parasitic in prodigious numbers. Such are *Achnanthes brevipes* and *unipunctata*, figured in the Cryptogamic Flora. From these microscopic forms, *Algæ* are found of all sizes on our own shores, up to thirty or even forty feet in length, an extent to which *Chorda Filum* not unfrequently attains. This plant resembles an enormous piece of catgut, and is, in fact, known by the name of *Sea-catgut* in Orkney, while, in Shetland, it goes by the name of *Lucky Minny's Lines*, and, in England, of *Sea-lace*. LIGHTFOOT mentions, that the fronds, skinned when half-dry, and twisted, acquire so considerable a degree of strength and toughness, that the High-

landers sometimes use them for fishing-lines. "In Scalpa Bay, near Kirkwall, in Orkney," relates Mr NEILL, "we have sailed through meadows of it in a pinnace not without some difficulty, where the water was between three and four fathoms deep, and where, of course, the waving weeds must at least have been from twenty to thirty feet long." *Laminaria digitata* and *bulbosa* are more robust, the former having a stalk as thick and as long as a stout walking-stick, and a large flat many-cleft frond at the summit. It is a social species, grows erect in the water, and reminds the spectator of a palm-like tropical forest, on a small scale. *Laminaria bulbosa* has sometimes so large a head that a single plant is as much as a man can carry. It is in the southern hemisphere, however, that we must look for the most wonderful examples of marine vegetation. The *Lessonia fuscescens*, described by M. BORY DE ST VINCENT, is twenty-five or thirty feet high, and has a trunk often as thick as a man's thigh, which divides into numerous branches, each terminated by a lanceolate frond. The *Laminaria buccinalis* of the Cape of Good Hope is much larger than our *L. digitata*, and is furnished with a hollow stem, which the natives convert into a kind of horn, whence it has acquired the name of *Trumpet-weed*. But the longest of all known *Algæ*, though at the same time comparatively slender, are the *Macrocystes*, the most common of which is the *M. pyrifera*. This appears to be the sea-weed reported by navigators to be from 500 to 1500 feet in length; the leaves are long and narrow, and at the base of each is placed a vesicle filled with air, without which it would be impossible for the plant to support its enormous length in the water, the stem being not thicker than the finger, and the upper branches as slender as common packthread. All those *Algæ* destined to resist the force and agitation of stormy seas, have roots peculiarly adapted to take the firmest hold of the rocks, which they grapple by means of tough and thick fibres. Other species of shorter duration, or presenting less surface to be acted on by the waves, are generally fixed by a simple shield-like base or disk.

Man, who has been humorously defined to be a cooking

animal, not content with the tribute of fish rendered to him by the Ocean, converts many of her vegetable productions into articles of diet. *Rhodomenia palmata*, the *dulse* of the Scots, *dillesk* of the Irish, and saccharine Fucus of the Icelanders, is consumed in considerable quantities throughout the maritime countries of the north of Europe, and in the Grecian Archipelago; *Iridea edulis* is still occasionally used, both in Scotland and the south-west of England. *Porphyra laciniata* and *vulgaris* is stewed, and brought to our tables as a luxury, under the name of *Laver*: and even the *Ulva latissima* or *Green Laver* is not slighted in the absence of the *Porphyra*. *Enteromorpha compressa*, a common species on our shores, is regarded, according to GAUDICHAUD, as an esculent by the Sandwich Islanders. *Laurentia pinnatifida*, distinguished for its pungency, and the young stalks and fronds of *Laminaria digitata*—the former called *Pepper-dulse*, the latter *Tangle*—were often eaten in Scotland, and even now, though rarely, the old cry, “Buy dulse and tangle,” may be heard in the streets of Edinburgh. When stripped of the thin part, the beautiful *Alaria esculenta* forms a part of the simple fare of the poorer classes in Ireland, Scotland, Iceland, Denmark, and the Faroe Islands.

To go farther from home, we find the large *Laminaria pottorum* of Australia, furnishing the aborigines with a proportion of their “instruments, vessels and food.” On the authority of BORY DE ST VINCENT, the *Durvillaea utilis*, and other LAMINARIEÆ, constitute an equally important resource to the poor on the west coast of South America*. In Asia, several species of *Gelidium* are made use of to render more palatable the hot and biting condiments of the east. Some undetermined species of this genus also furnish the materials of which the celebrated edible Swallows’ nests are composed.

* A marine production, Dr GILLIES informs me, is also commonly eaten in South America by the Roman Catholics during lent, under the supposition that it is a sea-weed; but, from the specimens brought home by that gentleman, it is clearly of an animal nature, belonging to some genus not far from *Aloyonidium*.

It is remarked by LAMOUROUX, that three species of Swallow construct edible nests, two of which build at a distance from the sea-coast, and use the sea-weed only as a cement for other matters. The nests of the third are consequently most esteemed, and sold for nearly their weight in gold. *Gracilaria lichenoides* is highly valued for food in Ceylon and other parts of the east, and bears a great resemblance to *Gracilaria compressa*, a species recently discovered on the British shores, and which seems to be little inferior to it; for my friend Mrs GRIFFITHS tried it as a pickle and preserve, and in both ways found it excellent.

It is not to mankind alone that marine *Algæ* have furnished luxuries, or resources in times of scarcity. Several species are greedily sought after by cattle, especially in the north of Europe. *Rhodomenia palmata* is so great a favourite with sheep and goats, that Bishop GUNNER named it *Fucus ovinus*. In some of the Scottish Islands, horses, cattle, and sheep feed principally upon *Fucus vesiculosus* during the winter months, and in Gothland it is commonly given to pigs. *Fucus serratus* also, and *Chorda Filum*, constitute a part of the fodder upon which the cattle are supported in Norway.

In medicine we are not altogether unindebted to the *Algæ*. The *Gigartina helminthochorton*, or *Corsican Moss*, as it is frequently called, is a native of the Mediterranean, and held once a considerable reputation as a vermifuge. The most important medical use, however, (omitting minor ones), derived from sea-weeds, is through the medium of *Iodine*, which may be obtained either from the plants themselves or from kelp. French kelp, according to Sir HUMPHREY DAVY, yields more Iodine than British; and, from some recent experiments made at the Cape of Good Hope, by M. EKLOND, *Laminaria buccinalis* is found to contain more than any European *Algæ*. Iodine is known to be a powerful remedy in cases of Goitre. The burnt sponge formerly administered in similar cases, probably owed its efficacy to the iodine it contained; and it is also a very curious fact, that the stems of a sea-weed are sold in the shops, and chewed by the inhabitants of South America, wherever Goitre is prevalent, for the same purpose. This

remedy is termed by them *Palo Coto* (literally Goitre-stick), and, from the fragments placed in my hands, by my friend Dr GILLIES, to whom I am indebted for this information, the plant certainly belongs to the order LAMINARIEÆ, and is probably a species of *Laminaria*.

Were the *Algæ* neither “really serviceable either in supplying the wants or administering to the comforts of mankind” in any other respect, their character would be redeemed by their usefulness in the arts: and it is highly probable that we shall find ourselves eventually infinitely more indebted to them. One species—and I regret to say it is not a British one—is invaluable as a glue and varnish to the Chinese. This is the *Gracilaria tenax*, the *Fucus tenax* of TURNER’S *Historia Fucorum*. Though a small plant, the quantity annually imported at Canton from the provinces of Fokien and Tche-kiang, is stated by Mr TURNER to be about 27,000 lb. It is sold at Canton for 6d. or 8d. per pound, and is used for the purposes to which we apply glue and gum-arabic. The Chinese employ it chiefly in the manufacture of lanthorns, to strengthen or varnish the paper, and sometimes to thicken or give a gloss to gauze or silks. In addition to the above account, the substance of which I have extracted from Mr TURNER’S work, Mr NEILL remarks that it “seems probable that this is the principal ingredient in the celebrated gummy matter called *Chin-chou*, or *Hai-tsai*, in China and Japan. Windows made merely of slips of bamboo, crossed diagonally, have frequently their lozenge-shaped interstices wholly filled with the transparent gluten of the *hai-tsai*.”

On the southern and western coasts of Ireland, our own *Chondrus crispus* is converted into size, for the use of house-painters, &c.; and, if I be not erroneously informed, is also considered as a culinary article, and enters into the composition of *Blanc-mange*, as well as other dishes.

In the manufacture of kelp, however, for the use of the glass-maker and soap-boiler, it is that the *Algæ* take their place among the most useful vegetables. The species most valued for this purpose are *Fucus vesiculosus*, *nodosus* and *ser-ratus*, *Laminaria digitata* and *bulbosa*, *Himanthalia lorea* and

Chorda Filum. The manufacture of kelp was introduced into Scotland, according to Mr NEILL, half a century subsequent to its establishment in France and England, and the first cargo exported from Orkney was about the year 1722. The employment, however, being new to the inhabitants of Orkney, the country people opposed it with the utmost vehemence. Their ancestors had never thought of making kelp, and it would appear that they themselves had no wish to render their posterity wiser in this matter. So violent and unanimous was the resistance, that officers of justice were found necessary to protect the individuals employed in the work. Several trials were the consequences of these outrages. It was gravely pleaded in a court of law, on the part of the defendants, "that the suffocating smoke that issued from the kelp-kilns, would sicken or kill every species of fish on the coast, or drive them into the ocean far beyond the reach of the fishermen; blast the corn and the grass on their farms; introduce diseases of various kinds; and smite with barrenness their sheep, horses and cattle, and even their own families." The proceedings exist, as I am informed by Mr PETERKIN, in the Records of the Sheriff-Court;—a striking instance of the prejudices, indolence and superstition, of the simple people of Orkney in those days. The influential individuals who had taken the matter up, succeeded in establishing the manufacture; and the benefits which accrued to the community soon wrought a change in the public feeling. The value of estates, possessing a sea-coast well stocked with sea-weed, rose so much in value, that, where the plants did not grow naturally, attempts were made, and not without success, to cultivate them, by covering the sandy bays with large stones. By this method a crop of *fuci* has been obtained, as we are informed by Mr NEILL, in about three years, the sea appearing to abound everywhere with the necessary seeds. Upon the authority of Dr BARRY,* during the years 1790 to 1800, the quantity sometimes made was 3000 tons, and, as the price was then from nine to ten pounds per ton, the

* History of the Orkney Islands, p. 383.

manufacture brought into the place nearly £30,000 Sterling, sometimes in one season. During the eighty years subsequent to its introduction (from 1720 to 1800) the total value will rise to £595,000 Sterling. Thus, says Dr BARRY, "in the space of eighty years, the proprietors of these Islands, whose land-rent does not exceed £8000 a-year, have, together with their tenants and their servants, received, in addition to their incomes, the enormous sum of more than half a million Sterling."

Among the Hebrides, also, large quantities of kelp are manufactured. "The inhabitants of Canna," observes Dr E. D. CLARKE *, in 1797, "like those of the neighbouring islands, are chiefly occupied in the manufacture of kelp. Cattle and kelp constitute, in fact, the chief objects of commerce in the Hebrides. The first toast usually given on all festive occasions is, 'A high price to kelp and cattle.' In this every islander is interested, and it always is drank with evident symptoms of sincerity. The discovery of manufacturing kelp has effected a great change among the people; whether for their advantage or not, is a question not yet decided. I was informed, in Canna, that, if kelp keeps its present price, Mr MACDONALD of Clanranald will make £6000 Sterling by his kelp, and Lord MACDONALD no less a sum than £10,000."

During the course of the late war, kelp rose to eighteen, twenty, and even twenty-two pounds per ton, in consequence of the interruption to the importation of *barilla*, and the profits upon it during that period were enormous. The price has subsequently fallen by degrees to five guineas per ton, and the sale has latterly been heavy even at that rate. This was to be attributed at first to the superior quality of the Spanish *Barilla* for the purposes of glass-making and soap-boiling, but more recently to the almost entire removal of the duty on muriate of soda, or common salt. The rock-salt of Cheshire, which now bears an insignificant price, is submitted to a chemical process, by means of which the soda is separated from the muriatic acid;

* Life and Remains of E. D. CLARKE, by OTTER, v. i. p. 338.

and this is found to answer so completely as a substitute for kelp (which is an impure carbonate of soda), that the great glass manufactories of Newcastle are supplied with soda thus prepared. So pernicious, however, are the fumes of the muriatic acid gas which issue from the soda-works, that vegetation is destroyed to a considerable distance, and the proprietors have been compelled to purchase the ground in their immediate neighbourhood.

The number of people that find occupation in the manufacture of kelp is so great, that a permanent interruption to the trade would be a serious evil. In the Orkney Islands alone, the number of hands, according to Mr Peterkin, who has obligingly furnished me with information on this subject, probably amounts to 20,000; for all the rural population is more or less employed in the business during the kelp season. Such being the case, it is gratifying to find that that public-spirited body, the Highland Society, is exerting itself to procure exact information about the qualities of kelp as a Manure. It has long been known that common sea-ware is extremely valuable for that purpose; and if the success which has attended the experiments already made with kelp, be confirmed by additional observations, the manufacture may still be regarded as an important article of domestic commerce. It appears from the communications made to the Highland Society, that the past success has been such as to induce Lord Dundas to take a cargo of 50 tons of kelp to Yorkshire for the sole purpose of agricultural experiments. It has been tried as a top-dressing, and singly or in combination with other manures on corn, pasture, potatoes, turnips, &c., and in most instances with decided good effect. The Committee appointed to collect the result of the experiments, are inclined to think that, for raising green crops, it would be better to compost it with other substances; that with good earth or moss and a little vegetable or animal manure, "a few tons of kelp would enable a Farmer to extend his farm-dung over at least four times the usual quantity of land." A very curious circumstance is mentioned by Charles Mackintosh, Esq. who

tried the effects of kelp-manure upon potatoes, at Crossbasket near Glasgow. A severe frost which occurred in September, injured and blackened every lot of potatoes to which the kelp had not been applied, while the kelp lots remained in perfect foliage, even when the respective drills were contiguous. It would appear that the soil for the time being had acquired a property equivalent to a certain degree of atmospheric temperature; or, rather, that the nourishment absorbed by the plants under such circumstances, had enabled them to resist a degree of cold that would otherwise have destroyed them.

The *Algæ* grow very rapidly, and the produce is far less exposed to casualties than the crops of the agriculturalist, in so precarious a climate as that of the Hebrides and Orkney Islands. I am informed that, in some places, the sea-weed is cut only every third year—while, in others, especially where there are strong currents, an annual harvest may be obtained without injury. The rapidity of development in the larger *Algæ* is indeed so striking, that I cannot resist the temptation of transcribing some very interesting facts related by Mr NEILL. “They were observed in the course of the very arduous undertaking of erecting a stone-beacon on a low rock called the Carr, situated near the entrance of the Frith of Forth: and when we mention as the observer the distinguished civil engineer Mr STEVENSON, a man accustomed to habits of accurate observation, it is perhaps superfluous to add, that particular attention was bestowed, at the request of the writer of this article, and specimens of the *Algæ* transmitted to him. The Carr Rock is about twenty feet broad, and sixty feet long: it is only uncovered at the lowest ebb of spring-tides. It was completely clothed with the larger *Algæ*, particularly *Fucus esculentus* and *F. digitatus*. In the course of the autumn 1813, the workmen had succeeded in clearing out and levelling with the pick and axe a considerable part of the foundation of the intended beacon, when, in the beginning of November, the operations were necessarily abandoned for the winter. At this time the Rock was reduced to a bare state. The coating of sea-weed had at first been cut away by the

workmen; the roots or bases were afterwards trampled by their feet, and much of the surface of the rock had been chiselled. Upon returning to the Carr in May 1814, in order to recommence operations, it was matter of no slight surprise to find the surface again as completely invested with large sea-weeds as ever it was, although little more than six months had elapsed since the work had been left off, when, as already said, the rock had been cleared of weed. In particular it was observed, that many newly produced specimens of *Fucus esculentus* measured six feet in length, and were already furnished with the small appendages near the base or *pinnae*, which, at maturity, contain the seeds of the plant. The common tangle, *F. digitatus*, was generally only about two feet long. It is to be observed, that the specimens here alluded to, were taken from that part of the surface of the rock which had been dressed off with the pick and chisel the preceding autumn; they had therefore grown from the seed."

SYNOPSIS.

SYNOPSIS
GENERUM ALGARUM,

CUM

ENUMERATIONE SPECIERUM COGNITARUM.

ORDO I.—FUCOIDEÆ.

GENUS I. SARGASSUM, *Rumph., Ag.*

Frons foliosa. Folia petiolata, plerumque costata. Vesiculæ simplices, axillares, pedunculatæ. Receptacula parva, linearia, tuberculata, loculosa, plerumque in racemis axillaribus.

* *Receptaculis axillaribus, foliis integris, majoribus.*

S. vulgare, Ag. Syst. Alg. p. 293. *Fucus natans*, Turn. Hist. Fuc. t. 47.

bacciferum, Ag. p. 294. *Fucus bacciferus*, Turn. t. 47.

pacificum, Bory in Duperrey's Voy. p. 123. vix species distincta.

dentifolium, Ag. p. 295. *Fucus dentifolius*, Turn. t. 93.

subreandum, Ag. p. 295.

Esperi, Ag. p. 295. *Fucus lendigerus*, Esp. Ic. Fuc. t. 15.

lendigerum, Ag. p. 295. *Fucus lendigerus*, Turn. t. 48.

virgatum, Ag. p. 296.

Swartzii, Ag. p. 296. *Fucus Swartzii*, Turn. t. 248.

ilicifolium, Ag. p. 296. *Fucus ilicifolius*, Turn. t. 51.

ligulatum, Ag. p. 297.

aquifolium, Ag. p. 297. *Fucus aquifolius*, Turn. t. 50.

crisæfolium, Ag. p. 297.

crispum, Ag. p. 297. *Fucus latifolius*, Delille Egypt. t. 54.

SARGASSUM.

- latifolium, Ag. p. 298. *Fucus latifolius*, Turn. t. 94.
 pyriforme, Ag. p. 298.
 telephifolium, Ag. p. 298. *Fucus telephifolius*, Turn. p. 95.
 droserifolium, Bory in Duperr. Voy. p. 129.
 incisifolium, Ag. p. 298. *Fucus incisifolius*, Turn. t. 214.
 lacerifolium, Ag. p. 298. *Fucus lacerifolius*, Turn. t. 167.
 tortile, Ag. p. 299. *Fucus longifrons* v. *angustifrons*, Turn.
 t. 104. f. b.
 serratifolium, Ag. p. 299.
 longifolium, Ag. p. 299. *Fucus longifolius*, Turn. t. 104.
 enerve, Ag. p. 299.
 graminifolium, Ag. p. 299. *Fucus graminifolius*, Turn. t. 210.
 flavicans, Ag. p. 300.
 filipendula, Ag. p. 300.
 linifolium, Ag. p. 300. *Fucus linifolius*, Turn. t. 268.
 cymosum, Ag. p. 300.
 Saltii, Ag. p. 301. *Fucus Saltii*, Turn. t. 213.
 heterophyllum, Ag. 301. *Fucus heterophyllum*, Turn. t. 92.
 acinaria, Ag. p. 301. *Fucus acinaria*, Turn. t. 49.
 compactum, Bory in Duperr. Voy. p. 126.
 duplicatum, Bory in Duperr. Voy. p. 127.
 confusum, Ag. p. 301.
 linearifolium, Ag. p. 302. *Fucus linearifolius*, Turn. t. 111.
 vestitum, Ag. p. 302. *Fucus vestitus*, Turn. t. 177.
- * * *Receptaculis axillaribus, foliis pinnatifidis vel divisis.*
- Desfontainesii, Ag. p. 302. *Fucus Desfontainesii*, Turn. t. 190.
 verruculosum, Ag. p. 302. *Fucus verruculosus*, Mert. Mem. t. 15.
 piluliferum, Ag. p. 303. *Fucus pilulifer*, Turn. t. 65.
 patens, Ag. p. 303. *Fucus pilulifer* v. *major*, Turn. t. 65.
 pinnatifolium, Ag. p. 303. *Fucus pinnatifolius*, Ag. in Act. Holm.
 1815, t. 5.
 fissifolium, Ag. p. 303.
 diversifolium, Ag. p. 303. *Fucus diversifolius*, Turn. t. 103.

*** *Receptaculis axillaribus vel variis, sed non terminalibus :
vesiculis et foliis minutis.*

SARGASSUM.

- spinifex, Ag. p. 304.
 polycystum, Ag. p. 304.
 baccularia, Ag. p. 304.
 parvifolium, Ag. p. 304. *Fucus parvifolius*, Turn. t. 211.
 plagiophyllum, Ag. p. 304.
 granuliferum, Ag. p. 305. Ic. Alg. t. 11.
 Desvauxii, Ag. p. 305. *Fucus Desvauxii*, Mert. Mem. t. 14?
 filifolium, Ag. p. 305.
 angustifolium, Ag. p. 305. *Fucus angustifolius*, Turn. t. 212.
 onustum, Ag. p. 305.
 microphyllum, Ag. p. 306.
 cystocarpum, Ag. p. 306. Ic. Alg. t. 1.

*** *Receptaculis terminalibus, foliis plerumque parvis
enervibus.*

- fulvellum, Ag. p. 306. *Fucus fulvellus*, Turn. t. 66.
 microceratium, Ag. p. 306. *Fucus microceratius*, Turn. t. 130.
 uviferum, Ag. p. 306.
 macrocarpum, Ag. p. 307.
 sisymbryoides, Ag. p. 307. *Fucus sisymbryoides*, Turn. t. 129.
 Horneri, Ag. p. 307. *Fucus Horneri*, Turn. t. 17.
 pallidum, Ag. p. 307. *Fucus pallidus*, Turn. t. 67.
 hemiphyllum, Ag. p. 307. *Fucus hemiphyllus*, Turn. t. 169.
 Hornschuchii, Ag. p. 308.

**** *Fronde plana, costata, pinnatifida.*

- decurrens, Ag. p. 308. *Fucus decurrens*, Turn. t. 194.
 Boryi, Ag. p. 308.
 Peronii, Ag. p. 308.

GENUS II. TURBINARIA, *Lamour., Bory.*

Frons foliosa. Folia petiolata, peltata, triangulata, in vesiculam inflata. Receptacula minuta, ramosa, cylindrica, tuberculata, axillaria.

- T. denudata, Bory in Duperr. Voy. p. 117. *Sargassum turbinatum*, Ag. p. 308. *Fucus turbinatus*, Turn. t. 24. f. a—e.
 decurrens, Bory in Duperr. Voy. p. 119. *Sargassum turbinatum*, Ag. p. 308. in part. *Fucus turbinatus*, Turn. t. 24. f. b.

GENUS III. CARPOPHYLLUM, *Grev.*

Frons plana vel compresso-plana. Folia ramiformia, disticha. Receptacula minuta, tuberculata, cylindracea, in racemis marginalibus.

- C. flexuosum, Grev. *Sargassum phyllanthum*, Ag. p. 309. *Fucus phyllanthus*, Turn. t. 206.
 maschalocarpum, Grev. *Sargassum maschalocarpum*, Ag. p. 309. *Fucus maschalocarpus*, Turn. t. 205.

GENUS IV. CYSTOSEIRA, *Ag.*

Frons ramosa. Folia ramiformia, superne filiformia. Vesiculæ simplices vel subconcatenæ, in foliis innatis, vel petiolatæ. Receptacula tuberculata, loculosa, capsulis filis intermixtis.

* *Vesiculis foliis ramiformibus innatis subconcatenatis.*

- C. ericoides, Ag. p. 281. *Fucus ericoides*, Turn. t. 191.
 sedoides, Ag. p. 281.
 myrica, Ag. p. 282. *Fucus myrica*, Turn. t. 192.
 abies marina, Ag. p. 282. *Fucus abies marina*, Turn. t. 249.
 granulata, Ag. p. 282. *Fucus granulatus*, Turn. t. 251.
 barbata, Ag. p. 283. *Fucus barbatus*, Turn. t. 250.
 concatenata, g. p. 283.
 Hoppii, Ag. p. 283. Ic. Alg. t. 2.
 nodularia, Ag. p. 284. *Fucus nodularius*, Mert. Mem. t. 15.
 fœniculacea, Grev. *Cystoseira discors*, et *abrotanifolia*, Ag. p. 284.
Fucus fœniculaceus, Turn. t. 252.
 spicigera, Ag. p. 285. Ic. Alg. t. 3.

CYSTOSEIRA.

- fibrosa, Ag. p. 285. *Fucus fibrosus*, Turn. t. 209.
 muricata, Ag. p. 285. *Fucus muricatus*, Turn. t. 112.
 trinodis, Ag. p. 286. *Fucus trinodis*, Delille Egypt. t. 54. f. 1.
 geminata, Ag. p. 286.
 filifolia, Ag. p. 286.
 crassipes, Ag. p. 286. *Fucus crassipes*, Turn. t. 131.
 ?? triquetra, Ag. p. 284. *Fucus triqueter*, Turn. t. 34.

* * *Retroflexæ. Rami ortu deflexi, vesiculis solitariis lateralibus.*

- ensifolium, Ag. p. 288.
 platylobium, Ag. p. 288. *Fucus platylobium*, Mert. Mem. t. 14.
 Brownii, Ag. p. 288. *Fucus Brownii*, Turn. t. 197.
 siliquastrum, Ag. p. 288. *Fucus siliquastrum*, Turn. t. 82., et *Fucus scoparius*, t. 132.
 retroflexa, Ag. p. 289. *Fucus retroflexus*, Turn. t. 155.
 retorta, Ag. p. 289.
 subfarinata, Ag. p. 289.
 paradoxa, Ag. p. 289. *Fucus paradoxus*, Turn. t. 156.
 torulosa, Ag. p. 290. *Fucus torulosus*, Turn. t. 157.
 tuberculata, Ag. p. 290.
 expansa, Ag. p. 290.
 decipiens, Ag. p. 290. *Fucus decipiens*, Turn. t. 166.
 paniculata, Ag. p. 290. *Fucus paniculatus*, Turn. t. 176.
 cephalornithos, Ag. p. 291. *Fucus cephalornithos*, Labill. Nov. Holl. t. 261.
 spartioides, Ag. p. 191. *Fucus spartioides*, Turn. t. 232.
 Grevillii, Ag. }
 dumosa, Grev. et Ag. } sp. ineditæ.
 tristicha, Grev. et Ag. }
 pectinata, Grev. et Ag. }

* * * *Vesiculis solitariis, apicem versus foliorum superiorum.*

phyllamphora, Ag. p. 291. Ic. Alg. t. 4.

* * * * *Vesiculis moniliformibus, pedunculatis, in foliis superioribus; (in C. quercifolio ignotis).*

- ? osmundacea, Ag. p. 287. *Fucus osmundaceus*, Turn. t. 105.
 ? quercifolia, Ag. p. 287. *Fucus quercifolius*, Turn. t. 151.

GENUS V. HALIDRYS, *Lyngb.*

Frons compressa, coriacea, linearis. Vesiculæ lanceolatæ, compositæ (articulatæ) pedunculatæ. Receptacula lanceolata, compressa, pedunculata, loculata, leviter tuberculata.

H. siliquosa, Lyngb. Hyd. Dan. p. 37. t. 8. *Cystoseira siliquosa*, Ag. p. 287. *Fucus siliquosus*, Turn. t. 159.

GENUS VI. CARPODESMIA, *Grev.*

Frons plana, linearis, dichotoma, costata. Vesiculæ nullæ. Receptacula tuberculata versus basin frondis innata.

C. zosteroides, Grev. *Cystoseira zosteroides*, Ag. p. 287. *Fucus zosteroides*, Turn. t. 231.

GENUS VII. SEIROCOCCUS, *Grev.*

Frons plana, linearis, ecostata, coriaceo-cartilaginea. Vesiculæ nullæ. Receptacula minuta, globosa, concatenata, marginalia, pedunculata.

S. axillaris, Grev. *Cystoseira axillaris*, Ag. p. 291. *Fucus axillaris*, Turn. t. 146.

GENUS VIII. SCYTOTHALIA, *Grev.*

Frons plana, linearis, ecostata, coriacea. Vesiculæ nullæ. Receptacula ad marginem aggregata, oblonga, compressa, tuberculata, pedunculata.

S. dorycarpa, Grev. *Cystoseira dorycarpa*, Ag. p. 292. *Fucus dorycarpus*, Turn. t. 143.

GENUS IX. COCCOPHORA, *Grev.*

Frons cylindrica filiformis, foliis parvis undique imbricata. Vesiculæ nullæ. Receptacula spherica, tuberculata, in racemis terminalibus.

C. Langsdorfii, Grev. *Cystoseira Tilesii*, Ag. p. 291. *Fucus Langsdorfii*, Turn. t. 165.

GENUS X. FUCUS, *Linn., Ag.*

Frons plana, compressa vel cylindræcea, coriacea, sæpe vesiculosa. Receptacula plerumque elliptica, tuberculata, non loculosa, tuberculis glomerulos fibrarum seminumque massæ interiori mucosæ immersos.

* *Fronde plana, costata.*

- F. vesiculosus, L. Ag. p. 275. Turn. t. 88.
 evanescens, Ag. p. 277. Ic. Alg. t. 13.
 ceranoides, L. Ag. p. 277. Turn. t. 89.
 distichus, L. Ag. p. 278. Turn. t. 4.
 serratus, L. Ag. p. 278. Turn. t. 90.

* * *Fronde plana vel compressa, ecostata.*

- confluens, Turn. t. 141. Ag. p. 278.
 canaliculatus, L. Ag. p. 279. Turn. t. 279.
 furcatus, Ag. p. 279. Ic. Alg. t. 14.
 gladius, Labill. Nov. Holl. t. 256. Ag. p. 279. Turn. t. 240.
 compressus, Ag. p. 279.
 nodosus, L. Ag. p. 275. Turn. t. 91.
 Mackaii, Turn. t. 52. *Fucus nodosus* v. *Mackaii*, Ag. p. 275.

* * * *Fronde cylindræcea, erecta, receptaculis terminalibus.*

- tuberculatus, Esp. Fuc. t. 121. Ag. p. 279. Turn. t. 7.

GENUS XI. HIMANTHALIA, *Lyngb.*

Frons orbicularis peziziformis coriacea. Vesiculæ nullæ.
 Receptacula valde elongata, linearia, dichotoma, tuberculata.

- H. lorea, Lyngb. Hyd. Dan. p. 36. t. 8. *Fucus loreus*, Ag. p. 280.
 Turn. t. 196.
 Durvillæi, Bory in Duperr. Voy. p. 135.

GENUS XII. MONILIFORMIA, *Lamour., Bory.*

Frons filiformis ramosa. Receptacula tuberculata, non loculosa, rotundata per frondis totam longitudinem distincte moniliformia. Folia vesiculæque nullæ.

M. Banksii, Bory in Duperr. Voy. p. 134. *Cystoseira Banksii*, Ag. p. 284. *Fucus Banksii*, Turn. t. 1.

Billardieri, Bory in Duperr. Voy. p. 133. *Fucus moniliformis*, Labill. Nov. Holl. t. 2. fide Bory.

GENUS XIII. SPLACHNIDIUM, *Grev.*

Frons cylindræa, tubularis, subinflata, coriacea. Tubercula per totam frondem sparsa, pertusa.

S. rugosum, Grev. *Fucus rugosus*, Ag. p. 280. Turn. t. 185.

GENUS XIV. POLYPHACUM, *Ag.*

Frons coriacea, prolifera, spinulosa. Receptacula siliquæformia. *Ag.*—Genus valde obscurum.

P. proliferum, Ag. p. 274. *Osmundaria prolifera*, Lamour. Essai, t. 1.

GENUS XV. SCABERIA, *Grev.*

Frons filiformis, cylindræa, coriacea, foliis parvis verrucosis amplexicaulibus dense imbricatis. Vesiculæ sphericæ, verrucosæ, laterales, sessiles.

S. Agardhii, Grev. *Polyphacum ? verrucosum*, Grev. et Ag. MSS.

Alga paradoxa, ad Novam Hollandiam a D. Fraser lecta. Frons ramosa, bipedalis, inferne nuda, superne fasciculata. Folia amplexicaulia arcte imbricata, squamæformia. Vesiculæ lathyri odorati seminum magnitudine, sessiles, inter folia sparsæ, densissime verrucosæ.

 ORDO II.—LICHINEÆ.
GENUS XVI. LICHINA, *Ag.*

Frons cartilaginea, lichenosa, nigro-viridis, dichotoma.

Fructus: capsulæ, semina pellucida in lineis radiantibus disposita includentes.

L. pygmæa, *Ag.* p. 274. *Grev. Crypt. Fl.* t. 219. *Fucus pygmæus*,
Turn. t. 204. f. a—h.

confinis, *Ag.* p. 274. *Grev. Crypt. Fl.* t. 221. *Fucus pygmæus*
 var. β . *Turn.* t. 204. f. i—o.

 ORDO III.—LAMINARIEÆ.
GENUS XVII. DURVILLÆA, *Bory.*

Frons plana, coriacea, in segmentis elongatis, subulatis, cylindraceis, fissa. Fructus: glomeruli seminum sparsi immersi.

D. utilis, *Bory* in *Duperr. Voy.* p. 65. t. 1. et t. 2. f. 1.

GENUS XVIII. LESSONIA, *Bory.*

Frons foliosa, coriacea, ramosa, ramis dichotomis. Folia elongata expansa petiolata. Vesiculæ nullæ. Fructus: semina sparsa vel aggregata in foliis immersa.

L. fuscescens, *Bory* in *Duperr. Voy.* p. 75. t. 2. f. 2. et t. 3.

quercifolia, *Bory* in *Duperr. Voy.* p. 79. t. 4.

nigricans, *Bory* in *Duperr. Voy.* p. 80. t. 5.

GENUS XIX. MACROCYSTIS, *Ag.*

Frons foliosa, coriacea, ramosa. Folia plana, elongata, enervia, petiolata, vesiculo solitario ad basin instructa.

M. pyrifer, *Ag.* p. 292. *Fucus pyriferus*, *Turn.* t. 110.

pomifera, *Bory* in *Duperr. Voy.* p. 94. t. 9. *M. Humboldtii*, *Ag.*

MACROCYSTIS.

- p. 293. *Laminaria pomifera*, Lamour. Essai, p. 22. *Fucus Humboldtii*, H. et B. Pl. Cœquin. v. 2. p. 7. t. 68.
 latifrons, Bory in Duperr. Voy. p. 88. t. 7.
 angustifrons, Bory in Duperr. Voy. p. 93. t. 8.
 integerifrons, Bory in Duperr. Voy. p. 86. t. 6.
 ?? comosa, Ag. p. 292. *Fucus comosus*, Turn. t. 142.
 ?? Menziesii, Ag. p. 293. *Fucus Menziesii*, Turn. t. 27.
 Species memorabiles, M. *comosa* et *Menziesii*, vix ad Macrocyistem,
 sed ad Fucum vel proprium genus pertinent.

GENUS XX. LAMINARIA, Lamour.

Frons stipitata, coriacea, plano-expansa, enervis. Fructus:
 semina in soris aggregata et fronde immersa.

* *Fronde fissa.*

- L. buccinalis, Lamour. Essai, p. 22. Ag. p. 270. *Fucus buccinalis*,
 Turn. t. 139.
 potatorum, Lamour. Essai, p. 22. Ag. p. 270. *Fucus potatorum*,
 Turn. t. 242.
 sessilis, Ag. p. 270.
 digitata, Lamour. Essai, p. 22. Ag. p. 270. *Fucus digitatus*,
 Turn. t. 162.
 radiata, Ag. p. 271. *Fucus radiatus*, Turn. t. 134.
 bironcinata, Bory in Duperr. Voy. p. 101. t. 10.
 bulbosa, Lamour. Essai, p. 22. Ag. p. 271. *Fucus bulbosus*,
 Turn. t. 161.
 Belvisii, Ag. p. 271. *Ulva bulbosa*, Pal. Fl. d'Ovare, t. 13.
 reniformis, Lamour. Essai, t. 1. f. 3. Ag. p. 271.
 brevipes, Ag. 272.
 ? purpurascens, Ag. 272. An Iridæa laminarioides, Bory?

* * *Fronde integra.*

- saccharina, Lamour. Essai, p. 22. Ag. p. 272. *Fucus saccharinus*,
 Turn. t. 163.
 latifolia, Ag. p. 272. *Ulva maxima*, Gunn. Fl. Norv. t. 7.
 elliptica, Ag. p. 272.
 debilis, Ag. p. 273. Grev. Crypt. Fl. t. 277.
 phyllittis, Lamour. Essai, p. 22. Ag. p. 273. *Fucus phyllittis*,
 Turn. t. 164.
 fascia, Ag. p. 273. *Fucus fascia*, Fl. Dan. t. 768.

GENUS XXI. AGARUM, *Bory.*

Frons coriaceo-membranacea, plano-expansa, costata. Fructus : semina in substantia frondis immersa.

- A. cribrosum, *Bory Dict. Class. d'Hist. Nat. v. 9. p. 193. Laminaria Agarum, Ag. p. 269. Fucus Agarum, Turn. t. 75.*
clathrus, Grev. Laminaria clathrus, Ag. p. 269. Fucus clathrus, Gmel. Hist. Fuc. t. 33.

GENUS XXII. ALARIA, *Grev.*

Frons membranacea, costa percurrente, cartilaginea, instructa. Stipes pinnata. Fructus : semina pyriformia pinnis incrassatis immersa.

- A. esculenta, *Grev. Laminaria esculenta, Ag. p. 270. Fucus esculentus, Turn. t. 117.*
Delisii, Grev. Agarum Delisii, Bory Dict. Class. d'Hist. Nat. v. 9. p. 194.
Pylaii, Grev. Agarum Pylaii, Bory Dict. Class. d'Hist. Nat. v. 9. p. 194.

GENUS XXIII. COSTARIA, *Grev.*

Frons membranacea, integra, linearis, multi-costata. Fructus ignotus.

- C. *Turneri, Grev. Laminaria costata, Ag. p. 269. Fucus costatus, Turn. t. 226.*

ORDO IV.—SPOROCHNOIDEÆ.

GENUS XXIV. DESMARESTIA, *Lamour.*

Frons cartilaginea, plana vel compressa distiche ramosa, primo penicillis filorum deciduorum ad marginem fimbriata, demum spinosa.

* *Fronde compressa.*

- D. *aculeata, Lamour. Essai, p. 25. Sporochnus aculeatus, Ag. p. 259. Fucus aculeatus, Turn. t. 187.*

DESMARESTIA.

- media, Grev. *Sporochnus medius*, Ag. p. 259. Ic. Alg. t. 16.
 verticillatus, Grev. *Sporochnus verticillatus*, Ag. Aufzählung,
 p. 21.

* * *Fronde plana.*

- D. ligulata, Lamour. Essai, p. 25. *Sporochnus ligulatus*, Ag. p. 261
Fucus ligulatus, Turn. t. 98.
 herbacea, Lamour. Essai, p. 25. *Sporochnus ligulatus*, Ag. p. 261
Fucus herbaceus, Turn. t. 99.
 Dresnii, Lamour. Dict. Sc. Nat. cum icone. *Sporochnus herbacea*,
 v. β. Ag. p. 261. Vix distincta species.

GENUS XXV. DICHLORIA, Grev.

Frons cylindracea, filiformis, cartilaginea, ramosissima.
 Rami oppositi. Fructus ignotus.

- D. viridis, Grev. *Sporochnus viridis*, Ag. p. 259. *Fucus viridis*,
 Turn. t. 97.

GENUS XXVI. SPOROCHNUS, Ag.

Frons filiformis, cylindracea vel compressa, cartilagineo-
 membranacea. Fructus: fila clavæformia, articulata, in
 verrucis sparsis aggregata et radiantia, vel in receptacu-
 lis clavatis concentrica, fasciculis penicillorum coronatis.

* *Receptaculis clavatis.*

- S. radiceformis, Ag. p. 258. *Fucus radiceformis*, Turn. t. 189.
 comosus, Ag. p. 259.
 pedunculatus, Ag. p. 259. *Fucus pedunculatus*, Turn. t. 188.
 Gærtnera, Ag. p. 259.

* * *Receptaculis terminalibus, sessilibus.*

- inermis, Ag. p. 260. *Fucus inermis*, Turn. t. 186.
 Cabrerae, Ag. p. 260. *Fucus Cabrerae*, Turn. t. 140.

SPOROCHNUS.

* * * *Receptaculis verrucæformibus.*

rhizodes, Ag. p. 260. *Fucus rhizodes*, Turn. t. 235.

adriaticus, Ag. Aufzählung, p. 21. Vix a Sporochlo rhizodi diversus.

* * * * *Fronde verticillato-villosa.*

villosus, Ag. p. 260. *Conferva villosa*, Eng. Bot. t. 546.

ORDO V.—CHORDARIEÆ.

GENUS XXVII. CHORDARIA, *Link.*

Frons filiformis, cartilaginea, solida, continua, ad exteriorem filis clavatis articulatis densissime obsita.

C. flagelliformis, Ag. p. 256: *Fucus flagelliformis*, Turn. t. 85.

sordida, Bory in Duperr. Voy. p. 139.

hippuroides, Bory in Duperr. Voy. p. 139.

? divaricata, Ag. p. 256.

flexuosa, Ag. p. 256.

nodulosa, Ag. p. 256. *Ceramium nodulosum*, Fl. Dan. t. 1546.

?? nemalion, Ag. p. 257. *Fucus nemalion*, Bertol. Amæn. t. 5. f. 9.

ORDO VI.—DICTYOTEÆ.

GENUS XXVIII. CHORDA, *Stackh.*

Frons simplex, filiformis, cylindræa, tubulosa, intus septata. Radix nuda scutata. Fructus: semina pyriformia ad superficiem frondis dense aggregata.

C. Filum, Lamour. Essai, p. 27. *Scytosiphon Filum*, Ag. p. 257.

Fucus Filum, Turn. t. 86.

lomentaria, Lyngb. Hyd. Dan. t. 18. *Scytosiphon Filum*, var. γ . Ag. p. 257.

GENUS XXIX. ASPEROCOCCUS, *Lamour.*

Frons tubularis, cylindræa, continua, membranæa. Radix nuda, scutata. Fructus: semina rotundata, immersa, in soris minutis aggregata, cum apiculis articulatis, massa sporæa, nigra, repletis, intermixta.

- A. echinatus, Grev. p. 50. t. 9. *Encelium echinatum*. Ag. p. 261.
 Lessoni, Bory in Duperr. Voy. p. 199. t. 11.
 Durvillæi, Bory in Duperr. Voy. p. 200. t. 11.
 bullosus, Lamour. Essai, p. 62. *Encelium bullosum*, Ag. p. 262.

GENUS XXX. STILOPHORA, *Ag.*

“Meine, *Solenia crinita* (die ganz von der Rothischen *Conferva crinita* verschieden ist), gehört nach von mir selbst beobachteten Exemplaren nicht zu *Solenia* oder *Ulva*, nicht einmal zu den *Ulvaceen*, sondern ist eine neue Gattung, welche durch in Figuren (entweder in cirkel oder fascien) gestellte flecken (Sori) von kleinen schwarzen der membran dicht anliegenden Sporidienblasen nebst einer tubulösen membranösen frons sich auszeichnet.”—Ag. in Aufzählung, &c. p. 17.

- S. crinita, Ag. Aufzählung, p. 17. *Solenia crinita*, Ag. Syst. p. 187.
 sinuosa, Ag. Aufzählung, p. 17. *Encelium sinuosum*, Ag. Syst. p. 262. *Ulva sinuosa*, Roth. Cat. Bot. v. 3. t. 12. f. a.
 clathrata, Ag. Aufzählung, p. 17. *Encelium clathratum*, Ag. Syst. p. 262.

GENUS XXXI. PUNCTARIA, *Grev.*

Frons simplex, membranæa, plana. Radix scutata, nuda. Fructus: semina rotundata, soris minutis undique sparsis aggregata, cum apiculis articulatis, clavatis, intermixta.

- P. latifolia, Grev. p. 52.
 plantaginea, Grev. p. 53. t. 9. *Zonaria ? plantaginea*, Ag. p. 268.
 tenuissima, Grev. p. 54. *Zonaria ? tenuissima*, Ag. p. 268.

GENUS XXXII. STRIARIA, *Grev.*

Frons filiformis, cylindræcea, membranæcea, ramosa. Radix nuda, scutata. Fructus: semina rotundata in soris minutissimis aggregata, soris lineas transversales formantibus.

S. attenuata, *Grev.* p. 55. t. 9. *Carmichaelia attenuata*, *Grev.* *Crypt.* Fl. t. 288.

GENUS XXXIII. DICTYOSIPHON, *Grev.*

Frons filiformis, tubulosa, continua, ramosissima, confervoidea. Radix nuda, scutata. Fructus: semina rotundata, solitaria, sparsa.

D. fœniculæceus, *Grev.* p. 56. t. 8. *Scytosiphon fœniculæceus*, *Ag.* p. 258. *Fucus subtilis*, *Turn.* t. 234.

GENUS XXXIV. DICTYOTA, *Lamour.*

Frons plana, distincte reticulata, membranæcea, dichotoma vel vage fissa. Radix stuposa. Fructus: semina sparsa vel in soris aggregata.

- D. Schröderi, *Grev.* *Zonaria Schröderi*, *Ag.* p. 265.
 dichotoma, *Lamour.* *Essai*, p. 58. *Grev.* p. 57. t. 10. *Zonaria dichotoma*, *Ag.* p. 266. *Ulva dichotoma*, *Eng. Bot.* t. 1774.
 marginata, *Grev.* *Zonaria marginata*, *Ag.* p. 266.
 linearis, *Grev.* *Zonaria linearis*, *Ag.* p. 266.
 furcellata, *Grev.* *Zonaria furcellata*, *Ag.* p. 266.
 Kunthii, *Grev.* *Zonaria Kunthii*, *Ag.* p. 267. *Ik. Alg.* t. 15.
 lineolata, *Grev.* *Zonaria lineolata*, *Ag.* *Aufzählung*, p. 21.
 atomaria, *Grev.* p. 58. *Zonaria atomaria*, *Ag.* p. 264. *Fucus zonalis*, *Lamour.* *Dissert.* t. 25. f. 1.
 papillosa, *Grev.* *Zonaria papillosa*, *Ag.* p. 267.
 fasciola, *Lamour.* *Essai*, p. 58. *Zonaria fasciola*, *Ag.* p. 267. *Fucus fasciola*, *Roth. Cat. Bot.* v. 1. t. 7. f. 1.
 ? polypodioides, *Lamour.* *Essai*, p. 58. t. 6. *Zonaria polypodioides*, *Ag.* p. 267.
 ? dentata, *Lamour.* *Essai*, p. 58. *Zonaria dentata*, *Ag.* p. 268.

GENUS XXXV. CUTLERIA, Grev.

Frons compresso-plana, cartilagineo-membranacea, subflabelliformis, vage fissa. Radix stipulosa. Fructus: racemuli punctiformes undique sparsi capsularum, capsulis oblongis, pedicellatis, granulis repletis.

C. multifida, Grev. p. 60. t. 10. *Zonaria multifida*, Ag. p. 267. *Ulva multifida*, Eng. Bot. t. 1913.

GENUS XXXVI. PADINA, Adans, Lamour.

Frons plana, distincte reticulata, subcoriacea, flabelliformis, plerumque integra, zonis concentricis notata. Radix stipulosa. Fructus: semina in lineis concentricis.

* *Fronde rotundata, flabelliformi.*

P. Pavonia, Gaill. Grev. p. 62. t. 10. *Zonaria Pavonia*, Ag. p. 263.

Commersoni, Bory in Duperr. Voy. p. 144. t. 21.

Fraseri, Grev. *Zonaria Fraseri*, Grev. in Nov. Act. Acad. v. 14, cum icone. *Z. Pavonia*, var. γ , Ag. p. 263.

Durvillæi, Bory in Duperr. Voy. p. 147. t. 21.

variegata, Gaill. *Zonaria variegata*, Ag. p. 264. *Dictyota variegata*, Lamour. Essai, t. 5.

? *rosea*, Pal. Beauv. *Zonaria rosea*, Ag. p. 264.

adpersa, Grev. *Zonaria adpersa*, Ag. p. 264. *Ulva adpersa*, Roth. Cat. Bot. v. 3. t. 11.

? *collaris*, Grev. *Zonaria collaris*, Ag. p. 264.

? *parvula*, Grev. p. 63. *Zonaria parvula*, Grev. Crypt. Fl. t. 360.

** *Fronde reniformi, coriacea, opaca, fructificatione obscura.*

? *squamaria*, Gaill. *Zonaria squamaria*, Ag. p. 265. *Fucus squamarius*, Turn. t. 224.

? *deusta*, Grev. *Zonaria deusta*, Ag. p. 420. *Fucus fungularis*, Fl. Dan. t. 420.

*** *Stipite cum fronde ramoso, ramis vel segmentis ad apicem cuneato-rotundatis.*

flava, Grev. *Zonaria flava*, Ag. p. 265. *Fucus Tournefortii*, Lamour. Dissert. t. 26.

? *lobata*, Grev. *Zonaria lobata*, Ag. p. 265.

? *interrupta*, Grev. *Zonaria interrupta*, Ag. p. 268. *Fucus interruptus*, Turn. t. 245.

GENUS XXXVII. HALYSERIS, *Tozzetti, Ag.*

Frons plana, linearis, membranacea, reticulata, costata.

Radix stuposa. Fructus: semina in soris aggregata, soris plerumque lineas longitudinales formantibus.

H. polyodioides, Ag. p. 262. Grev. p. 64. t. 8. *Fucus membranaceus*, Turn. t. 87.

Justii, Ag. p. 262. *Dictyopteris Justii*, Lamour. Journ. Philom. t. 6. f. A.

Woodwardia, Ag. p. 263. *Fucus Woodwardia*, Turn. t. 158.

delicatula, Ag. p. 263. *Dictyopteris delicatula*, Lamour. Journ. Philom. t. 6. f. B.

linearis, Ag. p. 263.

ORDO VII.—FURCELLARIÆ.

GENUS XXXVIII. FURCELLARIA, *Lamour.*

Frons cartilaginea, cylindracea, filiformis, dichotoma. Fructus: receptacula elongata, terminalia, clausa, semina pyriformia in strato submarginali includentia.

F. fastigiata, Lamour. Essai, p. 26. Grev. p. 67. t. 11. Ag. p. 274. *Fucus lumbricalis*, Turn. t. 6.

ORDO VIII.—SPONGIOCARPEÆ.

GENUS XXXIX. POLYIDES, *Ag.*

Frons cartilaginea, filiformis, cylindracea, dichotoma. Fructus: verrucæ nudæ, spongiosæ, fibrosæ, laterales, glomerulos seminum includentes.

P. rotundus, Grev. p. 70. t. 11. *Polyides lumbricalis*, Ag. p. 194. *Fucus rotundus*, Turn. t. 5.

Durvillæi, Bory in Duperr. Voy. p. 138. Species dubia.

ORDO IX.—FLORIDEÆ.

GENUS XL. CLAUDEA, *Lamour.*

Frons plana. e reticulo nervorum parallelorum formata.

Fructus: granula ternata in receptaculis foliaceis ellipticis utrinque nervis reticuli affixis.

C. elegans, *Lamour. Essai, t. 2. Oneillia elegans, Ag. p. 253. Fucus Claudei, Turn. t. 243.*

GENUS XLI. AMANSIA, *Lamour.*

Frons plana vel compressa, membranacea, obscure costata, transversim striata, ad apicem sæpe involuta. Fructus:

1. capsulæ; 2. granula ternata.

* *Fronde plana.*

A. multifida, *Lamour. Essai, p. 55. Ag. p. 247. Fucus lineatus, Turn. t. 201.*

Fructus terminalis. Granula ternata, ad apices frondis involutos latent.

obtusiloba, *Grev. Rytiphlæa obtusiloba, Ag. p. 161. Fucus obtusilobus, Mert. in litt. Vix Rytiphlæa species. Frons dense striata. Semina subpyriformia, ad basin capsulæ affixa.*

mamillaris, *Ag. p. 247.*

glomerata, *Ag. p. 247.*

prolifera, *Ag. p. 247.*

? ? semipennata, *Lamour. Essai, t. 5. Ag. p. 248.*

Seaforthii, *Grev. Thamnophora ? Seaforthii, Ag. p. 240. Fucus Seaforthii, Turn. t. 120.*

In hac specie sunt capsulæ ovatæ ad apicem pinnulæ.

* * *Fronde triangulari, ramulis dentibus imbricatis.*

? triangularis, *Grev. Thamnophora ? triangularis, Ag. p. 240. Fucus triangularis, Turn. t. 33.*

Species forsân dubia, sed fronde certe transversim striata.

GENUS XLII. DELESSERIA, *Lamour.*

Frons rosea, plana, membranacea, costa percurrente instructa. Fructus: 1. capsulæ; 2. granula ternata in soris coacervata.

D. *fraxinifolia*, Grev. *Amansia fraxinifolia*, Ag. p. 247. *Fucus fraxinifolius*, Turn. t. 198.

sanguinea, Lamour. Essai, p. 36. Ag. p. 248. *Fucus sanguineus*, Turn. t. 36.

Americana, Ag. p. 248.

quercifolia, Bory in Duperr. Voy. p. 186. t. 18.

sinuosa, Lamour. Essai, p. 36. Ag. p. 248. *Fucus sinuosus*, Turn. t. 35.

alata, Lamour. Essai, p. 36. Ag. p. 250. *Fucus alatus*, Turn. t. 160.

ruscifolia, Lamour. Essai, p. 36. Ag. p. 249. *Fucus ruscifolius*, Turn. t. 15.

Hypoglossum, Lamour. Essai, p. 36. Grev. p. 75. t. 12. Ag. p. 249. *Fucus Hypoglossum*. Turn. t. 14.

conferta, Ag. p. 249. *Fucus confertus*, Turn. t. 184.

ramentacea, Ag. p. 250.

interrupta, Ag. p. 250.

fimbriata, Lamour. Essai, t. 9. Ag. p. 250.

? *platycarpa*, Lamour. Essai, p. 36. Ag. p. 252. *Fucus platycarpus*, Turn. t. 144.

GENUS XLIII. NITOPHYLLUM, *Grev.*

Frons plana, reticulata, tenuissimo-membranacea, ecostata, dilute rosea. Fructus: 1. capsulæ hemisphæricæ, immerse; 2. granula ternata in soris sparsis distinctis coacervata.

N. *ocellatum*, Grev. p. 78. *Delesseria ocellata*, Ag. p. 252. Grev. Crypt. Fl. t. 347.

punctatum, Grev. p. 79. t. 12. *Delesseria punctata*, Ag. p. 252. *Fucus punctatus*, Turn. t. 71.

Hilliae, Grev. p. 80. *Delesseria Hilliae*, Grev. Crypt. Fl. t. 351.

Bonnemaisoni, Grev. p. 81. *Delesseria Bonnemaisoni*, Ag. p. 252. Grev. Crypt. Fl. t. 322.

NITOPHYLLUM.

- Durvillæi, Grev. *Dawsonia Durvillæi*, Bory in Duperr. Voy. p. 183. t. 19.
 Gmelini, Grev. p. 82. *Delesseria Gmelini*, Lamour. Essai, p. 36.
laceratum, Grev. p. 83. *Delesseria lacerata*, Ag. p. 251. *Fucus laceratus*, Turn. t. 68.

GENUS XLIV. HYMENENA, Grev.

Frons plana, membranacea, ecostata, venis spuriiis, numerosis, prominentibus, anastomosantibus, notata. Fructus: 1. capsulæ; 2. granula ternata inter venas sparsa.

- H. fissa, Grev. *Delesseria venosa*, Ag. p. 251. *Fucus venosus*, Turn. t. 138.

GENUS XLV. RHODOMENIA, Grev.

Frons plana, membranacea, roseo-rubra, omnino avenia, sessilis vel breviter stipitata. Fructus: 1. capsulæ hemisphæricæ, sparsæ; 2. granula ternata minutissima in soris indefinitis.

- R. laciniata, Grev. p. 86. *Sphærococcus laciniatus*, Ag. p. 230. *Fucus laciniatus*, Turn. t. 69.
 bifida, Grev. p. 85. *Sphærococcus bifidus*, Ag. p. 231. *Fucus bifidus*, Turn. t. 154.
 fimbriata, Grev. *Sphærococcus fimbriatus*, Ag. p. 231.
 interrupta, Grev. *Sphærococcus interruptus*, Grev. in Nov. Act Acad. v. 14. cum icone.
 Lambertii, Grev. *Sphærococcus Lambertii*, Ag. p. 232. *Fucus Lambertii*, Turn. t. 237.
 Bangii, Grev. *Sphærococcus Bangii*, Ag. p. 212. *Chondrus Bangii*, Lyngb. Hyd. Dan. t. 12.
 cristata, Grev. p. 89. *Sphærococcus cristatus*, Ag. p. 231. Grev. Crypt. Fl. t. 85.
 Palmetta, Grev. p. 88. t. 12. *Sphærococcus Palmetta*, Ag. p. 15. *Fucus Palmetta*, Turn. t. 73.
 corallina, Grev. *Sphærococcus corallinus*, Bory in Duperr. Voy. p. p. 175. t. 16.
 polycarpa, Grev. p. 87. *Sphærococcus polycarpus*, Grev. Crypt. Fl. t. 352.

RHODOMENIA.

- Chauvinii, Grev. *Sphaerococcus Chauvinii*, Bory in Duperr. Voy. p. 165. t. 20.
- ciliata, Grev. p. 90. *Sphaerococcus ciliatus*, Ag. p. 221. *Fucus ciliatus*, Turn. t. 70. f. a—e.
- jubata, Grev. p. 91. *Sphaerococcus jubatus*, Grev. Crypt. Fl. t. 359. *Sphaerococcus ciliatus*, var. γ , δ , ϵ , ζ , Ag. p. 221.
- palmata, Grev. p. 93. *Halymenia palmata*, Ag. p. 242. *Fucus palmatus*, Turn. t. 115.
- sobolifera, Grev. p. 95. *Halymenia?* *sobolifera*, Ag. p. 225. *Fucus soboliferus*, Turn. t. 45. vix bona.
- ? Teedii, Grev. p. 96. *Sphaerococcus Teedii*, Ag. p. 225. Grev. Crypt. Fl. t. 356.

GENUS XLVI. BOTRYOCARPA, Grev.

Frons plana, basi obscure costata, carnosa, purpureo-rubra, prolifera. Fructus: granula ternata in receptaculis, foliaceis, dense cæspitosis, per totam frondem sparsis.

- S. prolifera, Grev. *Delesseria botryocarpa*, Ag. 253. *Fucus botryocarpus*, Turn. t. 246.

GENUS XLVII. THAMNOPHORA, Ag.

Frons plana, avenia, pinnatifida. Radix repens reticulato-fibrosa. Fructus: receptacula filiformia, ramulosa, in pulvinulis coacervatis, et granula includentia.

- T. corallorhiza, Ag. p. 240. *Fucus corallorhiza*, Turn. t. 96.; et *F. cirrhosus*, t. 63.
- Mertensii, Grev. Fronde tripinnatifida, pinnulis subulatis, pulvinulis receptaculorum axillaribus. Hab. ad Novam Hollandiam; unde misit D. Fraser.
- cornuta, Grev. *Sphaerococcus cornutus*, Ag. p. 230. *Fucus cornutus*, Turn. t. 258.
- Vera species. Specimina fructifera legit et communicavit D. Bowie.

GENUS XLVIII. PLOCAMIUM, *Lamour.*

Frons filiformis, compressa, subcartilaginea, coccinea, ramosissima, ramis distichis. Fructus: 1. capsulæ sphaericæ; 2. granula oblonga transversim multipartita, in receptaculis linearibus foliaceis.

P. coccineum, Lyngb. Hyd. Dan. p. 39. t. 9. Grev. p. 98. t. 12.
Delesseria Plocamium, Ag. p. 250. *Fucus coccineus*, Turn. t. 59.

confervaceum, Bory in Duperr. Voy. p. 164. Species dubia.

GENUS XLIX. MICROCLADIA, *Grev.*

Frons filiformis, compressa, subcartilaginea, vage ramosa, ramis distichis. Fructus: 1. capsulæ sphaericæ, involucre ramuliformi instructæ; 2. granula ternata in apice intumescenti ramorum.

M. glandulosa, Grev. p. 99. t. 13. *Delesseria glandulosa*, Ag. p. 251.
Fucus glandulosus, Turn. t. 38.

GENUS L. ODONTHALIA, *Lyngb.*

Frons plana, membranaceo-cartilaginea, vinoso-rubra, obsolete costata, ad marginem dentata. Fructus: 1. capsulæ semina pyriformia basi affixa includentes; 2. granula ternata in receptaculis foliaceis filiformibus.

O. dentata, Lyngb. Hyd. Dan. p. 9. t. 3. Grev. p. 101. t. 13. *Rhodomela dentata*, Ag. p. 196. *Fucus dentatus*, Turn. t. 13.
corymbifera, Grev. *Rhodomela corymbifera*, Ag. p. 196. *Fucus corymbiferus*, Gmel. Fuc. t. 9.

GENUS LI. DICTYOMENIA, *Grev.*

Frons plana, obsolete costata vel enervi, membranacea, reticulata, badia aut fusco-rubra. Fructus: 1. capsulæ semina subglobosa includentes; 2. granula ternata in receptaculis foliaceis filiformibus.

D. fimbriata, Grev. *Rhodomela fimbriata*, Ag. p. 197. *Fucus fimbriatus*, Turn. t. 170.

DICTYOMENIA.

- tridens, Grev. *Rhodomela tridens*, Ag. p. 197. *Fucus tridens*, Turn. t. 255.
 volubilis, Grev. *Rhodomela volubilis*, Ag. p. 197. *Fucus volubilis*, Turn. t. 2.
 serrulata, Grev. *Rhodomela serrulata*, Ag. p. 197. *Dictyopteris serrulata*, Lamour. Essai, t. 5.
 ? dorsifera, Grev. *Rhodomela dorsifera*, Ag. p. 197.

GENUS LII. RHODOMELA, Ag.

Frons filiformis, cylindræa vel compressa, ramosissima, coriaceo-cartilaginea (ad apicem sæpe involuta). Fructus: 1. capsulæ, semina pyriformia includentes; 2. granula ternata in receptaculis filiformibus.

- R. *Larix*, Ag. p. 198. *Fucus Larix*, Turn. t. 207.
 floccosa, Ag. p. 198. *Fucus floccosus*, Turn. t. 8.
 Gaimardi, Ag. p. 200. Bory in Duperr. Voy. p. 215. t. 22.
 Swartzii, Ag. p. 198. *Fucus Swartzii*, Ag. in Act. Holm. 1815, t. 4.
 Thunbergii, Ag. p. 199. *Fucus Thunbergii*, Turn. t. 133.
 ? pilulifer, Grev. *Sphærococcus pilulifer*, Ag. p. 236. *Fucus pilulifer*, Turn. t. 236.
 subfusca, Ag. p. 199. *Fucus subfuscus*, Turn. t. 10.
 spinosa, Ag. p. 200.
 pinastroides, Ag. p. 200. Grev. p. 104. t. 13. *Fucus pinastroides*, Turn. t. 11.
 scorpioides, Ag. p. 200. *Fucus amphibius*, Turn. t. 109.
 aleutica, Ag. p. 198. Ie. Alg. t. 5.
 cloiophylla, Ag. p. 198.

GENUS LIII. ALSIDIUM, Ag.

Frons cylindræa, filiformis, attenuata, rigida, erecta, sparsa, ramosa. Radix late crustacea. Fructus ?

- A. *corallinum*, Ag. Ic. Alg. Europ. t. 9.

GENUS LIV. BONNEMAISONIA, *Ag.*

Frons membranacea, compressa vel plana, filiformis, ramossissima, ramis ciliis distichis pectinatis. Fructus: capsulæ sessiles vel pedicellatæ, semina pyriformia basi affixa includentes.

B. asparagoides, *Ag.* p. 246. *Grev.* p. 107. t. 13. *Fucus asparagoides*, *Turn.* t. 101.

elegans, *Ag.* p. 246.

pilularia, *Ag.* p. 246. *Fucus pilularia*, *Gmel.* *Fuc.* t. 10. f. 2.

GENUS LV. LAURENCIA, *Lamour.*

Frons cylindræa, filiformis, gelatinoso-cartilaginea. Fructus: 1. capsulæ ovatæ, apice pertusæ, semina pyriformia pedicellata includentes; 2. granula ternata in ramuli immersa.

L. pinnatifida, *Lamour.* *Essai*, p. 42. *Grev.* p. 108. t. 14. *Chondria pinnatifida*, *Ag.* p. 201. *Fucus pinnatifidus*, *Turn.* t. 21.

obtusa, *Lamour.* *Essai*, p. 42. *Chondria obtusa*, *Ag.* p. 203. *Fucus obtusus*, *Turn.* t. 21.

Forsteri, *Grev.* *Chondria Forsteri*, *Ag.* p. 203. *Fucus Forsteri*, *Turn.* t. 77.

nana, *Grev.* *Chondria nana*, *Ag.* *Aufzählung*, p. 19.

? *batracopus*, *Grev.* *Gigartina batracopus*, *Bory in Duperr.* *Voy.* p. 153. t. 19.

papillosa, *Grev.* *Chondria papillosa*, *Ag.* p. 203. *Fucus thyrsoides v. major*, *Turn.* t. 19.

seticulosa, *Grev.* *Chondria seticulosa*, *Ag.* p. 204.

botryoides, *Gaill.* *Chondria botryoides*, *Ag.* p. 204. *Fucus botryoides*, *Turn.* t. 178.

laxa, *Gaill.* *Chondria laxa*, *Ag.* p. 202. *Fucus laxus*, *Turn.* t. 203.

striolata, *Grev.* *Chondria striolata*, *Ag.* *Aufzählung*.

dasyphylla, *Grev.* *Chondria dasyphylla*, *Ag.* p. 205. *Fucus dasyphyllus*, *Turn.* t. 22.

tenuissima, *Grev.* *Chondria tenuissima*, *Ag.* p. 205. *Fucus tenuissimus*, *Turn.* t. 100.

fasciculata, *Grev.* *Chondria fasciculata*, *Ag.* p. 206. *Fucus fasciculatus*, *Turn.* t. 202.

GENUS LVI. GASTRIDIDIUM, *Lyngb.*

Frons cylindræa, filiformis, gelatinoso-cartilaginea (sæpe articulato-constricta) roseo-rubra. Fructus: 1. capsulæ sphericæ, ovatæ aut conicæ, semina cuneiformia vel rotundata includentes; 2. granula ternata in ramuli immersa.

* *Fronde continua (non articulato-constricta).*

G. clavellousum, *Lyngb. Hyd. Dan. p. 70. t. 17. Chondria clavellousa, Ag. p. 206. Fucus clavellousus, Turn. t. 30.*

? ramentaceum, *Grev. Chondria ramentacea, Ag. p. 206.*

? ? furcatum, *Grev. Chondria furcata, Ag. Aufzählung, p. 19.*

* * *Fronde ramulis ellipticis vel rotundatis.*

ovale, *Grev. p. 116. t. 14. Chondria ovalis, Ag. p. 204. Fucus ovalis, Turn. t. 81.*

uvarium, *Grev. Chondria uvaria, Ag. p. 204. Fucus botryoides, Wulf. in Jacq. Coll. v. 3. t. 13.*

* * * *Fronde articulato-constricta.*

kaliforme, *Lyngb. Hyd. Dan. p. 70. Chondria kaliformis, Ag. p. 207. Fucus kaliformis, Turn. t. 29.*

parvulum, *Grev. Chondria parvula, Ag. p. 207. Grev. Crypt. Fl. t. 346.*

articulatum, *Grev. Chondria articulata, Ag. p. 207. Fucus articulatus, Turn. t. 106.*

GENUS LVII. CORALLOPSIS, *Grev.*

Frons cylindræa, cartilaginea, articulata, articulis ad apicem concavis atque e centro proliferis. Fructus: capsulæ sparsæ in frondem immersæ.

C. Salicornia, *Grev. Sphærococcus Salicornia, Ag. p. 232. Ic. Alg. t. 8.*

? chondroides, *Grev. Gigartina chondroides, Bory in Duperr. Voy. p. 154.*

GENUS LVIII. ACANTHOPHORA, *Lamour.*

Frons cylindræa, cartilaginea, spinulosa. Fructus in spinulis immersus: 1. capsulæ; 2. granula ternata.

- A. Thierii, *Lamour. Essai*, p. 44. *Chondria acanthophora*, *Ag.* p. 209.
Fucus spiciferus, *Esp. Fuc. t.* 159.
 Delilii, *Lamour. Essai*, p. 44. *Chondria Delilii*, *Ag.* p. 209.
Fucus Najadiformis, *Del. Egypt. t.* 56.
 militaris, *Lamour. Essai*, p. 44. t. 4. *Chondria militaris*, *Ag. Sp. Alg. v. 1.* p. 367.
 muscoïdes, *Grev. Chondria muscoïdes*, *Ag.* p. 209. *Fucus acanthophorus*, *Turn. t.* 32.

GENUS LIX. GRACILARIA, *Grev.*

Frons cartilaginea, filiformis, cylindræa vel compressa, rubra. Fructus: 1. capsulæ, massam seminum minorum includentes; 2. granula simplicia in fronde nidulantia.

- G. filiformis, *Grev. Chondria filiformis*, *Ag.* p. 208.
 erecta, *Grev. p.* 124. t. 14. *Sphærococcus? erectus*, *Grev. Crypt. Fl. p.* 357.
 chordalis, *Grev. Delesseria chordalis*, *Ag.* p. 253.
 Lemanæformis, *Grev. Gigartina Lemanæformis*, *Bory in Duperr. Voy. p.* 151.
 confervoides, *Grev. Sphærococcus confervoides*, *Ag. p.* 232. *Fucus confervoides*, *Turn. t.* 84.
 purpurascens, *Grev. Sphærococcus purpurascens*, *Ag. p.* 236. *Fucus purpurascens*, *Turn. t.* 9.
 rugulosa, *Grev. Gigartina rugulosa*, *Bory in Duperr. Voy. p.* 151.
 lichenoides, *Grev. Sphærococcus lichenoides*, *Ag. p.* 233. *Fucus lichenoides*, *Turn. t.* 113.
 ? hypniformis, *Grev. Gigartina hypniformis*, *Bory in Duperr. Voy. p.* 154.
 compressa, *Grev. Sphærococcus compressus*, *Ag. p.* 233, et *S. secundus*, *Ag. Aufzählung*, p. 20.
 armata, *Grev. Sphærococcus armatus*, *Ag. Aufzählung*, p. 20.
 ? divaricata, *Grev. Sphærococcus divaricatus*, *Ag. Aufzählung*, p. 21.
 Chamissoi, *Grev. Sphærococcus Chamissoi*, *Ag. p.* 225. *Ic. Alg. t.* 6.

GRACILARIA.

- tenax, Grev. *Sphærococcus tenax*, Ag. p. 238. *Fucus tenax*, Turn. t. 125.
 livida, Grev. *Sphærococcus lividus*, Ag. p. 225. *Fucus lividus*, Turn. t. 254.
 difficilis, Grev. *Sphærococcus difficilis*, Ag. p. 236.

GENUS LX. CHONDRUS, Stackh. Lamour.

Frons cartilaginea, plana, enervia, dichotoma, sursum dilatata, livido-rubra. Fructus: capsulæ sparsæ plerumque in disco frondis immersæ, rarius pedicellatæ. Semina minuta, rotundata.

- C. mamillosus, Grev. *Sphærococcus mamillosus*, Ag. p. 220. *Fucus mamillosus*, Turn. t. 218.
 ? alveatus, Grev. *Sphærococcus alveatus*, Ag. p. 223. *Fucus alveatus*, Turn. t. 239.
 crispus, Lamour. Essai, p. 39. Grev. p. 129. t. 15. *Sphærococcus crispus*, Ag. p. 219. *Fucus crispus*, Turn. t. 216, 217.
 sejunctus, Bory in Duperr. Voy. p. 160.
 canaliculatus, Grev. *Sphærococcus canaliculatus*, Ag. p. 220.
 vermicularis, Grev. *Sphærococcus vermicularis*, Ag. p. 234. *Fucus vermicularis*, Turn. t. 221.
 crenulatus, Grev. *Sphærococcus crenulatus*, Ag. p. 218. *Fucus crenulatus*, Turn. t. 40.
 Norvegicus, Lamour. Essai, p. 39. *Sphærococcus Norvegicus*, Ag. p. 218. *Fucus Norvegicus*, Turn. t. 41.
 microcarpus, Grev. *Sphærococcus microcarpus*, Ag. p. 218.
 Torreyi, Grev. *Sphærococcus Torreyi*, Ag. p. 218.
 rostratus, Grev. *Sphærococcus rostratus*, Ag. p. 218.
 furcellatus, Grev. *Sphærococcus furcellatus*, Ag. p. 217.
 fragilis, Grev. *Sphærococcus fragilis*, Ag. p. 217.
 constrictus, Grev. *Sphærococcus constrictus*, Ag. p. 217. *Fucus constrictus*, Turn. t. 152.
 abscissus, Grev. *Sphærococcus abscissus*, Ag. p. 217. *Fucus abscissus*, Turn. t. 223.
 chondrophyllus, Grev. *Sphærococcus chondrophyllus*, Ag. p. 217. *Fucus chondrophyllus*, Turn. t. 222.
 linearis, Grev. *Sphærococcus linearis*, Ag. p. 216. *Fucus linearis*, Turn. 220.

CHONDRUS.

- dilatatus, Grev. *Sphærococcus dilatatus*, Ag. p. 216. *Fucus dilatatus*, Turn. t. 219.
- multipartitus, Grev. *Sphærococcus multipartitus*, Ag. p. 216. *Fucus granateus*, Turn. t. 215.
- spermophorus, Grev. *Sphærococcus spermophorus*, Ag. p. 216. *Fucus spermophorus*, Turn. t. 76.
- repens, Grev. *Sphærococcus repens*, Ag. p. 215.
- disciplinalis, Grev. *Sphærococcus disciplinalis*. Bory in Duperr. Voy. p. 172.
- Heredia, Grev. *Sphærococcus Heredia*, Ag. p. 215. *Fucus Cyrellon*, Bert. Amœn. t. 5.
- membranifolius, Grev. *Sphærococcus membranifolius*, Ag. p. 214. *Fucus membranifolius*, Turn. t. 74.
- ? flabellifolius, Grev. *Sphærococcus flabellifolius*, Bory in Duperr. Voy. p. 174. t. 17.
- ? Brodiaei, Grev. *Sphærococcus Brodiaei*, Ag. p. 213. *Fucus Brodiaei*, Turn. t. 72.

GENUS LXI. PHYLLOPHORA, Grev.

Frons cartilaginea vel membranacea, plana, rubra, obscure vel obsolete costata, e disco prolifera. Fructus: 1. capsulæ, semina minuta, rotundata, includentes; 2. granula simplicia in receptaculis planis foliaceis.

- P. rubens, Grev. p. 135. t. 15. *Sphærococcus rubens*, Ag. p. 213. *Fucus rubens*, Turn. t. 42.
- nervosa, Grev. *Sphærococcus nervosus*, Ag. p. 213. *Fucus nervosus*, Turn. t. 43.
- pristioides, Grev. *Sphærococcus pristioides*, Ag. p. 202. *Fucus pristioides*, Turn. t. 39.
- lucida, Grev. *Sphærococcus? lucidus*, Ag. p. 228. *Fucus lucidus*, Turn. t. 238.
- vittata, Grev. *Sphærococcus vittatus*, Ag. p. 212. *Fucus vittatus*, Turn. t. 64.
- seminervis, Grev. *Sphærococcus seminervis*, Ag. p. 212. Ic. Alg. t. 17.
- ? Lactuca, Grev. *Sphærococcus Lactuca*, Ag. p. 211. *Fucus Palmetta*, Gmel. t. 22, 23.

GENUS LXII. SPHÆROCOCCUS, *Stackh. Ag.*

Frons cartilaginea, compressa, anceps, linearis, distiche ramosa. Fructus: capsulæ mucronatæ, semina ovata brevi-pedicellata includentes.

- S. coronopifolius, Ag. p. 229. Grev. p. 138. t. 15. *Fucus coronopifolius*, Turn. t. 122.
 crinitus, Ag. p. 224. *Fucus crinitus*, Turn. t. 123.

GENUS LXIII. BOWIESIA, *Grev.*

Frons compressa, cartilagineo-cornea, linearis, distiche ramosa, pectinata, obsolete costata. Fructus: capsulæ globosæ subterminales, apice pertusæ: semina clavata ad columellam affixa et globulum formantia.

Nomen generis in honorem Domini Bowie, indagatoris indefessi plantarum, qui plures Algas ad Promontorium Bonæ Spei legit.

- B. pulchra, Grev. Frons pedalis, vage ramosa, ramis distichis, ciliato-pectinatis, ciliis subulatis subincurvatis, lineam longis. Species, *Gelidio Labillardieri*, similis, sed fructu non affinis. Hab. ad Novam Hollandiam, ubi legit D. Fraser.

GENUS LXIV. GELIDIUM, *Lamour.*

Frons cartilagineo-cornea, compressa, linearis, plus minusve pinnata. Fructus: 1. capsulæ in ramuli immersæ, semina minuta rotundata includentes; 2. granula composita in ramuli nidulantia.

- G. cartilagineum, Gaill. *Sphærococcus cartilagineus*, Ag. p. 227. *Fucus cartilaginius*, Turn. 124.
 ? Labillardieri, Grev. *Sphærococcus Labillardieri*, Ag. p. 230. *Fucus Labillardieri*, Turn. t. 258.
 corniculatum, Grev. *Sphærococcus corniculatus*, Ag. p. 228. *Fucus corniculatus*, Turn. t. 182.
 corneum, Lamour. Essai, p. 41. Grev. p. 141. t. 15. *Sphærococcus corneus*, Ag. p. 225. *Fucus corneus*, Turn. t. 257.
 rigidum, Grev. *Sphærococcus rigidus*, Ag. p. 227. *Fucus spinæformis*, Lamour. Dissert. t. 36.
 flicinum, Bory in Duperr. Voy. p. 162.

GELIDIUM.

- mirabile, Grev. *Sphærococcus mirabilis*, Ag. p. 230. Ic. Alg. t. 7.
 nanum, Grev. *Sphærococcus nanus*, Ag. p. 228.
 asper, Grev. *Sphærococcus asper*, Ag. p. 228.
 crassifolium, Grev. *Sphærococcus crassifolius*, Ag. p. 224.
 Burmanni, Grev. *Sphærococcus Burmanni*, Ag. p. 224.
 Sternbergii, Grev. *Sphærococcus Sternbergii*, Ag. p. 224.
 cervicornis, Grev. *Sphærococcus cervicornis*, Ag. p. 229. *Fucus*
cervicornis, Turn. t. 121.
 oppositifolium, Grev. *Sphærococcus oppositifolius*, Ag. p. 230.

GENUS LXV. GIGARTINA, Lamour.

Frons cornea vel cartilaginea, filiformis, cylindracea, vage
 ramosa. Fructus: capsulæ sphæricæ, sessiles, globulum
 seminum subrotundorum includentes.

- G. subulata, Grev. *Sphærococcus subulatus*, Ag. p. 239.
 ustulata, Grev. *Sphærococcus ustulatus*, Ag. p. 237.
 congesta, Grev. *Sphærococcus congestus*, Ag. p. 237. *Fucus con-*
gestus, Turn. t. 179.
 ? Helminthochorton, Lamour. Essai, p. 49. *Sphærococcus Hel-*
minthochorton, Ag. p. 235. *Fucus Helminthochorton*, Turn.
 t. 233. Alga sui generis.
 plicata, Lamour. Essai, p. 48. *Sphærococcus plicatus*, Ag. p. 234.
Fucus plicatus, Turn. t. 180.
 Griffithsiæ, Lamour. Essai, p. 49. *Sphærococcus Griffithsiæ*, Ag.
 p. 235. *Fucus Griffithsiæ*, Turn. t. 37.
 contorta, Bory in Duperr. Voy. p. 153.
 spinella, Grev. *Sphærococcus spinellus*, Ag. p. 237.
 acicularis, Lamour. Essai, p. 48. Grev. p. 147. t. 16. *Sphærococ-*
cus acicularis, Ag. p. 237. *Fucus acicularis*, Turn. t. 126.
 dura, Grev. *Sphærococcus durus*, Ag. p. 234.
 concinna, Grev. *Sphærococcus concinnus*, Ag. p. 234. *Fucus con-*
cinnus, Turn. 153.
 divergens, Grev. *Sphærococcus divergens*, Ag. p. 238.
 pistillata, Lamour. Essai, p. 49. *Sphærococcus gigartinus*, Ag. p. 224.
Fucus gigartinus, Turn. t. 28.

GIGARTINA.

- ? *isiformis*, Grev. *Sphærococcus isiformis*, Ag. p. 223.
 ? *spinosa*, Grev. *Sphærococcus spinosus*, Ag. p. 223. *Fucus spinosus*, Turn. t. 18.
 ? *horrida*, Grev. *Sphærococcus horridus*, Ag. p. 237.

GENUS LXVI. GRATELOUPIA, Ag.

Frons cartilagineo-membranacea, plana, quandoque pin-
 nulis vel ramulis foliaceis basi attenuatis instructa. Fruc-
 tus: tuberculæ minutæ, aggregatæ, immersæ, pertusæ,
 semina rotundata vel elliptica includentes.

- G. flicina*, Ag. p. 241. Grev. p. 151. t. 16. *Fucus flicinus*, Turn.
 t. 150.
hystrix, Ag. p. 241.
ornata, Ag. p. 241. *Fucus erinaceus*, Turn. t. 26.
 ? *verruculosa*, Grev. *Sphærococcus verruculosus*, Ag. p. 222. *Fucus*
Rissoanus, Turn. t. 253.

GENUS LXVII. HYPNEA, Lamour.

Frons cartilaginea, cylindræa, filiformis, ramosissima, ad
 apicem ramulorum sæpe incurva. Fructus obscurus:
 granula in ramulis setaceis intumescensibus siliquæfor-
 mibus nidulantia.

- H. musciformis*, Lamour. Essai, p. 43. *Sphærococcus musciformis*,
 Ag. p. 238. *Fucus musciformis*, Turn. t. 127.
Esperi, Bory in Duperr. Voy. p. 157.
charoides, Lamour. Essai, p. 44. t. 4.
hamulosa, Lamour. Essai, p. 44. *Chondria hamulosa*, Ag. p. 209.
Fucus hamulosus, Turn. t. 79.
divaricata, Grev. *Chondria divaricata*, Ag. p. 208. *Fucus di-*
varicatus, Turn. t. 181.
 ? *rangiferina*, Grev. *Chondria rangiferina*, Ag. p. 208. *Fucus*
rangiferinus, Turn. t. 183.

GENUS LXVIII. CHÆTOSPHORA, *Ag.*

Frons subgelatinosa, filiformis, ramosa, rosea. Fructus obscurus: ramuli fructiferi setacei, in receptaculis lanceolatis dilati, e filis nudis ramosis radiantibus compositi (basi granuliferi?).

C. Wiggii, *Ag.* p. 146. *Grev.* p. 153. t. 16. *Fucus Wiggii*, *Turn.* t. 102.

GENUS LXIX. PTILOTA, *Ag.*

Frons compressa vel plana, pectinato-pinnata, rubra, membranaceo-cartilaginea. Fructus: capsulæ minutæ, aggregatæ, involucre polyphyllo instructæ.

P. plumosa, *Ag.* p. 195. *Grev.* p. 155. t. 16. *Fucus plumosus*, *Turn.* t. 60.

asplenioides, *Ag.* p. 195. *Fucus asplenioides*, *Turn.* t. 62.
densa, *Ag.* p. 195.

flaccida, *Ag.* p. 195. *Fucus flaccidus*, *Turn.* t. 61.

GENUS LXX. DASIA, *Ag.*

Frons filiformis. Fructus duplex: 1. capsulæ pedicellatæ orificio dentato coronatæ, glomerulum sporidiorum includentes, fasciculis filorum articularum circumdatæ; 2. siliculæ (vel receptacula) filis intermixtæ, *Ag.*

D. pedicellata, *Ag.* p. 211. *Fucus confervoides*, *Wulf.* in *Jacq. Coll.* v. 3. t. 14. f. 1.

spinulosa, *Ag.* *Ic. Alg. Europ.* t. 8.

plana, *Ag.* *Aufzählung*, p. 20.

GENUS LXXI. CHAMPIA, *Lamour.*

Frons filiformis coriacea, articula purpurea, geniculis clausis, tubo simplici. Receptacula lateralia ramuliformia aggregata, sporidia terna, purpurea, aggregata, sparsa, nidulantia, continentia. *Ag.*

C. lumbricalis, *Ag.* p. 146. *Mertensia lumbricalis*, *Roth. Cat. Bot.* v. 3. t. 10.

GENUS LXXII. DIGENIA, *Ag.*

Frons filiformis, obtecta setis articulatis. Fructus . . . ?
Ag.

D. simplex, *Ag.* p. 194.

ORDO X.—THAUMASIEÆ.

GENUS LXXIII. THAUMASIA, *Ag.*

Frons filis corneis undique articulatis, rigidiusculis composita, quorum areolæ membrana implentur. *Ag.*

T. ovalis, *Ag.* p. 195. Ic. Alg. Europ. t. 10.

flava, *Ag.* p. 196. *Fucus flavus*, Linn.

ORDO XI.—GASTROCARPEÆ.

GENUS LXXIV. IRIDEA, *Bory.*

Frons plana, expansa, carnosâ vel gelatinoso-cartilaginea, purpureo-rubra. Fructus: glomeruli seminum rotundorum substantia interiori frondis omnino immersi.

I. edulis, *Bory.* Grev. p. 158. t. 17. *Halymenia edulis*, *Ag.* p. 242.

Fucus edulis, Turn. t. 114.

reniformis, Grev. p. 160. *Halymenia reniformis*, *Ag.* p. 241.

Fucus reniformis, Turn. t. 113.

cordata, *Bory* in Duperr. Voy. p. 104. *Halymenia cordata*, *Ag.* p. 241. *Fucus cordatus*, Turn. t. 116.

micans, *Bory* in Duperr. Voy. p. 110. t. 13.

Laminarioides, *Bory* in Duperr. Voy. p. 105. t. 11.

Augustinæ, *Bory* in Duperr. Voy. p. 108. t. 12.

Radula, *Bory* in Duperr. Voy. p. 107. *Sphærococcus Radula*, *Ag.* p. 222. *Fucus bracteatus*, Turn. t. 25.

? stiriata, *Bory* in Duperr. Voy. p. 105. *Sphærococcus stiriatus*, *Ag.* p. 223. *Fucus stiriatus*, Turn. t. 16.

? papillata, Grev. *Sphærococcus papillatus*, *Ag.* 222.

? volans, Grev. *Sphærococcus volans*, *Ag.* p. 222. Ic. Alg. t. 18.

GENUS LXV. HALYMENIA, *Ag.*

Frons subplana vel cylindrica, gelatinoso-membranacea, roseo-rubra, plus minusve dichotoma, segmentis sæpe laciniatis. Fructus: glomeruli punctiformes seminum substantia interiori frondis immersi.

H. Floresia, *Ag.* p. 243. *Fucus Floresius*, *Turn.* t. 256.

Usnea, *Grev.* *Chondria Usnea*, *Ag.* p. 208. *Fucus Usnea*, *Turn.* t. 225.

elongata, *Ag.* p. 243.

Durvillæi, *Bory in Duperr. Voy.* p. 180. t. 15.

variegata, *Bory in Duperr. Voy.* p. 179. t. 14.

ligulata, *Ag.* p. 244. *Grev.* p. 162. t. 17. *Ulva ligulata*, *Eng. Bot.* t. 421.

? platyna, *Ag.* p. 243.

trigona, *Ag.* p. 244.

pinnulata, *Ag. Aufzählung*, p. 21.

furcellata, *Ag.* p. 244. *Ulva furcellata*, *Eng. Bot.* t. 1881.

GENUS LXXVI. DUMONTIA, *Lamour.*

Frons cylindrica, simplex vel ramosa, membranacea, tubulosa, intus gelatinosa, rubra vel purpureo-rubra. Fructus: glomeruli seminum ad membranam frondis intus adnascentes.

D. filiformis, *Grev.* p. 165. t. 17. *Halymenia filiformis*, *Ag.* p. 245.

Ulva purpurascens, *Eng. Bot.* t. 641.

saccata, *Grev.* *Halymenia saccata*, *Ag.* p. 243. *Fucus saccatus*, *Turn.* t. 241.

ventricosa, *Lamour. Essai*, p. 45. t. 4. f. 6. *Halymenia ventricosa*, *Ag.* p. 244.

fastigiata, *Bory in Duperr. Voy.* p. 198. t. 18.

robusta, *Grev.* fronde vage ramossissima, turgida, gelatinosa, ramis crassis patentibus obtusis basi attenuatis. Hab. ad Novam Hollandiam ubi legit Fraser, qui specimen communicavit.

Frons spithamæa vel ultra, pennæ anserinæ crassitie, valde ramoso-cæspitosa.

? ramentacea, *Grev.* *Halymenia ramentacea*, *Ag.* p. 245. *Fucus ramentaceus*, *Turn.* t. 149.

GENUS LXXVII. CATENELLA, *Grev.*

Frons filiformis subcompressa, reptans, articulato-constricta, moniliformis, intus fibris ramosis dichotomis e centro radiantibus instructa. Fructus ?

- C. Opuntia*, *Grev.* p. 166. t. 17. *Halymenia*? *Opuntia*, *Ag.* p. 245.
Fucus Opuntia, *Turn.* t. 107.

ORDO XII.—CAULERPEÆ.

GENUS LXXVIII. CAULERPA, *Lamour.*

Frons viridis, membranacea, plana vel cylindracea, stipitata, surculo repente cartilagineo radicante instructa. Fructus ?

* *Fronde pinnata.*

- C. taxifolia*, *Ag.* p. 180. *C. pennata*, *Lamour. Essai*, p. 67. *Fucus pinnatus*, *Turn.* t. 53.
Lessoni, *Bory in Duperr. Voy.* p. 193. t. 22.
plumaris, *Ag.* p. 181. *Fucus taxifolius*, *Turn.* t. 54.
scalpelliformis, *Ag.* p. 181. *Fucus scalpelliformis*, *Turn.* t. 174.
longifolia, *Ag.* p. 181.

** *Ramulis undique imbricatis clavatis.*

- clavifera*, *Ag.* p. 181. *Fucus clavifer*, *Turn.* t. 57.
uvifera, *Grev.* *C. clavifera*, var. γ . *Ag.* p. 182. *Fucus uvifer*,
Turn. t. 230.
Lamourouxii, *Grev.* *C. clavifera*, var. β . *Ag.* p. 181. *Fucus Lamouroucii*, *Turn.* t. 229.
sedoides, *Ag.* p. 182. *Fucus sedoides*, *Turn.* t. 172.
cactoides, *Ag.* p. 182. *Fucus cactoides*, *Turn.* t. 171.

*** *Ramulis undique ambientibus, peltatis.*

- chemnitzia*, *Lamour. Essai*, p. 68. *Ag.* p. 182. *Fucus chemnitzia*,
Turn. t. 200.
peltata, *Lamour. Journ. Bot.* 1809, p. 145. t. 3. f. 2. *Ag.* p. 182.

CAULERPA.

* * * * *Ramulis undique imbricatis, linearibus vel setaceis.*

paspaloides, Grev. *Chauvinia paspaloides*, Bory in Duperr. Voy. p. 205. t. 23.

phleoides, Grev. *Chauvinia phleoides*, Bory in Duperr. Voy. p. 206. t. 23.

cupressoides, Ag. p. 183. *Fucus cupressoides*, Turn. t. 195.

ericifolia, Ag. p. 183. *Fucus ericifolius*, Turn. t. 56.

Selago, Ag. p. 183. *Fucus Selago*, Turn. t. 55.

hypnoides, Ag. p. 183. *Fucus hypnoides*, Turn. t. 173.

flexilis, Lamour. Essai, p. 68. t. 7. f. 3.

* * * * * *Fronde plana.*

Freycinetii, Ag. p. 184. Bory in Duperr. Voy. p. 192. t. 22.

? prolifera, Lamour. Essai, p. 67. Ag. p. 184. *Fucus ophioglossum*, Turn. t. 58.

? vitifolia, Ag. p. 184. *Fucus vitifolius*, H. et B. Pl. Æquin. t. 69. f. 2.

* * * * * *Fronde filiformi.*

flagelliformis, Ag. p. 184.

ORDO XIII.—ULVACEÆ.

GENUS LXXIX. ANADYOMENE, *Lamour.*

Frons flabelliformis, conspicue et symmetrice venosa. *Ag.*

Fructus ?

A. stellata, Ag. p. 191. *A. flabellata*, Lamour. Polyp. p. 365. t. 14. f. 3.

plicata, Ag. p. 191.

obscura, Ag. p. 191.

GENUS LXXX. PORPHYRA, *Ag.*

Frons plana, tenuissima, purpurea. Fructus: 1. sori sparsi granulorum ovalium; 2. granula quaternata per totam frondem pulchre disposita.

P. laciniata, *Ag.* p. 190. *Ulva laciniata*, *Lightf. Fl. Scot.* p. 974. t. 33. vulgaris, *Ag. Aufzählung*, p. 18. *Ulva purpurea*, *Roth. Cat. Bot.* v. 1. t. 6. f. 1.

linearis, *Grev.* p. 170. t. 18.

miniata, *Ag.* p. 191. *Ulva miniata*, *Lyngb. Hyd. Dan.* t. 6.

GENUS LXXXI. ULVA, *Linn.*

Frons membranacea, viridis, plana (rarius juniore saccata).

Fructus: granula quaternata per totam frondem aggregata.

* *Marinæ.*

U. latissima, *L.* *Ag.* p. 188. *Esp. Ulv.* t. 1. *U. Lactuca*, *Eng. Bot.* t. 1551.

nematoidea, *Bory in Duperr. Voy.* p. 190.

Lactuca, *Linn.* *Ag.* p. 189. *Grev. Crypt. Fl.* t. 313.

rigida, *Ag.* p. 189.

plicata, *Fl. Dan.* t. 829. *Ag.* p. 189.

reticulata, *Forsk.* *Ag.* p. 189.

Linza, *Linn.* *Fl. Dan.* t. 889.

* * *In aqua dulce.*

bullosa, *Roth. Cat. Bot.* v. 3. p. 329. *Ag.* p. 190.

velutina, *Spreng. Sp. Pl.* v. 4. p. 368. *Scytosiphon velutinus*, *Lyngb. Hyd. Dan.* p. 68. t. 16.

* * * *Terrestres.*

crispa, *Lightf. Fl. Scot.* p. 972. *Ag.* p. 416.

calophylla, *Spreng. Sp. Pl.* v. 4. p. 368. *Bangia calophylla*, *Grev. Crypt. Fl.* t. 220.

furfuracea, *Fl. Dan.* t. 1489. *Ag.* p. 19. *Grev. Crypt. Fl.* t. 265.

GENUS LXXXII. TETRASPORA, *Link.*

Frons tubulosa vel inflata, gelatinosa. Fructus: granula quaternata per totam frondem laxè aggregata.

- T. *lubrica*, Ag. p. 188. *Ulva lubrica*, Roth. Cat. Bot. v. 1. p. 204.
cylindrica, Ag. p. 188. *Ulva cylindrica*, Wahl. Fl. Lap. p. 509.
 t. 30. f. 1.
gelatinosa, Ag. p. 188. *Ulva gelatinosa*, Vauch. Conf. t. 17. f. 2.

GENUS LXXXIII. ENTEROMORPHA, *Link.*

Frons tubulosa, cava, membranacea, viridis, striato-areolata.
 Fructus: granula subquaternata, in areolis aggregata.

- E. *intestinalis*, Link. *Solenia intestinalis*, Ag. p. 185. et. *S. Bertoloni*, p. 185.
compressa, Link. Grev. p. 180. t. 18. *Solenia compressa*, Ag. p. 186.
fulvescens, Grev. *Solenia fulvescens*, Ag. p. 186.
clathrata, Grev. *Solenia clathrata*, Ag. p. 186. *Ulva ramulosa*,
 Eng. Bot. t. 2137. et *Conferva paradoxa*, t. 2328.
 Linkiana, Grev. p. 182.
percursa, Grev. *Solenia percursa*, Ag. p. 187. *Scytosiphon compressus* v. *confervoideus*, Lyngb. Hydr. Dan. t. 15. f. B. 4—6.
attenuata, Grev. *Solenia attenuata*, Ag. p. 187.

GENUS LXXXIV. VALONIA, *Ag.*

Frons saccata et simpliciuscula vel cylindrica et ramosa, membrana hyalina pulvere viridi intus consperso colorata, fibris nullis conspicuis percursa. Fructus coniocystæ aggregatæ, frondem extus co-operientes. *Ag.*

- V. *intricata*, Ag. p. 180. *Ulva intricata*, Clemente.
ovalis, Ag. p. 180. *Gastroidium ovale*, Lyngb. Hydr. Dan. p. 72. t. 18.
favulosa, Ag. p. 180.

Valonia ægragropila et *utricularis* Agardhii, ad regnum animale spectant.

GENUS LXXXV. ALYSIUM, *Ag.*

Frons cava, articulato-strangulata, e membrana reticulata constituta, areolis pentagonis. *Ag.*

A. *Holtingii*, *Ag.* p. 179. *Ulva Holtingii*, *Mert.* MSS.

ORDO XIV.—SIPHONÆ.

GENUS LXXXVI. CODIUM, *Stackh.*

Frons spongiosa, viridis, crustacea globularis cylindræa vel plana, e fibris tubulosis, continuis, laxè intertextis, composita. Fructus: coniocystæ versus superficiem frondis.

C. *simpliciusculum*, *Grev.* *Caulerpa simpliciuscula*, *Ag.* p. 182. *Fucus simpliciusculus*, *Turn.* t. 175.

tomentosum, *Stackh.* *Ag.* p. 177. *Grev.* p. 185. t. 19. *Fucus tomentosus*, *Turn.* t. 135.

elongatum, *Ag.* p. 177.

lineare, *Ag.* p. 177.

flabelliforme, *Ag.* p. 177.

membranaceum, *Ag.* p. 177. *Flabellaria Desfontainii*, *Lamour.* *Essai*, t. 6. f. 4.

adhærens, *Ag.* p. 178.

Bursa, *Ag.* p. 178. *Fucus Bursa*, *Turn.* t. 136.

GENUS LXXXVII. BRYOPSIS, *Lamour.*

Frons membranæa, tubulosa, filiformis, cylindræa, ramosa, ramis imbricatis vel distichis pinnatisque, humore viridi repletis.

B. *plumosa*, *Ag.* p. 178. *Grev.* p. 187. t. 19. *B. Lyngbyei*, *Fl. Dan.* t. 1603. *Ulva plumosa*, *Eng. Bot.* t. 2375.

pennata, *Lamour. Journ. Bot.* 1809, p. 134. t. 3. f. 1. *Ag.* p. 178.

Balbisiana, *Lamour. Essai*, p. 66.

BRYOPSIS.

- muscosa*, Lamour. Journ. Bot. 1809, p. 135. t. 1. f. 4. Ag. p. 179.
Rosæ, Ag. p. 179. Bory in Duperr. Voy. p. 211. t. 24.
hypnoides, Lamour. Journ. Bot. 1809, p. 135. t. 1. f. 2. *B. Ar-*
buscula, Ag. p. 179.

GENUS LXXXVIII. VAUCHERIA, *De Cand.*

Frondes valde aggregatæ, tubulosæ, continuæ, capillares,
 massa viridi interna subpulverulenta coloratæ. Fructus:
 coniocystæ homogeneæ.

* *Coniocystis solitariis.*

- V. dichotoma*, Lyngb. Hyd. Dan. p. 75. t. 19. Ag. p. 171. *Con-*
serva dichotoma, Eng. Bot. t. 932.
bursata, Ag. p. 172. *Ectosperma ovata*, Vauch. Conf. p. 25. t. 2.
 f. 1.
hamata, De Cand. Lyngb. Hyd. Dan. p. 77. t. 20. Ag. p. 172.
clavata, De Cand. Ag. p. 172. *Ectosperma clavata*, Vauch. Conf.
 p. 34. t. 3. f. 10.
littorea, Ag. p. 172. *V. clavata*, Lyngb. Hyd. Dan. p. 78. t. 21.
marina, Lyngb. Hyd. Dan. p. 79. t. 22. Ag. p. 172.
Dillwynii, Ag. p. 173. Grev. p. 191. t. 19. Lyngb. Hyd. Dan.
 p. 77. t. 21. *Conserva frigida*, Dillw. Conf. t. 16.
terrestris, De Cand. Ag. p. 173. *Ectosperma terrestris*, Vauch.
 Conf. p. 27. t. 2. f. 3.
frigida, Ag. p. 173. *V. terrestris*, Lyngb. Hyd. Dan. p. 77. t. 21.

** *Coniocystis binis vel pluribus.*

- V. sessilis*, De Cand. Ag. p. 174. Lyngb. Hyd. Dan. p. 80. t. 22.
ornithocephala, Ag. p. 174. *Conserva vesicata*, Dillw. Brit. Conf.
 t. 74.
geminata, De Cand. Ag. p. 174. Grev. p. 193. t. 19. Eng. Bot.
 t. 1766.
cæspitosa, De Cand. Ag. p. 174. Lyngb. Hyd. Dan. p. 81. t. 23.
cruciata, De Cand. Ag. p. 175. *Ectosperma cruciata*, Vauch.
 Conf. p. 30. t. 2. f. 6.
racemosa, De Cand. Ag. p. 175. Lyngb. Hyd. Dan. p. 82. t. 23.
multicornis, De Cand. Ag. p. 175. *Ectosperma multicornis*,
 Vauch. Conf. p. 33. t. 3. f. 9.

* * * *Coniocystis ignotis.*

V. Boryana, Ag. p. 176.

pusilla, Lyngb. Hyd. Dan. p. 79. t. 22. Ag. p. 176.

elongata, Ag. p. 176.

australis, Ag. p. 176. °

fastigiata, Ag. p. 176.

fusca, Ag. p. 176. *Ceramium fuscum*, Roth. Cat. Bot. v. 2. p. 186.

GENUS LXXXIX. BOTRYDIUM, Wallr.

Frons globosa, vesiculosa, cava, humore aquosa repleta, ad apicem dehiscens, basi radicans. Fructus ?

B. granulatum, Grev. p. 197. t. 19. *B. argillaceum*, Wallr. Ann. Bot. p. 153. *Vaucheria granulata*, Lyngb. Hyd. Dan. p. 78. *V. radicata*, Ag. p. 173. *Ulva granulata*, Linn. *Tremella granulata*, Eng. Bot. t. 324.

Algæ paradoxæ et perobscuræ sunt,—*Fucus obtusatus*, Labill., Turn. t. 145. (*Rhomela obtusata*, Ag.), et *Fucus Wrightii*, Turn. t. 148. (*Chondria Wrightii*, Ag.)

CATALOGUE OF AUTHORS.

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DESCRIPTION
OF
BRITISH ALGÆ.

ORDER I.—FUCOIDEÆ.

Plants all marine, of an olive-brown or olive-green colour, becoming black on exposure to the air ; of a firm coriaceous or ligneous substance, and fibrous texture, tearing with facility in a longitudinal direction. Frond with a hard scutate root, furnished in many species with distinct leaves. Vesicles or air-vessels generally present, and are either uniform dilatations of particular parts, or distinct bodies supported on little stalks. Fructification, tubercles contained in distinct receptacles, or imbedded in the frond, and containing dark-coloured seeds surrounded with a pellucid limbus, which escape by a terminal pore.

GENUS I. SARGASSUM, *Rumph., Ag.* Tab. I.

GEN. CHAR. Frond leaved. Leaves stalked, with a mid-rib. Air-vessels simple, axillary, stalked. Receptacles small, linear, tuberculated, (mostly in axillary clusters or racemes). Seeds in distinct cells.

A very extensive genus, separated by Agardh from the genus *Fucus*, under which it was included even by Lamouroux. It is a very natu-

ral one, and entirely exotic; for two species, recorded as British, are only occasionally wafted to our shores from more distant regions. They are therefore to be considered in the same light with certain birds, which, upon the strength of visits, few and far between, have been admitted into our Fauna.

A small group of this genus, found in the seas of China and Japan, differ very much in several particulars. The individuals which compose it are distinguished by very small nerveless leaves and terminal receptacles. Their habit is very slender, and the air-vessels generally oval or elongated. Could these be removed, *Sargassum* would then be peculiarly well defined, by its ribbed leaves, axillary fructification, and spherical vesicles. Such a separation is recommended by M. Gaillon, but it can hardly be effected without more information than we possess at present on the subject.

The generic name is derived from *Sargaço*, or *Sargazo*, the Spanish name for the masses of sea-weed found floating on the surface of the ocean.

I. SARGASSUM VULGARE. Tab. I.

Stem compressed filiform, leaves linear-lanceolate serrated, air-vessels spherical pointless supported on a little flat stalk, receptacles racemose.

Sargassum vulgare, Ag. Sp. Alg. v. 1. p. 3. Syst. Ag. p. 293. Spreng. Sp. Pl. v. 4. p. 320.

Fucus natans, Turn. Hist. Fuc. t. 46. Syn. p. 48. Sm. Eng. Bot. t. 2114. Lamour. Essai, p. 15.

HAB. Cast on the shores of the Orkney Isles.—*Mr P. Neill*.

Root a small callous base. *Stem* above a foot long, alternately pinnated with simple branches. *Leaves* dotted with pores, distichous, alternate, two lines to half an inch broad, olive when growing, dark red brown after exposure to the air. *Receptacles* cylindrical, about two lines long. *Vesicles* nearly as large as a small pea.

This, as well as the following species, has been found in almost every part of the world, and is repeatedly alluded to by the old navigators as occurring in such prodigious quantities in the Atlantic as to appear like a boundless floating meadow, and actually to impede the progress of the ships. Osbeck mentions, that, if prepared with vinegar, it furnishes an excellent pickle; and Rumphius, according to Mr Turner, relates, that, in the East, salads are made of it, as well as of other Algæ. It is also eaten in Chili.

2. SARGASSUM BACCIFERUM.

Stem cylindrical filiform much branched, leaves linear acute serrated, air-vessels spherical on little cylindrical stalks.

Sargassum bacciferum, Ag. Sp. Alg. v. 1. p. 6. Syst. Alg. p. 294. Spreng. Sp. Pl. v. 4. p. 396.

Fucus bacciferus, Turn. Hist. Fuc. t. 47. Syn. p. 55. Sm. Eng. Bot. t. 1967. Lamour. Essai, p. 16.

Fucus natans, Linn. Sp. Pl. 1628.

HAB. Cast ashore by the waves. It has been received by Mr P. Neill from the Orkney Isles along with the preceding; and Mr W. Backhouse junior has gathered it at the foot of Castle Eden Dean, Durham.

Stems much more branched than in the former species; the branches irregular, and much longer. Leaves about a line wide, varying greatly in length, and destitute of pores. Air-vessels generally, but not always mucronate. Receptacles unknown.

Both this and the preceding species exhibit several varieties, characterised chiefly by the size or slenderness of the frond and leaves. It is not a little amusing to see the air-vessels gravely described as the fructification, in the sixth edition of Withering's Botanical Arrangement.

GENUS II. CYSTOSEIRA, Ag. Tab. II.

GEN. CHAR. Frond furnished with branch-like leaves, becoming more filiform upwards; air-vessels simple, arranged consecutively within the substance of the branch-like leaves. Receptacles cylindrical, more or less lanceolate, tuberculated, terminal. Seeds in distinct cells.

This genus, like the preceding one, formed a section of the *Fucus* of Lamouroux, but was removed by Agardh, and established as a distinct genus in his excellent *Species Algarum*. I agree, however, with M. Gaillon, that it would be rendered more perfect by the exclusion of various individuals, which in reality have little affinity with the remainder, and of themselves furnish types for several new genera.

The lower leaves of the species of *Cystoseira*, as I have modified the genus, are either dichotomous or pinnatifid, and, when not cylin-

dical, furnished with a nerve. These leaves often disappear, and pass into filiform branches, or branch-like leaves. Agardh has derived the generic name from two Greek words, signifying a little sac or bladder, and a chain; but the air-vessels are not by any means always arranged in the manner of a chain or necklace: thus, while, of the British species, *granulata*, and (sometimes) *fibrosa*, exhibit this character, the vesicles of the others are solitary. In all, however, they are innate and simple.

The shores of New Holland and the neighbouring seas afford an extensive series of species, remarkably distinguished by the branches being retroflex at their insertion.

I. CYSTOSEIRA ERICOIDES.

FronD cylindrical branched closely beset every where with very short subulate spinous leaves or branchlets, vesicles elliptical solitary, receptacles swelling at the base of the terminal spines.

Cystoseira ericoides, Ag. Sp. Alg. v. 1. p. 52. Syst. Alg. p. 281. Spreng. Sp. Pl. v. 4. p. 316.

Fucus ericoides, Linn. Sp. Pl. p. 1631. Turn. Hist. Fuc. t. 191. Sm. Eng. Bot. t. 1968.

Fucus tamariscifolius, Huds. Fl. Ang. p. 576. Lamour. Essai, p. 18. Stackh. Ner. Brit. t. 11.

Fucus selaginoides, Linn. Good. et Woodw. Linn. Trans. v. 3. p. 132. Turn. Syn. p. 85.

HAB. Rocks in the sea. Perennial. Summer and autumn. Many places on the south-west coast of England, especially in Devonshire and Cornwall, where it has been long found by Mrs Griffiths and other botanists. Yarmouth Beach, *Turner*. Bantry Bay, *Miss Hutchins*.

Root a hard flattish disk. *FronD* a foot long or more, furnished with a stout cylindrical *stem*, which produces a number of *branches* in an irregular manner: these, in their young state, are nearly flat, hardly a line wide, and half an inch to an inch long, some simple, others pinnatifid; but they soon lose this character, and are converted into cylindrical branches, imbricated with awl-shaped ramuli (or leaves) one to two lines in length. *Air-vessels* often near the extremity of the branches, but sometimes scattered along their course. *Receptacles* composed of tubercles, which distend the base of the terminal ramuli. *Seeds* roundish-ovate. The *substance* of the branches is cartilaginous and flexible, and the *colour* a semitransparent olive, or yellowish green.

This plant possesses, in common with some other species, but in a prominent degree, the property of being iridescent when in a growing state beneath the surface of the water: and so striking and extraordi-

nary is the beautiful appearance thus produced by the reflection of bright glaucous and other tints, that every botanist who beholds it for the first time is deceived by it.

In drying, the whole plant turns nearly black, and shrinks considerably, without adhering to the paper.

2. CYSTOSEIRA GRANULATA. Tab. II.

Fronde cylindrical, stem bearing elliptical knobs each producing a filiform repeatedly dichotomo-pinnated branch furnished with remote subulate spines, air-vessels elliptical-lanceolate, two or three connected together, receptacles elongated.

Cystoseira granulata, Ag. Sp. Alg. v. 1. p. 55. Syst. Alg. p. 282. Spreng. Sp. Pl. v. 4. p. 317.

Fucus granulatus, Linn. Sp. Pl. p. 1629. Turn. Hist. Fuc. t. 251. Sm. Eng. Bot. t. 2169.

Fucus mucronatus, Turn. Syn. p. 73. Lamour. Essai, p. 18.

Fucus feniculaceus, Gooden. and Woodw. Linn. Trans. v. 3. p. 134.

HAB. Rocky pools left by the receding tide. Perennial. Summer. Various parts of the coast of Devonshire and Cornwall, *Mrs Griffiths*, *Mr Rashleigh*, *Mr Turner*, &c. Bantry Bay, *Miss Hutchins*.

Root a hard flattish disk. *Stem* cylindrical, about as thick as a goose-quill, two to eight inches high: branches numerous, nearly a foot in length, filiform, the primary divisions irregularly dichotomous, the subsequent ones unequally and alternately pinnate, the axils rounded, and the whole set at distant intervals, with small spines one or two lines in length. *Air-vessels* forming a sort of chain, sometimes running into one another. *Receptacles* filiform, acuminate; sometimes the tubercles are not collected into a well-defined receptacle, but are scattered over the extremities of the branches for half an inch or more, giving them a granulated appearance. *Substance* firm, coriaceous, flexible. *Colour* olive-green. In drying it does not adhere to paper.

Whatever difficulty may arise in distinguishing the present from some other exotic species, to the British botanist, the bulb-like knobs which are attached to the stem, and form the base of the branches, afford an excellent character, especially when joined to the absence of a setaceous point at the apex of the receptacles. The latter character separates it from the following species, which is so rarely thrown upon the British shore, as almost to exclude its being admitted even as a straggler.

Agardh, indeed, has quoted the principal figure (Fig. a) of Mr

Turner's plate of *C. granulata* doubtfully, as belonging to *C. barbata* : but from my own observations upon living specimens, I am enabled to say that the figure in question really belongs to the species it is intended to represent; the branches, however, are in an immature state, and have not developed their vesicles.

A very curious variety is mentioned by Mr Turner as coming under the observation of Mr Sowerby and himself at Falmouth, in the summer of 1799. "The branches were scarcely at all divided, and all flat and linear, except that for about half an inch at their extremities they were covered with numerous round tubercles, placed close to each other, mixed with a few spines."

3. CYSTOSEIRA BARBATA.

Fronde cylindrical, stem furnished with elliptical knobs each producing a branch many times dichotomo-pinnate and filiform, air-vessels lanceolate chain-like, receptacles ovate-elliptical mucronate.

Cystoseira barbata, Ag. Sp. Alg. v. 1. p. 57. Syn. Alg. p. 283. Spreng. Sp. Pl. v. 4. p. 317.

Fucus barbatus, Gooden. et Woodw. Linn. Trans. v. 3. p. 128. Turn. Syn. p. 80. Hist.

Fuc. t. 250. Sm. Eng. Bot. t. 2170. Lamour. Essai, p. 18.

Fucus granulatus, Good. et Woodw. Linn. Trans. v. 3. p. 131. (excluding the synonyms).

HAB. In the sea. Said to have been gathered by Hudson on the Devonshire coast.

Root a hard flattish disk. *Fronde* a foot long or more. *Stem* as thick as a goose-quill, two or three inches long: branches numerous, arranged in a paniced manner, the ultimate ones forked, often curled and twisted. *Vesicles* very rare. *Receptacles* about two lines long, tipped with a setaceous point. *Substance* flexible, coriaceous-cartilaginous. *Colour* olive-green.

Whether the specimen found by Mr Hudson was actually *C. barbata* or not, I fear there can hardly be a question that it has no right to be considered a *native* of our seas. Mr Turner has already expressed much doubt on this point; and Mrs Griffiths, than whom few have attended more to our marine flora, is decidedly against it. At the same time, it is to be hoped that its introduction into this Work may lead to something more conclusive on one side or the other.

4. CYSTOSEIRA FÆNICULACEA.

Fronde compressed, stem destitute of tuberos knobs, branches more or less rough with little hard points, repeatedly pinnate filiform, air-

vessels solitary or about two together, receptacles mostly proceeding from the terminal vesicles, linear-lanceolate.

Cystoseira discors, Ag. Sp. Alg. v. 1. p. 62. Syst. Alg. p. 284. Spreng. Sp. Pl. v. 4. p. 317.
Cystoseira abrotanifolia, Ag. Sp. Alg. v. 1. p. 63. Syst. Alg. p. 284. Spreng. Sp. Pl. v. 4. p. 317.

Fucus feniculaceus, Linn. Sp. Pl. p. 1629. Turn. Hist. Fuc. t. 252.

Fucus discors, Linn. Turn. Syn. p. 70. Sm. Eng. Bot. t. 2131. Lamour. Essai, p. 17.

Fucus abrotanifolius, Linn. Turn. Syn. p. 66. Sm. Eng. Bot. t. 2130. Lamour. Essai, p. 18.

Fucus fimbriatus, Lamour. Dissert. p. 70. t. 34, 35.

HAB. Coasts of the south-west of England. Perennial. Summer. Sidmouth, *Mrs Griffiths*. Sussex, *Hudson* and *Mr W. Borrer*. Weymouth, *Stackhouse* and *Mr E. Forster*. Hampshire, *Hudson*. Isle of Wight, *Stackhouse*. Tor-Abbey rocks.

Root a hard somewhat conical disk. Frond one to two feet long. Stem four or six inches high, as thick as a quill, almost cylindrical, giving off a number of branches in an irregular manner near the top: branches compressed, undivided, subdistichous, alternately pinnate, the pinnæ two or even three inches long at the base, shorter upwards, producing in their turn about two series of ramuli in a pinnated manner. Air-vessels elliptical-oblong, in the extremity of the pinnæ, and the branchlets given off from them. Receptacles not two lines in length, cylindrical, simple or forked, solitary or several together, some produced at once from the terminal air-vessels, others having the intervention of a little stalk.

In a young state this plant is furnished with flat pinnated leaves one to two lines broad, obscurely midribbed, dotted, and with a somewhat crenate or denticulate margin. These leaves are gradually converted into branches, and as the plant acquires a stem, often disappear entirely, and are never reproduced at any season. When, however, the plant is situate in deep water, fructification is sometimes produced before the frond has lost its foliaceous character, and it might then be easily mistaken for another species. Hence the two species named *discors* and *abrotanifolia* maintained by Linnæus, Stackhouse, Smith, Lamouroux, and by Turner in his *Synopsis Fucorum*. The latter, in his subsequent admirable work the *Historia Fucorum*, united them under the Linnean name of *feniculacea*, in which I entirely concur, though my friend Professor Agardh still retains both.

In my determination upon this point I have been materially assisted by the practical observations of Mrs Griffiths, through whose kindness I am in possession of a beautiful series of specimens illustrative of the various states of the plant.

One of the most remarkable features in this species is the roughness more or less present in the primary branches, arising from little processes which Mr Turner justly compares to the rudiments of abortive branches. Near the base they are half a line long or more, but decrease in the upper part till they become mere dots. They are, in fact, another instance of the proneness to transformation among the parts of these vegetables. The thin plane leaves become filiform branches, and the dots upon them, which at first look like glands or pores on the surface, become elongated into rigid, blunt bristles.

The *colour* in the branches is rather pale olive green; *substance* flexible and cartilaginous.

5. CYSTOSEIRA FIBROSA.

Fronde bushy very much branched, branches filiform the terminating branchlets (or leaves) linear plane, vesicles elliptical mostly solitary, receptacles filiform much elongated.

Cystoseira fibrosa, Ag. Sp. Alg. v. 1. p. 65. Syst. Alg. p. 285. Spreng. Sp. Pl. v. 4. p. 317.
Fucus fibrosus, Huds. Fl. Ang. p. 575. Turn. Syn. p. 93. Hist. Fuc. t. 208. Sm. Eng. Bot. t. 1969. Lamour. Essai, p. 18.

HAB. In the sea. Perennial. Summer. Falmouth, *Turner*. Ilfracombe, *Goodenough*. Weymouth, *Pulteney*. Coasts of Yorkshire and Hampshire, *Hudson*. Dover, rare, *Dillwyn*. Yarmouth Beach, but rarely seen, *Mr Wigg*. Selsey, *Mr Borrer*.

Root a hard spreading disk. *Fronde* two to three feet long: *stem* as thick as a swan's quill, about a foot in length, nearly cylindrical, set with distichous alternate undivided branches, the lower ones of which become gradually broken off: *branches* bushy, subcylindrical, one or two feet long, producing many subordinate divisions, the ultimate ones simple or forked, plane, linear-setaceous, two lines to an inch long. *Air-vessels* above two lines in length, round-elliptical, sometimes oblong, solitary, or two or three placed at short intervals, generally towards the base of the branchlet on which they occur. *Receptacles* simple or divided, filiform, torulose, half an inch to above an inch long, set with little setaceous plane ramuli or leaves.

The young plant, and often also the young branches, when any happen to arise near the base of the stem, are furnished with flat simple incurved leaves, one or two inches long, nearly linear, one or two lines broad, having a midrib, and a paler colour. Sometimes the whole fronde bears plane linear leaves, only much smaller. The *sub-*

stance is woody in the stem, and coriaceous in the rest of the frond. Colour yellowish olive-green.

The vesicles of this fine species, which are three or four times wider than the part in which they appear, and about the size of a vetch-seed, and the bushy and somewhat harsh appearance of the frond, serve to distinguish it at first sight.

GENUS III. HALIDRYS, Lyngb. Tab. I.

GEN. CHAR. Frond compressed, coriaceous, linear, pinnated with distichous branches. Air-vessels lanceolate, stalked, divided by transverse septa. Receptacles lanceolate, stalked, compressed. Seeds in distinct cells.

On this genus Lyngbye (the author) has conferred a name expressive of the habit of the only known species, when growing in the water. It is derived from two Greek words, the one signifying the sea, the other a tree. I say the only known species; for though Lyngbye himself has admitted into it *Fucus nodosus*, I cannot conceive it possible that they should continue to be associated. The latter is undoubtedly a true *Fucus*. By Lamouroux *Halidrys* was considered to form a part of the fourth section of his genus *Fucus*, distinguished only by the form of the vesicle. By Agardh it is arranged with *Cystoseira*. M. Gaillon not only follows Lyngbye in continuing to retain *Fucus nodosus*, but adds besides, *Fucus comosus* of Labillardière, and *Fucus Sysimbrioides* and *Horneri*, of Turner.

1. HALIDRYS SILIQUOSA. Tab. I.

Halidrys siliquosa, Lyngb. Hydroph. Dan. p. 37.

Cystoseira siliquosa, Ag. Sp. Alg. v. 1. p. 72. Syst. Alg. p. 287. Spreng. Sp. Pl. v. 4. p. 317. Grev. Fl. Edin. p. 285.

Fucus siliquosus, Linn. Sp. Pl. p. 1229. Stackh. Ner. Brit. t. 5. Turn. Syn. p. 60. Hist. Fuc. t. 159. Lamour. Essai, p. 17. Sm. Eng. Bot. t. 474.

VAR. β minor, *Fucus siliculosus*, Stackh. Ner. Brit. t. 11.

HAB. in the sea. Var. β in rocky basins and pools exposed by the tide. Perennial. Common on almost every part of the British coast.

Root a hard conical disk. Frond one to four feet long, linear, flexuose, compressed, mostly undivided, pinnated irregularly with spreading branches of various lengths, in a distichous manner: the branches rarely again divided, but set, as well as the main stem, at

short intervals, with vesicles. *Vesicles* linear-lanceolate, about an inch long, and one to two lines broad, compressed, supported on little stalks about two lines in length, and terminated by a flat linear beak, generally a few lines, but often as long as themselves. On the external surface of the vesicles it is easy to perceive transverse furrows, about a line asunder, indicating a similar number of dissepiments, by which the interior is divided into many distinct cavities. *Receptacles* situated at the summit of the branches, distichous like the vesicles, and nearly of the same form, scarcely an inch long, linear-lanceolate, compressed, pedunculate, the surface dotted with pores, communicating with the immersed collections of seeds.

Substance coriaceous. *Colour* pale olive opake green.

In the young state, the plant is furnished with flat linear leaves, about a line broad and two inches long, traversed by an obscure midrib, and entire at the margin: they soon pass into branches.

The variety *minor* is commonly six to twelve inches in height, with every part much smaller and narrower. Mr Turner also records another variety which he names *Denudata*, having "a very narrow compressed stem, and long, thin, flat leaves, without any appearance of their any where swelling into vesicles or pods: the width of the plant is scarcely half a line, and nearly the same in all its parts." I fear that this variety, gathered at Weymouth by Mr Bryer, must be denominated rather an extraordinary state of the plant, developed under peculiar circumstances; a point of view in which Mr Turner himself regards it in the *Synopsis Fucorum*.

The larger states of this Alga are produced in deep water. Specimens intermediate between variety *minor* and the common appearance, I have gathered in a growing state in deep pools in the Isle of Bute, two feet in length. At Sidmouth, in the winter 1827-8, I obtained others from the sea-beach with the whole frond singularly broad: the vesicles are oblong and one-third of an inch in breadth.

In some parts of Norway, this species, as well as *Fucus nodosus*, is known by the name of *Knoptang*. It is not put to any use.

GENUS IV. FUCUS. *Linn. Ag. Tab. II.*

GEN. CHAR. Frond plane, compressed or cylindrical, linear, dichotomous, coriaceous. Air-vessels when present, innate in the frond, simple, large. Receptacles terminal (except in *F. nodosus*), turgid, containing tubercles imbedded in mucus, and discharging their seeds by conspicuous pores.

This genus, the name of which is derived from a Greek word, signifying either a paint or dye, or a sea-weed, was applied by Linnæus to almost every marine plant not comprehended in his genera *Ulva* and *Conferva*, and remained entire for many years. At length (for it is hardly worth while to describe the attempts of Donati, Adanson, and Roussel) Decandolle broke in upon the old system, by transferring from the genus *Fucus* to *Ulva* all those species which are destitute of tubercular fructification. In 1813, M. Lamouroux divided the inarticulated *Algæ* into two orders and seventeen genera, and laid the groundwork of every succeeding arrangement; but the plants he retained under the original generic name of *Fucus* were obviously susceptible of farther division; and, accordingly, Agardh established some new genera in his *Synopsis Algarum Scandinaviæ*, and Lyngbye others in his *Tentamen Hydrophytologiæ Danicæ*. Agardh, in his two subsequent works, has made farther alterations; and M. Gailon, in the *Dictionnaire des Sciences Naturelles*, after adopting the system of Lamouroux, suggests various changes, not perhaps in most instances very judicious. The genus *Fucus* is, however, now pretty well defined, and in Agardh's *Systema Algarum* contains only fourteen species, of which I have thought it right to exclude *F. loreus* and *F. rugosus*,—the former will be found in this work under *Himantalia*; the latter I have made the type of a new genus, under the name of *Splachnidium*. *Fucus Banksii*, Turn., which Agardh has referred to *Cystoseira*, is also made the foundation of a distinct genus by M. Bory de St Vincent.

The species are peculiarly coriaceous, and mostly of robust growth; the frond, when plane, is furnished with a midrib; the vesicles are large, hollow, with a single cavity; the receptacles, when ripe, are turgid with mucus, mostly of an elliptical form (in *F. serratus*, imbedded in the flat extremities of the frond), and large size; the seeds and

mucus passing through the pores in abundance; after maturity, the receptacles change colour and decay. On the surface of the frond in many species, are minute pores, from which issue little tufts of white filaments, the use of which has not been discovered. In all the species the root is in the form of a hard disk.

* *Frond plane, with a midrib.*

1. FUCUS VESICULOSUS. Tab. II.

Frond plane linear dichotomous entire at the margin, air-vessels roundish-oval in pairs, receptacles mostly elliptical terminating the branches.

Fucus vesiculosus, Linn. Sp. Pl. p. 1626. Stackh. Ner. Brit. t. 2. Turn. Syn. Fuc. p. 117. Hist. t. 88. Lamour. Essai, p. 18. Sm. Eng. Bot. t. 1066. Lyngb. Hydroph. Dan. p. 3. t. 1. Ag. Sp. Alg. v. 1. p. 87. Syst. Alg. p. 275. Grev. Fl. Edin. p. 283. Crypt. Fl. t. 319. Spreng. Sp. Pl. v. 4. p. 315.

● *Fucus divaricatus*, Linn. Sp. Pl. p. 1627. Light. Fl. Scot. p. 909.

Fucus inflatus, Linn. Sp. Pl. p. 1627. Light. Fl. Scot. p. 910.

Fucus spiralis, Linn. Sp. Pl. p. 1627. Stackh. Ner. Brit. t. 5. Sm. Eng. Bot. t. 1685.

Fucus volubilis, Huds. Fl. Angl. p. 577.

Fucus angustifolius, With. Bot. Arr. Ed. 6. v. 4. p. 109.

Fucus Sherardi, Stackh. Ner. Brit. t. 13.

Fucus linearis, Huds. Fl. Angl. p. 578.

Fucus distichus, Lightf. Fl. Scot. p. 912.

VAR. β *subcostatus*, densely tufted, one or two inches in height, midrib indistinct, no receptacles or vesicles, Ag. Sp. Alg. v. 1. p. 92.

Fucus Balticus, Ag. Sv. Bot. t. 516. Grev. Crypt. Fl. t. 181.

HAB. Sea-Shores. Perennial. Summer and autumn. Very common every where. Var. β , in salt-marshes only occasionally flooded by the sea. Near Dunstaffnich Castle, and on the Island of Kerera, *Mr Maughan*. Appin, *Captain Carmichael*. Isle of Arran, *Hooker*. Isle of Bute, near Point-House.

Root a hard flattish disk. *Frond* a few inches to three or more feet in length, and two or three lines to an inch in width, flat, furnished with a midrib, occasionally twisted in a spiral manner, repeatedly dichotomous, the angles of the dichotomies acute, except when a solitary vesicle happens to be placed there: the sterile branches obtuse, and often notched at the extremity. *Air-vessels* from the size of a pea to a hazel-nut, in pairs, and situated at irregular intervals, in different parts of the frond: sometimes two or three pair are arranged close to each other. They are rarely altogether wanting. *Receptacles* terminal, compressed, mostly ovate or elliptical, and about half an inch long, but varying from nearly spherical, to linear-lanceolate, and in length from a quarter of an inch to nearly two inches: they are also mostly in pairs, but are sometimes solitary, and occasionally forked. The

whole frond is prolific in a remarkable degree in cases of injury, throwing out numerous new shoots from the injured part.

The variety β , is not more than one or two inches high, half a line to one line wide, obscurely midribbed. It is only twice or thrice divided, erect, and densely crowded, forming extensive masses among the herbage peculiar to salt-marshes.

Substance thickish, flexible, very tough. *Colour* dark olivaceous glossy green, paler at the extremities: in var. β , tawny-yellow. In drying it becomes blackish, and does not adhere to paper.

I find most of the varieties of this species running so insensibly into each other, that I have ceased to consider them as capable of being strictly defined. Even the var. β . is rather an extraordinary *state* than any thing else, depending chiefly on negative characters. When Marine Algæ were less understood, many trifling appearances were considered to be of importance, which are now regarded in their proper light. Among such instances may be enumerated the twisting of the frond, and the occasional inflation of the frond, which is nothing more than an accidental accumulation of air between the two membranes or coats, often distending a portion of the frond for the space of two inches or more. Upon these circumstances two of the Linnæan species depend. In regard to the form of the receptacles, it may be observed, that they differ even on the same individual; and that they are rarely so constant as to deserve separation. Most of the many appearances remarked in this species, are caused by the influence of locality.

This plant is the *common Sea Ware* or *Sea Wrack* of the English: the *Kelp Ware* and *Black Tang* of the Scots. It is applied to many uses, but is chiefly employed in the making of kelp, upon which indeed depends the value of many estates in the Western Islands of Scotland. It serves as winter food for the cattle, which come regularly down to the shore at ebb-tide, in search of it. The inhabitants of Gothland, according to Linnæus, boil it, and, after adding a little coarse flour, give it to their hogs, and consequently know it by the name of *Swintang* or *Swine-tang*. The dried frond is used for fuel in several parts of the north; and in the Hebrides, cheeses are covered with the ashes, and in this manner dried without salt. The ashes, in fact, are said to contain half their weight of alkaline salt.

2. FUCUS CERANOIDES.

Fronde coriaceo-membranaceous flat midribbed linear entire at the margin without vesicles, the fertile branches lateral spreading narrower repeatedly divided in a flabelliform manner, receptacles terminal linear-acuminate nearly cylindrical.

Fucus ceranoides, Linn. Sp. Pl. p. 1626. Turn. Syn. Fuc. p. 136. Hist. Fuc. t. 89. Lamour. Essai, p. 18. Sm. Eng. Bot. t. 2115. Lyngb. Hydroph. Dan. p. 5. Ag. Sp. Alg. v. 1. p. 93. Syst. Alg. p. 277. Grev. Fl. Edin. p. 284. Spreng. Sp. Pl. v. 4. p. 315.

HAB. Sea shores. Perennial. Spring and summer. Coast of Hampshire, *Goodenough*. Shoreham, *Turner*. Anglesea, *Rev. H. Davies*. Fawy River, near St Winnoe, *Mr E. Forster junior*. Swanage and Poole, *Pulteney*. Larne, near Belfast, *Dr Drummond*. Near the Castle of Aros, in Mull, *Messrs Turner and Hooker*. Brodick Bay, in Arran, *Hooker*. Loch of Stenhouse, Orkney, *Rev. C. Clouston*. Frith of Forth, near Cramond, *Mr Maughan*. Loch Long. Loch Fine. Isle of Bute.

Root a hard disk. Frond six to twenty inches long, two to four lines broad, several times dichotomous, but in a very unequal and irregular manner, bifid or palmate at the summit of the sterile branches, the surface dotted with minute pores (as in *F. vesiculosus*) from which issue minute tufts of white filaments. Fructification produced on lateral branches given off alternately from the main divisions of the frond, spreading, narrower than the main divisions, much branched in a radiating or fan-like manner. These fertile branches are two to four inches long at the bottom, but become shorter towards the extremity of the frond. Receptacles half an inch to an inch in length, solitary or in pairs.

Substance between membranaceous and coriaceous. Colour olivaceous green, often tinged with red or yellow. In drying it becomes black, and does not adhere to paper.

The description here given, will, I hope, be sufficient to distinguish this species at once from the preceding one. I may add, however, that it is far less tough, much thinner and more transparent, in every part, both in the growing and the dried state. The midrib is finer and more clearly defined. The base of the frond is often composed for several inches of nothing but the midrib, stripped of the foliaceous part, and looking like a slender filiform stem. It is very frequently found growing upon stones, with the lower part buried in sand, gravel or mud. Occasionally the sterile extremities of the frond become in-

flated with air in the same manner as *F. vesiculosus*. The practical botanist is well aware that the whole plant dries under pressure in half the time that the species last mentioned requires to part with its moisture.

3. FUCUS SERRATUS.

FronD flat midribbed serrated at the margin, receptacles flat solitary terminating the branches of which they are simply continuations.

Fucus serratus, Linn. Sp. Pl. p. 1636. Stackh. Ner. Brit. t. 1. Turn. Syn. Fuc. p. 110. Hist. Fuc. t. 90. Lamour. Essai, p. 19. Sm. Eng. Bot. t. 1291. Lyagh. Hydroph. Dan. p. 5. t. 1. Ag. Sp. Alg. v. 1. p. 95. Syst. Alg. p. 278. Grev. Fl. Edin. p. 284. Spreng. Sp. Pl. v. 4. p. 316.

HAB. Sea shores. Perennial. Winter and spring. Frequent on most parts of the British coast.

Root a hard disk. Frond two to six feet long, half an inch to two inches broad, regularly dichotomous, and totally destitute of vesicles, the margin serrated. Receptacles merely a thickened prolongation of the frond, one to three inches in length, in which the tubercles are immersed. The surface of the frond abounds in the same minute pores with tufts of white filaments that exist in the two preceding species.

Substance very tough and coriaceous. Colour dark olivaceous green. In drying it changes to black, and does not adhere to paper.

Mr Dawson Turner has described two varieties: the first, named *integerrimus*, has the marginal serratures nearly obsolete; the margin, however, is still hardly sufficiently entire to admit of the plant being mistaken, even when out of fruit, for *F. vesiculosus*. This variety abounds on the Chit Rocks at Sidmouth. The second variety is named *latifolius*, having the upper branches as wide again as the lower ones, so as to render them rounded at the end, and elliptical-ovate. I have specimens of this from the Isle of Bute, with the upper branches two and a half inches broad even after having been dried. A third very striking variety I have also gathered in the Isle of Bute, which may be named *laciniatus*. The serratures are narrow, two or three lines long or more, and cleft or lacinate, the laciniæ being often quite subulate.

In some parts of Scotland this species has received the names of *Black Wrack* and *Prickly Tang*. Compared with *F. vesiculosus*, it is unproductive in the manufacture of kelp. The Norwegians mix it with meal, and feed their cattle with it. It is a very handsome species, especially the broad variety.

* * *Fron*d plane or compressed, without a midrib.

4. FUCUS NODOSUS.

Fron

d compressed without a midrib, vesicles solitary at remote intervals, receptacles lateral somewhat pear-shaped distichous stalked.

Fucus nodosus, Linn. Sp. Pl. p. 1628. Stackh. Ner. Brit. t. 10. Turn. Syn. Fuc. p. 252.
 Hist. Fuc. t. 91. Sm. Eng. Bot. t. 570. Lamour. Essai, p. 19. Ag. Sp. Alg. v. 1. p. 85.
 Syst. Alg. p. 275. Grev. Fl. Edin. p. 284. Spreng. Sp. Pl. v. 4. 316.
Halidrys nodosa, Lyngb. Hydroph. Dan. p. 37. t. 8. Gall. in. Dict. Sc. Nat. v. 4. p. 316.

HAB. Sea shores. Perennial. Winter and spring. Common.

Root a hard conical disk. *Fron*ds tufted, two to six feet long, two or three lines wide, linear, a few times dichotomous, the divisions irregularly pinnated with spreading branches attenuated at their base almost to a point and furnished with minute, remote, distichous, teeth: from the axils of which the receptacles and young branches are produced. *Vesicles* from three quarters of an inch to one inch and a half in length, elliptical or oblong, swelling to three or four times the diameter of the frond, of which they seem to be inflated portions. *Receptacles* arising distichously from the whole of the frond, varying from spherical to oblong, half an inch to an inch in length, solitary or several together, of an orange-yellow colour when ripe, supported upon a little compressed stalk.

Substance remarkably tough and coriaceous. *Colour* opaque olivaceous green. In drying, every part, except the ripe receptacles, turns black, and does not adhere to paper.

Like the other larger Algæ, its mode of growth is more or less influenced by its situation; several varieties might therefore be enumerated depending for their characters upon size and relative proportion of the different parts. When growing in deep water the frond is carried out to a great length, the vesicles are distinct and very large, and the receptacles mostly towards the extremity. In shallow water, where the plant is a good deal exposed to the sun, the frond is sometimes not above a foot long, and crowded with large yellow receptacles in a very beautiful manner. When injured, the whole frond is capable of producing new shoots in the utmost profusion. A singular but solitary specimen, distinguished by linear-lanceolate receptacles, was found at Dover by Mr Dillwyn, and communicated to Mr Turner, in whose *Historia Fucorum* it forms the variety *siliquatus*.

This species is known in some parts of the kingdom by the name of *Sea-whistles*, in consequence of the custom which the children have of

converting the vesicles into whistles, by cutting them in a particular manner. Mr Neill mentions, that, in Orkney, it is called *Yellow Tang*, on account of its conspicuous yellow receptacles. In Norway it is named *Knoptang*, because of the knob-like vesicles. It is a valuable species in the making of kelp. *Polysiphonia fastigiata* (*Conferva polymorpha* of British authors) is parasitic upon it, and indeed rarely to be found elsewhere.

5. FUCUS MACKAIL.

FronD between compressed and cylindrical almost filiform dichotomous uniform, vesicles elliptical solitary.

Fucus Mackaili, Turn. Hist. Fuc. t. 52. Sm. Eng. Bot. t. 1927. Lamour. Essai, p. 20. Ag. Sp. Alg. v. 1. p. 87.

Fucus nodosus var. γ *Mackaili*, Ag. Syst. Alg. p. 275. Spreng. Sp. Pl. v. 4. p. 316.

HAB. Sea shores. Perennial. Cunnemara, county of Galway, *Mr J. T. Mackay*. Loch Seaforth, *Lord Seaforth*. Arasaig, *Mr Borrer*. Loch Coul and Kyle Scough, Sutherland, *Messrs Borrer and Hooker*. Eastern coasts of the Isle of Skye, and head of Loch Duich, *Messrs Hooker and Greville*.

FronD six to nine inches long, one to two lines wide, becoming narrower towards the extremity where it is filiform and cylindrical, towards the base and in the broader varieties compressed; dichotomous, and crowded with branches more or less divaricated at the axils, and terminating in short obtuse forks. *Vesicles* scattered, solitary, two or three lines long, elliptical, wider than the frond in which they are innate. *Receptacles* unknown.

Substance coriaceous, when dry hard and horny and semitransparent. *Colour* olivaceous green, often tinted with brown or yellow. In drying it does not become very much darker.

As the fructification of this plant is unknown, some doubt exists whether it be really a distinct species. Agardh in his last work has made it nothing more than a variety of *F. nodosus*, and it is highly probable that farther information may prove him to be correct. Perhaps the very circumstance of the plant having never been observed in fructification, though produced in inconceivable abundance, is in favour of its being a variety. I once saw the sea-beach in the Isle of Skye covered with it to the extent of an acre in one place, and presenting a most deceitful surface; for the sea had left the whole mass apparently growing in an erect manner, bristled with the tops of the filiform branches, and completely concealing a dangerous muddy shore that lay

beneath. As I could never find it actually growing, it is probably an inhabitant of deep water, and to that cause may be in part attributed its very peculiar appearance.

The excellent Lamouroux committed a singular error in placing this species in that section of the genus *Fucus*, which contains plants with a channelled frond destitute of vesicles; yet, at the same time, he refers to Turner's very faithful representation.

6. FUCUS CANALICULATUS.

Frond flat channelled dichotomous linear without a midrib and without vesicles, receptacles terminal oblong.

Fucus canaliculatus, Linn. Syst. Nat. v. 2. p. 716. Sm. Eng. Bot. t. 823. Turn. Syn. Fuc. p. 242. Hist. Fuc. t. 3. Lamour. Essai, p. 20. Lyngb. Hydroph. Dan. p. 6. t. 1. Ag. Sp. Alg. v. 1. p. 96. Syst. Alg. p. 279. Grev. Fl. Edin. p. 284. Spreng. Sp. Pl. v. 4. p. 316.

HAB. Rocks on the sea-shore. Perennial. Summer and autumn. Common on most parts of the British coast.

Root a conical disk. *Fronde* tufted, numerous, two to six inches long; several times dichotomous, one to three lines wide, distinctly channelled. *Receptacles* oblong, obtuse, simple or bifid, compressed, wider than the frond, half an inch to an inch in length.

Substance tough and pliable. *Colour* olivaceous green, the receptacles yellow when ripe. In drying it does not adhere to paper, and becomes blackish.

One of those species which are satisfied with only periodical immersion. It grows upon the rocks and large stones within the reach of the flow of every tide.

* * * *Frond cylindrical. Receptacles terminal.*

7. FUCUS TUBERCULATUS.

Frond filiform erect dichotomous without vesicles, receptacles terminal cylindrical.

Fucus tuberculatus, Huds. Fl. Angl. p. 568. Turn. Syn. Fuc. p. 305. Hist. Fuc. t. 7. Sm. Eng. Bot. t. 796. Lamour. Essai, p. 20. Stackh. Ner. Brit. t. 9. Ag. Sp. Alg. v. 1. p. 98. Syst. Alg. p. 279. Spreng. Sp. Pl. v. 4. p. 316.
Fucus bifurcatus, Wkh. Bot. Arr. ed. 6. v. 4. p. 131. t. 17. f. 1.

HAB. In the sea. Perennial. Summer and autumn. Near St Ives, Hudson. Near Acton Castle, in pools left by the tide, Stackhouse. King's Cove and St Michael's Mount, Cornwall, Turner. Lizard Point, Mr E. Forster junior. Ilfracombe, Goodenough. Bill of Portland, below low water mark, Mr Bryer. North of Ireland, Dr Scott.

Root a small disk accompanied with a few creeping processes. *Fronds* six to twelve inches high, as thick as a small goose-quill, nearly simple towards the base, repeatedly dichotomous in the upper part, the axils obtuse. *Receptacles* solitary, nearly twice as thick as the frond, half an inch to an inch or more in length, cylindraceous, obtuse.

Substance coriaceous, shrinking very much in drying, and becoming black, rigid and very brittle, without adhering to paper. *Colour* olivaceous green.

There is something peculiar in the habit of this plant, and the root differs in some degree from that of the other FUCOIDEÆ. It may ultimately form a distinct genus. Though said to grow abundantly in several places, it must be considered as generally of exceedingly rare occurrence on the British coast. The finest specimens I have seen, were communicated by M. Chauvin from the coast of Normandy.

GENUS V. HIMANTHALIA, *Lyngb.* Tab. III.

GEN. CHAR. Frond coriaceous, orbicular, peziziform. Vesicles none. Receptacles elongated, strap-shaped, compressed, dichotomously divided, springing from the centre of the frond, containing immersed tubercles furnished with a pore.

A genus removed from *Fucus* by Lyngbye; and it must be confessed, the habit is so different and peculiar, that we cannot wonder at its separation. Lyngbye, however, does not seem to have formed his genus upon the best grounds. For he considers the peziziform base as a part of the root, and the remainder as the frond. In this he is surely in error, though supported by the authority of my friend Agardh. The peziziform expansion, I am led by my investigations to regard, along with Wahlenberg, as the true frond in the strict sense, and the elongated part as a true receptacle. The part which I name the frond, attains nearly its full size before it begins to develop the receptacle, which is exclusively occupied with the tubercles.* La-

* Since the above was written, I have received the Botanical part of Duperrey's Voyage round the World, in which I find that an able naturalist,

mouroux also at one time considered it a distinct genus, and named it *Loricaria*. The frond he regarded as a solitary leaf at the base of the branches, for so he denominated the divided receptacle. The generic name is literally translated by the common English appellation for the plant *Sea Thongs*.

I. HIMANTHALIA LOREA. Tab. III.

Frond subpyriform at length collapsing plano-concave stalked, receptacles repeatedly dichotomous linear slightly tapering at the extremity.

Himanthalia lorea, Lyngb. Hydroph. Dan. p. 36. t. 8. Grev. Fl. Edin. p. 285. Gaill. in Dict. Sc. Nat. v. 53. p. 357.

Fucus loreus, Linn. Syst. Nat. v. 2. p. 716. Stackh. Ner. Brit. t. 10. Sm. Eng. Bot. t. 569. Turn. Syn. Fuc. p. 246. Hist. Fuc. t. 196. Lamour. Essai, p. 19. Ag. Sp. Alg. v. 1. p. 9E. Syst. Alg. p. 280. Spreng. Sp. Pl. v. 4. p. 316.

Fucus elongatus, Linn. Sp. Pl. p. 1627.

HAB. Rocks in the sea. Annual. Winter and spring. Common on most of the British shores.

Root a small disk. *Fronde*s generally growing together in a crowded manner, at first either cylindrical and somewhat pear-shaped, or nearly globose, soon collapsing and becoming plano-concave, an inch or more wide, and supported on a stem half an inch to an inch in height. Out of the centre of this peltate frond arise one to three *receptacles*, two to ten or more feet in length, three or four lines in width, linear, compressed, repeatedly dichotomous, all the divisions of nearly equal length, and looking very much like a set of leather thongs. *Fructification*, tubercles immersed in the whole length of the receptacle, discharging their seeds along with abundance of mucus through their pores.

Substance coriaceous and tough. *Colour* olivaceous green. In drying it adheres somewhat to paper on account of the quantity of mucus in the receptacle, and becomes black, rigid and brittle.

I have already mentioned that the common name for this *Alga* is *Sea Thongs*. Mr Neill states, that, in Orkney, it is called *Drew*, —a name, he observes, which would seem to be etymologically related to the *Badreux* of the Straits of Magellan. This, again, appears to have some connection with *Baudrier*, or *Baudraie*, the name given to *Laminaria saccharina* on some parts of the French coast. *H. lorea*

Bory de St Vincent, has taken precisely the same view of *Himanthalia*, and has added a second species.

is a large plant, being frequently six feet, sometimes ten, and even, according to Borlase, in his History of Cornwall, twenty feet in length. In Orkney, where it is plentiful, it is made into excellent kelp. In regard to its duration, it appears to commence its vegetation in the spring, and to arrive at maturity in the early part of the spring following.

ORDER II.—LICHINEÆ.

Plants marine, of a blackish green colour, changing to deep black on exposure to the air, of a cartilaginous substance and fibrous structure. Frond flat or cylindrical, minute, branched in a dichotomous or subpalmate manner. Fructification terminal or nearly terminal, composed of capsules furnished with a pore, and filled with a colourless gelatinous mass of very fine filaments, among which, pellucid oval or oblong seeds are disposed in many radiating moniliform series.

GENUS VI. LICHINA, Ag. Tab. VI.

GEN. CHAR. Frond cartilaginous, blackish green, dichotomous. Fructification, roundish capsules of the same colour, containing radiating moniliform lines of pellucid seeds imbedded in a gelatinous mass of filaments.

A very curious genus of marine *Algæ*, containing only two species, one of which was placed in the Lichen family by Acharius and Sir J. E. Smith. Agardh arranged the genus among his *FUCOIDEÆ*, but it must be kept in mind, that, at the time he wrote, the seeds had not been observed: these are extremely minute, pellucid, and furnished with no limbus. The fructification, in fact, bears no affinity with that of the *FUCOIDEÆ*; and when taken along with the colour and structure of the frond, the two species are equally excluded from every other order. When the contents of the capsule are superficially viewed, they resemble what we find in many *Sphæriæ* more than any

thing hitherto observed among the *Algæ*. In regard to habit, the LICHINEÆ touch closely on the boundary of the Lichens.

One species was described by Lamouroux as a *Chondrus*: and the author of the article *Lichina* in the *Dictionnaire Classique d'Histoire Naturelle*, affirms that *Gigartina pygmæa* of the same botanist is also *Lichina pygmæa* or *confinis*. It is, however, quite impossible that the figure given by Lamouroux under that name in his *Essai*, p. 49. t. 4. f. 12. & 13., can be intended for either.

The generic name expresses the resemblance which both species bear to some lichens.

I. LICHINA PYGMÆA. Tab. VI.

FronD between flat and compressed, the capsules globose.

Lichina pygmæa, Ag. Sp. Alg. v. 1. p. 105. Syst. Alg. p. 274. Grev. Fl. Edin. p. 286. Spreng. Sp. Pl. v. 4. p. 315.

Chondrus pygmæus, Lamour. Essai, p. 40.

Fucus pygmæus, Lightf. Fl. Scot. p. 964. t. 32. Turn. Syn. Fuc. p. 258. Hist. Fuc. t. 204. figs. a—h. Sm. Eng. Bot. t. 1332.

Fucus pumilus, Huds. Fl. Ang. p. 584.

Fucus lichenoides, Good. & Woodw. in Linn. Trans. v. 3. p. 192.

HAB. Rocks on the sea-shore, nearer to high than low water mark. Perennial. Autumn. Very abundant on the south-west coast of England. Frequent on the coast of Cornwall, *Stackhouse*. Falmouth, Ilfracombe, and Sidmouth, *Turner*. Isle of Portland, *Goodenough*. Weymouth, *Pulteney*. Abundant on the coasts of Pembrokeshire and Glamorganshire, *Dillwyn*. Coast of Northumberland, *Winch*. Bantry Bay, *Miss Hutchins*. Orkney, *Rev. C. Clouston*. Frith of Forth.

Root a disk. Fronds densely tufted, about half an inch in height, flat, less than half a line in width, repeatedly divided in an irregularly dichotomous manner, the main branches often somewhat palmate: branches spreading, obtuse at the extremity. Fructification, subglobose, capsules situate at or near the top, and often clustered together: they are furnished with an obvious pore, and contain a colourless gelatinous mass of fine filaments and lines of oval-oblong pellucid seeds. Substance cartilaginous. Colour blackish green. When dry it becomes rigid and deep black.

I believe this plant occurs on almost every part of the British coast; but as the following species has been more or less confounded with it, it is impossible to speak with precision regarding it. The present one is by far the most common of the two, and often covers the rocks to a very considerable extent. It is also much larger, and has

less of a crustaceous appearance than the other. Upon the authority of Bory de St Vincent, M. Durville met with it on the coast of Chili.

The capsules, after having been emptied of their contents, collapse, and, by the gradual disappearance of the upper part, at length resemble the old shields of a Lichen.

2. LICHINA CONFINIS. Tab. VI.

Fronde cylindrical, capsules terminal oval.

Lichina confinis, Ag. Sp. Alg. v. 1. p. 105. Syst. Alg. p. 274. Grev. Fl. Edin. p. 28. Spreng. Sp. Pl. v. 4. p. 315.

Fucus pygmaeus, var. *β minor*, Turn. Hist. Fuc. t. 204. f. 1—c.

Lichen confinis, Ach. Prodr. Lich. p. 208. Sm. Eng. Bot. t. 2575.

HAB. On marine rocks very near high water mark. Perennial. Autumn. Bantry Bay, *Miss Hutchins.* Dunbar, *Turner.* Rocks opposite Caroline Park, near Edinburgh.

Root a minute disk. *Fronde*s densely tufted, two or three lines in height, spreading in a concentrical manner, and covering the rocks like a lichen; cylindrical, irregularly branched, the branches erect, obtuse at the apex. *Capsules* oval, terminal, furnished with a pore, and filled with a gelatinous mass of fine filaments, among which the oval colourless seeds are arranged in radiating lines. After the contents of the capsule have escaped, the orifice enlarges, as in *L. pygmaea*, and at length becomes a mere concave empty disk. *Substance* cartilaginous. *Colour* blackish green. In drying it becomes rigid and quite black.

It cannot be considered as surprising that this minute plant should have been described as a lichen in the Flora Danica, English Botany, and the works of Acharius. At a little distance, it is not to be distinguished from some species of *Collema*, and the mode of growth tends still farther to deceive the eye; for the centre of the tuft dies away, leaving the circumference entire, which continues to enlarge itself in a concentrical manner. The structure of the frond is in every respect similar to that of the preceding species.

 ORDER III.—LAMINARIÆ.

Plants all marine, of an olive-brown or olive-green colour, becoming somewhat darker on exposure to the air ; varying from coriaceous to membranaceous. Frond with a lobed or fibrous root, more or less stipitate, and forming a plane, entire or cleft expansion, in a few cases furnished with one or more ribs. Vesicles none, except in the genus Macrocystus, unless the hollow stem of some species be considered as such. Fructification, as far as hitherto known, either seeds mixed with a mass of vertical jointed filaments, or roundish granules without filaments, forming in both cases dense spreading spots or sori on the surface of some part of the frond. Structure densely fibroso-cellular, without any appearance of reticulation.

This family of *Algæ* is proposed by M. Bory de St Vincent, in the ninth volume of the *Dictionnaire Classique d'Histoire Naturelle*, p. 191., under the name here adopted. He is borne out in this arrangement, not only by the fructification, but by the structure and habit of the group under consideration. The fructification is never tubercular, nor are the seeds surrounded by a pellucid border. The largest known *Algæ* belong to this family, and they are fixed to the rocks by a more powerful apparatus than the simple scutate base of the FUCOIDÆ. By means of thick clasping fibres, they take so firm a hold as to resist the force of the waves ; and even specimens of a very moderate size cannot be wrenched from their situation by the utmost efforts of the botanist.

The frond is flat, and characterized by its large expansion ; it tears in some given direction, and, under a moderate magnifying power, appears to be of a dense uniform organization ; but when carefully examined, is seen to be constructed of a tissue of densely interwoven filaments, and an interstitial granular mass.

GENUS VII. ALARIA, Grev. Tab. IV.

GEN. CHAR. Frond membranaceous, furnished with a percurrent cartilaginous midrib, the stem pinnated with distinct leaflets. Fructification, pyriform seeds, vertically arranged in the incrassated leaflets.

The individuals which constitute this genus I have removed from an assemblage published by Bory de St Vincent, under the name of *Agarum*. They are peculiar in the distichous fertile leaflets of the stem: in the membranaceous substance of the frond, which, moreover, differs in structure from other LAMINARIÆ. It is easily lacerated, and the lacerations take place in an oblique direction from the margin to the midrib. The surface is scattered over with minute pores, from which issue minute tufts of filaments. The *Agarum Delisei* and *Pylaii* of Bory belong to this genus.

The generic name is expressive of the winged frond.

I. ALARIA ESCULENTA. Tab. IV.

Frond elongated ensiform entire at the margin, the stem closely pinnated for a short space midway between the root and the frond with linear-oblong leaflets.

Agarum esculentum, Bory, Dict. Class. d'Hist. Nat. v. 9. p. 194.

Laminaria esculenta, Lyngb. Hydroph. Dan. p. 23. Ag. Sp. Alg. v. 1. p. 110. Syst. Alg. p. 269. Grev. Fl. Edin. p. 282. La Pylaie, Annal. des Sc. Nat. v. 4. p. 178. t. 9. f. D-F. Spreng. Sp. PL v. 4. p. 326.

Fucus esculentus, Linn. Syst. Nat. p. 718. Turn. Syn. Fuc. p. 104. Hist. Fuc. t. 117. Sm. Eng. Bot. t. 1759.

HAB. In the sea, generally in deep water. Annual. Winter and spring. Lizard Point, Kynance Cove, and Tintagel Castle, *Mr E. Forster junior*. King's Cove and St Michael's Mount, *Turner*. Coast of Cumberland, *Hudson*. Coast of Anglesea and Isle of Man, *Rev. H. Davies*. Weymouth, *Stackhouse*. Shores of Durham and Northumberland, *Winch*. Common on the coast of Antrim, *Dr Drummond*. Coast of Scotland, not uncommon, *Lightfoot*. Orkney, *Rev. C. Clouston*. Dunbar. Isle of May, and at Seafield Rocks, on the coast of Fife.

Root composed of thick hard simple or branched fibres, an inch in length or more. Stem as thick as a small goose-quill, four to eight

inches long, pinnated about the middle for an inch or more, with an irregular number of flat nerveless leaflets, two to seven inches in length, filiform at their origin, then becoming linear wedge-shaped, or linear-oblong, and varying in breadth from a few lines to even an inch in their broadest part. From the summit of the stem commences the frond, which is from three to twenty feet long or more, and four to eight inches wide, the stem being continued in the form of a midrib to the very extremity: the surface perforated with scattered pores, from which issue minute tufts of filaments. *Fructification* situated in the thickened leaflets of the stem, in dense uniform masses, "consisting of small, narrow, pyriform, pellucid seeds, internally dotted, having on their largest extremity a white transparent globule," *Turner*.

Substance thin and membranaceous, drying beautifully and transparently without changing colour, adhering imperfectly to paper; the midrib thick and firm. *Colour* pale transparent yellowish olive-green.

The extremity of the full grown frond is never found entire, but more or less torn by the violence of the waves. The lacerations always occur in an oblique and parallel direction, from the margin to the midrib, as if regulated by a transverse venation, and indicating a structure very different from that of the other midribbed LAMINARIÆ, not even excepting *Fucus costatus* of *Turner*, which, as far as I can judge from the figure, is worthy of being formed into the type of a separate genus. In the young state, *A. esculenta* exhibits no traces of the leaflets; they are sometimes not developed until the frond is two or three feet in length.

M. de La Pylaie found, on the coast of Newfoundland, a variety with the frond so broad, that it reminded him of the leaves of the plantain-tree. A second variety he observed on the shores of the same country, no wider than a common ribband.

The midrib of this plant, when stripped of the membrane, and sometimes also the leaflets, are eaten in Ireland, Scotland, Iceland, Denmark, and the Faroe Islands. It is called in Scotland *Badderlocks* or *Hen-ware*, and in the Orkney Islands *Honey-ware*. *Dr Drummond* informs me, that in some parts of Ireland it bears the name of *Murlins*. In Newfoundland, where the species abounds, no use is made of it.

GENUS VIII. LAMINARIA, Lamour. Tab. V.

GEN. CHAR. Frond coriaceous (rarely membranaceous), plane, expanded, without a midrib. Fructification, seeds or granules forming dense sori or spots, and imbedded in the thickened surface of some part of the frond.—Fructification has only been observed in *L. bulbosa*, *digitata*, *saccharina*, and the exotic *purpurascens*.

The name of *Laminarius* (derived from the Latin word *lamina*, a thin plate or substance); was first appropriated to this genus, but in an indefinite manner, by Roussel, in his *Flore du Calvados*. Lamouroux, by a slight alteration, changed the name to *Laminaria*, and introduced it with an amended character, into his system of *Algæ*. It has been universally adopted, with the exception of having undergone some restriction. The fructification for the most part is involved in the greatest obscurity. Some gigantic marine plants belong to this genus. The *L. buccinalis* or Trumpet-weed, of the Cape of Good Hope, has a large hollow stem, which the country people convert into a kind of horn or trumpet. The *L. potatorum* of New Holland is of such a size and firmness, that the natives manufacture vessels from the frond, for the purpose of carrying water.

By Linnæus and his followers, all the *Laminariæ* were considered as *Fuci*.

* *Frond cleft into segments.*

I. LAMINARIA DIGITATA.

Stem woody cylindrical compressed upwards, expanded at its apex into a roundish flat cartilagino-coriaceous frond, entire at the margin, and cleft into numerous ensiform segments.

Laminaria digitata, Lamour. Essai, p. 22. Lyngb. Hydroph. Dan. p. 20. Ag. Sp. Alg. v. 1. p. 112. Syst. Alg. p. 270. Grev. Fl. Edin. p. 283. Spreng. Sp. Pl. v. 4. p. 326.
Fucus digitatus, Linn. Syst. Nat. v. 2. p. 718. Stackh. Ner. Brit. t. 3. Turn. Syn. Fuc. p. 207. Hist. Fuc. t. 162. Sm. Eng. Bot. t. 2274.

HAB. In the sea, generally in deep water. Perennial. Very common.

Root composed of thick clasping fibres. Stem one to six feet in height, half an inch to near two inches in diameter, solid, very tough,

and in old plants woody, expanding at the top into a flat frond, one to five feet or more long, and nine inches to two feet or more wide; in its general outline oblong, roundish, flabelliform or somewhat reniform, cleft deeply into an uncertain number of segments, half an inch to two inches in width. *Fructification*, according to Mr Borrer, in "English Botany," linear-oblong, vertical seeds forming dense irregular thickened patches on the surface of the frond.

Substance between cartilaginous and coriaceous, of considerable thickness. *Colour* olivaceous-brown. In drying it becomes darker, much thinner, somewhat transparent, and does not adhere to paper.

M. Bory de St Vincent describes two new species, which he affirms to have been confounded with *L. digitata*. The first, *L. palmata*, is much larger, according to him, than the true *L. digitata*, the stem much longer, and the frond dilated and reflected backward, as it were, on each side the stem. The second species, *L. conica*, is chiefly characterised by the conical outline of the frond. *L. digitata* he describes as having a short stem. These new species, if really distinct, probably occur on our own coasts, as well as on those of France; but the experience I have had in these plants tends to render me very sceptical about them. The length of the stem depends greatly upon the situation and age of the specimen. The same causes likewise influence the form and magnitude of the frond. On the coast of Sidmouth I traced this species from the length of a few lines to many feet, and had occasion to remark how much variation existed. In its young state, *L. digitata* is entire, ovato-lanceolate, sometimes almost linear, and I have specimens in my possession even eighteen inches in length, without any division: these very fronds, however, in the course of a few months, become either cordate or reniform at the base, and vary prodigiously in the length and number of the segments. *L. phycodendron*, *leptopoda*, *stenoloba*, and *platyloba* of La Pylaie, may be nothing more than varieties; but with the scanty information that he has given us in the *Annales des Sciences Naturelles*, it is quite impossible to form an opinion.

L. digitata possesses the power of renewing its frond, but it is doubtful whether this process takes place in all individuals. I have frequently found specimens with an old and new frond, of equal size, attached to each other by a narrow neck; the old one cleft to the base, dark and coriaceous, the new one entire, or just beginning to split, but the segments still cohering at the base of the old one, the texture thin, and of a much paler colour. Mr Dawson Turner men-

tions the same circumstance as having come under his own observation.

In England, this species is known by the name of *Sea-girdles*. In Scotland, where the tender stalks of the young fronds are eaten, and still cried about the streets of Edinburgh, it is called *Tangle*. In Orkney it is known as *Red-ware*, and, according to Mr Neill, it is the *Stat-mhara* or *Sea-wand* of the Scots Highlanders. Bishop Gunner mentions, that the fronds and stems of young plants are boiled, and given to the cattle in Nordland. On many parts of the British coast, it is collected and thrown in heaps, and in a putrescent state extensively used as a manure. The dried stalks serve the inhabitants of the Orkney and Shetland Isles, and the coast of Brittany, for fuel. "In Scotland," relates my friend Mr Neill, "the stems are sometimes put to rather an unexpected use,—the making of knife-handles. A pretty thick stem is selected, and cut into pieces about four inches long: into these, while fresh, are stuck blades of knives, such as gardeners use for pruning and grafting. As the stem dries it contracts and hardens, closely and firmly embracing the hilt of the blade. In the course of some months the handles become quite firm, and very hard and shrivelled, so that when tipped with metal, they are hardly to be distinguished from hartshorn."

2. LAMINARIA BULBOSA.

Stem plane, with a waved foliaceous margin, once twisted at the base, arising from a large rough roundish hollow bulb, frond roundish, oblong or reniform, cleft deeply into numerous segments.

Laminaria bulbosa, Lamour. Essai, p. 22. Lyngb. Hydroph. Dan. p. 20. Ag. Sp. Alg. v. 1. p. 114. Syst. Alg. p. 271. Spreng. Sp. Pl. v. 4. p. 325.
Fucus bulbosus, Huds. Fl. Ang. p. 579. Turn. Syn. Fuc. t. 161. Sm. Eng. Bot. t. 1760.
Fucus polyschides, Lightf. Fl. Scot. p. 936. Stackh. Ner. Brit. t. 4.

HAB. In the sea, mostly in deep water. Perennial. Shores of Cornwall every where, *Hudson*. Rocks about the Isle of Portland, *Pulteney*. Dover, washed ashore after storms, *Dillwyn*. Near Torquay, *Mrs Griffiths*. Sidmouth. Iona, *Lightfoot*. Washed ashore on all the islands of the Minch, *Mr Neill*. Lossiemouth, *Mr Brodie*. Bantry Bay, *Miss Hutchins*. Larne, near Belfast, *Dr Drummond*.

Plant, in the young state, a simple undivided frond, a few inches in length, and about two inches in width, with a short filiform stem, furnished near the base with a small knot or dilatation, the root at the extremity composed of a few fibres. In this state, the minute tufts of filaments proceeding from the pores which are scattered over the sur-

face, are very conspicuous. As the growth of the plant proceeds, the stem becomes insensibly flattened, widened, and elongated, the little dilatation swells into a hollow bulb-like cavity, and throws out short thick radicles from its surface, while the original root is concealed by, and does not project beyond the bulb, which has in fact inclosed it; the frond in the mean time is cleft into segments, and increases in size and thickness. In the mature plant, the *bulb* is roundish, several inches in diameter, rough all over with short thick *papillæ*. The *stem* is from eight inches to four feet long, two to four inches wide, the margin much waved and curled, especially towards the base; at the top dilating suddenly into a roundish or reniform *frond*, two to twelve feet long, and two to several feet broad, deeply cleft into segments of various sizes. *Fructification* composed of oblong vertical seeds intermixed with filaments, forming dense continuous masses in the thickened waved margin of the stem, and sometimes spreading over the whole stem, and even the lower part of the frond.

Substance coriaceous and tough. *Colour* olivaceous or greenish-brown, glossy, the part bearing the fructification reddish, darker when dry. It does not adhere to paper.

M. Bory de St Vincent, in his article on the genus *Laminaria* in the *Dictionnaire Classique d'Histoire Naturelle*, considers the *Fucus bulbosus* of Linnæus as distinct from the *F. bulbosus* of Turner, and has named the latter *L. Turneri*. He rests his characters of the former on a thick, compressed, elongated stem, terminating in a conical, flabelliform frond, split into long segments;—of the latter, on a short much dilated stem, terminating in a fan-shaped frond, very open, or reflected laterally, and in its proportions broader than long. I will not take upon me to assert that there may not be two species confounded together; but having *L. digitata* before my eyes, which I know to differ in an equally striking degree, I am induced, in the absence of decisive and authentic specimens, to refrain from adopting M. Bory's species. In this proceeding I am supported by the experience of Mrs Griffiths, of whom it is scarcely necessary for me to observe, that few individuals at home or abroad are more practically conversant with marine *Algæ*. She has, at my request, examined this species in all its stages, and bears witness to the extreme variation occurring in every part of the plant, depending chiefly upon situation. The length of the stem is in proportion to the depth of the water. Mr Brodie states (in Mr Turner's work), that the plant, when expanded, occupies nearly the whole of a circle of thirty-two inches diameter. But a plant

recently measured by Mrs Griffiths, will give a more correct idea of the immense size of this species, which has been known to form a sufficient load for a man's shoulders. This specimen was obtained from deep water, near Torquay, and, according to my kind correspondent, was a flourishing young plant. The original fibrous root was perfect; the bulb which had formed above it was about a foot in diameter; the stem flat at the edges, about three feet in length, the upper half occupied by the young waved margin or furbelow; the frond was entire for about a foot and a half, and then split into an immense number of segments, from a quarter of an inch to six or eight inches in width, and six or more feet in length. When spread out upon the ground, it formed nearly a circle of at least twelve feet in diameter.

In examining the pores on the surface of the frond, I had occasion to observe a curious, and I believe unrecorded fact. The filaments which appear to issue from the cavity of the pores, in reality fringe the margin, and are merely free terminations of the longitudinal filaments entering into the structure of the frond. This is quite obvious in very young specimens, in which the frond is so tender that the filaments may be traced, and even removed from the margin of the pore to a considerable distance.

The substitution of the large hollow bulb for the primary root, is evidently intended as a means of furnishing the increased support which the enormous frond soon requires. The extended surface of the bulb putting forth powerful radicles from every part, when requisite, enables the mature plant to defy the winter-storm. It is the largest of the European species, and is known in many parts of England by the names of *Sea-furbelows* and *Furbelowed Hangers*. Where it abounds, it forms an excellent manure for land, and in the Orkney and the Scilly Isles, it supplies the kelp-furnace. It is rare on the eastern side of the kingdom.

* * *Frond undivided.*

3. LAMINARIA LATIFOLIA.

Stem short cylindrical expanding into an ovate-elliptical submembranaceous undivided frond.

Laminaria latifolia, Ag. Sp. Alg. v. 1. p. 119. Syst. Alg. p. 272.

Fucus saccharinus, var. *latissimus*, Turn. Hist. Fuc. v. 3. p. 160.

Uva maxima, Gunn. Fl. Norv. 2. t. 7. f. 5.

HAB. In the sea. Biennial? Thrown ashore at Yarmouth, *Mr Mason*. Frith of Forth, and Isle of Bute, in summer.

Root fibrous. *Stem* half an inch to an inch and a half long, filiform, cylindrical at the base, compressed upwards, and expanding into an ovate or ovate-oblong frond, one to two feet long or more, and six to twelve inches wide. *Substance* almost membranaceous, semitransparent. *Colour* pale olivaceous or greenish brown. In drying it does not adhere to paper, and becomes thin and membranous and acquires a yellowish hue.

I have very considerable doubts regarding the validity of this species. The fructification is totally unknown, and the only characters of any consequence are the very short stem, and form of the frond. Bishop Gunner and Agardh describe the margin as undulated: I have found it sometimes quite even. The substance, which Agardh considers as more membranous than *L. saccharina*, does not appear to be a decisive feature; for the latter has sometimes, even when ten or twelve feet long, an equally membranous frond.

4. LAMINARIA SACCHARINA.

Stem cylindrical compressed upwards and expanding into a cartilago-membranous linear or linear-oblong attenuated frond.

Laminaria saccharina, Lamour. Essai, p. 22. Lyngb. Hydroph. Dan. p. 21. t. 5. Ag. Sp. Alg. v. 1. p. 117. Syst. Alg. p. 272. Grev. Fl. Edin. p. 282. Spreng. Sp. Pl. v. 4. p. 325.

Fucus saccharinus, Linn. Sp. Pl. p. 1630. Stackh. Ner. Brit. t. 9. Turn. Syn. Fuc. p. 198. Hist. Fuc. p. 163. Sm. Eng. Bot. t. 1376.

HAB. In the sea. Perennial. Very common.

Root composed of clasping fibres. *Stem* from a few inches to several feet in length, from a quarter to about half an inch in diameter, expanding into a simple ensiform frond, two to ten feet or more in length, and two to sixteen inches in width; sometimes quite even, at others beautifully waved and curled at the margin, and very frequently bulleted, rugose, and thickened in the centre. *Fructification*, according to Turner, composed of minute oblong brown seeds mixed with filaments, and forming irregular spreading patches in the middle of the frond, which is then twice as thick as usual.

Substance varying according to circumstances from cartilaginous to coriaceous, sometimes even to membranaceous. *Colour* olivaceous brown, often with a pale yellow or reddish tinge. In drying it does not adhere to paper.

What are the real specific characters of this plant, or whether more than one species be included under the name, I confess myself utterly incapable of deciding. It has a most extraordinary range both in regard to length and breadth: then, it is sometimes opaque, and so thick as to be rigidly coriaceous, sometimes so thin as to be transparent and membranous. Sometimes it is even and plane at the margin, at others wrinkled and bullated along its whole length, and waved at the margin. At the insertion of the stem the frond is tapering, rounded, or even somewhat cordate. Bory de St Vincent has described two new species, *L. longipes* and *cornea*, which, he says, have been hitherto confounded with *L. saccharina*. Mr Turner's figure, he observes, represents a variety of his *L. cornea*. I have in vain attempted to trace this species, but find the appearances I have above enumerated subject to every combination. At the same time, it must be granted that individuals might be selected which appear to be specifically different—so long as the intermediate states are kept out of sight. In the Isle of Bute I observed many specimens cast ashore ten feet long, and more than twelve inches wide, very thin and transparent, of a very pale reddish colour, hardly at all wrinkled in the centre, but waved at the margin in so uncommon a degree, that a portion of the frond measuring one foot in length in the middle, had a corresponding margin of between four and five feet! In other specimens of a similar size and form, the substance was corneous.

A contraction which occurs in the frond of this species, as well as in *L. digitata*, Bory de St Vincent makes a character of the variety β of his *L. cornea*, which, he says, is longer, greener, and less corneous when dry than var. α ; but I have specimens exhibiting the contraction, of all forms and dimensions, even from one inch to nine feet in length; and in some, the contraction occurs near the base—in others almost quite at the extremity; in regard also to the substance of these individuals, some are quite membranaceous, some quite corneous. It cannot therefore be considered of any value as a specific character. I may observe in this place, that we may infer from the presence of the contraction in exceedingly young plants, that it does not always, at least, arise from an effort in the vegetating power to replace an old by a new frond. My observations upon this species in a growing state, induce me to think that it changes its appearance in many respects, in proportion to its age; and that a plant in its second year might almost be taken for another species. Before this Work shall reach a second edition, I hope to determine this question.

Little use is made of *L. saccharina* in this country, except in the way of manure, when mixed with other kinds of sea-weed. What Lightfoot says regarding its consumption as an article of food by the lower classes in England, is justly referred by Mr Neill to *Rhodomenia palmata*. The saccharine fucus referred to by Anderson as eaten by the Icelanders, would also appear, according to Wahlenberg and Dr Hooker, to be the same plant. Bishop Gunner mentions that in Norway it is eaten by cattle; but Wahlenberg, on the other hand, says that cattle will not touch it, and that the common name of it in Nordland is *Troll-tare*, which signifies that it is fit only for the Sea Devil. It is the *Sea-belt* of the English. The white efflorescence which appears upon the surface of this, and many other Algæ, after having been dried, is nothing but common salt: it leaves, however, a sweetish impression upon the palate, and hence the specific name.

5. LAMINARIA PHYLLITIS.

Stem cylindrical-compressed passing into a thin membranaceous lanceolate or linear-lanceolate frond.

Laminaria phyllitis, Lamour. Essai, p. 22. Lyngb. Hydroph. Dan. p. 23. Ag. Sp. Alg. v. 1. p. 121. Syst. Alg. p. 273. Spreng. Sp. Pl. v. 4. p. 325.

Laminaria saccharina var. *attenuata*, Grev. FL. Edin. p. 282.

Fucus phyllitis, Stackh. Ner. Brit. t. 9. Turn. Syn. Fuc. p. 193. Hist. Fuc. t. 164. Sm. Eng. Bot. t. 1331.

HAB. In the sea, growing upon stones or the stems of the larger Algæ. Biennial? Plentiful at Portlandhead, and at Tenby, *Stackhouse*. Coast of Dorsetshire, *Pulteney*. Sidmouth and Torquay, *Mrs Griffiths*. Yarmouth, *Mr Wigg*. East Bourne, Sussex, *Mr Borrer*. Larne, near Belfast, *Mr Templeton*. Bantry Bay, *Miss Hutchins*. Frith of Forth. Staffa.

Root composed of thick, fleshy, branched, clasping fibres. *Stem* half an inch to two inches in length, from the thickness of a stout bristle to that of a crow-quill, cylindrical at the base, compressed upwards, and then gradually expanding into a lanceolate or linear-lanceolate frond, eight inches to three or more feet in length, and one to six inches in width, slightly waved at the margin. *Substance* thin, membranous, and transparent, particularly delicate in young plants, somewhat lubricous, and partly adhering to paper in drying. *Colour* pale yellowish green, or very pale greenish brown, with a reddish tinge in old plants.

I cannot but express some doubt regarding the claim of this beauti-

ful *Alga* to be considered as distinct from the preceding species. The more I have studied it in a growing state, the less am I tempted to speak positively on the subject. Upon the whole, however, I am rather inclined to think it a true species. Having traced it from its earliest appearance to its full size, I can testify that its characters are preserved in every stage. In my herbarium are specimens four feet in length, and certainly far more delicate than any I ever saw of *L. saccharina*. The frond is always of a very pale colour, transparent, and in many hundred individuals I have had occasion to examine invariably lanceolate at the base. The fructification remains to be discovered.

6. LAMINARIA DEBILIS. Tab. V.

Stem very short setaceous expanding into a membranaceous oblong-wedged shaped frond.

Laminaria debilis, Ag. Sp. Alg. v. 1. p. 120. Syst. Alg. p. 273. Grev. Crypt. Fl. t. 277.

Laminaria papyrina, Bory in Dict. Class. d'Hist. Nat. v. 9. p. 189.

HAB. In the sea. Annual? On the coasts of the Western Islands of Scotland, *Mr Chalmers*.

Root minute, scarcely developed into fibres. *Fronde*s tufted, two to ten inches in height, one to three inches or more in width, obtuse, between obovate and wedge-shaped, rarely somewhat linear or linear-oblong, suddenly attenuated below into a very slender stem, only two or three lines in height. *Substance* thin, membranous, somewhat transparent, and rather flaccid. *Colour* olivaceous green. It adheres to paper when young and lubricous, but not when old.

Sprengel has not admitted this plant as a species into his *Species Plantarum*, but refers it as a synonym to *Zonaria plantaginea* of Agardh, the *Punctaria plantaginea* of this Work. It is nevertheless not only perfectly distinct, but has no affinity whatever with the genus *Punctaria*.

ORDER IV. SPOROCHNOIDEÆ.

Plants all marine, of an olivaceous or yellowish green colour, not changing to black in drying; of a cartilagino-membranaceous substance, becoming flaccid almost immediately after exposure to the air, in some cases acquiring under such circumstances a verdigris green colour, and then possessing the property of rapidly decomposing other delicate Alge in contact with them. Frond with a scutate (rarely tomentose) root, flat, compressed, or cylindrical, with distichous (rarely irregular) branches, and bearing in most species at some period of their growth little pencil-like deciduous tufts of fine green filaments. Fructification, as far as it is known, composed of club-shaped moniliform radiating filaments, either forming sessile warts, or arranged concentrically in little stalked club-shaped bodies terminated by pencils of delicate fibres.

GENUS IX. DESMARESTIA, Lamour. Tab. V.

GEN. CHAR. Frond cartilaginous, plane or compressed, distichously branched, while young furnished with marginal deciduous tufts of fine green filaments, the branches set with marginal spines.

OBS. This genus was dedicated by Lamouroux to the celebrated French naturalist and professor of zoology, A. G. Desmarest. I have adopted it, with the exclusion only of *Fucus viridis* of authors. Agardh, it appears, rejected Lamouroux's name for one of his own, intending, at the same time, to bring together a number of other plants. In strict justice the older name should have been sustained by the learned Swede. Why Lyngbye should also have substituted a third name, that of *Desmia*, I am at a loss to conjecture. The fructification is unknown, but the habit of the species is vastly different from that of the other SPOROCHNOIDEÆ.

I. DESMARESTIA LIGULATA. Tab. V.

FronD plane membranaceous with a faint midrib tri- or quadri-pinnate, the pinnæ and pinnulæ opposite linear-lanceolate attenuated at the base.

Desmarestia ligulata, Lamour. Essai, p. 25.

Sporochneus ligulatus, Ag. Sp. Alg. v. 1. p. 158. Syst. Alg. p. 261. Grev. Fl. Edin. p. 287.

Spreng. Sp. Pl. v. 4. p. 330.

Desmia ligulata, Lyngb. Hydroph. Dan. p. 33. t. 7.

Fucus ligulatus, Lightf. Fl. Scot. p. 246. t. 29. Turn. Syn. Fuc. p. 99. Hist. Fuc. t. 98.

Sm. Eng. Bot. t. 1636.

HAB. in the sea, usually in deep water. Annual. Summer. Frith of Forth, *Lightfoot*. Orkney Islands, *Rev. C. Clouston*. Near Hastings and in Northumberland, *Hudson*. Common in deep waters in Cornwall, *Stackhouse*. Lizard Point and Kynance Cove, *Mr E. Forster junior*. Near Abergele, *Mr Griffith*. Exmouth, Weymouth, and Portland Island, *Goodenough*. Oystermouth and Caswell Bay, *Dillwyn*. Yarmouth beach, *Mr Wigg*. At Corton and Gunton, Suffolk, *Mrs Fowler*. Torquay and Sidmouth, *Mrs Griffiths*.

FronD two to six feet in length, cylindrical, and as thick as a crow-quill at the very base, soon becoming plane, one to three lines wide, attenuated at the extremity, when fresh exhibiting a faint midrib, pinnated throughout its whole length: the *pinnæ* three inches to a foot or more long towards the base, and in large plants bearing three or even four other sets of *pinnulæ*, each smaller than the preceding one, all of them attenuated at the base and apex, and furnished with little marginal spines. The little pencils of filaments are produced from the axils of the spines, and soon fall off.

Substance at first slightly elastic, but immediately becoming flaccid; when very young it adheres to paper in drying, afterwards not at all. *Colour* while growing, glossy olive or greenish brown.

Many of the specimens of this strikingly beautiful *Alga*, which I have received from my friend the Rev. Charles Clouston, who gathered them in the Orkney Isles, tally exactly with Mr Turner's var. *γ dilatata*, the frond being nearly four lines broad, the pinnulæ elliptical, and supported upon short setaceous stalks. It is therefore a native of the northern as well as of the more southern seas.

2. DESMARESTIA ACULEATA. Tab. V. figs. 2. 3.

Stem short cylindrical soon terminating in a much branched linear-filiform flattish frond alternately and repeatedly pinnated, branches solitary or in pairs, the pinnulæ set with erect subulate distichous spines.

Desmarestia aculeata, Lamour. Essai, p. 25.

Sporochnus aculeatus, Ag. Sp. Alg. v. 1. p. 151. Syst. Alg. p. 259. Grev. Fl. Edin. p. 237. Spreng. Sp. Pl. v. 4. p. 329.

Desmia aculeata, Lyngb. Hydroph. Dan. p. 34. t. 44. B. 1.

Fucus aculeatus, Linn. Sp. Pl. p. 1632. Stackh. Ner. Brit. t. 8. Turn. Syn. Fuc. p. 262. Hist. Fuc. t. 187. Sm. Eng. Bot. t. 2445.

HAB. in the sea. Perennial. Common on the British shores.

Root a hard disk. *Frond* without any midrib, one to three feet long, very much branched in a distichous manner, all the branches and branchlets much attenuated at their origin, sometimes two or even three arising from the same point. The breadth hardly exceeds half a line. When young the branches are beset with distichous pencils of fine green conferva-like filaments, about a line apart, and three lines long, which falling off are succeeded by little erect very acute spines, scarcely a line in length. *Fructification* unknown.

Substance woody in the stem, cartilaginous, pliable, and very tough in the branches. *Colour* olivaceous, but in the younger branches green. Old plants do not adhere to paper in drying, and become a little darker. Young plants still furnished with the pencils of filaments, adhere, and do not change colour at all. If gathered in this state it becomes soon flaccid, and, if allowed to remain in the vasculum even for a short time, turns to a verdigris green, and destroys the *Algæ* placed near it.

It is hardly possible to conceive a more beautiful object than this plant waving its young and delicately feathered branches in the water. When older and more robust, and furnished with spines instead of tufts of filaments, it might easily be taken for a different species. Though several naturalists have believed themselves to have detected fructification, their accounts differ widely; and it must still be regarded as unknown. It would be unphilosophical to conjecture that, in a perennial plant, the fructification could exist in such a part as the pencils of filaments, which accompany the earliest efforts of vegetation, and fall away long before the frond attains its natural size and strength. In the true *Sporochni*, pencils very similar terminate an evident organ of fructification, but they are not deciduous till the plant has fully de-

veloped itself. The true *Sporochni* are, besides, if I mistake not, either annual or biennial; but, at any rate, do not produce the little tufts before the appearance of fructification.

GENUS X. DICHLORIA, Grev. Tab. VI.

GEN. CHAR. Frond cylindrical, filiform, cartilaginous, pin-nated with opposite branches; becoming flaccid and of a verdigris green colour on exposure to the air. Fructification unknown.

OBS. This genus is the connecting link between *Desmarestia* and *Sporochnus*, but differs in habit and structure from both. The interior is composed of a mass of longitudinal jointed fibres, or, at least, has a cellular tissue, which is so arranged as to separate into fibre-like portions. There are no pencils of filaments, and, unlike all the species of *Desmarestia*, the branches are not attenuated at their origin. It possesses the remarkable property of decomposing most other *Algæ* placed in contact with it, after it has been removed from the water. By Lamouroux, the single species composing this genus was placed under *Desmarestia*; by Agardh, it was made first a *Chordaria*, then a *Sporochus*; by Lyngbye a *Gigartina*.

The generic name is derived from the Greek numeral two, and the word denoting a green colour; in allusion to its singular change of hue.

I. DICHLORIA VIRIDIS. Tab. VI.

Sporochnus viridis, Ag. Sp. Alg. v. 1. p. 154. Syst. Alg. p. 259. Grev. Fl. Edin. p. 287.

Sprenng. Sp. Pl. v. 4. p. 329.

Gigartina viridis, Lyngb. Hydroph. Dan. p. 44.

Desmarestia viridis, Lamour. Essai, p. 25.

Fucus viridis, Fl. Dan. t. 886. Turn. Syn. Fuc. p. 397. Hist. Fuc. t. 97. Sm. Eng. Bot. t. 1669.

HAB. in the sea, growing upon stones and the larger *Algæ*. Annual. Summer. Yarmouth beach, *Mr Wigg*. Scarborough, *Sir T. Frankland*. Beach at Brighton, *Mr Borrer*. Budleigh and Torquay, *Mrs Griffiths*. Bantry Bay, *Miss Hutchins*. At Larne, near Belfast, *Dr Drummond*. Coast of Morayshire, *Messrs Hooker and Borrer*. Frith of Forth, especially at Seafeld rocks on the Fife coast.

Root a small hard disk. Fronds one to several from the same base,

two to three feet long, beautifully delicate and feathery, less than a crow-quill in thickness at the base, becoming gradually attenuated, pinnated with branches a few lines apart, along its whole length, and similar in all respects, one to many inches in length; the main branches are again indefinitely pinnate, every division more slender than the preceding one, but the whole of them capillary, and every branch and branchlet opposite. The aspect of the whole plant is that of a robust and bushy *Conferva*.

Substance cartilaginous, and rather rigid to the touch, becoming flaccid on exposure to the air. *Colour* olivaceous when growing, changing to verdigris-green when removed from the water, and when dry, resuming its olive-green or brown colour. In drying it does not adhere very firmly to paper.

I know not how it has happened that the species before us is generally described of an orange colour in its growing state. Turner mentions that Sir Thomas Frankland, who introduced it to the British Flora, knew it under the name of *Conferva auricoma*. It therefore seems certain that it occasionally assumes an orange hue. Dr Drummond informs me, that near Belfast, it is of a "foxy colour" when growing. Opposite Seafield rocks, it grows plentifully, and, at low tides, may be reached by wading into the water. Here I have had frequent opportunities of seeing it growing in abundance, and have ever found it of a dull olive-green colour; in age more or less reddish or brownish. Its appearance is very delicate and beautiful. No pencil-like tufts of filaments have been observed upon this plant.

GENUS XI. SPOROCHNUS, *Ag.* Tab. VI.

GEN. CHAR. Frond filiform cylindrical or compressed, cartilagino-membranaceous. Fructification, club-shaped moniliform filaments, radiating in scattered warts, or concentrical in distinct (mostly clavate stalked) receptacles, often terminated by a deciduous tuft of filaments.

OBS. The present genus which Agardh intended to contain both the preceding ones, has been retained by M. Gaillon for a limited number of species, agreeing pretty well in habit and the essential character of the fructification. I approve entirely of this division, but

cannot follow M. Gaillon in placing *Desmarestia* among the FUCOIDEÆ, and *Sporochnus* among the FLORIDEÆ, by which, genera nearly allied to each other are widely separated, and inserted among other genera with which they assimilate in no points of importance. In Lamouroux's arrangement, such species as were known to him are found in the genera *Gigartina* and *Dictyota* (the latter on the authority of Gaillon). *S. rhizodes* is a *Chordaria* according to Lyngbye.

It is by no means improbable, that, at some future time, the species with fructification in the form of naked sessile warts, will form a distinct genus. The exotic species *S. inermis* and *Cabrera* may also be eventually separated: and perhaps even *S. villosus* also, when the fructification shall be discovered.

1. SPOROCHNUS PEDUNCULATUS. Tab. VI.

Fronde cylindrical somewhat pinnated in a lax straggling manner, branches simple long set with stalked linear club-shaped receptacles which are terminated by a deciduous tuft of confervoid filaments.

Sporochnus pedunculatus, Ag. Sp. Alg. v. 1. p. 149. Syst. Alg. p. 259. Spreng. Sp. Pl. v. 4. p. 329. Gall. Dict. Sc. Nat. v. 53. p. 366.

Gigartina pedunculata, Lamour. Essai, p. 48.

Fucus pedunculatus, Huds. Fl. Ang. p. 587. Sm. Eng. Bot. t. 545. Turn. Syn. Fuc. p. 367. Hist. Fuc. t. 188.

HAB. In the sea. Annual. Summer and autumn. Isle of Portland, Hudson. Anglesea, Rev. H. Davies. Cromer and Sheringham, Turner. On the beach at Corton and Gunton, Mrs Fowler. Weymouth, Rev. M. J. Berkeley. Seaton, Mrs Griffiths. Prestonpans, in the Frith of Forth, Mr Hasell.

Root a small roundish disk. **Fronde** one to several from the same base, six to eighteen inches in length, set with setaceous horizontal branches, several inches long about the centre of the frond, shorter towards the base and apex. The stem and branches are beset at short intervals, and on all sides, with the receptacles, which, including their minute stalk, do not exceed a line on the stem, and are still less on the branches, the terminating pencil of filaments excessively delicate, and about three lines in length. **Fructification** club-shaped filaments, arranged concentrically round the receptacle, unprotected by any covering, the uppermost joint of the filaments often swollen and coloured, and probably deciduous.

Substance cartilaginous in the stem and branches. **Colour** yellow-

ish and semitransparent, in the pencils green, becoming yellower by age. In drying, the plant adheres to paper.

In consulting Mr Dawson Turner's work, for his description of this species, I was not a little gratified to observe, that he has there recorded his opinion, that the present individual and its nearest allies, with *Conferva villosa* of Hudson, *Fucus aculeatus*, and perhaps *Fucus ligulatus* and *viridis*, would at some time be found to constitute a distinct and natural family. I was not aware of this opinion until I entered upon the description of the species before us, and feel the more confirmed in my arrangement, since I find it suggested by one of equal penetration and experience.

2. SPOROCHNUS VILLOSUS.

Fronde cylindrical, remotely and repeatedly pinnated, almost capillary, pinnæ opposite (sometimes solitary), the stem and branches minutely nodose, with whorls of delicate filaments arising from the knobs.

Sporochnus villosus, Ag. Sp. Alg. v. 1. p. 155. Syst. Alg. p. 260. Spreng. Sp. Pl. v. 4. p. 329.
Conferva villosa, Huds. Fl. Ang. p. 603. Sm. Eng. Bot. t. 546, not good. Dillw.
 Conf. t. 37.

HAB. In the sea. Annual. Summer and autumn. Cornwall, *Hudson*. Yarmouth Beach, *Turner*. Rocks at the Mumbles, near Swansea, *Dillwyn*. Anglesea, *Rev. H. Davies*. Beach at Corton and Gunton, Suffolk, *Mrs Fowler*. Torquay, *Mrs Griffiths*. Weymouth, *Rev. M. J. Berkeley*. Frith of Forth, at Prestonpans, *Mr Hasell*.

Root a little disk. Fronds one or several from the same base, six inches to near three feet in length, very slender and filiform, in large plants twice or thrice pinnated, but often simply pinnate, the pinnæ of various lengths, often several inches, remote, sometimes alternate, but oftener opposite, frequently there is a solitary one between each pair. The knobs on the frond are less than a line asunder, and are whorled with beautiful, very delicate, branched, green filaments, about two lines in length, which are so numerous that the younger branches are thickly clothed with them. Fructification unknown. Substance cartilaginous, becoming flaccid on removal from the water. Colour yellowish-green. It adheres to paper in drying, and becomes of a purer green colour.

It is mentioned by Dillwyn, and repeated by Agardh, that the whorls of filaments occur only on every fourth or fifth knot. In a fine speci-

men, gathered by Mr Hasell in the Frith of Forth, every knot is beautifully feathered by them. Mr Turner has remarked, that it generally accompanies the preceding species; it does so in the Frith of Forth, on the coast of which Mr Hasell was so fortunate as to find them at the same time and place. They appear to grow in deep water, as the specimens he obtained were entangled in the fishermen's nets. A curious circumstance was remarked by this gentleman, which deserves to be recorded. The fresh specimens, when spread upon paper, rendered it transparent, as if it had been touched with oil: but in a very short time the transparency quite disappeared.

3. SPOROCHNUS RHIZODES. Tab. VI.

Fronde cylindrical, filiform, irregularly branched, the branches subdichotomous, and more or less attenuated, rough, and almost twisted in appearance, with the wartlike fructification.

Sporochnus rhizodes, Ag. Sp. Alg. v. 1. p. 156. Syst. Alg. p. 260. Spreng. Sp. Pl. v. 4. p. 329.

Chordaria rhizodes, Ag. Syn. p. 15. Lyngb. Hydroph. Dan. p. 52. t. 13.

Chordaria paradoxa, Lyngb. Hydroph. Dan. p. 53. t. 14.

Fucus rhizodes, Turn. Hist. Fuc. t. 235.

Conferva verrucosa, Sm. Eng. Bot. t. 1688, incorrect.

HAB. In the sea, attached to other Algæ. Annual. Summer. Southampton, *Miss Biddulph*. Coast of Cornwall, *Stackhouse*. Sidmouth, *Mrs Griffiths*. Torquay. Brighton Beach, *Mr Borrer*. Bantry Bay, *Miss Hutchins*.

Root a minute disk. Fronds four to sixteen inches in length, very slender-filiform, a good deal branched in a subhorizontal and straggling manner; the branches partly alternately and partly dichotomously divided, the lower ones several inches long. Fructification wart-like; the warts distinct or confluent, and rendering the frond rough and distorted. Each wart is composed of a mass of radiating moniliform filaments, the uppermost joints of which appear to be converted into deciduous brownish seeds.

Substance somewhat cartilaginous, but flaccid, especially after exposure to the air. Colour pale yellowish-brown. In drying it shrinks, and adheres to paper, changing to a greenish colour, except in old specimens, which often become blackish.

Having received an authentic specimen of *Chordaria paradoxa*, Lyngb., from my friend Professor Hornemann, I am enabled to follow Agardh without hesitation in referring it to this place.

ORDER V.—CHORDARIEÆ.

Plants all marine, of an olive-green colour, becoming darker on exposure to the air; of a cartilaginous and lubricous substance. Root scutate. Frond continuous, cylindrical, filiform, composed of a solid cellular centre, and a dense exterior mass of concentric filaments. Fructification imperfectly known.

GENUS XII. CHORDARIA, Ag. Tab. VII.

GEN. CHAR. Frond filiform, cartilaginous, solid, continuous, composed exteriorly of a stratum of concentric filaments.

This genus as at present constituted by Agardh, contains five species, hardly any two of which really agree in structure. In the absence of fresh specimens, I can do no more than observe that *C. divaricata* will probably form the type of a new genus. *C. flagelliformis* is the type of the present one, and the only British species. The singular structure of this plant removes it from all the other orders. Even with *Chorda Filum* it has nothing in common but its olivaceous hue and filiform habit. *Chorda Filum* is fistular, of a lax cellular texture: *C. flagelliformis* solid in its centre, very firm, and its diameter partly composed of concentric filaments, to which the pear-shaped seeds of *Chorda Filum* bear no real analogy, as the one are co-existent with every state of the plant, the other only in the season of fructification. The generic name is derived from the Latin word, signifying a cord or string.

1. CHORDARIA FLAGELLIFORMIS. Tab. VII.

Frond nearly equal throughout, more or less branched, branches long, nearly simple, and somewhat distichous, those at the base horizontal.

Chordaria flagelliformis, Ag. Lyngb. Hydroph. Dan. p. 51. t. 13. Ag. Sp. Alg. v. 1. p. 166.

Syst. Alg. p. 256. Grev. Fl. Edin. p. 268. Spreng. Sp. Pl. v. 4. p. 330.

Gigartina flagelliformis, Lamour. Essai, p. 48.

Fucus flagelliformis, Fl. Dan. t. 650. Turn. Syn. Fuc. p. 335. Hist. Fuc. t. 85. Sm. Eng. Bot. t. 1222.

Fucus longissimus, Stackh. Ner. Brit. p. 99. t. 16., according to Agardh.

HAB. In the sea, attached to rocks and stones. Annual. Summer. Shores of Anglesea, *Rev. H. Davies*. Devonshire, *Mrs Griffiths*. Dawlish, *Mr Pigott*. Abundant on the rocks at Cromer and Sheringham, *Turner*. Falmouth, *Messrs Turner and Sowerby*. Near Belfast, *Mr Templeton*. Coasts of Scotland, *Lightfoot*. *Mr Brodie*. Orkney, *Rev. C. Clauston*. Abundant in the Frith of Forth.

Root a very small disk. **Fron**d six inches to near three feet in length, not thicker than very fine twine, furnished with a stem which divides at a certain point abruptly into branches: branches more or less numerous, commencing near the root, arranged in a subdistichous manner, varying in length from two to many inches, those at the base horizontal, the uppermost ones erect, generally simple, or at most once or twice forked, truncate at the extremity. Every part, the stem as well as the branches, is uniform in appearance, and nearly so in thickness, and is composed inwardly of a rather dense cellular tissue, outwardly of a mass of concentric club-shaped filaments; and, if viewed while growing, is covered with a short fringe of very fine white filaments. **Fructification**, according to Turner, oblong or somewhat pyriform seeds lying among the concentric filaments. **Substance** firm, cartilaginous, and slimy to the touch, adhering to paper. **Colour** very dark olive-green, black when dry.

This is known in some parts of the country by the name of *Whipcord Fucus*. I have referred to Stackhouse on the authority of Agardh, as it unfortunately happens that the only copy of the *Nereis Britannica*, to which I have access, does not extend farther than the twelfth plate.

ORDER VI.—DICTYOTEÆ.

Plants all marine, of an olive-green colour, not changing on exposure to the air, of a membranaceous flexible substance (rarely cartilaginous) and reticulated structure. Root either naked and scutate, or composed of a mass of woolly filaments. Frond cylindrical or flat; when flat, nerveless (except in Haliseris), thin, entire or divided, often flabelliform. Fructification, roundish, ovate, pear-shaped or club-shaped seeds, enveloped in a pellucid case, covering the surface, or scattered, or forming minute spots or transverse lines. The seeds in most cases are produced beneath the epidermis, through which they burst, and become prominent.

GENUS XIII. CHORDA, Stackh. Lamour. Tab. VII.

GEN. CHAR. Frond simple, filiform, cylindrical, with an interrupted cavity. Root naked, scutate. Fructification external continuous masses of pear-shaped seeds fixed by their base.

The genus *Chorda* proposed by Stackhouse, adopted by Lamouroux, and continued by Lyngbye and by Hooker, possesses a priority of many years over the name *Scytosiphon*, of my friend Professor Agardh. As the original name is, besides, employed by the majority of authors, no inconvenience can arise from the justness of its claim being recognised. The *Fucus Filum* of Linnæus forms the type of the genus which contains only two species. What Agardh calls *Scytosiphon fœniculaceus* (*Fucus subtilis*, Turn.), possesses a very different structure and a totally different fructification. This fructification, which is represented pretty correctly by Lyngbye, agrees with that of some *Dictyotæ*, as does also the structure and substance.

By Lamouroux and Agardh, *Chorda* is placed among the FUCOIDÆ: by Gaillon among the jointed *Algæ*, on account of the trans-

verse interruptions of the internal cavity. To me it appears to be very nearly related to *Asperococcus* and other DICTYOTÆ, especially in the fructification. The generic name is derived from the Latin word signifying a cord or string.

1. CHORDA FILUM. Tab. VII.

Fronde cartilaginous much elongated, the transverse septa not accompanied by external constriction.

Chorda Filum, Lamour. Essai, p. 26. Lyngb. Hydroph. Dan. p. 79. t. 18. Hook. in Fl. Lond. New Series, t. 204.

Scytosiphon Filum, Ag. Sp. Alg. v. 1. p. 161. Syst. Alg. p. 257. Grev. Fl. Edin. p. 288. Spreng. Sp. Pl. v. 4. p. 328.

Fucus Filum, Linn. Sp. Pl. p. 1631. Stackh. Ner. Brit. t. 10. Turn. Syn. p. 339. Hist. Fuc. t. 86. Sm. Eng. Bot. t. 2487.

VAR. β *Thrix*. Fronde very slender, almost capillary, two to four inches in length.

Chorda Filum v. *trichodes*, Lyngb. p. 73. t. 18.

Scytosiphon Filum v. *Thrix*, Ag. Sp. Alg. v. 1. p. 162.

Fucus Thrix, Stackh. Ner. Brit. p. 25. t. 12.

HAB. In the sea, attached to rocks and stones. Annual. Summer and autumn. Very common on the British shores.

Root a very small conical disk. *Fronde* generally several from the same base, quite simple, one to twenty feet in length, cylindrical, one-eighth of an inch to half an inch in diameter in the middle, much attenuated at each extremity, hollow, the cavity interrupted at short intervals by transverse divisions: the whole fronde spirally twisted from the base to the apex. *Fructification*, pyriform capsules, covering the surface in a nearly continuous mass, and fixed by their base.

In the growing state the whole plant is fringed with delicate filaments one to two lines in length, which give it a slippery feel. In some states these filaments are more numerous, obvious, and of a brownish green colour. The plant then forms the *Chorda tomentosa* of Lyngbye.

Substance cartilaginous, lubricous, elastic and tough, adhering to paper in drying. *Colour* an olivaceous, somewhat transparent green, becoming somewhat darker when dry.

The fructification of this *Alga* was for a long time a desideratum. It was first represented in "English Botany," from specimens collected by Mr Borrer; afterwards, not very perfectly, in the "Tentamen Hydrophytologiæ Danicæ." Agardh describes it correctly. A second kind of fructification, composed of sessile, ovate capsules, scattered among clavate, articulated filaments, is recorded in the "Flora Lon-

dinensis" to have been discovered by Captain Carmichael, and a representation is given of it from one of that gentleman's drawings. I have in vain searched for the same appearance. Captain Carmichael does not mention whether the two kinds occur on distinct individuals.

The structure of the frond is extremely singular. The naturalist last mentioned expresses himself happily when he observes, that the frond is composed of a "simple fillet, one or two lines in breadth, spirally twisted into a filiform tube, formed by the cohesion of its edges." Any one may prove this to his own satisfaction, by inserting a probe at the base, and carrying it along the interior of the frond. When in full fructification the frond is liable to become inflated and distorted, and is more than usually gelatinous.

The *Scytosiphon fistulosum* of Lyngbye, which Agardh makes a variety of *C. Filum*, I consider to be nothing more than *Asperococcus echinatus* in a barren state.

Chorda Filum is used in Norway as food for cattle.

2. CHORDA LOMENTARIA.

Frond membranaceous, the transverse septa remote and at irregular intervals, accompanied with an external constriction, the intervals somewhat inflated.

Chorda Lomentaria, Lyngb. Hydroph. Dan. p. 74. t. 18.

Scytosiphon filum, var. γ , Ag. Sp. Alg. v. 1. p. 162. Syst. Alg. p. 257.

HAB. In the sea, on rocks and stones. Annual. Summer and autumn. Frequent. Devonshire very plentiful, *Mrs Griffiths*. Near Belfast, *Dr Drummond*. Abundant both on the western and eastern coasts of Scotland.

Root a minute disk. **Fronde** several from the same base, three to sixteen inches in height, one to four lines in diameter in the middle, attenuated at each extremity, but especially at the base, hollow, contracted at the articulations to half its diameter or more; the spaces between the contractions very unequal, from half an inch to two inches, more or less inflated. **Fructification** (as far as I have been able to discover) interrupted masses of minute cylindrical or somewhat club-shaped jointed filaments.

Substance thin flaccid and membranaceous, adhering to paper in drying. **Colour** somewhat transparent yellowish olive green, scarcely becoming darker when dried.

A careful examination of this plant induces me to think it a very distinct species. From its membranaceous substance, I have been accustomed to consider it a species of *Asperococcus*, if not a variety of *A. echinatus*. But the total absence of the fructification of that genus led me to study it more closely. The frond is really divided by transverse septa, and the substance is composed of lax cells, as in *Chorda Filum*, with which it also agrees in having to a certain extent a spiral structure. The surface is covered with interrupted masses of very minute club-shaped filaments, fixed by their base; but they are hardly moniliform, as represented by Lyngbye. The most curious circumstance attending them is, that they are in pairs, each pair being connected by their base. Some farther facts doubtless remain to be discovered concerning the fructification of this species.

The appearance of the plant is very similar to the intestine of an animal tied at certain intervals.

GENUS XIV. ASPEROCOCCUS, *Lamour.* Tab. IX.

GEN. CHAR. Frond tubular, cylindrical, continuous, membranaceous. Root minutely scutate, naked. Fructification, distinct spots composed of imbedded seeds, mixed with erect club-shaped filaments.

Obs. This very natural genus was created by Lamouroux expressly for a plant which he erroneously conjectured to be the *Ulva rugosa* of Linnæus (*Fucus rugosus*, Turn.) Lamouroux's plant, however, which is the *Ulva rugosa* of De Candolle, remains the type of the genus, which Agardh has since called *Encelium*. The name bestowed by Lamouroux is remarkably characteristic, being expressive of the perceptible roughness which the fructification gives to the surface of the frond. In cases of this kind, I feel assured that Professor Agardh will not believe me to be actuated by caprice, in preferring the original appellation.

The genus contains only four species; for Agardh has placed his *Encelium sinuosum* and *clathratum*, along with *Conferva crinita* of Roth, in a new genus which he names *Stilophora*.

1. ASPEROCOCCUS ECHINATUS. Tab. IX.

Fronde cylindrical, filiform.

Asperococcus rugosus, Lamour. Essai, p. 62.

Encalium echinatum, Ag. Sp. Alg. v. 1. p. 145. Syst. Alg. p. 261. Spreng. Sp. Pl. v. 4. p. 386.

Encalium Lyngbyanum, Grev. Crypt. Fl. t. 290.

Scytosiphon fistulosus, Lyngb. Hydroph. Dan. p. 66.

Scytosiphon Filum v. *fistulosus*, Ag. Sp. Alg. v. 1. p. 163. Syst. Alg. p. 258.

Ulva fistulosa, Huda. Fl. Ang. p. 569. Sm. Eng. Bot. t. 642. a bad figure.

HAB. Rocks and stones in the sea. Annual. Summer and autumn. Very common on many parts of the British coast. Devonshire, *Mrs Griffiths*. Near Belfast, *Dr Drummond*. West coast of Scotland, *Captain Carmichael*. Frith of Forth.

Root a minute disk. **Fronde** several from the same base, two inches to two feet in length, one to three or four lines in diameter, much attenuated towards the base, and sometimes attenuated upwards, but more frequently incrassated, hollow, and when mature dotted over the whole surface with the fructification. **Fructification** yellowish, imbedded seeds, mixed with very minute, linear, obtuse, short, articulated filaments, incrassated at the apex; pellucid below, but containing in the terminal joints an opaque black mass; all fixed by the base, crowded and erect.

Substance membranaceous, reticulated, adhering imperfectly to paper in drying. **Colour** olive or brownish green, not changing on exposure to air.

This plant is often found partly filled with sand, like some of the tabular ULVACEÆ. In its general habit it most resembles the following rare species, and some states of *Chorda Lomentaria*; but it is rarely, like the latter, contracted. I should hardly have ventured to quote Agardh's *Scytosiphon Filum* var. *fistulosum*, if he had not referred to the figure in 'English Botany,' which, though a wretched representation, I cannot conceive to be any thing else than our present plant. The species I published under the name of *Encalium Lyngbyanum* is not different, as I have since ascertained by tracing the species through its various states and great range of size.

2. ASPEROCOCCUS BULLOSUS.

Fruond thin membranaceous oblong-club-shaped inflated.

Asperococcus bullosus, Lamour. Essai, p. 62. t. 6. f. 5.

Encosium bullosum, Ag. Sp. Alg. v. 1. p. 146. Syst. Alg. p. 262. Spreng. Sp. Pl. v. 4. p. 328.

Gastridium Opuntia, Lyngb. Hydroph. Dan. p. 71. t. 18.

Uloa Turneri, Sm. Eng. Bot. t. 2570.

HAB. In the sea, on rocks and stems of Algæ. Annual. Summer. On the coast of Sussex, *Mr Borrer*. Rocks at Larderham, near Sidmouth, *Mrs Griffiths*. Bantry Bay, *Miss Hutchins*. Appin, *Captain Carmichael*.

Root a minute disk. *Fronde* solitary, or several growing from the same base, one to three inches or more in length, and three lines to one inch in diameter at its thickest part, rounded at the summit, attenuated at the base, perfectly tubular, the sides thin and transparent. *Fructification* minute dots, composed of aggregated club-shaped or somewhat pear-shaped short filaments, mixed with roundish yellowish brown seeds.

Substance tender, thin, reticulated. *Colour* a sort of pale watery olive-green, becoming rather darker when dried. It adheres imperfectly to paper.

A rare species. *Mrs Griffiths* once remarked to me, that the plant is not very conspicuous when growing under water: the cavity is filled with that fluid, and the substance being thin and transparent, it appears, to use *Mrs Griffiths*' own words, to be of the colour of the water itself, and therefore not easily seen, unless the light be cast upon it in a particular manner. This may account for its having been so rarely noticed. Specimens from the Cape of Good Hope, communicated to me by Professor *Agardh*, agree with those from our own shores. *Lyngbye's* figure is incorrect, as far as regards the fructification.

It would have given me much pleasure could I have retained the name bestowed upon this plant in "English Botany." The name I have adopted was published as nearly as possible at the same time, in 1813, and, on account of being the one in general use, deserves the preference.

GENUS XV. PUNCTARIA, Grev. Tab. IX.

GEN. CHAR. Frond simple, membranaceous, flat, with a naked scutate root. Fructification scattered over the whole frond in minute distinct spots, composed of roundish prominent seeds, intermixed with club-shaped filaments.

OBS. In proposing this genus, I am not without fear that the ground of distinction may be considered too slight. The frond, however, besides being flat, is formed of an interlacing of longitudinal and transverse filaments, covered by a finely reticulated membrane. *Asperococcus*, on the other hand, in addition to this structure, exhibits on the inner surface an approximation to the cellulose organization of *Chorda Filum*. The fructification is very similar to that of *Asperococcus*, in being accompanied with the club-shaped filaments. It is remarkable that the seeds of the last named genus should have been overlooked by Agardh, who makes the generic character to rest entirely upon the filaments or *apiculi*. These articulated apiculi, however, I have ascertained to exist in the present and even in the following genus, though in a less perfectly developed form, and I am inclined to regard them as abortive seeds: or, in other words, as linear extensions of the cells of the frond, with the abortive substance of the seed diffused in the uppermost cellules.

The generic name is derived from the Latin word signifying a dot or minute spot, the frond being covered with the dotted fructification.

1. PUNCTARIA LATIFOLIA.

Frond narrow-obovate or oblong wedge-shaped.

HAB. On rocks in the sea. Annual. April and May. Sidmouth, *Mrs Griffiths*. Near Belfast, *Dr Drummond*.

Root a very minute disk. Fronds several from the same base, three to eight inches in height, one to two inches or more in width at the broadest part, mostly obovate, flat, even or slightly waved at the margin, rounded or between rounded and truncate at the top. Fructification minutely dot-like, scattered over the whole surface, composed of roundish seeds, intermixed with linear-elliptical, articulated, short filaments, filled with a dark reddish mass.

Substance thin and flaccid, adhering to paper in drying. *Colour* while young, a rather bright yellowish olive-green, when mature, olivaceous brown, not changing by exposure to the air.

I have never seen any specimens of this species, except one found by Dr Drummond, and those communicated by Mrs Griffiths, some of which being gathered at Sidmouth during my residence there, I had an opportunity of examining in a fresh state. In its outline and general appearance, it resembles *Laminaria debilis*, which, as well as the two following species of *Punctaria*, Sprengel has referred to his *Zonaria plantaginea*,—an association which proves him to have generalized without much examination.

2. PUNCTARIA PLANTAGINEA. Tab. IX.

Frond from linear-club-shaped to linear-lanceolate, much attenuated at the base, subopake.

Zonaria plantaginea, Spreng. Sp. Pl. v. 4. p. 336.

Zonaria ? plantaginea, Ag. Sp. Alg. v. 1. p. 138. Syst. Alg. p. 268.

Ulva plantaginea, Roth. Sm. Eng. Bot. t. 236. Lyngb. Hydroph. Dan. p. 31. t. 6.

HAB. in the sea, attached to rocks, stones, and the larger Algæ. Annual. Summer. Cromer, *Turner*. Coast of Sussex, *Mr Borrer*. Falmouth, *Mr G. Sowerby*. Dawlish, *Mr Pigott*. Near Belfast, *Dr Drummond*. Frith of Forth.

Root a minute disk. *Fronde*s generally aggregated, six to twelve inches long, three lines to nearly an inch broad in the widest part, linear, linear-lanceolate, or linear with a slight dilatation upwards, the apex either obtuse or somewhat acute and attenuated; the margin slightly waved. *Fructification* ovate reddish green seeds in minute scattered dots, intermixed with a few short filaments; seeds are also scattered singly over the whole surface. *Substance* thin and tender, very often perforated to a great extent by marine animals. *Colour* olivaceous or reddish brown, and rather opake.

In this species, which is undoubtedly very nearly related to the preceding, the *apiculi* or little short filaments are scarcely to be traced; while the seeds, on the other hand, are very plentiful, and scattered over the whole frond; those forming the dots being comparatively few in number. This fact points out the impropriety of regarding the *apiculi* as essential to the generic character. The seeds are tolerably correctly represented by Lyngbye, though he has omitted the pellucid case. The little dots of fructification, though always

visible to the eye (of an oval or oblong form) are often abortive; but the scattered seeds are distinctly visible under the microscope, lying beneath the epidermis, and slightly prominent.

3. PUNCTARIA TENUISSIMA.

Fronde sublinear, very thin, transparent.

Zonaria ? tenuissima, Ag. Syst. Alg. p. 268.

Zonaria ? plantaginea v. tenuior, Ag. Sp. Alg. v. 1. p. 138.

Ulva plantaginifolia v. tenuior, Lyngb. Hydroph. Dan. p. 31. t. 6.

HAB. in the sea, parasitic on *Zostera marina*. Annual. Summer. Common on the coasts of the Isle of Bute.

Root a very minute disk. Fronds aggregated, often forming a thick fringe on the leaves of *Zostera marina*, two to eight inches in length, and one to three lines in width, always attenuated at the base, but either attenuated at the extremity or abruptly terminated and rounded, the margin entire or somewhat denticulate, waved or even. Fructification unknown. Substance exceedingly thin and transparent, highly and beautifully reticulated, slightly lubricous, adhering to paper in drying. Colour a very pale transparent yellowish or reddish green, becoming slightly darker when dried.

In this delicate species the fructification has not been observed. I have indeed noticed a minute thickening in the substance of the frond here and there, accompanied with an opacity sufficiently indicative of fructification; but in no case have I seen the seeds developed. The reticulated structure is very striking and beautiful.

GENUS XVI. STRIARIA, Grev. Tab. IX.

GEN. CHAR. Frond filiform, tubular, continuous, membranaceous, branched. Root naked and scutate. Fructification groups of roundish seeds forming transverse lines.

OBS. The name I first bestowed upon this plant in the Cryptogamic Flora, was that of *Carmichaelia*, to commemorate a very industrious botanist in this department, Captain Carmichael. I find, however, the same appellation has been bestowed upon a genus of Leguminose plants a short time before, and have therefore substituted *Striaria* for the

Alga. It differs from the preceding genus, in its tubular and branched frond, and in the uniformly transverse disposition of the groups of seeds, which to the naked eye appear as lines. From the following one, it differs in the last named character, and the more highly reticulated structure.

1. STRIARIA ATTENUATA. Tab. IX.

Striaria attenuata, Grev. Crypt. Fl. (Synopsis) p. 44.
Carmichaelia attenuata, Grev. Crypt. Fl. t. 288.

HAB. In the sea, on various Algæ. Annual. Summer. Appin, Captain Carmichael. Shores of the Isle of Bute.

Root a very minute disk. *Fronde* three to twelve inches in height, less than a line in diameter, attenuated at each extremity, much branched, the branches patent, elongated, mostly opposite, sometimes set with a second series, all much attenuated at their origin and extremity. *Fructification* circular prominent groups of roundish seeds (occasionally mixed with a few short obtuse filaments), disposed in transverse lines hardly more than a quarter of a line asunder. *Substance* tender and membranaceous, adhering to paper in drying. *Colour* pale olivaceous green, changing when dry to a yellower hue.

The duration of this species seems to be short; as it prefers attaching itself to the more delicate Algæ, such as the upper branches of the *Polysiphoniæ*, *Rhodomela subfusca*, &c.: and I have seldom seen a specimen uninjured, in consequence of its tender substance. Hitherto it has only been observed on the western coast of Scotland.

GENUS XVII. DICTYOSIPHON, Grev. Tab. VIII.

GEN. CHAR. Frond filiform, tubular, continuous, branched. Root minutely scutate, naked. Fructification, ovate, scattered seeds lying beneath the epidermis.

OBS. It was my wish to have formed a single genus of this and the preceding plant; and perhaps farther observation may discover reason for their union. At present, however, the difference in fructification, the exceedingly branched frond, the branches quite capillary, and not attenuated at their origin, and the different substance of the plant before us, induce me to keep them asunder.

The generic name is derived from two Greek words, signifying a net-work and a tube; the frond being tubular and reticulated.

I. DICTYOSIPHON FENICULACEUS. Tab. VIII.

Scytosiphon feniculaceus, Ag. Sp. Alg. v. 1. p. 164. Syst. Alg. p. 258. Lyngb. Hydroph. Dan. p. 63. t. 14. (upper figure). Spreng. Sp. Pl. v. 4. p. 328.
Conferva feniculacea, Huds. Fl. Ang. p. 594.
Fucus subtilis, Turn. Hist. Fuc. t. 234.

HAB. In the sea, parasitic upon *Chorda Filum* and some other *Algæ*. Annual. Spring and summer. Shores of Anglesea, *Dillenius*. Cornwall, *Hudson*. Bantry Bay, *Miss Hutchins*. Near Belfast, '*Dr Drummond*'. Not uncommon on the western coast of Scotland, *Turner*. Shores of the Isle of Bute, Frith of Forth.

Root an extremely minute disk. *Fronde*s often numerous from the same base, one to two feet long or more, the stem undivided, about half a line or more in diameter, but the whole frond otherwise capillary, branched from the very bottom, the branches patent at their origin, mostly alternate, sometimes partially secund, very irregular in length, numerous or scattered, gradually attenuated to their extremity, bearing a second series, half an inch or an inch in length, and as fine as a hair, which, in their turn, produce a third series, still finer, and a few lines only in length; both the last series being set with an almost invisible fringe of minute articulated filaments. *Fructification* ovate scattered seeds slightly imbedded in the substance of the frond.

Substance membranaceous, or very slightly coriaceous, adhering to paper in drying. *Colour* pale yellowish or olivaceous green, when old, reddish, brownish, or blackish, not changing on exposure to the air.

The appearance of this plant when growing, is very much that of *Dichloria viridis*, especially if it be not injured from growing in an exposed situation. When that is the case, many of the finer branches disappear, and the soft feathery character is partly lost. Within the tube, the surface is lined with pellucid oblong cellules. The fructification requires close observation, and a high power of the microscope. Lyngbye has represented one of the seeds pretty correctly, but the larger of his uppermost figures is bad, and the seeds incorrect. The state observed by Lyngbye, represented in his lowest figure, I have never been able to discover.

GENUS XVIII. DICTYOTA, *Lamour.* Tab. X.

GEN. CHAR. Frond flat, highly reticulated, membranaceous, dichotomous or irregularly cleft (palmato-flabelliform in *D. atomaria*). Root a mass of woolly filaments. Fructification composed of scattered or variously aggregated, somewhat prominent, seeds, on both surfaces of the frond.

Obs. This genus, originally proposed by Lamouroux, at first contained that of *Padina* also, in the form of a section. But he afterwards separated them, assigning to each the names they bear in this work. Both of them are of earlier date than *Zonaria*, the name published by Agardh, who reunited the two genera. They must of course be sustained by the usual rights of courtesy and priority. Having carefully examined most of the species in this and the following genera, I perfectly accord with Lamouroux in his separation. The *Dictyotæ* are of a thinner and more membranaceous substance, producing their fructification indifferently on both surfaces of the frond. The seeds are generally scattered, hardly ever forming transverse lines, but when they do so, they are not regular ones: They at length burst through the epidermis, enveloped in their pellucid cases. The frond itself does not form a regular segment of a circle when entire, and, when divided, the segments have no tendency to assume the same form at their extremity. Even in one or two species, which are between palmate and flabelliform, the margins of the segments exhibit no trace of laceration, but are often denticulate, and evidently independent in every stage of growth of the margin of the adjoining segment. There is also something in the habit not easily expressed in words, which is very striking.

The name is derived from the Greek word for a net or net-work, in allusion to the reticulated structure of the frond.

I. DICTYOTA DICHOTOMA. Tab. X.

Frond linear, regularly dichotomous.

Dictyota dichotoma, Lamour. Essai, p. 58.

Zonaria dichotoma, Ag. Sp. Alg. v. 1. p. 133. Syst. Alg. p. 266. Grev. Fl. Edin. p. 297.

Haltiera dichotoma, Spreng. Sp. Pl. v. 4. p. 328.

Uva dichotoma, Huds. Sm. Eng. Bot. t. 774. Lyngb. Hydroph. Dan. p. 31. t. 6.

VAR. β *intricata*. Frond very narrow, much branched, twisted and entangled.

Zonaria dichotoma, var. *intricata*, Ag. Sp. Alg. v. 1. p. 134. Syst. Alg. p. 266.

HAB. In the sea, parasitic upon various *Algæ*. Annual. Summer. Common on most parts of the British coast. Var. β on the Dumfriesshire coast, *Dr Richardson*.

Root a small mass of filaments. *Fronde* several from the same base, three to twelve inches in length, one to four lines in width, divided from the very bottom, many times dichotomous, the margins quite entire. *Fructification*, on some plants ovate, solitary, scattered, blackish seeds; on others, seeds collected into little dense scattered roundish clusters; both kinds bursting through the epidermis, and becoming at length prominent. *Substance* thin and membranaceous, adhering to paper when dry. *Colour* yellowish-green.

To Mrs Griffiths I am indebted for beautiful specimens, covered with the scattered single seeds, first observed, I believe, by herself. On other specimens, communicated by the same lady, are numerous minute vesicles on both sides of the frond, similar, I presume, to those alluded to in "English Botany." They do not appear to be at all connected with the fructification, though, when in a young state, the seeds sometimes happen to be included by them. When the seeds are collected into little sori or spots, they are densely wedged together, and are fixed by the lower extremity of their pellucid case.

2. DICTYOTA ATOMARIA.

Frond membranaceous, between palmate and flabelliform, irregularly cleft and lacinate, seeds forming waved transverse lines, with others scattered in the intervals.

Dictyota zonata, Lamour Essai, p. 57.

Dictyota ciliata, Lamour. Essai, p. 58.

Zonaria atomaria, Ag. Sp. Alg. v. 1. p. 128. Syst. Alg. p. 264. Grev. Fl. Edin. p. 286.

Spreng. Sp. Pl. v. 4. p. 327.

Uva atomaria, Woodw. Sm. Eng. Bot. t. 419.

HAB. In the sea, on rocks. Annual. Summer. On the shore at Cromer, *Mr Wigg*. At Corton and Gunton, *Mrs Fowler*. In the pools among the rocks, about the Worm's Head, in Glamorganshire, *Dillwyn*. In pools among the rocks at Sidmouth, Torquay and Ilfracomb, *Mrs Griffiths*. Frith of Forth, cast on the beach, exceedingly rare.

Root a mass of woolly filaments. *Fronde* several from the same

base, four to ten inches long, the general outline either flabelliform or wedge-shaped, three to nine inches in width, divided very deeply in a somewhat palmate manner, into a few large segments, which are also variously cleft to about half way down into smaller ones, and these again often lacinated and cut at the extremity, the margins often more or less ciliated with minute teeth. *Fructification*, blackish ovate seeds, enveloped in pellucid cases, on both surfaces of the frond, aggregated into waved transverse lines at unequal intervals, the intervals occupied by similar seeds, solitary and scattered, or collected into little spots. *Substance* thin and membranaceous, adhering to paper in drying. *Colour* a bright pale reddish or yellowish olive-green, not changing on exposure to the air.

Splendid specimens of this beautiful *Alga* have been communicated to me by my friend Mrs Griffiths, from Sidmouth, in every desirable state. The fructification, the substance, colour, and structure shew that it is closely allied to the preceding species, though arranged by Lamouroux, and since by Gaillon, among the *Padinæ*. Specimens from the coast of Normandy, kindly presented to me by M. Chauvin, agree in every respect with our own. Two of them, however, represent the plant less divided than is usual, and shew, that what may be called the primary form of the frond, is not really that of the *Padinæ*, but is rather broadly wedge-shaped, without any tendency in the terminal margin to continually extend itself at the lateral extremities in a circular manner.

GENUS XIX. CUTLERIA, *Grev.* Tab. X.

GEN. CHAR. Frond plano-compressed, cartilagino-membranaceous, subflabelliform, irregularly cleft. Root a mass of woolly filaments. Fructification, minute tufts of capsules, scattered on both sides of the frond; the capsules pedicillate, containing several distinct granules.

Obs. It will be at once evident how much this genus differs from the preceding, especially in the fructification. I cannot satisfy myself that the capsules are situated at any period of their growth beneath the epidermis; though such is the most natural conclusion. They are supported upon long slender stalks, and contain about ten granules or

seeds. The habit and outline of the frond bear a near resemblance to *Dictyota atomaria*, at least in the dry state.

I have dedicated this genus to Miss Cutler of Sidmouth, a lady well deserving of such commemoration, for her zealous devotion to marine botany. It is to Miss Cutler that we owe the discovery of *Gratelou-pia filicina* in this country.

I. CUTLERIA MULTIFIDA. Tab. X.

Zonaria multifida, Ag. Sp. Alg. v. 1. p. 135. Syst. Alg. p. 267.

Sporochnus multifidus, Spreng. Sp. Pl. v. 4. p. 329.

Ulva multifida; Sm. Eng. Bot. t. 1913.

Dictyota penicellata, Lamour. Essai, p. 58.

HAB. In the sea. Annual. August. Very rare. Yarmouth beach, Turner, and Mr Wigg.

Root a mass of woolly filaments. Frond between flat and compressed, four to eight inches long, the general outline more or less flabelliform, the width often exceeding the length; cleft nearly to the very base into three or four main divisions, each division cleft into many segments, which in their turn divide into another series: all the divisions, from the largest to the smallest, are dilated upwards. Fructification scattered over the whole frond, in the form of innumerable minute reddish-brown dots, so prominent as to give a roughness to the margin, even under the naked eye: dots composed of numerous erect oblong yellowish capsules, supported on long slender pedicels, containing a number of distinct granules. Substance between cartilaginous and membranaceous, reticulated, adhering to paper in drying. Colour reddish-olive.

The capsule of this plant has a remarkable similarity to the little black fungus, so common on the leaves of rose-bushes in gardens,—the *Phragmidium mucronatum* of Link, figured in the Cryptogamic Flora, t. 15. It is a beautiful object under the microscope.

The *Dictyota penicellata* of Lamouroux, is nothing more than our plant, with the ultimate segments almost filiform. Having never seen a recent specimen, I cannot describe the substance from my own observation; in "English Botany" it is said to be somewhat cartilaginous. Agardh says it is membranaceous, but, I believe, had only dried specimens to judge from. By Poiret it was once named *Ulva cornea*, but it certainly is not of a horny consistence.

What character in this plant could induce Sprengel to place it among the *Sporochni*?!

GENUS XX. PADINA, *Adans.* Tab. X.

GEN. CHAR. Frond flat, highly reticulated, subcoriaceous, flabelliform, mostly undivided, marked with concentric lines. Root a mass of woolly filaments. Fructification, ovate blackish seeds, fixed by their base, bursting through the epidermis in compact concentric lines (rarely spots), mostly on one surface of the frond.

Obs. Some few exotic species of this genus are provided with a divided frond, the lower part and stem being covered with woolly filaments; each branch or segment, however, resembles on a smaller scale, the entire frond of the other species, being curved at the lateral angles into a flabelliform or reniform outline. The concentric lines in the frond appear to be the result of an accumulation of the vegetable matter in the cellules, which, at certain intervals, assumes a wedge-shaped form, a dense consistence, and dark opaque colour. It is probable that this repeated and abrupt condensation of the vegetable matter, is an attempt towards the development of the fructification, for it is in one or more of these lines that the capsules are generally produced.

It is not improbable that when we know more of these plants, *Padina* will be divided into at least three genera, of which the types may be *P. Pavonia*, *P. interrupta*, and *P. squamaria*. *P. collaris*, *rosea*, *adpersa*, and *deusta*, require careful examination, and are probably not true *Padinæ*. Of the fructification of some species we know nothing, while of others our information is extremely imperfect. In regard to the most common of the European species, *P. Pavonia*, Agardh describes the concentric lines of fructification as containing alternately seeds and *apiculi*, or short curved linear bodies, half the size of the seeds. I have never been able to detect these, although I have examined specimens with six or seven lines. May not these *apiculi* be young or abortive seeds?

The species were referred to the genera *Fucus* and *Ulva*, prior to the time of Lamouroux, by all, except Adanson, who is the author of the name adopted in the present work.

I. PADINA PAVONIA. Tab. X.

Fronde reniform, almost sessile, subentire or deeply lobed, mostly pulverulent on one or both sides, the margin revolute, concentric lines numerous.

Padina Pavonia, Lamour. Gall. Dict. d'Hist. Nat. v. 53. p. 371.

Dictyota Pavonia, Lamour. Essai, p. 57.

Sonaria Pavonia, Ag. Sp. Alg. v. 1. p. 125. Syst. Alg. p. 263. Spreng. Sp. Pl. v. 4. p. 326.

Ulva Pavonia, Linn. Sm. Eng. Bot. t. 1276.

HAB. In the sea, attached to the rocks at the bottom of still and generally shallow pools. Annual. Autumn. Rocks near Exmouth, *Mr Stephens*. At Weymouth, Lullworth Cove, and Swanage, in Dorsetshire, *Pulteney*. Isle of Walney, *Martyn*. Sidmouth and Torquay, *Mrs Griffiths*. Near Aberdeen, *D. Gargill*.

Root a mass of reddish woolly filaments. **Fronde** several from the same base, in somewhat erect tufts, two to five inches in height, sometimes stipitate, especially when young, afterwards mostly sessile, flabelliform, reniform, undivided or lobed. Lobes sometimes so large, and produced so early, as to appear like branches, each having a completely developed frond; the width of an entire frond is thus often greater than its height, while the diameter of each lobe is two inches or more. The whole frond is beautifully marked with concentric zones, one to two lines apart, and is generally on one side at least pruinose, or covered with a white pulverulent substance, which can hardly be called extraneous. The margin is revolute, and fringed with minute, almost invisible, confervoid reddish filaments, about two lines in length. **Frustrification** blackish, ovate, somewhat erect seeds, each fixed by the base of its pellucid case, aggregated in the concentric lines; they burst the epidermis, and after remaining some time thus exposed, fall off.

Substance somewhat coriaceous at the base, membranaceous and rather transparent towards the margin, highly reticulated, adhering imperfectly to paper in drying. **Colour** pale yellowish or reddish-olive, more or less influenced by the white pulverulent substance already mentioned.

We have few *Algae* upon our coasts more singular or beautiful than the subject of the present description, which is very imperfectly represented in "English Botany," the revolute margin of the frond being even omitted. In the growing state, it is not uncommon to see the

rays of light decomposed, as by a prism, by the mass of minute filaments which fringe the margin.

2. PADINA PARVULA.

FronD resupinate, somewhat orbicular, membranaceous, deeply lobed, lobes orbicular, somewhat imbricated, scarcely at all marked with concentrical lines.

Zonaria parvula, Grev. Crypt. Fl. t. 390.

HAB. On rocks in the sea. Annual. March. Near Sidmouth.

FronD attached by its inferior surface to the rocks, by means of a short whitish pubescence, somewhat circular, an inch or an inch and a half in width, deeply lobed, the lobes orbicular, smooth, quite entire, about half an inch in breadth, more or less imbricated. *Substance* membranaceous and somewhat lubricous, partly transparent towards the margin; the reticulations quadrangular, twice as long as they are broad. *Colour* olivaceous-green. In drying it does not adhere to paper, and becomes a little darker.

I have already mentioned in the Cryptogamic Flora, that I have published this plant, chiefly with a view to draw the attention of such botanists towards it, as have opportunities of investigating the marine *Algæ* of the South-West of England. I have only seen the species in its immature state, but it is certainly one new to our Flora, and I think also undescribed. The structure of the frond is quite sufficient to place it in this order, and though the concentrical lines are not developed, it can hardly be referred to any genus except the present one.

GENUS XXI. HALYSERIS, *Tozzetti*, *Ag.* Tab. VIII.

GEN. CHAR. FronD flat, linear, membranaceous, with a midrib. Root a mass of woolly filaments. Fructification ovate seeds, forming distinct sori or groups (mostly arranged in longitudinal lines).

OBS. Upon the authority of the excellent Swedish algologist, the name of *Halysaris* (signifying *Sea Endive*) has the right of priority over that of *Dictyopteris*, given by Lamouroux.

It does not appear that any other kind of fructification is described by botanists, except the sori, or line of spots on each side of the midrib. The penetrating eye of Mrs Griffiths has, however, discovered another, in which the whole frond is covered with single scattered seeds, similar to those of the sori,—a modification analogous to what the same lady has observed in *Dictyota dichotoma*. This twofold fructification differs from that of the FLORIDÆ, in the circumstance of both kinds consisting of similar seeds. The reticulation of the frond in this genus is very conspicuous under the microscope, and the cellules are arranged obliquely from the midrib to the margin. On the surface of, at least, *H. polypodioides* are minute pores, from which issue tufts of white filaments, as in some species of *Fucus*,—a fact sufficient to prove that this organ does not indicate generic affinity.

Professor Sprengel, who, whatever may be the merits of his book in other respects, has a singularly indefinite idea of the genera of many Cryptogamic plants, has brought *Dictyota dichotoma*, with other species, into this genus.

I. HALYSERIS POLYPODIOIDES. Tab. VIII.

Frond dichotomous, entire at the margin, obtuse at the apex, spots of seeds linear-oblong forming a line on each side of the midrib.

Halysaris polypodioides, Ag. Sp. Alg. v. 1. p. 142. Syst. Alg. p. 262. Spreng. Sp. Pl. v. 4. p. 328.

Fucus polypodioides, Lamour. Dissert. p. 32. t. 24. f. 1.

Dictyopteris polypodioides, Lamour. Jour. Bot. p. 19. according to Agardh.

Dictyopteris elongata, Lamour. Essai, p. 56, according to Agardh.

Fucus membranaceus, Stackh. Ner. Brit. t. 6. Turn. Syn. Fuc. p. 141. Hist. Fuc. t. 87. Sm. Eng. Bot. t. 1758.

HAB. In the sea, on rocks and the larger *Algæ*. Biennial? August to October. Chit rocks, Sidmouth, and Peakhead rocks two miles to the west of Sidmouth, Mrs Griffiths. St Austell's Bay, Cornwall, Mr W. Rasleigh. Shield's Beach, Mr Winch. Near Torquay.

Root a spreading mass of woolly filaments. Fronds many from the same base, eight to twelve inches or more in height, and about half an inch in width, linear, several times dichotomously branched, furnished with a decided midrib, the surface more or less dotted with tufts of white filaments issuing from minute pores, the extremities obtuse. Fructification blackish ovate seeds, either solitary and scattered over the frond, or aggregated and forming oblong spots arranged on

each side, and nearly close to the midrib, in a linear series: the two kinds always found on distinct individuals.

Substance between cartilaginous and membranaceous, somewhat elastic when growing; in drying it does not adhere to paper. *Colour* pale, brownish, olive green, glossy, somewhat transparent.

Besides the two modifications of the fructification which I have described, another state of the plant has been observed by Mrs Griffiths, which is evidently in some way or other connected with the fructification. The appearance will be better understood by a glance at the plate, than by description. That portion of the frond which is usually occupied by seeds (about the upper half), is marked with dark, waved, most irregular lines, inclosing spaces of various sizes, often confluent and intersecting each other, and resembling the lines on a map more than any thing else; sometimes these lines are more scattered, and then resemble little islands of all shapes. The spaces so inclosed are somewhat more transparent, under the microscope, than the rest of the frond. The lines themselves, when microscopically examined, exhibit nothing that can lead to a knowledge of their real nature: the cellules of the part are sometimes filled with a dark mass of vegetable matter, which is hardly definite enough to be called a granule; the cellules themselves are also sometimes distorted. Mrs Griffiths, who communicated many specimens of the plant in this state, informs me that the substance of the frond is thicker when fresh, than in barren specimens. This appearance occurs on distinct individuals, and at the period when other specimens produce seeds.

It not unfrequently happens that the frond appears to be proliferous from the midrib. When carefully examined, it will be seen that the young shoot does not actually proceed from the midrib, though it always arises near it. It springs from an oval semi-opaque green mass, and, if the mass were a seed, we should say without hesitation that young fronds were vegetating upon the old one. In *Dictyota Kunthii* this is actually the case; and in *D. dentata* there are also abundance of little fronds springing from both surfaces. In *H. polypodioides* the little fronds at length really attach themselves to the midrib, and generally, in so doing, throw out a few woolly filaments like those of the root of the parent plant.

The odour of this species when fresh gathered is extremely powerful and disagreeable.

ORDER VII.—FURCELLARIEÆ,

Plants marine, of a dull, dark purplish or brownish red colour, changing to black on exposure to the air. Substance cartilaginous. Structure cellular, with a dense coloured stratum of horizontal filaments forming the circumference. Root creeping. Frond cylindrical, filiform, dichotomous. Fructification terminal, composed of pod-like, indehiscent receptacles, within which is imbedded, near the circumference, a horizontal circular stratum of dark brown oblong-pear-shaped seeds.

Obs. This well marked family contains only a single genus, and that genus one species. It resembles the following Order in habit, but is removed as far from it in the fructification as the **FUCOIDÆ**, or any other group, most opposed to it. In structure it is not fibrous, and therefore approaches nearer to the following than the preceding Orders, an arrangement confirmed both by the colour and habit. The seeds, however, in their colour and form are near to those of the **DICTYOTÆ**; but they are destitute of the limbus, always present both in that family and the **FUCOIDÆ**. Lamouroux and Agardh, nevertheless, both place it among the **FUCOIDÆ**. At the same time, the former expresses his opinion, that more accurate observations might lead future botanists to arrange it among the **FLORIDÆ**, and that the fructification might be regarded as an elongated tubercle or capsule.

GENUS XXII. FURCELLARIA, Lamour. Tab. XI.

GEN. CHAR. Frond cartilaginous, cylindrical, filiform, dichotomous. Fructification, terminal elongated pod-like receptacles containing a stratum of dark oblong-pear-shaped seeds in the circumference.

OBS. Lamouroux proposed this genus in his *Essai*, and characterized it by the form of the receptacles. Agardh, who has adopted it, very justly remarks, that the internal structure equally contributes to establish it.

1. FURCELLARIA FASTIGIATA. Tab. XI.

- Furcellaria fastigiata*, Lamour. Essai, p. 26. Ag. Sp. Alg. v. 1. p. 103. Syst. Alg. p. 274. Grev. Fl. Edin. p. 285.
Furcellaria lumbriçalis, Lamour. Essai, p. 26. Lyngb. Hydroph. Dan. p. 48. t. 40. A. f. 1—4. bad. Spreng. Sp. Pl. v. 4. p. 315.
Fucus fastigiatus, Huds. Fl. Ang. p. 588. Gmel. Hist. Fuc. p. 106. t. 6. f. 1. Gooden. and Woodw. in Linn. Trans. v. 3. p. 193.
Fucus lumbriçalis, Gmel. Hist. Fuc. p. 108. t. 6. f. 2. Gooden. and Woodw. in Linn. Trans. v. 3. p. 204. Turn. Syn. Fuc. p. 317. Hist. Fuc. t. 6. Sm. Eng. Bot. t. 824. Stackh. Ner. Brit. t. 6.
Fucus furcellatus, Linn. Sp. Pl. p. 1631.

HAB. On rocks in the sea, extremely common. Perennial? In fructification during the winter months.

Root creeping, composed of entangled, pale pink, fibres. *Fronde* tufted, very numerous, three to nine inches in height, about as thick as a crow-quill, cylindrical, many times divided in a dichotomous manner, the branches fastigiate, with acute axils, and, when barren, obtuse at the apex. *Fructification*, elongated pod-like acute receptacles, about an inch and a half in length, terminating the branches, of which they seem to be continuations in colour and substance, but are twice as thick. Within, are imbedded numerous oblong-pear-shaped dark brown seeds, arranged concentrically in a circle within the circumference of the whole length. *Substance* cartilaginous. *Colour* dark brownish or purplish red, changing in decay to greenish. When dry it becomes quite black, brittle, and does not adhere to paper.

A very singular state of the plant forms Mr Dawson Turner's variety β . It is characterized by the little, ovate-lanceolate, transparent, very pale, soft, terminations of the branches, generally two or three lines in length, and somewhat compressed. I am inclined to agree with Mr Turner, that these bodies are in some way or other connected with the fructification, for they appear, he observes, at the same time with the cylindrical pods. They occur on distinct individuals. When dissected, there are no traces of seeds, but the filaments forming the structure of the circumference are swollen and moniliform. They are clearly abortive attempts of the vegetating power, whether regarded as connected with the fructification, or the mere growth of

the frond. When the cylindrical receptacles are fully ripe, they fall off, and leave the frond truncated, as if, to use Mr Turner's words, the apices "had been laid together and chopped off at once with a knife; out of these rise new shoots, at first much more thin than the rest of the frond, giving the plant that annulated appearance which has been often noticed by authors." Mr Turner is perfectly correct in saying that the ovate-lanceolate transparent tips also fall off. I have, however, seen them elongate into healthy branches, and pointed them out to Mrs Griffiths, at Sidmouth. If, therefore, they are to be regarded as imperfectly developed receptacles (or pods), they are still capable, under favourable circumstances, of being converted into a continuation of the frond in its ordinary state.

In a barren state it is very difficult to distinguish this plant from *Polyides rotundus* without examining the root.

ORDER VIII.—SPONGIOCARPEÆ.

Plants marine, of a dull, dark reddish purple colour, changing to nearly black on exposure to the air, cartilaginous substance, and cellular structure. Root scutate. Frond filiform, cylindrical, and dichotomous. Fructification uniform, consisting of naked spongy warts composed of a mass of radiating filaments, among which are imbedded numerous roundish clusters of seeds, surrounded with a pellucid border; the seeds wedge-shaped, fixed by their base to a central point.

OBS. The fructification of the genus *Polyides* is so peculiar, that I know not any other with which it has the most remote affinity, and I therefore propose to consider it as the type of a distinct family. In regard to the mere habit of growth, it is similar to the genus which also stands alone in the preceding order. The colour of the frond, the nature of the seeds, and the general structure, indicate its situation in a system to be near the FLORIDEÆ.

GENUS XXIII. POLYIDES, Ag. Tab. XI.

GEN. CHAR. Frond cartilaginous, filiform, cylindrical. Fructification naked spongy warts, composed of radiating filaments, among which are imbedded roundish clusters of wedge-shaped seeds, surrounded with a pellucid border.

OBS. One of the most distinct genera of *Algæ*, separated about the same time by Professor Agardh, under the name of *Polyides*, and by myself under that of *Spongiocarpus*: the former has the priority, and is derived from two Greek words, signifying many forms or appearances. It is therefore scarcely applicable, as the only well-known species is tolerably constant to all its characters. In an earlier work Agardh made it a species of *Chordaria*; Lyngbye considered it a *Furcellaria*; Lamouroux a *Gigartina*: all equally remote from the truth. The peculiar characteristic is the spongy wart-like fructification. When carefully examined with the aid of a microscope, the internal structure of the frond is perceived to be cellular; but the cellules are elongated and arranged in such a manner as to have the appearance of filaments, especially in the centre, and towards the circumference. Many are constantly inclining in a curve towards the circumference, where they terminate, and constitute a dense coloured stratum. During the development of the fructification, these filaments are prolonged, become branched, and produce, here and there on the frond, spongy masses, within which are roundish clusters of wedge-shaped seeds, fixed by their base to a central point. My late correspondent, Captain Carmichael of Appin, who was remarkable rather as an indefatigable collector, than correct observer of plants, maintained that the spongy fructification of *Polyides* ought to be regarded as a distinct and parasitic *Alga*;—an opinion easily proved to be erroneous by microscopical examination, and which the very nature of the seeds might have convinced him was untenable.

In sterile plants, globular white masses are freely deposited in the cellular tissue towards the circumference of the frond, and are easily broken down into minute spherical grains. They are very obvious when a thin transverse slice is placed in the microscope. The grains resemble those with which the cellules of the barren frond of *Rhodomela subfusca* are sometimes filled.

M. Bory de St Vincent has described another species, brought from the coast of Chili, under the name of *P. Durvillæi*. The same has also been collected, according to him, in Otaiti. He does not, however, mention whether the specimens are in fructification; and his specific character, "*Polyides, caulibus cylindræis vage dichotomis; ramis fastigiato-furcatis,*" so nearly applies to the common species, that its claim to be ranked as distinct from it, seems to be dubious.

1. POLYIDES ROTUNDUS. Tab. XI.

- Polyides tumbricalis*, Ag. Sp. Alg. v. 1. p. 192. Syst. Alg. p. 194. Spreng. Sp. Pl. v. 4. p. 344.
Spongiocarpus rotundus, Grev. Fl. Edln. p. 296.
Furcellaria rotunda, Lyngh. Hydroph. Dan. p. 49.
Gigartina rotunda, Lamour. Essai, p. 49.
Fucus rotundus, Gmel. Hist. Fuc. p. 116. t. 6. f. 3. Turn. Syn. Fuc. p. 308. Hist. Fuc. t. 5. Sm. Eng. Bot. t. 1738.
Fucus radiatus, Gooden. and Woodw. Linn. Trans. v. 3. p. 202.
Fucus fastigiatus, Linnean Herbarium, according to Turner. Stackh. Ner. Brit. t. 6. (the smaller figure).

HAB. On rocks in the sea. Perennial? Autumn and winter. Pensance, *Mr E. Forster junior*. Falmouth and Yarmouth, *Turner*. Sidmouth and many other places in Devonshire. Sussex, *Mr Borrer*. On the large stones at Cromer, *Goodenough and Woodward*. Coast of Suffolk, *Mrs Fowler*. Coast of Northumberland, *Winck*. Near Belfast, *Dr Drummond*. Coast near Dumfries, *Dr Richardson*. Frith of Forth very rare.

Root an expanded disk. *Fronde* tufted, numerous, three to nine inches high, about the thickness of a crow-quill, filiform, cylindrical, branched many times in a dichotomous manner, the axils more or less obtuse and rounded, the branches fastigiate, the uppermost ones somewhat acuminate and often incurved. *Fructification*, spongy pale or pink warts on the sides of the upper branches, at first roundish or oblong and scattered, but at length two to four lines long, and one or two lines thick, sometimes creeping all round the frond, and occasionally, several becoming confluent, extend for nearly an inch along the branches. The warts are naked, or destitute of any epidermis, composed of white articulated filaments, radiating horizontally from the frond, and containing numerous imbedded clusters of seeds, each cluster surrounded by a pellucid limbus. *Seeds* red, wedge-shaped, fixed by their base to a central point. *Substance* cartilaginous. *Colour* blackish or brownish purple. When dry it is horny, and of a darker

colour. In decay it becomes paler, reddish, yellowish, and at length whitish.

Two varieties of this plant are mentioned in the *Historia Fucorum*, both of which occur on the British coast. The one is distinguished by the uppermost segments being long and linear; the other, by being very thin and scarcely two inches long. The latter I have never seen.

The specific name in use by almost every author, I have retained, in preference to that of *lumbricalis*, adopted by Agardh, from the "Pinax Theatri Botanici" of Bauhin, published in 1623.

ORDER IX.—FLORIDEÆ.

Plants all marine, of a purplish, reddish, or fine rose colour, seldom changing much by exposure to the air; of a coriaceous, cartilaginous, or membranaceous substance, and cellular texture, often reticulated. Frond flat, compressed or cylindrical, with or without a midrib, sometimes furnished with distinct leaves or foliaceous expansions. Fructification often of two kinds: the first, spherical or hemispherical capsules, sessile or stalked, and containing a round mass of seeds; the second composed of granules, (mostly ternate) scattered or collected into little spots (sori) or lines, and situated either in the general substance of the frond, or in little leaflets or distinct pod-like foliaceous processes. More than one kind of fructification is never found upon the same individual.

GENUS XXIV. DELESSERIA, Lamour. Tab. XII.

GEN. CHAR. Frond rose-red, flat, membranaceous, with a percurrent midrib. Fructification of two kinds:—capsules containing a globular mass of seeds, and ternate granules forming definite sori in the frond, or in distinct foliaceous leaflets.

Obs. M. Lamouroux dedicated this genus to a noble French patron of science, the Baron Benjamin Delessert. He was aware that another genus of plants had already been named *Lessertia*, in honour of the

same individual. Such a proceeding is undoubtedly not usual, but there is no canon of botany against it, and another example may be seen in the genera *Desfontainia* and *Fontanesia*, both named after M. Desfontaines. As, therefore, no valid objection exists against *Delesseria*, I shall avoid unnecessary nomenclature, and retain it in preference to that of *Wormskioldia*, introduced by Sprengel without any alleged reason at all. I am very willing, however, to restrict it according to the views of M. Gaillon.

1. DELESSERIA SANGUINEA.

Stem cylindrical branched, leaves oblong-ovate, entire at the margin, transversely veined, fructification stalked, attached to the midrib.

- Delesseria sanguinea*, Lamour. Essai, p. 124. Lyngb. Hydroph. Dan. p. 7. t. 2. Ag. Sp. Alg. v. 1. p. 172. Syst. Alg. p. 248. Grev. Fl. Edin. p. 292.
Wormskioldia sanguinea, Spreng. Syst. Pl. v. 4. p. 331.
Fucus sanguineus, Linn. Syst. Nat. 2. p. 718. Stackh. Ner. Brit. t. 7. Turn. Syn. Fuc. p. 7. Hist. Fuc. t. 36. Sm. Eng. Bot. t. 1041.

HAB. In the sea. Biennial. Producing fructification in the winter and spring of the second year. The frond itself is in its finest state in the summer. Common on the British and Irish coast.

Root a red disk. *Stem* scarcely an inch in height before it divides into two or three branches, about as thick as a crow-quill, and two to eight inches long, bearing a considerable number of simple *leaves*, four to ten inches in length and one to four in breadth, either subacute or quite rounded at the extremity, the midrib strong, and the transverse parallel veins obvious. The margin is entire, and more or less waved. *Fructification*: 1. ovate-globose *capsules*, filled with a dense mass of radiating moniliform filaments, the red uppermost joints of which become deciduous ovate seeds: 2. ovate flat membranaceous stalked seed-leaflets, one or two lines in length, in which *ternate granules* are thickly imbedded.

Substance of the stem cartilaginous; of the remainder of the frond very delicate and membranaceous. *Colour* a most splendid shining pink. In drying it adheres to paper, if much pressed. -

The fructification of this species often escapes observation, from occurring when the plant ceases to attract much notice. Little or nothing remains of the more delicate part of the frond, and the midrib and stem alone accompany the fruit. The seed-leaflets and the capsules form a sort of fringe on the midrib, and are produced on distinct individuals.

2. DELESSERIA SINUOSA.

Stem cylindrical, frond at first simple, at length pinnated, leaves oblong, more or less deeply sinuated or even pinnatifid, transversely veined, seed-leaflets linear.

Delesseria sinuosa, Lamour. Essai, p. 124. Lyngb. Hydroph. Dan. p. 7. t. 2. Ag. Sp.

Alg. v. 1. p. 174. Syst. Alg. p. 248. Grev. Fl. Edin. p. 292.

Wormakioldia, sinuosa, Spreng. Sp. Pl. v. 4. p. 831.

Fucus sinuosus, Gooden. and Woodw. Linn. Trans. v. 3. p. 111. Sm. Eng. Bot. t. 822.

Turn. Syn. Fuc. p. 1. Hist. Fuc. t. 36.

Fucus rubens, Huds. Fl. Ang. p. 573. Stackh. Ner. Brit. p. 18. t. 7.

HAB. In the sea, mostly attached to the stems of *Laminaria digitata*. Biennial? Producing fructification in summer and autumn. Common on almost all the British coasts.

Root a blackish disk, from which arise several *stems*. These at first support a simple and somewhat elliptical *frond* or *leaf*, two to four inches in length, and one to three or more in breadth, often so deeply sinuate as to be rather pinnatifid, with the margin more or less crenate. As the plant advances in age, the principal laciniae elongate into leaves, become sinuated in their turn, while the primary midrib, deprived gradually of its frond, changes to a naked stem. By this process, the frond at length becomes twelve inches long, pinnated as it were with long branches, which, in like manner, are once or twice pinnate or pinnatifid. *Fructification*: 1. spherical *capsules* imbedded in the substance of the leaves, or in little flat obovate leaflets; 2. *ternate granules* in minute linear flat seed-leaves, appearing like ciliae to the naked eye, and fringing not only the margin, but sometimes the midrib or transverse veins.

Substance thin, transparent, and membranaceous. *Colour* a beautiful rose-red. In drying it adheres imperfectly to paper.

In beauty of form, fine specimens of this plant do not yield to the preceding, though it is greatly behind it in splendour of colour. The most magnificent individuals I have seen, were collected by my friend Dr Drummond of Belfast, at Larne. The width of the frond in one of his specimens, uninjured by laceration, is at least four inches.

From the size to which they attain, several FLORIDÆ seem to claim Ireland in a particular manner as their native country.

3. DELESSERIA ALATA.

Frond linear, dichotomous, much divided towards the extremities,

becoming alternately pinnatifid, seed-leaflets lanceolate, mostly at the apex of the segments.

Delesseria alata, Lamour. Essai, p. 194. Lyngb. Hydroph. Dan. p. 8 t. 2. Ag. Sp. Alg. v. 1. p. 178. Syst. Alg. p. 250. Grev. Fl. Edin. p. 293.

Wormakioidia alata, Spreng. Sp. Pl. v. 4. p. 331.

Fucus alatus, Huds. Fl. Ang. p. 578. Sm. Eng. Bot. t. 1837. Turn. Syn. Fuc. p. 144. Hist. Fuc. t. 160.

VAR. β *angustissima*, Turn., frond extremely narrow, without any trace of lateral membrane. Turn. Hist. Fuc. t. 160. f. k.

HAB. In the sea, generally attached to the stems of *Laminaria digitata*, &c. Biennial? Summer. Common on the British coast. Var. β at Scarborough, *Mr Pitchford*. Lossiemouth in Scotland, *Mr Brodie*.

Root a blackish disk, from which arise several plane much divided fronds, three to eight inches in length, one to four lines in breadth, the main divisions dichotomous, the subsequent ones alternately pinnatifid; the principal branches spreading in such a manner that the width of the frond is mostly greater than the length. The margin is entire and even, and faint transverse veins are perceptible. *Fructification*: 1. spherical capsules attached to the midrib, or in minute lanceolate leaflets arising from the midrib, and containing a mass of radiating moniliform filaments, the uppermost joint of which swells into a red obovate seed: ternate granules imbedded in minute lanceolate seed-leaflets terminating the pinnæ, or springing from the midrib. Sometimes the ternate granules are imbedded in the apices of the pinnæ themselves.

Substance transparent, tender, and membranaceous. *Colour* a deep rose-red. In drying it adheres imperfectly to paper.

The var. β is an extraordinary plant, preserving in all respects the mode of branching belonging to the common state of the species, but almost quite destitute of membrane,—in some specimens completely so: it then, as Mr Turner has justly observed, seems more allied to *Microcladia glandulosa* and *Plocamium coccineum*. I should have been tempted to consider it distinct, were I not in possession of specimens in which the lateral membrane can be distinctly traced in some parts of the frond. The most remarkable circumstance attending this variety is, that the membrane is often wanting to the very extremities of the branches, where, nevertheless, we find a compressed frond, many times thicker than the midrib, as it exists in the extreme branches of the plant in its ordinary state.

In very broad fronds, the margin is slightly waved: in some Irish specimens, collected by Dr Drummond, where the frond is half an inch wide, the transverse veins are well marked to the naked eye.

4. DELESSERIA HYPOGLOSSUM. Tab. XII.

FronD with leaves proliferous from the midrib, linear-lanceolate, gradually attenuated at their origin, the youngest ones always lanceolate and acute, ternate granules forming two linear parallel spots towards the end of the leaves.

Delesseria hypoglossum, Ag. Sp. Alg. v. 1. p. 176. Syst. Alg. p. 249. Grev. Fl. Edin. p. 293.

Delesseria hypoglossa, Lamour. Essai, p. 194.

Wormskiolidia Hypoglossum, Spreng. Sp. Pl. v. 4. p. 331.

Fucus Hypoglossum, Woodw. in Linn. Trans. v. 2. p. 30. t. 7. Sm. Eng. Bot. t. 1396.

Turn. Syn. Fuc. p. 17. Hist. Fuc. t. 14.

Fucus hypoglossoides, Stackh. Ner. Brit. p. 76. t. 13.

HAB. In the sea, on rocks and other *Algæ*. Annual. Producing fructification in summer. Anglesea, *Rev. H. Davies*. All along the coast of Cornwall and Isle of Wight, *Stackhouse*. Plymouth, *Turner*. Weymouth, *Pulteney*. Torquay, Budleigh, Sidmouth, and Ilfracombe, *Mrs Griffiths*. Dover, and shore at Swansea, *Dillwyn*. Yarmouth, *Mr Wigg*. Corton and Gunton, Suffolk, *Mrs Fowler*. Brighton, *Mr Borrer*. Scarborough, *Mr Travis*. Exmouth. Bantry Bay, *Miss Hutchins*. Near Belfast, *Dr Drummond*. Frith of Forth, *Dr Richardson*. Ettrick Bay, Isle of Bute.

Root a minute disk. Fronds several from the same base, two to six inches or more long, and one or two lines wide, at first a simple linear-lanceolate frond, but afterwards branched by means of proliferous shoots from the midrib. These shoots, which are in every respect similar to the primary frond, give rise in the same manner to a third series, and so on; the number depending upon the age and size of the plant. The youngest leaves are always lanceolate, and nearest the apex. All the leaves are undivided, reticulated, with very obscure pellucid simple lines, passing from the midrib to the margin; the margin entire, flat, or slightly waved, the extremity more or less acute. *Fructification*; 1. spherical capsules sessile on the midrib of the smaller leaves, containing obovate somewhat stalked seeds: 2. oblong or linear sori or spots a line or more in length, on each side of the midrib on the younger leaves of distinct plants, composed of ternate granules.

Substance thin and membranaceous, adhering to paper in drying. Colour a beautiful transparent rose-pink.

In regard to the size, the degree of ramification, the breadth of the leaves, and the substance, this very elegant *Alga* is subject to variation, but the leading characters will prevent its being confounded with

any species except the following one. In Britain, its full length is about three inches; but a specimen in my possession, gathered by Miss Hutchins in Ireland, measures about eight inches. I have seen its breadth equal to near three lines, and, on the other hand, hardly exceeding half a line. The younger leaves of some specimens collected in Bute, are still narrower. In some Devonshire individuals, found by Mrs Griffiths, the substance is firmer, and the reticulation less conspicuous, but they do not otherwise differ.

If carefully examined under the microscope, the frond will be found to be transversely veined, as in the following species, but, in this instance, the oblong cellules which form the vein, are arranged in a single undivided line, and are much less conspicuous. I have never, however, found them absent.

5. DELESSERIA RUSCIFOLIA.

Frond with leaves proliferous from the midrib, leaves linear-oblong, abruptly attenuated at their origin, the youngest ones always rounded at the apex, ternate granules forming two linear parallel spots towards the end of the leaves.

Delesseria ruscifolia, Lamour. Essai, p. 124. Ag. Sp. Alg. v. 1. p. 174. Syst. Alg. p. 249.
Wormakioldia ruscifolia, Spreng. Sp. Pl. v. 4. p. 331.
Fucus ruscifolius, Turn. in Linn. Trans. v. 6. p. 127. t. 8. f. 1. Syn. Fuc. p. 11. Hist. Fuc. t. 15. Sm. Eng. Bot. t. 1305.

HAB. In the sea, attached to rocks and other *Algæ*. Annual. May to September. Yarmouth, *Turner*. Coast of Suffolk, at Corton and Gunton, *Mrs Fowler*. Bognor, *Mr De Luc*. Budleigh, Sidmouth, Torquay, Ilfracombe, and other places on the Devonshire coast, *Mrs Griffiths*. Exmouth.

Root a minute disk. Fronds several from the same base, one to three inches in length, and two or three lines in width, at first entire and ovate-oblong; afterwards producing other leaves, of an oblong or linear-oblong form from the midrib, in a proliferous manner; and in this way the original frond becomes three or four times divided, the youngest leaves being always roundish or obovate, and very obtuse. The margin is throughout entire, flattish, or waved. The space between the midrib and margin is traversed by oblique, parallel, white, pellucid, branched veins, composed of a single row of elongated cellules. Fructification: 1. spherical capsules sessile on the midrib of the younger leaves, filled with roundish seeds: 2. linear

sori or spots a line or more in length, on each side of the midrib on distinct plants, composed of ternate granules.

Substance thin and membranaceous, but more elastic than the preceding, adhering to paper in drying. *Colour* fine rose pink.

The present and the preceding species, it will be at once perceived, are very much alike in many points, and they were confused together, till Mr Turner separated them, in a paper published in Linnean Transactions. Some of the varieties, however, still come so near to one another, that it is very difficult to pronounce upon them, unless some prominent character be kept in view. The most decided one is perhaps the form of the youngest leaves, which Mr Turner says is constant, and I have found no reason to differ from that close observer. The transverse veins certainly exist in both species, but are far more visible in *D. ruscifolia*. In this species, also, the reticulation is much smaller, and the cellules of a rounder figure than in *D. Hypoglossum*.

The present plant is a very beautiful one, and by no means so frequent as the last species. I am not aware that it has been found in Scotland or Ireland.

GENUS XXV. NITOPHYLLUM,* *Grev.* Tab. XII.

GEN. CHAR. Frond plane, delicately membranaceous, rose-coloured, reticulated, wholly without veins, or very slight vague ones towards the base. Fructification, hemispherical capsules imbedded in the substance of the frond, and ternate granules forming distinct scattered spots.

OBS. The plants forming this genus are removed from all other FLORIDEÆ by their extreme delicacy and tenuity, their beautifully reticulated structure, their transparency, and peculiar fructification, the ternate granules being always collected into defined sori or little spots, scattered

* Having just received the third fasciculus of the botanical part of Duperrey's Voyage round the World, I perceive that Bory de St Vincent has adopted the generic name of *Dawsonia* for this group: a name suggested by Pallas de Beauvois, as a proper one for a genus of *Algae*, but neither defined nor applied by that naturalist. Lamouroux, indeed, took it up, but in so indefinite a manner, that his species are referred by all authors to two or three other genera. Under such circumstances was Mr R. Brown's genus of Mosses, *Dawsonia*, established, dedicated to the same excellent man Mr Dawson Turner, founded upon one of the most singular of plants, with no ambiguity of character. This surely is the *Dawsonia* that will remain, and connect the names of Turner and Brown in the annals of science.

either over the entire surface or near the margin of the frond. There is also no midrib, and if a few veins appear towards the base, they are obviously of a spurious nature, and quite different from the uniform venation observed in the *Delesseria*.

The name I have bestowed upon this beautiful little group, is compounded of two Greek words, and signifies a bright or shining leaf; the surface of most of the species appearing as if varnished, when dried.

I. NITOPHYLLUM OCELLATUM.

Frond with a roundish outline, extremely thin, quite veinless, cleft almost to the base, the segments repeatedly divided in a manner more or less between palmate and dichotomous, mostly linear, obtuse at the ends, spots of granules in the segments.

Delesseria ocellata, Lamour. Essai, p. 125. Ag. Sp. Alg. v. 1. p. 187. Syst. Alg. p. 252.

Gtev. Crypt. Fl. t. 347.

Wormakioidia ocellata, Spreng. Sp. Pl. v. 4. p. 331.

Fucus ocellatus, Lamour. Diss. t. 32.

Fucus granatous, Lamour. Diss. t. 33. f. 3, 4.

HAB. In the sea, attached to other *Algæ*. Annual. June to October. Near Torquay and at Budleigh, *Mrs Griffiths*.

Fronde one to five inches in length, perfectly sessile, having a roundish or reniform outline, the width in full-grown plants being generally equal to the length; they are cleft nearly to the very base, where, previous to division, it is rarely more than half an inch in breadth: the primary segments are from two lines to half an inch broad, and are repeatedly divided, mostly in a dichotomous manner, becoming slightly narrower after each division. The inferior divisions are mostly dilated upwards, and often give off three to five or more branches at once, in a palmate manner: the subsequent ones are more or less linear, divaricated, more regularly dichotomous, one to three lines in breadth.

Substance extremely thin, transparent, adhering closely to paper in drying. *Colour* a most delicate rose-pink, fading in old plants till they become almost white.

A highly beautiful plant, known to exist in this country for many years, but not distinguished as a species by British botanists till very recently. It was communicated to Mr Turner by Miss Hutchins and Mr Brodie, but without fructification; at least, I conjecture that that excellent author alludes to our species (in his observations upon his

Fucus ulvoides), when he remarks, that "the whole frond is not above three inches long, and every where dichotomous, with linear segments about four lines wide."

I have never seen a specimen with capsules: they are figured by Lamouroux as hemispherical, with a rather acute point. Mrs Griffiths, who has kindly communicated numerous specimens, informs me that even the second mode of fructification is rare.

2. NITOPHYLLUM PUNCTATUM. Tab. XII.

Frond very thin, quite destitute of veins in every part, vaguely cleft for half its length or more into segments, which become narrower as they subdivide, spots of granules scattered over every part of the frond.

Delesseria punctata, Ag. Sp. Alg. v. 1. p. 186. Syst. Alg. p. 252. Grev. Fl. Edin. p. 294.

Wormakioides punctata, Spreng. Sp. Pl. v. 4. p. 331.

Fucus punctatus, With. Bot. Arr. ed. 6. v. 4. p. 120. Sm. Eng. Bot. t. 1575. Turn. Hist. Fuc. t. 71.

Fucus ulvoides? Turn. Hist. Fuc. t. 80.

Uva punctata, Stackh. in Linn. Trans. v. 3. p. 236.

HAB. In the sea, attached to various other *Algæ*. Annual. Summer. Weymouth, *Stackhouse*. Coast of Cornwall, *Mrs Griffiths*. Swansea, *Dillwyn*. Orkney Islands, *Rev. C. Clouston*. Western coasts of the Isle of Bute. Larne, near Belfast, *Dr Drummond*. Bantry Bay, *Miss Hutchins*.

Root a small disk. *Fronds* one to several from the same base, three to eight inches in length, one to four in breadth, of a roundish or roundish-wedge-shaped outline, cleft from the extremity to more than half-way down into two or three main, somewhat diverging, segments, which are variously and often repeatedly subdivided, all becoming gradually narrower, and ending obtusely: besides these terminal divisions, a smaller series are generally given off from the sides in a spreading direction. *Fructification*; 1. hemispherical *capsules*, as large as turnip-seed, scattered over the frond, and containing a gelatinous mass of radiating filaments, each terminated by an obovate, red, deciduous seed; 2. oval or oblong *spots of ternate granules*, a line or more in length, scattered over the whole surface, on distinct individuals.

Substance exceedingly thin, and delicately reticulated, transparent, adhering to paper when dried. *Colour* beautiful pale rose-pink, the capsules and sori dark.

In venturing to consider *Fucus ulvoides* of Turner as a synonym of *Nitophyllum punctatum*, I have chiefly been guided by some specimens I possess, which were gathered at Larne by my friend Dr Drummond. They are intermediate between the more common state of *N. punctatum* and Mr Turner's figure of *Fucus ulvoides*. At the same time, candour obliges me to confess that I am still in uncertainty respecting the latter plant, and I do not see how the difficulties attending its discrimination can be cleared up, until the second mode of fructification be discovered. At present the capsular mode is only known. Agardh, in his *Species Algarum*, supposed it might be a variety of Lamouroux's *Delesseria ocellata*, but in his *Systema Algarum* has carried his doubts so far as to decline noticing it at all.

3. NITOPHYLLUM HILLIÆ.

Fronde thickish but delicate, veined towards the base, of a roundish general outline, vaguely and deeply cleft, the segments linear-oblong, broad, rounded at the ends, spots of granules very numerous, punctiform, scattered over the whole frond.

Delesseria Hilliæ, Grev. Crypt. Fl. t. 351.

HAB. In the sea. Annual. October. Plymouth, *Miss Hill*. Near Torquay, *Mrs Griffiths*. Whitsand Bay, *Mr Walker Arnott*.

Root a small disk. *Fronde* arising with a stem about a line in height, then at once expanding into a roundish frond, three to eight inches long, two to six inches broad, cleft more or less deeply in its circumference into irregular segments half an inch to above one inch broad, very rounded at the ends, and seldom more than once subdivided, sometimes slightly waved at the margin, and erose, as if torn. *Fructification*; 1. hemispherical *capsules* about the size of turnip-seed, minutely umbonate, scattered rather remotely over the whole frond, and containing roundish-ovate seeds; 2. *ternate granules* forming minute dot-like *spots*, hardly half a line apart, and scattered over the whole surface.

Substance when fresh thickish and tender, semitransparent, adhering imperfectly to paper in drying, cracking and becoming very thin and membranous. *Colour* rose-red, changing to dull red, with a greenish hue in old plants.

In my Cryptogamic Flora I have dedicated this plant to its discoverer, Miss Hill of Plymouth, a lady who for many years devoted

much time and acute observation to the study and collecting of our marine *Algæ*. The minute and thickly scattered sori are sufficient of themselves to establish the species.

Those who have been so fortunate as to gather this fine species in its fresh state, agree in representing it as of a thicker substance than its congeners. Miss Hill and Mrs Griffiths compare it to very fine kid-leather when handled; and Mr Arnott remarks, that it is "thicker than membranaceous."

4. NITOPHYLLUM BONNEMAISONI.

FronD shortly stipitate extremely thin vaguely cleft the segments roundish wedge-shaped, the stem vanishing at the base of the frond in a few obscure veins, fructification scattered over the frond.

Delesseria Bonnemaisioni, Ag. Sp. Alg. v. 1. p. 186. Syst. Alg. p. 252. Grév. Crypt. Fl. t. 322.

HAB. in the sea. Annual. Summer. Orkney, *Rev. C. Clouston*. Isle of Bute. Larne, Near Belfast, *Dr Drummond*.

Root a small red disk. *Stem* one to several lines in length, slender, expanding into a semicircular or roundish wedge-shaped frond, two to four inches in length, and two to five inches in width, or more, irregularly cleft into roundish wedge-shaped segments: sometimes a few smaller fronds arise from the sides of the stem. At the base of the frond are a few veins produced by the disappearance of the stem. *Fructification* scattered over the frond: *capsules* small; spots of *ternate granules* oval, those in the centre about a line long.

Substance extremely thin delicate and membranaceous, adhering to paper in drying, easily lacerated. *Colour* a most beautiful rose-pink, which changes to purplish in drying.

This species is clearly distinguished from the two subsequent ones, by the spots of ternate granules being scattered over the disk of the frond. The figures 2. and 3. in my Cryptogamic Flora, t. 322., belong to *N. Gmelini*: at the time the drawing was made, I had not seen both kinds of fructification. Many specimens of *N. Gmelini* closely resemble the present plant in their general outline. The error, I trust, will be pardoned, in consideration of the difficulty of the subject.

5. NITOPHYLLUM GMELINI.

Stem short, passing into a frond with a roundish outline deeply cleft the main segments broadly wedge-shaped vaguely subdivided faintly marked with vague flexuose veins, the margin entire, spots of ternate granules irregular, marginal.

Delesseria Gmelini, Lamour. Essai, p. 36.

HAB. In the sea. Annual. Summer. Torquay, Budleigh and Sidmouth, *Mrs Griffiths*. Ilfracombe, *Miss Hill*. Larne, near Belfast, *Dr Drummond*.

Root a small disk. *Stem* two lines to half an inch in height, simple or divided into two to four branches, each expanding into a roundish semicircular or broadly wedge-shaped frond, one to four inches in height, cleft more than half-way down into two to five wedge-shaped segments, which are again divided, but not so deeply, very unequally and irregularly, the summits always obtuse. The margins are entire, and mostly quite even: the reticulated substance is traversed from the base to the extremity with obscure often pale veins, always perceptible when fresh, but sometimes almost disappearing in dried specimens. *Fructification*: 1. *capsules* not so large as turnip-seed, dark red, hemispherical, scattered remotely over the surface of the frond; 2. spots of *ternate granules* irregular, often confluent, forming interrupted lines a little within the margin.

Substance thin and membranaceous, but firmer and more elastic than the following, cartilaginous in the stem. *Colour* a purplish rose-red.

After comparing numerous individuals communicated by Mrs Griffiths in the most perfect state of fructification, added to some magnificent ones collected in Ireland by Dr Drummond, with authentic specimens of Lamouroux's *Delesseria Gmelini* presented to me by my friend M. Chauvin of Caen, I do not hesitate to consider the present species as essentially distinct. I have never seen it myself in a growing state, but have been indebted to the lady above mentioned for several observations, without which my account of it would necessarily have been imperfect. The frond seldom exceeds three or four inches in height, but is often more in width, and is altogether a compact plant contrasted with the following, from which it is also remarkably distinguished by being never fringed. The Irish specimens are twice the size of the English ones.

6. NITOPHYLLUM LACERATUM.

Fronde dichotomously or vaguely divided sublinear more or less traversed by obscure flexuose longitudinal veins, the margin either entire crenate waved or fringed with little processes, spots of ternate granules marginal.

Delesseria lacerata, Ag. Sp. Alg. v. 1. p. 184. Syst. Alg. p. 251. Grev. Fl. Edin. p. 293.

Wormskioldia lacera, Spreng. Sp. Pl. v. 4. p. 332.

Chondrus laceratus, Lyngb. Hydroph. Dan. p. 18.

Fucus laceratus, Gmel. Hist. Fuc. p. 179. t. 21. f. 4. Stackh. Ner. Brit. p. 77. t. 13.

Turn. Syn. Fuc. p. 154. Hist. Fuc. t. 68. Sm. Eng. Bot. t. 1067.

Fucus crispatus, Huds. Fl. Ang. p. 580.

Fucus undivisiifolius, Lightf. Fl. Scot. p. 948. t. 32.

HAB. in the sea, attached to rocks and various *Algæ*. Annual. Summer. Common, especially on the English coast. Remarkably large near Belfast, *Dr Drummond*.

Root a small disk. Fronds several from the same base, two to nine inches in length, two lines to half an inch in width, cleft to the base in a dichotomous or alternate manner: sometimes the main divisions spring from nearly the same point in a subpalmate manner; these are again repeatedly subdivided, the ultimate segments rounded and obtuse; the margin is sometimes quite entire, but often producing short decurrent alternate lacinia; it is also much waved and curled (rarely even), and frequently notched or set with minute slender processes. Slender, obscure, flexuose, nearly parallel veins, darker than the frond, sometimes traverse the whole length of the branches, but in other cases are only visible towards the base. Fructification, 1. hemispherical dark red capsules, nearly as large as turnip-seed, scattered irregularly over every part of the frond, or situate in the minute marginal processes; 2. spots of ternate granules mostly roundish, confined to the margin.

Substance extremely thin, transparent, and easily lacerated, adhering but slightly to paper in drying. Colour varying from pink red to brown red, and becoming rather darker when dry.

A variable plant, but distinguished from the preceding by the linear frond, the curled and fringed margin, and by the absence of a decided stem. Sometimes, it is true, there is a spurious stem produced by the wearing away of the membrane at the base, but it is easily distinguished from the true stem of *N. Gmelini*. Mr Turner's variety γ (and perhaps δ) I take to be the latter plant, but, in the absence of authen-

tic specimens I dare not speak positively. The figure of *Fucus granateus* of Lamouroux, referred to by Mr Turner, agrees well enough, with the exception of the capsules, respecting which there must surely be some error.

Mr Turner's variety *uncinatum* is remarkable for having the ends of some of the branches curved inwards like a sickle, and of a cartilaginous substance. Miss Hill's opinion, that it fastens itself by this means to other *Algæ*, is not an improbable one. The whole frond has the power of attaching itself by its edges, and creeping, as it were, upon the rocks and plants in its way—so much so, that it can hardly be gathered without some resistance and laceration.

In this, as well as the preceding species, the veins are found under the microscope to be composed of longer cells than the ordinary reticulation.

Sprengel has confounded *N. Bonnemaisoni* with this species.

GENUS XXVI. RHODOMENIA, Grev. Tab. XII.

GEN. CHAR. Frond plane, membranaceous, fine pink or red, quite veinless, sessile, or with a short stem, which expands immediately into the frond. Fructification—1. hemispherical scattered capsules; 2. minute ternate granules spreading over the whole or some part of the frond (not in defined spots).

OBS. This genus, the name of which is derived from two Greek words signifying a red colour and a membrane, is composed of various species of *Sphærococcus*, according to the system of Agardh, and of one species of *Halymenia*. Such as were described by Lamouroux were regarded by him as *Delesseriæ*. M. Gaillon has associated *Rhodomenia bifida*, *Palmetta*, *laciniata*, and *palmata*, in the genus *Halymenia*, along with *Nitophyllum ocellatum*, *Iridæa edulis*, *Thamnophora corallorrhiza* Ag., and many others, equally remote from one another in habit, structure, and fructification.

In most of the species both kinds of fructification have been observed. The hemispherical capsules, which are imbedded in the substance of the frond in the disk or margin, resemble those of the last genus. The ternate granules, however, are generally much smaller, almost requir-

ing the assistance of a pocket magnifier to perceive their situation, though the experienced eye is at no loss to perceive when they are present. The substance of the frond, though membranaceous, is of a dense cellular structure, and scarcely reticulated: it is besides destitute of the beautiful transparency of the *Nitophylla*. The colour is often bright, but generally deeper, less shining and delicate.

1. RHODOMENIA BIFIDA.

FronD thin transparent subdichotomously divided linear the apices obtuse, capsules minute spherical marginal.

Sphaerococcus bifidus, Ag. Sp. Alg. v. 1. p. 298. Syst. Alg. p. 231. Spreng. Sp. Pl. v. 4. p. 334.

Delesseria bifida, Lamour. Essai, p. 37.

Halymenia bifida, Gaill. Dict. Sc. Nat. v. 53. p. 360.

Fucus bifidus, Gooden. and Woodw. in Linn. Trans. v. 3. p. 159. t. 17. f. 1. Sm. Eng. Bot. t. 773. Turn. Syn. Fuc. p. 165. Hist. Fuc. t. 154.

HAB. in the sea, attached to rocks and plants. Annual. Summer. Common on the coast of Cornwall, *Stackhouse*. Near Plymouth, *Mr E. Forster junior*. Sidmouth, Budleigh, and Torquay, *Mrs Griffiths*. Coast of Hampshire, *Hudson*. Shores of the Isle of Wight, *Mr Maimburg*. Yarmouth, *Mr Wigg*. Near Tynemouth, *Winch*. On the beach at Corton and Gunton, *Mrs Fowler*. Belfast, *Mr Templeton*. Bantry Bay, *Miss Hutchins*.

Root a minute disk. Fronds numerous, spreading, one to three inches long, repeatedly divided, either truly dichotomous or between dichotomous and palmated, the segments all nearly uniformly linear, one to three lines in width, and divaricated, so that the frond, in consequence of the short space between the subdivisions, acquires a dilated and roundish outline. The apices are obtuse; the margin entire, or fringed with little foliaceous horizontal processes, the result of a proliferous tendency, which sometimes grow into branches, and at length give the plant a very paradoxical character. *Fructification*, 1. minute spherical dark red capsules, smaller than poppy-seed, arranged along the margin, or very near to it; 2. ternate granules generally occupying a space about three or four lines in length at the extremities of the ultimate segments, sometimes scattered over the whole frond.

Substance delicate, thin, transparent, adhering to paper in drying.

Colour varying from pale pink to rose red.

The second mode of fructification in this species, though entirely spread over the ends of the frond, is so minute as to be only just

visible to the naked eye in the form of a cloud, a little darker than the rest of the frond. It was observed in this country by Mrs Griffiths. I have never seen the ternate granules scattered over the whole frond, as described by Agardh.

In the variety *ciliatus* of Turner, the capsules sometimes occupy the proliferous marginal ciliae.

2: RHODOMENIA LACINIATA.

FronD between cartilaginous and membranaceous dichotomous or palmate, the margin when producing capsules fringed with minute processes in which the capsules are placed, ternate granules on distinct plants form a line along the margin, which is then entire.

- Spheropococcus laciniatus*, Lyngb. Hydroph. Dan. p. 12. t. 4. Ag. Sp. Alg. v. 1. p. 297. Syst. Alg. p. 230. Spreng. Sp. Pl. v. 4. p. 334.
Delesseria laciniata, Grev. Fl. Edin. p. 293. Hook. in Fl. Lond. New Series, t. 198.
Delesseria ciliaris, Lamour. Essai, p. 37.
Halymenia ciliaris, Gaill. Dict. Sc. Nat. v. 53. p. 360.
Fucus laciniatus, Huds. Fl. Angl. p. 579. Sm. Eng. Bot. t. 1068. Turn. Syn. Fuc. p. 161. Hist. Fuc. t. 69.
Fucus crispatus, Stackh. Ner. Brit. p. 92. t. 15.

HAB. in the sea, attached to rocks and stones. Biennial? Producing fructification from January to July. Coast of Anglesea, Rev. H. Davies. Coast of Cornwall, Stackhouse. Portluney, Carhayes: Penzance; Lizard Point, &c. Mr E. Forster junior. Yarmouth, Mr Wigg. On the beach at Corton and Gunton, Suffolk, Mrs Fowler. Many places in Devonshire, Mrs Griffiths. Exmouth and Torquay. Port Rush, Dr Scott. Larne, near Belfast, Dr Drummond. Iona, Dr Hooker. Orkney, Rev. C. Clouston. Berwick and Dunbar; very rare near Edinburgh.

Root a small blackish disk. Fronds generally several from the same base, three to nine inches long; at the very base the frond divides into two to four branches, narrow at first, but gradually dilating till it attains a width from half an inch to one or two inches or even more, and then is repeatedly subdivided, sometimes in a dichotomous, sometimes in a palmate manner, the general outline always becoming more and more dilated, till at length it acquires a broadly fan-shaped or semicircular figure. The apices are rounded, but in consequence of a proliferous disposition is frequently lacinated. The margin is even, but also frequently proliferous, throwing out little frondlets half an inch or more in length, which are sometimes supported upon little

stalks. The margin also derives a character according to the nature of the fructification: in those individuals which produce capsules, they are closely fringed with minute processes about half a line in length: in those individuals which produce ternate granules, there are none of these processes, but the margin is quite entire. *Fructification*, 1. *capsules* minute, hemispherical, always situate in the marginal processes; 2. *ternate granules* very minute, forming a reddish linear cloud on the surface of the frond, and following the margin.

Substance thickish, between membranaceous and cartilaginous, of a dense uniform structure under the microscope, becoming thinner, and adhering to paper in drying, especially young plants. *Colour* a beautiful opaque bright red, varying to pink on the one hand, and to nearly blood colour on the other.

Mr Turner has well observed of this plant, that, if examined with a pocket-glass, it appears to be obscurely reticulated; but with a higher magnifying power it is shown to be of a uniform texture. The ternate granules are often scattered irregularly and at intervals over the whole frond; but the margin is their proper situation, and there they are numerous, and quite visible to the naked eye.

3. RHODOMENIA POLYCARPA.

Frond between cartilaginous and membranaceous dichotomous or somewhat palmate the segments sublinear lacinated and acute at the ends, capsules hemispherical scattered over the frond.

Sphaerococcus polycarpus, Grev. Crypt. FL t. 352.

HAB. In the sea. Biennial? Cast ashore under Tait's Hill, near Plymouth, 1814, *Miss Hill*. Whitsand Bay, *Mr Walker Arnott*.

Root unknown. *Frond* about seven inches in length, divided from near the base, where it is hardly more than two to three lines broad; the segments then gradually dilate for the space of two inches till they are above half an inch in width, and then subdivide in an irregular dichotomous lacinated manner, terminating rather sharply, the general outline becoming more and more fan-shaped. *Fructification*, as far as hitherto known, consisting of prominent, hemispherical, dark red *capsules*, as large as turnip-seed, imbedded in the substance of the frond, and scattered plentifully all over it. *Seeds* oblong, minute.

Substance between cartilaginous and membranaceous, at the base coriaceous, thickish like the last, semitransparent only towards the end. *Colour* opaque dull pink red, very dark at the base.

As only a single and imperfect specimen of this species has come under my observation, any account of it must be indulgently received. Though we are acquainted only with the capsular mode of fructification, yet I do not see how it can be referred with propriety to any other genus. Its structure is dense, and very similar, under the microscope, to that of *Rhodomenia palmata*,—but the different colour, and the fructification, besides its greater thickness, at once remove it from that plant. Under a high magnifying power the surface seems to be pitted (an appearance too strongly represented by the engraver in the Cryptogamic Flora), but it is impossible to say whether the same character exists in the fresh state.

Is it possible that this plant can have any relation with the *Fucus Sarniensis* of Professor Mertens?

Since the description of this plant was prepared for the press, Mr Walker Arnott has informed me that he found lately a specimen in Whitsand Bay, Devonshire. He thinks it is really the *Fucus Sarniensis* of Mertens and Roth. Having no access to the *Catalecta Botanica*, in which that species was published, I regret that I cannot determine the question. It is certainly possible that the *Fucus Sarniensis* of Turner, which is a variety of *R. palmata*, may not be the true plant of Professor Mertens.

4. RHODOMENIA PALMETTA. Tab. XII.

Stem cylindrical filiform subsimple expanding into a fan-shaped semicircular frond divided throughout in a dichotomous or palmate manner the segments linear with entire margins the axils rounded, capsules imbedded in the disk and margin.

Sphærococcus Palmetta, Ag. Sp. Alg. v. 1. p. 245. Syst. Alg. p. 215. Spreng. Sp. Pl. v. 4. p. 335.

Delesseria Palmetta, Lamour. Essai, p. 37.

Halymenia Palmetta, Gall. Dict. Sc. Nat. v. 53. p. 361.

Fucus Palmetta, Esp. Ic. Fuc. p. 84. t. 40. excluding all the synonyms. Stackh. Ner.

Brit. p. 102. t. 16. Sm. Eng. Bot. t. 1120. Turn. Syn. Fuc. p. 21. Hist. Fuc. t. 73.

Fucus bifidus, Huds. Fl. Ang. p. 581.

HAB. In the sea, growing upon rocks and the large stems of *Laminaria digitata*. Annual. Summer and autumn.

Root a red cartilaginous disk, often accompanied by a few creeping fibres, and producing numerous stems. *Stem* from one or two lines to an inch in length, simple or giving off a few branches, expanding more or less gradually into a frond one to three inches long, which is generally wedge-shaped or semicircular, and often so much dilated in its outline as to exceed its length in its width. The segments into which

the frond is divided, are from one to three lines in breadth, and mostly linear, but sometimes several divisions are compressed into so small a space that the linear character is lost; the margin is always entire, and the apices are generally obtuse, or even rounded, rarely somewhat elongated and rather acute, still more rarely somewhat lacinate. *Fructification*; 1. hemispherical red capsules, nearly as large as turnip-seed, and sessile in the disk and margin of the frond: 2. ternate granules minute, on distinct individuals, forming a cloud-like transverse spot at the very extremity of the ultimate segments.

Substance cartilaginous in the stem, thin, semitransparent and membranaceous in the frond, becoming darker and adhering imperfectly to paper in drying. *Colour* varying from fine rose pink to nearly a crimson red.

The ternate granules were discovered in this species by my friend Mrs Griffiths, and are sufficiently obvious to be detected by the naked eye. They seem to occur far more frequently than the capsules, and are often situate in what appears to be a proliferous extension of the apex of the frond, of an obtuse or obovate figure, and from two to three lines in length.

R. Palmetta is placed by Agardh in that group of the genus *Sphærococcus* of which his *S. crispus* is the type; but it must be confessed it associates with its neighbours neither in substance, colour, nor fructification. With *S. membranifolius* it might sometimes be possible to confound it, were the mere outline alone to be regarded; but that species has always a livid purplish hue, never present in any of the species of *Delesseria*, *Nitophyllum*, and *Rhodomenia*, not to mention the totally distinct fructification.

5. RHODOMENIA CRISTATA.

Frond semicircular membranaceous subdichotomous the segments somewhat dilated upwards repeatedly subdivided the divisions alternate decurrent lacinate at the ends, capsules spherical imbedded in the margin of the frond.

Sphærococcus cristatus, Ag. Lyngb. Hydroph. Dan. p. 13. t. 4. Ag. Sp. Alg. v. 1. p. 300.
Syst. Alg. p. 231. Grev. Cr. Fl. t. 85. Fl. Edin. p. 296. Spreng. Sp. Pl. v. 4. p. 336.
Fucus cristatus, Linn. Herb. Turn. Hist. Fuc. t. 23. excluding var. γ.

HAB. In the sea, upon the stems of *Laminaria digitata*. Annual. July. On the sea-shore at Wick, Caithness, Messrs Borrer and Hooker. Frith of Forth.

Root a minute disk, throwing up several fronds. *Fron*d about an inch long, dividing near the base into several main branches, flat and even, entire at the margin, linear or dilated upwards, about a line in width, the branches again dividing once or twice subdichotomously, and then bearing numerous other smaller segments in an alternately pinnatifid manner, decurrent and cleft or lacinated at the apices; every division has a tendency to dilate upwards, so that the circumference of the frond is extended and crowded. *Fructification*, sessile spherical dark red *capsules* half the size of poppy-seed, usually occurring towards the extremity of the branches.

Substance membranaceous, or very slightly cartilaginous, adhering closely to paper in drying. *Colour* a rose red, nearly similar to that of *Delesseria alata*.

A variety of this species is figured and described by Mr Turner, from specimens brought from the Red Sea by the Earl of Mountnorris. It is narrow, linear throughout, and two inches or more in length. The same variety, upon the authority of the Flora Scotica, was found on the shore of Caithness by Dr Hooker and Mr Borrer. The species seems to be of very rare occurrence. Ternate granules have not been observed, but future researches will probably discover them to exist.

6. RHODOMENIA CILIATA.

Root fibrous, frond between membranaceous and cartilaginous somewhat lanceolate and more or less pinnated with sublanceolate branches attenuated at their origin the surface and margin ciliated, capsules spherical, in the ciliæ.

Sphaerococcus ciliatus, Ag. Lyngh. Hydroph. Dan. p. 12. t. 4. Ag. Sp. Alg. v. 1. p. 263.

Syst. Alg. p. 221. Spreng. Sp. Pl. v. 4. p. 334.

Delesseria ciliata, Lamour. Essai, p. 37.

Halymenia ciliata, Gall. Dict. Sc. Nat. v. 53. p. 361.

Fucus ciliatus, Huds. Fl. Ang. p. 580. Stackh. Ner. Brit. p. 90. t. 15. Sm. Eng. Bot. t. 1000. Turn. Syn. Fuc. p. 160. Hist. Fuc. t. 70. figs. e—e.

HAB. In the sea. Annual. Producing capsules only in the winter. Frequent on the English coast, especially in the south and south-west. Rare in Scotland. Rare also near Belfast, *Dr Drummond*.

Root a mass of pink cylindrical branched creeping fibres. *Fron*ds several from the same root, three to nine inches long, filiform at the base, but rapidly expanding, half an inch to near two inches broad in the widest part; this primary frond is of a lanceolate figure, but

the general outline depends upon the branches or divisions which are apt to vary in number, form, and length. They arise from the margin generally in a pinnatifid manner (rarely somewhat palmate), and are more or less contracted at their origin, often so much so as to make them appear like proliferous frondlets supported on little stalks. They are more or less lanceolate, a few lines to an inch in width, and one to six inches in length, but in these respects are very unequal on the same plant. The margin is fringed with small subulate ciliæ a line or more in length, which are often also found upon the disk. *Fructification*; 1. spherical pink *capsules*, nearly as large as turnip-seed, situate in the ciliæ both of the margin and surface; 2. *granules* very minute, on distinct individuals, forming broad irregular cloud-like stains on the surface, perceptible to the practised eye.

Substance thickish, rather firm, between cartilaginous and membranaceous, becoming thinner, and not adhering to paper in drying; the texture dense. *Colour* a deep semitransparent red, sometimes (but not always) becoming much darker when dry.

This plant and the following one deviate from the other species in their distinctly fibrous root, and in the duller red colour of the frond. In regard to the root, however, *R. Palmetta* must be considered intermediate, as the disk is furnished with fibres which often creep much in the same manner.

R. ciliata occurs sometimes almost destitute of branches, or with a division or two only, in a palmate manner: at other times the frond is only a few lines wide, entangled, and much branched at the base, slender and attenuated. Specimens collected by Dr Drummond, at Bangor, in Ireland, are from a few lines to nearly an inch wide, fringed at the margin, with almost filiform ciliæ, above an inch long; the apex of the frond is also lacinate, the laciniae passing into similar ciliæ.

7. RHODOMENIA JUBATA.

Root fibrous, frond flaccid between membranaceous and coriaceous linear-attenuated vaguely branched the branches simple or once or twice pinnatifid ciliated the ciliæ linear-subulate, containing the fructification.

Sphærococcus jubatus, Grev. Crypt. Fl. t. 359.

Sphærococcus ciliatus, vars. *jubatus*, *linearis*, *angustus*, and *spinosus*, Ag. Sp. Alg. v. 1. p. 264. Syst. Alg. p. 221.

Fucus jubatus, Gooden. and Woodw. Linn. Trans. v. 3. t. 17. Stackh. Ner. Brit. p. 51. t. 11.

Fucus ciliatus, vars. *jubatus*, *lanceolatus*, *angustus*, and *spinosus*, Turn. Hist. Fuc. t. 70. f. f—h.

HAB. In the sea, attached to rocks and the larger *Algæ*, producing fructification only in summer. Annual. Abundant at Sidmouth and many parts of the coasts of Devonshire and Cornwall, *Mrs Griffiths*. Plymouth, *Miss Hill*. Exmouth, *Sir Thomas Frankland*. Torquay.

Root creeping, composed of cylindrical branched pink fibres. *Fronde*s, numerous from the same root, three to twelve inches in length, linear, or very narrow linear-lanceolate, cylindrical and filiform at the base, very gradually dilating into a flat frond, one to four lines wide in the broadest part. Sometimes the frond is only divided into a few nearly simple elongated branches, given off near the base, in a manner between dichotomous and pinnate. At other times the main branches are numerous, more or less closely pinnatifid with others of various lengths (from one to six inches), which, in their turn, often bear one or two other series. All the divisions are linear or linear-lanceolate, and invariably attenuated at their origin. The margin and also the disk produce linear processes, commonly one to three lines in length. *Fructification*: 1. hemispherical *capsules* about the size of poppy seed, containing ovate seeds; and, 2. *granules* (ternate?) all situated in the ciliary processes.

Substance soft and flaccid, adhering to paper in drying, and becoming darker. *Colour* a dull rather pinkish red.

Mrs Griffiths has the merit of clearly ascertaining the distinctness of this species, by pointing out the flaccid substance, so different from that of the preceding, and the important fact, that the one is a summer, the other a winter plant. To these characteristics may be added another: the *granules* in *R. ciliata* invariably occupy the surface of the frond itself; while in *R. jubata* they invariably occupy the *cilia*. When the former is in perfect fructification, the young plants of the latter are only just making their appearance, so that the two species can hardly be said to even exist at the same time.

This plant is extremely sportive in its mode of growth. The *cilia* are sometimes so numerous, both at the margin and on the surface, as to crowd each other, and produce a singularly bristly or fringed appearance. In some specimens, especially the larger and more luxuriant ones, the branches, and even the *cilia*, have a tendency to elongate themselves into slender filiform tendrils, hooked or spirally curled at the end. In other cases, the *cilia* change into simple filiform ramuli, nearly an inch in length; or, not unfrequently, they become compound, dividing into two to five divaricated spinous segments, which give the frond quite a prickly character.

The capsules are very rare; the only specimen I have seen produ-

cing them, was found at Plymouth by Miss Hill. The granules occur constantly.

8. RHODOMENIA PALMATA.

FronD membranaceous or slightly coriaceous palmated the margins entire the segments oblong mostly simple, ternate granules forming cloud-like spots over the whole frond.

Halymenia palmata, Ag. Sp. Alg. v. 1. p. 204. Syst. Alg. p. 242. Spreng. Sp. Pl. v. 4. p. 333.

Delesseria palmata, Lamour. Essai, p. 37.

Fucus palmatus, Linn. Sp. Pl. v. 2. p. 1630. Turn. Syn. Fuc. p. 175. Hist. Fuc. t. 115.

Sm. Eng. Bot. t. 1306. Lightf. Fl. Scot. v. 2. t. 27. Hook. in Fl. Lond. new Series, with a figure, the analyses incorrect.

Ulva palmata, Lyngb. Hydroph. Dan. p. 24. Grev. Fl. Edin. p. 296.

VAR. β *sarniensis*, frond lacinated, the segments linear, the uppermost ones very narrow.

Fucus sarniensis, Mert. in Roth. Cat. Bot. v. 3. p. 103. t. 1., according to Agardh. Turn. Hist. Fuc. t. 44.

HAB. On rocks and the larger *Algæ* in the sea. Annual or biennial. In the winter months. Extremely common.

Root scutate. *FronDs* solitary or clustered, three to twelve inches in length, and half an inch to two inches in width, flat, entire at the margin, more or less cleft in a palmate manner. The general outline of the whole either elliptical or wedge-shaped. The segments are mostly simple and oblong or linear-oblong, but they are sometimes again shortly cleft at the apex, which gives them a wedge-shaped form. The variety β is much branched and divided and lacinated, some of the branches a quarter of an inch, but many less than a line in width. *Fructification*, as far as we are acquainted with it, composed of spherical *ternate granules*, half imbedded in the surface of the frond, and forming irregular cloud-like spots. *Substance* between membranaceous and coriaceous, semitransparent. *Colour* a purplish-red: the young fronds with a pinker tinge, sometimes almost rose-red. While rather young, the substance is very thin, slightly lubricous, and adheres to paper in drying, but not when in fructification.

The structure of the frond and the nature of the fructification, induce me to remove this plant far from *Iridæa edulis*, with which it has usually been contrasted and associated. It is most probable that the capsular mode of fructification remains to be discovered upon it. It has indeed already been detected by Professor Mertens, should his *Fucus sarniensis* prove the same as Mr Turner's, which is certainly nothing more than a variety. It is much to be regretted, as Mr Dawson Turner remarks, that he should have confined himself to describing the

fructification as immersed tubercles ; an indefinite expression considering that *Algæ* were formerly examined without reference to generic distinction, and leaves us in the dark as to its real nature.

Mr Dawson Turner, in his description of this species, has not failed to observe, that the substance of the frond is different under the microscope from that of *Iridæa edulis* ; and that the surface appears to be every where full of small circular spots resembling cavities. This appearance arises from the cellules, of which the whole substance is composed, and which are very small on the surface. The ternate granules, however, which are only half imbedded, fall out, and leave numerous real cavities, as may be easily seen by examining some perpendicular sections of the frond.

A state of this plant by no means unfrequent, is described by Turner as his variety *marginifer*. It consists in the margin being proliferous, and pinnated, as it were, with elliptical or oblong leaves, supported upon little footstalks. A figure of the proliferous frond is to be seen in the twelfth plate of Stackhouse's *Nereis Britannica*.

This species, without having so imposing a name as *Iridæa edulis*, is in reality more generally considered as an article of food, both for men and cattle. It is cried about the streets of Edinburgh, under the well known name of *Dulse*. By the Highlanders it is called *Duillisg*, a word compounded of *Duille*, a leaf, and *Uisge*, water ; literally the leaf of the water *. It is the *Dillesk* of the Irish, a name evidently derived from the same source, as is also the Lowland *Dulse*. Both the Scots and Irish wash the plant in fresh water, dry it in the sun, and, rolling it up, chew it like tobacco. But it is usually eaten fresh from the sea. The Icelanders, after drying it, pack it down in casks for occasional consumption, and it is then ready to be eaten, either raw, with fish and butter, or boiled with milk, to which, we are informed by Dr Hooker, is sometimes added a little rye-flour, by those who can afford it. In Norway it is named *Sou-söll* or Sheep's-weed, sheep being exceedingly fond of it, and frequenting the sea-shore at ebb-tide in order to obtain it. On this account also, it was named *Fucus ovinus* by Bishop Gunner. According to Lightfoot, it is used medicinally in the Isle of Skye, to promote perspiration in fevers. In the Islands of the Archipelago, it is a favourite ingredient for ragouts, to which it imparts a red colour, besides rendering them of a thicker and richer consistence. The dried frond, like many other marine *Algæ*, when infused in water,

* On the authority of the late Duke of Gordon, in Jamieson's Dictionary of the Scottish Language. (Supplement.)

exhales an odour resembling that of violets, and Mr Neill mentions that it communicates that flavour to vegetables with which it is mixed. I have already stated in another part of this work, that the present plant, and not *Laminaria saccharina*, is the true saccharine Fucus of the Icelanders.

9. RHODOMENIA SOBOLIFERA.

Fronde membranaceous shortly stipitate, stem filiform dividing into branches which expand into flat dilated fronds, much deeply and irregularly cleft, the segments linear-wedge-shaped lacinate at their apex.

Halymenia? *sobolifera*, Ag. Sp. Alg. v. 1. p. 218. Syst. Alg. p. 246.

Fucus soboliferus, Fl. Dan. Turn. Hist. Fuc. t. 45. Sm. Eng. Bot. t. 2133.

HAB. In the sea, growing on the stems of *Laminaria digitata*. Shores of the Orkney Isles, Mr Charles Fothergill. Messrs Hooker and Borrer. Brackish Loch of Stenhouse, Orkney, Rev. C. Clouston. Mull of Galway, Rev. Dr Walker. Glenarm, Ireland, Dr Drummond.

Root scutate. Fronds growing in bushy tufts, two to six inches in length, arising with a very slender filiform stem, dividing into an indefinite number of very slender filiform branches, which soon begin to expand insensibly into flat, dilated, or wedge-shaped fronds, varying from a few lines to two inches in width, always more or less cleft, generally down to the middle, often to the base, the segments frequently again divided, all of them, large and small, lacinate, and sometimes even almost fringed at the apex. Fructification unknown. Substance membranaceous, semitransparent, obscurely reticulated. Colour dark purplish-red to rose-pink, changing in decay to dirty yellow and white. In drying it adheres but slightly to paper, and scarcely changes colour.

Although I have received most splendid specimens of this beautiful species from my obliging correspondent Mr Clouston, I have not been so fortunate as to observe the least trace of fructification, so that, convinced as I am of the distinctness of the plant from all other described species, some doubt must still exist respecting its proper place. Agardh is extremely uncertain about it; but, Sprengel, paying less deference to Turner's plate and description, confirmed as it is by Smith, in "English Botany," cuts the knot of difficulty by leaving it out altogether. Much unnecessary perplexity has probably been occasioned by an error in the *Flora Danica*, by which two plates, with their descriptions, were transposed, viz. 1065 and 1066,—the one a variety of *Chondrus crispus*, the other *Fucus soboliferus*.

I have received a specimen of this species from the coast of Normandy, gathered by M. Chauvin, by whom it is marked as exceedingly rare. It appears, therefore, that its distribution is more extended than it was supposed to be.

No species that I am acquainted with, is so apt to vary in the width of the frond and its segments. In some specimens, the whole has a narrow linear character, while in others there is a considerable expansion. There is in fact as great a range as between the broad *Rhodomenia palmata* and its narrow variety *Sarniensis*; at the same time it can never be mistaken after having been once seen. The colour is brighter than in *R. palmata*, more fugitive, and the frond is evidently marked with pretty large though obscure reticulations, which are sufficient to distinguish it from that plant.

10. RHODOMENIA TEEDII.

FronD membranaceous tender between compressed and flat linear irregularly pinnated and ciliated the ciliæ like little subulate spines, capsules spherical on the ciliæ.

Spharococcus Teedii, Ag. Sp. Alg. v. 1. p. 277. Syst. Alg. p. 225. Spreng. Sp. Pl. v. 4. p. 337. Grev. Crypt. Fl. t. 366.

Gigartina Teedii, Lamour. Essai, p. 49. t. 4. f. 11.

Fucus Teedii, Turm. Hist. Fuc. t. 206.

HAB. On rocks in the sea. Perennial. Lupton Cove and Tor-Abbey rocks, Torbay, *Mrs Griffiths*,

Root minute, scutate. *FronDs* tufted, two to five inches in length, less than a line in width, nearly cylindrical at the base, gradually becoming between flat and compressed, pinnated, or rather pinnatifid, with numerous branches from the very base: *pinnæ* horizontal, irregular, from a few lines to three inches in length, arising at short intervals, bearing a second smaller equally irregular series, set with scattered minute subulate ramuli; all the divisions attenuated and acute. *Fructification*: 1. minute, red, spherical *capsules* in the substance of the subulate ciliæ, containing a mass of red, very small ovate seeds: 2. *granules* imbedded in the ciliæ, on distinct individuals. *Substance* membranaceous and flaccid. *Colour* a purplish-red. In drying it becomes somewhat corneous, does not adhere to paper, and is often beautifully variegated with green pink and pale purple.

A very charming marine plant, added to the British Flora, by my often mentioned friend *Mrs Griffiths*, in 1811. She has not, however, been so fortunate as to meet with the fructification, and my

foreign specimens are not sufficiently perfect to enable me to obtain a completely satisfactory analysis. Lamouroux has figured a small portion of the frond with imbedded granules, but does not say whether the granules are ternate. Should they be entire, the plant might be placed without much violence among the *Gracilariæ*. Mr Dawson Turner has remarked, that it bears no small resemblance to some states of *Rhodomencia ciliata*; this applies to a more simple form of the frond than occurs in this country, where the species most likely to be confounded with it while growing in the water, is *Gelidium corneum*.

My foreign specimens are finely clouded with different colours, while the British ones are uniformly red: the latter are also rather thinner in substance.

GENUS XXVII. PLOCAMIUM, *Lamour.* Tab. XII.

GEN. CHAR. Frond filiform, compressed, between membranaceous and cartilaginous, fine pink-red, much branched, branches distichous (alternately secund and pectinate). Fructification of two kinds: spherical sessile capsules, and lateral minute processes, containing oblong granules, transversely divided into several parts by pellucid lines.

OBS. In habit this genus is intermediate between *Delesseria* and *Sphærococcus*. The frond is very narrow, much divided in a distichous and widely spreading manner; the structure dense. The seed-leaves or processes containing the granules are similar in structure to the rest of the frond, and seem rather to be a permanent continuation or ramification of it than organs thrown out to perform the temporary purpose of fructification. The granules themselves are very different from those of the preceding genera of the order, being oval or elliptical-oblong, surrounded by a pellucid limbus, and transversely divided into four or five parts, which ultimately separate.

The generic name is derived from a Greek word, signifying hair or a head of hair:—not a very happy appellation, for though the frond is finely divided, it cannot be said to resemble hair.

The genus was originally proposed by Lamouroux, and continued by Lyngbye: Agardh abolished it, but Gaillon has again restored it,

though not, I conceive, with sufficient precision. His *P. glandulosum* and *Labillardieri* differ very decidedly in their fructification. His *P. maxillosum* I have never seen: it is, however, considered as a variety of *P. coccineum* by Agardh, and the latter is therefore probably the type and only known species of the genus.

1. PLOCAMIUM COCCINEUM. Tab. XII.

Plocamium coccineum, Lyngb. Hydroph. Dan. p. 36. t. 9.

Plocamium vulgare, Lamour. Essai, p. 50. Gall. Dict. Sc. Nat. v. 53. p. 368.

Delesseria coccinea, Ag. Syn. p. xiv. Grev. Fl. Edin. p. 294.

Delesseria Plocamium, Ag. Sp. Alg. v. 1. p. 180. Syst. Alg. p. 250.

Fucus Plocamium, Gmel. Hist. Fuc. p. 153. t. 16. f. 1. Lightf. Fl. Scot. p. 957.

Fucus coccineus, Huds. Fl. Angl. p. 586. Stackh. Ner. Brit. p. 106. Sm. Eng. Bot. t. 1242.

Turn. Syn. Fuc. p. 291. Hist. Fuc. t. 59.

HAB. In the sea, very common every where. Perennial? Summer and autumn.

Root a small disk, accompanied with a mass of entangled fibres. **Fronds** numerous, two to twelve inches in length, the main branches commonly about half a line in width, but occasionally broader, and sometimes much narrower, flexuose, irregularly alternate, patent. All the smaller branches are set with uniform ramuli, like the teeth of a comb, and in a regular distichous order, three or four on one side, and then three or four on the other; these produce a second series of three or four short ramuli from their upper edge, and a third or even fourth occur, each smaller than the preceding one, similar in number, and always from the upper or inner edge. This character is sufficient to distinguish the species from all other *Algæ*. **Fructification**: 1. dark and spherical capsules as large, or a little larger than poppy-seed, mostly on some part of the margin of the smaller branches: 2. transversely parted granules placed irregularly, or in two longitudinal series, in minute lanceolate processes, which are single or clustered, and arise from the margin of the ultimate pectinate ramuli, or even from other parts of the smaller branches.

Substance more cartilaginous than membranaceous, adhering to paper in drying. **Colour** a very beautiful red, between scarlet and crimson.

One of the most charming and symmetrical *algæ* in the world, extremely common, and a universal favourite. Though liable to vary very considerably in size and in the proportion of its parts, a single glance at the beautifully regular and peculiar division of the ultimate branches is at all times sufficient to distinguish it. I have specimens not above an inch in height, with the frond almost as fine as a hair, and others

from New Holland, a line in width, and above a foot in length, but the admirable character above mentioned is equally striking in each.

GENUS XXVIII. MICROCLADIA. Grev. Tab. XIII.

GEN. CHAR. Frond filiform, compressed, subcartilaginous, irregularly branched, the branches distichous. Fructification of two kinds: sessile spherical capsules, accompanied by an involucre, in the form of several short ramuli: and ternate granules in the swollen apices of the branches.

Obs. The type of this genus is the *Fucus glandulosus* of the Bankian Herbarium, and of Mr Dawson Turner; the *Delesseria glandulosa* of Agardh. At first sight it appears to be nearly allied to *Plocamium coccineum*: but it differs in the capsules, being provided with an involucre, and essentially in the different structure of the granules, which are besides confined to the apices of the frond. The structure of the frond is also different, being reticulated, the interstices dense. The generic name is derived from two Greek words, and signifies finely branched.

1. MICROCLADIA GLANDULOSA. Tab. XIII.

Delesseria glandulosa, Ag. Sp. Alg. v. 1. p. 192. Syst. Alg. p. 261.

Fucus glandulosus, Herb. Banks. Turn. Hist. Fuc. t. 38. Sm. Eng. Bot. t. 2135.

HAB. In the sea, growing upon other *Algæ*. Annual. Producing fructification in September and October. Budleigh and Torquay, Mrs Griffiths.

Root a minute disk. Fronds two to three inches long, and as many broad, much branched from the very base; branches one-third of a line in width, compressed, irregularly given off; the secondary ones patent, many times divided in an alternate manner, the ultimate ones very short, forked, rather acute, and mostly incurved like a pair of forceps. Fructification: 1. minute spherical capsules, sessile on the margin of the branches, and surrounded by an involucre composed of two to six short incurved processes: 2. ternate granules scattered in the swollen apices of the branches.

Substance between membranaceous and cartilaginous, widely reticulated on the surface, but with an otherwise dense structure. In drying it scarcely adheres to paper. *Colour* a pink-red.

Mrs Griffiths has well observed that this plant at first sight resembles a small mass of *Conferva rubra* of the older authors. It appears to be extremely rare, and I believe has been found only in Devonshire by the lady above mentioned, whose good fortune it is to find the rarest *Algæ* in their most perfect state. It is to her kindness that I am indebted for specimens with both kinds of fructification. The mature fructification she finds in September and October; but specimens occur as early as May, so that it probably exists in some state or other throughout the greater part of the year.

GENUS XXIX. ODONTHALIA, *Lyngb.* Tab. XIII.

GEN. CHAR. Frond plane, between membranaceous and cartilaginous, dark vinous red, with an imperfect or obsolete midrib, and alternately toothed at the margin. Fructification, marginal, axillary, or in the teeth: 1. capsules, containing pear-shaped seeds, fixed by their base; 2. slender processes containing ternate granules.

Obs. In adopting this genus, invented by Lyngbye for the sake of *Fucus dentatus* of Linnæus, I propose to extend it to the *Fucus corymbiferus* of Gmelin, which agrees entirely in habit and in the dense structure of the frond. According to Agardh's system, they form a part of his genus *Rhodomela*, to a certain extent only characterised by its fructification, but in no other respect; as it comprehends plants with flat and cylindrical fronds, of different classes of colour, some dense, and others singularly lax in their structure. M. Gaillon has also admitted *Fucus cirrhosus* of Turner, which if not indeed the *Thamnophora corallorhiza* of Agardh (*Fucus corallorhiza*, Turn.), certainly belongs to the same genus.

The generic name is compounded of two Greek words, signifying a tooth and the sea, expressive of the dentate margin of the frond, and its place of growth.

1. ODONTHALIA DENTATA. Tab. XIII.

Fruond branched spreading the branches distichous alternately pinnatifid pinnulæ toothed at their apex, capsules ovate pedunculate pinnated; in axillary clusters.

Odonthalia dentata, Lyngb. Hydroph. Dan. p. 9. t. 3. Grev. Fl. Edin. p. 286.

Rhodomela dentata, Ag. Sp. Alg. v. 1. p. 370. Syst. Alg. p. 196. Spreng. Sp. Pl. v. 4. p. 342.

Delesseria dentata, Lamour. Essai, p. 36.

Fucus dentatus, Linn. Syst. Nat. 2. p. 718. Turn. Syn. Fuc. p. 149. Hist. Fuc. t. 13.

Sm. Eng. Bot. t. 1241.

HAB. In the sea, growing on rocks. Perennial. Found more or less at all seasons, but producing fructification from January to March. Coast of Yorkshire, *Hudson*. Coast of Durham and Northumberland, rare, *Winch*. In the Frith of Forth, and on the coast of Iona, plentifully, *Lightfoot*. Orkney, *Rev. C. Clouston*. Isle of Bute. Coast of Ireland, *Mr Robert Brown*. Larne near Belfast, *Dr Drummond*.

Root a small hard disk. Fronds one or several from the same base, three to ten inches long, much branched, furnished below with a kind of midrib, which disappears in the upper part: The branches spreading in such a manner as to form a roundish general outline, pinnatifid with short alternate erecto-patent divisions, cut or dentated at their apex; including these short pinnulæ, the branches are almost half an inch in breadth. Fructification of two kinds:—1. ovate minute transparent capsules, on slender branched peduncles, in the axils of the pinnulæ, and containing clavato-pyriform pink seeds, fixed by their base to the bottom of the capsule, at length separating and escaping. 2. slender minute linear-lanceolate seed-leaves, or processes, solitary or in branched clusters arising from the margin of the frond (mostly from the axils), resembling delicate cilæ, and containing two rows of roundish ternate red granules.

Substance in mature fronds more cartilaginous than membranaceous, adhering imperfectly to paper in drying. The structure is dense, and, under a high magnifying power, minutely reticulated or areolated. Colour. rose-red in the youngest plants, afterwards dark vinous or brownish-red, and nearly opaque. The fructification of both kinds almost colourless, excepting the seeds and granules.

This is a very beautiful species, and confined in this country, as far as I know, to the northern shores. It has not been my fortune to meet with the urceolate capsules represented in "English Botany," and Mr Turner's *Historia Fucorum*. Those I have described are of common

occurrence, and very much resemble the capsules of the genus *Lau-
rencia* in structure.

GENUS XXX. RHODOMELA, *Ag.* Tab. XIII.

GEN. CHAR. Frond cylindrical or compressed, filiform, much branched, coriaceous-cartilaginous (the apex sometimes involute). Fructification: 1. subglobose capsules, containing free pear-shaped seeds; 2. pod-like receptacles, with imbedded ternate granules.

OBS. Out of twenty species described by Agardh, I have retained only twelve to form the present genus; and even among these, two or more genera probably remain to be determined by future naturalists. In Lamouroux's system, the species known to him formed, with one exception, a part of his genus *Gigartina*, the least natural one he ever created. Two of the four British species have the apex of the branches incurved. The structure of *R. lycopodioides* and *subfusca* is similar. In *R. pinastroides* and *scorpioides* it is very peculiar: in the former, presenting the appearance of articulations; while in the latter, coloured filaments pass through the elongated cellules of the stem.

The name appropriated by Agardh to these plants is significant of the change that takes place, from a red to a black colour, after exposure to the atmosphere.

* *Summit of the branches straight (not involute).*

I. RHODOMELA LYCOPODIOIDES.

Frond cylindrical, elongated, mostly simple, presenting no appearance of articulations, densely clothed with finely divided bushy ramuli, intermixed with the setaceous remains of a former series at their base.

Rhodobela lycopodioides, *Ag.* Sp. Alg. v. 1. p. 377. Syst. Alg. p. 199. Spreng. Sp. Pl. v. 4. p. 343.

Gigartina lycopodioides, *Lyngb.* Hydroph. Dan. p. 45. *Grev.* Fl. Edin. p. 289.

Fucus lycopodioides, *Linn.* Syst. Nat. v. 2. p. 717. *Turn.* Syn. Fuc. p. 343. *Hist. Fuc.* t. 12. *Sm.* Eng. Bot. t. 1163.

HAB. In the sea, growing upon the stems of *Laminaria digitata*. Perennial. In fructification from May to July, or perhaps longer.

Scarborough, *Sir Thomas Frankland*. Coast of Northumberland, at Bate's Island, *Winch*. Coast of Durham, *Mr J. Thornhill*. Cromer, *Mr Woodward*. Coast of Antrim, *Dr Scott*. North of Scotland, *Mr Brodie*. Staffa. Frith of Forth, opposite Seafield Tower.

Root a small disk. *Fronde* generally tufted, usually simple or at most divided near the base into a few simple branches, six to eighteen inches in length, filiform, naked for an inch or so at the bottom, where it is as thick as small pack-thread: in winter clothed with a dense mass of bristle-like rigid spreading ramuli, three to six lines in length; in summer a number of new ramuli spring from the short old ones, one or two inches in length, as fine as a hair, and much branched in a bushy manner. *Fructification*: 1. nearly globular capsules, containing pyriform seeds, situated on the summer branches: 2. clusters of lanceolate pod-like receptacles, with imbedded ternate granules produced on young shoots given off by the old ramuli.

Substance cartilaginous, adhering very imperfectly, or not at all, to paper. *Colour* a purplish or reddish-brown, becoming black in drying.

The name of this species is rather unfortunate, being only applicable to its winter and battered state. In the summer its aspect is completely changed, and in the water is extremely beautiful and feathery. The figures in "English Botany" and *Historia Fucorum*, represent the winter state, but are otherwise characteristic, especially the latter. It is altogether a northern species.

2. RHODOMELA SUBFUSCA.

Fronde cylindrical, very much branched, without any appearance of articulations, the ramuli subulate pinnate and clustered.

Rhodomela subfusca, Ag. Sp. Alg. v. 1. p. 378. Syst. Alg. p. 199. Spreng. Sp. Pl. v. 4. p. 343.

Gigartina subfusca, Lamour. Essai, p. 48. Lyngb. Hydroph. Dan. p. 47. t. 10. Grev. Fl. Edin. p. 289.

Fucus subfuscus, Woodw. in Linn. Trans. v. 1. p. 131. t. 12. Turn. Syn. Fuc. p. 350. Hist. Fuc. t. 10. Sm. Eng. Fl. t. 1164.

Fucus variabilis Gooden. and Woodw. in Linn. Trans. v. 3. p. 220.

HAB. In the sea, growing on rocks and other *Algæ*. Biennial? April to September. Cromer, *Woodward*. Most common on the Norfolk coast, *Mr Wigg*. Gorton and Gunton, *Mrs Fowler*. Coast of Anglesea, *Rev. H. Davies*. Coast of Cornwall, *Mr E. Foster*. Portland Island, *Turner*. Weymouth, *Mr Bryer*. Isle of Wight, *Mr Maimburg*. Near Tynemouth, *Winch*. Orkney, *Rev. C. Clouston*. Isle of Bute. Frith of Forth.

Root a thin disk. *Fronde* many from the same base, four to ten inches in length, rising with a main stem about the thickness of small

twine, and often undivided, bearing throughout its whole extent numerous irregular erecto-patent branches (of which the lowest are usually the longest), two to five inches in length. The branches are set with several other series, each preserving the same characters upon a smaller scale, the youngest alternately pinnate. *Fructification*: 1. ovate solitary or "panicked" capsules, situated on the younger branches, and containing free pyriform seeds: 2. pinnated clusters of lateral or terminal lanceolate pod-like receptacles containing ternate granules.

Substance cartilaginous, very rigid in winter, more flexible, and somewhat flaccid in summer, and then adhering to paper in drying. *Colour* a brownish-red, or pale yellow-brown, changing to black, except in the smaller branches, when dry.

The summer and winter state of this species present even a greater contrast than that which we have seen to exist in the last species. In the winter, all the finer branches disappear, and those that remain are rigid, broken, and battered. In the summer a profusion of young branches are produced, of a paler colour, and frequently terminated by flaccid tufts, of exceedingly fine confervoid filaments. The fructification is produced in summer, but it appears to me that the pod-like receptacles, at least, are produced earlier on plants of the second year than on plants of the first. Young plants come into fruit of both kinds in June: but the year following, the first shoots that are put forth, as early as February and March, are often only two or three lines in length, and terminated with the receptacles of ternate granules.

* * *Summit of the branches involute.*

3. RHODOMELA PINASTROIDES. Tab. XIII.

Fronde cylindrical branched clothed with equal apparently jointed secund ramuli.

Rhodomela pinastroides, Ag. Sp. Alg. v. 1. p. 381. Syst. Alg. p. 200. Spreng. Sp. Pl. v. 4. p. 343.

Gigartina pinastroides, Lyngb. Hydroph. Dan. p. 45.

Fucus pinastroides, Gmel. Hist. Fuc. p. 127. t. 11. f. 1. Turn. Syn. Fuc. 346. Hist. Fuc. t. 11. Sm. Eng. Bot. t. 1042.

HAB. On rocks in the sea. Perennial. November to February. Coast of Cornwall, *Stackhouse*. Torquay and Sidmouth, *Mrs Griffiths*. Lyme Regis, and many other places on the Devonshire coast. Weymouth, *Pulteney*. At Portsmouth, *Mr Gilman*. Deal, *Martyn*. Sussex, not uncommon, *Mr Borrer*. Coast of Ireland, near Dublin, *Dr Scott*.

Root a small disk. *Fronde* tufted, three to twelve inches in height, about as thick as a crow-quill, branched in a fastigate manner, the

branches long; somewhat recurved, and clothed with numerous ramuli. ramuli half an inch long or more, mostly simple, arising on all sides of the stem, but more or less secund, especially in the upper part, where they are generally given off in pairs. The younger branches and ramuli are involute at the extremity, and even to the naked eye are transversely striated, as if articulated. *Fructification*: 1. minute, spherical, shortly pedicellate capsules, containing free pyriform seeds, and situated on the ramuli: 2. minute lanceolate, curved, pod-like receptacles arising from the ramuli, and containing ternate granules.

Substance cartilaginous. *Colour* dull red. In drying it does not adhere to paper, and becomes quite black and rigid.

Notwithstanding the apparently articulated structure of this plant, it is not in reality interrupted in its internal continuity. The whole substance is composed of a mass of uniform oblong hexagonal cells, arranged in transverse rows, so that the junction of the top of one set of cells with the commencement of the next set, forms the dark line which bears the external character of an articulation.

In the winter months, very minute, globular, shortly stalked yellow bodies, resembling what are called anthers in *Jungermannia*, form clusters upon the upper ramuli, and from their number are very obvious, as the plant is growing under water. They are certainly extraneous, and probably of an animal nature.

4. RHODOMELA SCORPIOIDES.

Fronde cylindrical capillary attenuated three or four times pinnated branches horizontal the uppermost ones involute at the extremity.

Rhodomela scorpioides, Ag. Sp. Alg. v. 1. p. 380. Syst. Alg. p. 200. Spreng. Sp. Pl. v. 4. p. 343.

Fucus scorpioides, Huds. Fl. Ang. Ed. 1. p. 471.

Fucus amphibius, Huds. Fl. Ang. Ed. 2. p. 590. Turn. Syn. Fuc. p. 391. Hist. Fuc. t. 109. Sm. Eng. Bot. t. 1428.

Plocamium amphibium, Lamour. Essai, p. 50.

HAB. On rocks in the sea, and in salt water ditches and marshes, growing about the roots of flowering plants and other substances. Annual? Summer. North Wales, *Rev. H. Davies*. Abundant at Shoreham, growing upon *Atriplex portulacoides*, *Mr Borrer*. Mouth of the River Dart, *Mrs Griffiths*. Tydd Marsh, Cambridgeshire, *Mr Skrimshire*. Shore of Blackwater at Maldon, *Mr E. Foster junior*. Selseg Marshes, *Martyn*.

Root a minute disk. *Fronde* tufted, entangled, cylindrical, two or three inches in length, alternately branched in a distichous manner:

branches horizontal, bearing two or three series of alternate capillary pinnæ and pinnulæ, exhibiting no appearance of articulations, the uppermost ones having their apices rolled in. *Fructification*: 1. minute axillary roundish capsules, according to Roth. 2. lanceolate, pod-like receptacles terminating the ramuli, and containing ternate granules. .

Substance cartilaginous, tender. *Colour* pale purplish, pellucid. In drying it becomes blackish, and does not adhere to paper.

The structure of this *alga* is so curious that there can hardly be a doubt of its removal, at some future period, from the genus. A transverse section of the stem, shews nothing but a tissue of hexagonal cells, each marked with a red central spot. A longitudinal section shews the cells, forming parallel longitudinal series, each cell being about twice as long as it is broad: through each line of cells runs a filament, dilated, oblong-elliptical, and of a red colour within the cells, contracted and colourless as it passes through the ends of the cells. In cutting transverse slices of the stem, upon the table of the microscope, portions of these filaments escape. Mr Turner probably saw them, when he observed the frond to be streaked with faint, longitudinal parallel lines, and I agree with him in his remark, that it possesses some affinity with *Conferva polymorpha* (*Polysiphonia fastigiata*). It may indeed be said to form one of the intermediate links between all the *Polysiphoniæ* and the continuous *Algæ*: there is not, however, any articulation even in the young ramuli. Until the capsules shall be examined, and their nature ascertained, it may remain with little inconvenience in this place.

GENUS XXXI. BONNEMAISONIA, *Ag.* Tab. XIII.

GEN. CHAR. Frond membranaceous, compressed or plane, filiform, much branched, the branches pectinate with distichous ciliæ. Fructification, sessile or pedicillate capsules, containing a cluster of pyriform (compound?) seeds fixed by their base.

OBS. Too little is known of the fructification of this genus (named after a celebrated French Algologist, of the name of Bonnemaison), to allow of its being considered as perfectly well defined. There are only three species described, and, it must be confessed, that in regard to habit they assimilate, and are strikingly different from other *Algæ*. I have

only seen the capsules of the British *B. asparagoides*, and they greatly resemble those of the genus *Laurencia*; but the seeds are compound, that is, contain within a pellucid border a number of granules, in the same manner as those of *Cutleria multifida*. It is not improbable that a second modification of the fructification remains to be discovered; and that, although the habit of the genus is quite peculiar, it will still farther contribute to distinguish it. Agardh's character, "Semina pyriformia concatenata," I do not understand, unless he so defines the appearance of the granules of which the seeds are composed.

1. BONNEMAISONIA ASPARAGOIDES. Tab. XIII.

Fronde compressed conferva-like very much branched capsules stalked alternate and opposite to the ciliæ.

Bonnemaisonia asparagoides, Ag. Sp. Alg. v. 1. p. 197. Syst. Alg. p. 246. Spreng. Sp. Pl. v. 4. p. 333.

Plocamium asparagoides, Lamour. Essai, p. 50.

Fucus asparagoides, Woodw. in Linn. Trans. v. 2. p. 29. t. 6. Sm. Eng. Bot. t. 571. Turn. Syn. Fuc. p. 364. Hist. Fuc. t. 101.

HAB. On rocks and stones in the sea, very rare. Annual. June to September. Yarmouth Beach, *Mr Wigg*. At Cromer and Sheringham, *Turner*. Coast of Cornwall, *Stackhouse*. Sunderland Beach, *Mr Weighell*. At Gorton and Gunton, Suffolk, *Mrs Fowler*. Bantry Bay, *Miss Hutchins*. Donaghadee, *Mr Templeton*. Bangor, near Belfast, *Dr Drummond*.

Root a minute disk. **Fronde** six to nine inches long, and hardly half a line wide in the main stem, compressed, attenuated, distichously branched: branches several inches long towards the base, set with two or three lesser series, and all of them bearing distichous ciliæ or subulate ramuli about a line in length, resembling the teeth of a comb. **Fructification**; stalked ovate minute capsules, with a terminal pore, alternating with the ciliæ, in such a manner that a capsule is placed opposite to a cilia first on one side and then on the other; within is a cluster of pear-shaped stalked seeds fixed by their base.

Substance soft, flaccid, and membranaceous, adhering to paper in drying. **Colour** a pale transparent crimson.

An extremely elegant and beautiful plant, resembling a finely branched Conferva when growing. The subulate ramuli seem to be really alternate, as Roth has described them, and not opposite, as Mr Turner is inclined to believe. The capsules are uniformly oppo-

site to the ramuli; and the very short processes which sometimes occur in a similar situation are rather, perhaps, to be considered abortive capsules, than imperfect ramuli. The whole frond is made up of a delicate cellular tissue.

GENUS XXXII. LAURENCIA, *Lamour.* Tab. XIV.

GEN. CHAR. Frond cylindrical, filiform, between cartilaginous and gelatinous, mostly yellowish or purplish red. Fructification of two kinds: 1. ovate capsules, with a terminal pore, containing a cluster of stalked pear-shaped seeds, fixed by their base; 2. ternate granules imbedded in the ramuli.

OBS. The name bestowed upon this genus by Lamouroux is designed to commemorate a friend of the name of De Lalaurencie, who was very partial to pursuits of natural history.

Agardh, however, brought together the *Laurenciæ* and a number of other species, in order to form his genus *Chondria*, but they differ much in habit, and so much in fructification, that the generic character does not in reality affect half of them. Even as it is, the fructification is only known of *Laurencia Forsteri*, *obtusa*, *pinnatifida*, *dasyphylla*, and *tenuissima*; but the habit of the remainder, viz. *L. laxa*, *papillosa*, *botryoides*, *seticulosa*, and *fasciculata*, is so striking, that a doubt can hardly be admitted of their fructification being similar. All the species have their branches either obtuse and often lobed, or set with little incrassated ramuli; and it is in these parts that the ternate granules are always imbedded. The root is scutate, but generally throws out a few creeping fibres.

* *Ramuli turgid, obtuse.*

1. LAURENCIA PINNATIFIDA. Tab. XIV.

Frond compressed cartilaginous twice or thrice pinnatifid branches alternate the pinnulæ erecto-patent obtuse simple or lobed.

Laurencia pinnatifida, Lamour. Essai, p. 42.

Chondria pinnatifida, Ag. Sp. Alg. v. 1. p. 337. Syst. Alg. p. 201. Grev. Fl. Edin. p. 291.

Speng. Sp. Pl. v. 4. p. 341.

Gelidium pinnatifidum, Lyngb. Hydroph. Dan. p. 40. t. 9.

Fucus pinnatifidus, Huds. Fl. Ang. p. 581. Stackh. Ner. Brit. p. 48. t. 11. Turn. Syn. Fuc. p. 267. Hist. Fuc. t. 20. Sm. Eng. Bot. t. 1202.

Var. β *Osmunda*, frond flat, generally undivided; ramuli short and multfid. Turn.

Fucus Osmunda, Gmel. Hist. Fuc. p. 155. t. 16. f. 2. Stackh. Ner. Brit. p. 46. t. 11.

Var. γ *angusta*. Frond roundish, ramuli cylindrical, thickened upwards, set on all sides of the stem, often clustered, and simple. Turn.

Chondria hybrida, Chauvin, Alg. Norm. Fasc. 2. No. 40. according to a specimen sent.

Var. δ *tenuissimus*. Frond flat, ramuli very thin and much branched, the branches divaricated. Turn.

HAB. Rocks in the sea. Annual. June to September. Extremely common. Var. δ is found in Devonshire and Cornwall, *Mrs Griffiths*. *Mr Stackhouse*.

Root a flattish disk, throwing out a few creeping fibres. *Fronde* tufted or several from the same base, one to fourteen inches in length, one to eight inches in entire breadth, more or less compressed, the main stem divided once or twice in a dichotomous manner, generally a line or more in width, and insensibly dilated towards the extremity, twice or thrice pinnatifid, the pinnæ and pinnulæ spreading, arising at short but unequal intervals, dilated, rounded and thickened at the ends, where they are also sometimes lobed, or set with what appear to be the rudiments of fresh branches.

The variety β is a beautiful plant, the main stem widening upwards till it is half an inch in breadth, and then again decreasing towards the extremity, the margin being only fringed with short obtuse many-cleft ramuli.

The variety γ is chiefly characterized by cylindrical branchlets, which at the same time are frequently inserted on all sides of the stem or branches. It varies much in size (from one to five inches in length) and in the degree of ramification. Sometimes the stem is only set on its upper half with clustered simple incrassated branches: sometimes, on the other hand, there are three or four series of branches; but even in that case, the secondary branches are mostly naked on their lower half, and bear the ramuli in a thick sort of spike, or rather in the form of a *thyrsis*. This variety is often of a fine green colour, not only when dried, but even when growing.

The variety δ is chiefly conspicuous for the branches being two or three times narrower than the stem, and for the divarication of the ramuli.

Fructification; 1. broadly ovate *capsules* situate towards the extremity of the ramuli, about the size of poppy-seed, containing red pear-shaped seeds supported on narrow stalks; 2. *ternate granules* imbedded in the ramuli.

Substance cartilaginous, tender, soon becoming flaccid, and decomposing; adhering to paper in drying, and retaining its colour. *Colour* deep purplish brown, reddish, or green. *Taste* often, but not always, hot and biting.

In the whole series of the British Marine *Algæ* there is no species which puts on more distinct appearances than the subject of the present description, and yet, like Mr Turner, I am convinced that the varieties form really but one individual. During my late residence at Sidmouth, Miss Cutler gathered a plant, which she was kind enough to send me in a recent state, and which at first so effectually perplexed me, that I imagined it might eventually lead to the formation of a new genus. The branches and branchlets were cylindrical, and terminated by a saucer-like cavity about twice the diameter of the branches, and very similar to the shield of a lichen. This was uniformly filled with numerous linear simple or divided bodies vertically arranged; apparently composed of very short filaments surrounding a longitudinal axis, the whole terminated by a number of round pellucid lobes. These bodies will be found represented at Fig. 9. in Plate XIV. .

Upon examining her collection, Mrs Griffiths found some Cornish specimens exhibiting the same appearance. And a short time afterwards, I was still more surprised to find these bodies in some of the more common varieties; only with this difference, that, instead of a shield-like cavity, there was a regular capsule. This kind of capsule is twice or thrice the size of the true capsule, but is of the same form, and situate on the same part, but always in distinct individuals. On pressing one of these capsules on the table of the microscope, the little bodies above described escape by the terminal pore in profusion.

A curious appearance has also come under my observation, in some specimens which seemed to contain ternate granules. In the place of ternate granules, however, I found oblong red granules imbedded from the surface to the very heart of the branchlet, in a longitudinal direction, with their lower extremity attenuated into a pellucid short stalk. It would therefore appear, that, in a physiological point of view, the ramuli, in this case, had failed to develop their capsules externally, and had produced seeds within their own substance; and that such specimens are not truly granuliferous, but abortive capsuliferous plants.

Laurencia pinnatifida was formerly (and perhaps still is) eaten in Scotland, where it is known by the name of *Pepper-dulse*.

2. LAURENCIA OBTUSA.

Fronde cylindrical, repeatedly pinnated, the branches mostly opposite nearly horizontal, ultimate pinnulæ very short, clavate.

Laurencia obtusa, Lamour. Essai, p. 42.

Laurencia intricata, Lamour. Essai, p. 43. t. 3. f. 8. 9.

Laurencia gelatinosa, } Lamour. according to Agardh.

Laurencia lutea,

Laurencia cyanosperma, Lamour. Essai, p. 43.

Chondria obtusa, Ag. Sp. Alg. v. 1. p. 340. Syst. Alg. p. 302. Grev. Fl. Edin. p. 290. Spreng. Sp. Pl. v. 4. p. 341.

Fucus obtusus, Huds. Fl. Ang. p. 586. Turn. Syn. Fuc. p. 43. Hist. Fuc. t. 21. Sm. Eng. Bot. t. 1901.

HAB. In the sea, parasitic on the larger *Algæ*. Annual. May to October. Coasts of Devonshire, and at Hastings, *Hudson*. Near Exmouth, *Goodenough*. Near Torquay, *Mrs Griffiths*. Weymouth, *Mr Fryer*. Caswell Bay and the Worms Head, *Mr Dillwyn*. Sunderland beach, *Mr Weighell*. Isle of Wight, *Stackhouse*. Flamborough Head, *Mr Teesdale*. Coasts of Ireland, *Turn. Hist. Fuc.* Bangor, Ireland, *Dr Drummond*. Frith of Forth, very rare.

Root a minute disk throwing out a few creeping fibres. *Fronde* solitary or several from the same base, three to six inches long, cylindrical, filiform, half a line, more or less, in diameter, composed generally of a single flexuose stem, much branched from the very base; branches nearly twice or thrice pinnate, horizontal, lax, the lower ones one to three inches long, the remainder becoming gradually shorter upwards, the subdivisions mostly opposite (sometimes ternate); the ultimate branchlets one or two lines in length, approximated, club-shaped, simple and truncate, or somewhat lobed and rounded. *Frustrification*: 1. ovate capsules containing stalked pear-shaped seeds on the younger branches; 2. ternate granules in the club-shaped callous ramuli.

Substance cartilaginous, tender; adhering to paper in drying. *Colour* a yellowish fugitive semitransparent pink. The main stem is often colourless, while the rest is quite pink.

This is a far more delicate plant than the preceding, both in substance, habit, and colour. Its lax, nearly horizontal and mostly opposite branches, are sufficient to mark it while growing.

Mr Turner describes a variety with the ramuli longer than usual, and merely rounded at the extremities without being incrassated.

* * *Ramuli much attenuated at their base.*

3. LAURENCIA DASYPHYLLA.

Frond cylindrical irregularly branched ultimate branchlets very short subtruncate much attenuated at their insertion.

Laurencia cœspitosa, Lamour. Essal, p. 43.

Chondria dasyphylla, Ag. Sp. Alg. v. 1. p. 350. Syst. Alg. p. 205. Spreng. Sp. Pl. v. 4. p. 342.

Gigartina dasyphylla, Lamour. Essal p. 48.

Fucus dasyphyllus, Woodw. in Linn. Trans. v. 2. p. 239. t. 21. Turn. Syn. Fuc. p. 38. Hist. Fuc. t. 22. Sm. Eng. Bot. t. 847.

HAB. In the sea, attached to rocks and stones. Annual. June to September. Yarmouth, *Mr Wigg*. Cromer, *Mr Woodward*. Sheeringham, *Mr Turner*. Coast of Dorsetshire, *Mr Bryer*. Cornwall, *Mr Stackhouse*. Torquay and Sidmouth, *Mrs Griffiths*. Dawlish, *Mr Pigott*. Rocks at the Mumbles, near Swansea, and at Dover, *Dillwyn*. Beach at Corton, and Gunton, Suffolk, *Mrs Fowler*. Near Belfast, *Dr Drummond*. Lossiemouth, in Scotland, *Mr Brodie*. Isle of Bute.

Root a minute disk, throwing out a few creeping fibres. Fronds several from the same base, generally rising with a main undivided stem, three to twelve inches in height, cylindrical, filiform, half a line to a line in diameter, branched from within a short distance of the base: *branches* nearly horizontal, sometimes few and remote, sometimes very numerous and even bushy, arising without order, and bearing a second and even third series, the last always becoming gradually shorter towards the ends of the branches, where they are less than a line in length, and almost top-shaped. The whole frond in many specimens is marked with regular transverse striæ. *Fructification*: 1. ovate sessile capsules on the younger branches, containing stalked pear-shaped seeds; 2. ternate granules in the ultimate ramuli.

Substance rather gelatinous than cartilaginous; adhering to paper in drying. *Colour* a pale reddish pink, becoming darker when dried, very fugitive, and changing in decay to a yellowish or dirty brownish white.

All the specimens that have hitherto come under my observation have exhibited the transverse striæ more or less distinctly. Their breadth is much greater than their length. Upon a careful dissection of the internal structure, it does not appear that these striæ are pro-

duced by real septa or partitions, but by a similar arrangement of the cellules to what is observed in *Rhodomela pinastroides*. Mr Turner, however, mentions that some specimens are without striæ, and Agardh considers the striated ones as forming a distinct variety. The subject deserves farther investigation.

4. LAURENCIA TENUISSIMA.

Fronde cylindrical irregularly branched ultimate branchlets setaceous much attenuated at their base.

Gigartina tenuissima, Lamour. Essai, p. 48.

Chondria tenuissima, Ag. Sp. Alg. v. 1. p. 352. Syst. Alg. p. 205. Spreng. Sp. Pl. v. 4. p. 340.

Fucus tenuissimus, Gooden. and Woodw. in Linn. Trans v. 3. p. 215. t. 19. Turn. Syn. Fuc. p. 35. Hist. Fuc. t. 100. Sm. Eng. Bot. t. 1882.

HAB. In the sea, on rocks and stones and the larger Algæ. Annual. July to September. Near Weymouth, under the "Look-out," *Good-enough* and *Woodward*. Isle of Wight, *Rev. G. R. Leathes*. Near Torquay, *Mrs Griffiths*. Cornwall, *English Botany*.

Root a minute disk, throwing out creeping fibres. *Fronde* several from the same base, six to nine inches in height, generally arising with a single cylindrical stem less than a line in diameter, which gives off numerous long nearly horizontal very slender branches, terminating in almost bristle-like points; the branches are set with a smaller series, and all of them bear a number of minute bristle-like ramuli one or two lines in length, and tapering very considerably at their base. *Fructification*: 1. ovate sessile capsules, containing stalked pyriform seeds, situate on the younger branches and setaceous ramuli; 2. ternate granules imbedded in the setaceous ramuli.

Substance very tender, between cartilaginous and gelatinous, adhering to paper, and shrinking in drying. *Colour* a pale pinky red.

The form of the ultimate ramuli give as peculiar an appearance to this species as to the preceding one. There is no danger of their ever being confused.

Laurencia tenuissima must be accounted one of our rarest Algæ, being confined to the south-western coasts of the island, and nowbare very plentiful.

GENUS XXXIII. GASTRIDIDIUM, *Lyngb.* Tab. XIV.

GEN. CHAR. Frond cylindrical, filiform, (often contracted as if jointed), between gelatinous and cartilaginous, of a pinky red colour. Fructification of two kinds: 1. spherical ovate or conical capsules with wedge-shaped or angular seeds; 2. imbedded ternate granules.

OBS. The species of this genus constitute part of the first and third sections of Lamouroux's genus *Gigartina*. In Lyngbye's System they belong partly to *Lomentaria* and partly to *Gastridium*. Although very indefinite in the author's work, and intended to include plants that have no affinity with each other, I have adopted the name in preference to any new one. It is sufficiently expressive of the habit of the species, which are turgid with fluid, and may be compared to a hollow membrane distended with its contents. I must also observe that the present genus was comprehended by the *Chondria* of my friend Agardh, whose name I should have retained, had it not interfered with the earlier genus *Chondrus*, bestowed upon another group by the late Professor Lamouroux.

If we consider the fructification of these plants, two *genera* appear to be indicated: but in every other respect, there is so great a similarity, that, in the present state of our knowledge, at least, it would be doing violence to nature to separate them. In *Gastridium kaliforme* and *ovale*, the capsules are globose, with a pellucid border, without a terminal pore, the interior filled with a most dense red mass of wedge-shaped seeds radiating from a central point at the bottom of the capsule. The same holds good in regard to *G. parvulum*, except that the capsule is ovate, and without a pellucid border. The capsule of *G. uvarium*, at present unknown, will probably be found of a similar nature. In *G. clavellosum* and *articulatum*, on the contrary, the capsules are obtusely conical, without any pellucid border, furnished with a terminal pore, and contain a conical mass of angular seeds. It will be perceived how ill the species of the preceding genus would associate with the present individuals,—differing, as they do, not only in fructification but in habit.

All the British species, except *G. clavellosum* and *ovale*, are contracted at regular intervals as if they were jointed. The colour of the frond varies from a fine pink to an orange-red or brick-red, often ac-

quiring a greenish tint in decay, and at length becoming white. The root is between scutate and fibrous.

* *Fronde without contractions.*

1. GASTRIDIVM CLAVELLOSUM.

Fronde gelatinous much branched branches distichous repeatedly pinnate the ultimate ramuli more or less lanceolate attenuated at their base, capsules conical.

Gastridium clavellousum, Lyngb. Hydroph. Dan. p. 70. t. 17.

Chondria clavellousa, Ag. Sp. Alg. v. 1. p. 353. Syst. Alg. p. 206. Grev. FL. Edin. p. 291. Spreng. Sp. Pl. v. 4. p. 342.

Gigartina clavellousa, Lamour. Essai, p. 49.

Fucus clavellousus, Turn. in Linn. Trans. v. 6. p. 133. t. 9. Hist. Fuc. t. 30. Sm. Eng. Bot. t. 1203.

VAR. β *sedifolius*, ramuli between oblong and oval, crowded, undivided, Turn.

Gastridium purpurascens, Lyngb. Hydroph. Dan. p. 69. t. 17.

HAB. In the sea. Annual. May to September. Scarborough, *Sir Thomas Frankland*. Beach at Yarmouth, *Mr Wigg*. Sunderland beach, *Mr Weighell*. At Gunton and Gorton, Suffolk, *Mrs Fowler*. Coast of Cornwall, and at Torquay, *Mrs Griffiths*. Dublin Bay, *Dr Scott*. Bantry Bay, *Miss Hutchins*. Larne, near Belfast, *Dr Drummond*. Frith of Forth. Isle of Bute. Var. β at Lossiemouth, *Mr Brodie*. Bantry Bay, *Mr J. T. Mackay*.

Root a minute disk. *Fronde* mostly solitary, three to twelve inches in height, much branched in a bushy manner, the main stem often as thick as a crow-quill: branches alternate, distichous, the lower ones sometimes as long as the entire fronde, repeatedly pinnate, somewhat attenuated, but rarely acute at the extremity, the ultimate ramuli one or two lines long, more or less lanceolate, tapering much at their base, and arranged in a distichous manner along the primary as well as all the other branches. *Fructification*; 1. obtusely conical capsules furnished with a pore, containing a conical mass of red angular-ovate seeds: 2. ternate granules in the lanceolate ramuli, on distinct plants. *Substance* gelatinous and tender, adhering to paper in drying. *Colour* a beautiful fugacious pink, yellowish white or greenish in decay.

The ramuli of this elegant species are liable to considerable variation: the most common form is perhaps linear-lanceolate, but they are sometimes ovate-lanceolate, and in Mr Turner's singular variety they are said to resemble the leaves of *Sedum sexangulare*. They are al-

ways much attenuated at their insertion. The stem often appears to be compressed, especially in large specimens, and also to be tubular: there is not, however, a real cavity.

Some specimens presented to me by Mrs Griffiths, gathered by herself in Devonshire, are four inches high, the main branches comparatively few and straggling, naked towards their insertion on the stem, very bushy upwards, the ramuli very narrow, and between club-shaped and lanceolate. Other specimens from the coast of Cornwall do not exceed an inch in height, and appear to have grown exposed to the sun in very shallow rocky pools.

* * *Ramuli elliptical, rarely somewhat elongated and contracted.*

2. GASTRIDIDIUM OVALE. Tab. XIV.

Fronde cartilaginosa dichotoma beseta elliptica obtusa simpliciter gelatinosa ramuli tapering at their base, capsulae sphericae cum pellicula lucida.

- Chondria ovalis*, Ag. Sp. Alg. v. 1. p. 348. Syst. Alg. p. 264. Spreng. Sp. Pl. v. 4. p. 342.
Fucus ovalis, Huds. Fl. Ang. p. 573. Sm. Eng. Bot. t. 711. Turn. Syn. Fuc. p. 30.
 Hist. Fuc. t. 81.
Fucus esdoidez, Gooden. and Woodw. in Linn. Trans. v. 3. p. 117. Stackh. Ner. Brit.
 p. 67, t. 12.
Gigartina vermicularis, Lamour. Essai, p. 48.
Gigartina ovata, Lamour. Essai, p. 48.

HAB. In the sea, attached to rocks and other *Algæ*. Annual. June to August. St Michael's Mount, and elsewhere, on the coast of Cornwall, *Turner*. Exmouth; *Goodenough*. Dawlish, *Mr Pigott*. Torquay, Budleigh and Sidmouth, *Mrs Griffiths*. All along the coast of Devonshire, *Turner*. Weymouth, *Mr Bryer*. At Christ Church, *Hudson*. Coast of Suffolk, *Mrs Fowler*. Scarborough, *Hudson*. Pools in Caswell Bay, *Dillwyn*. Plentiful in Bantry Bay, *Miss Hutchins*. North of Ireland, *Mr Templeton*. Little Isles of Jura, *Lightfoot*.

Root a small disk accompanied with a few creeping fibres. *Fronde* tufted, each rising with a stem three to ten inches in height, as thick as small twine, irregularly dichotomous, the lower part naked, clothed above with numerous elliptical imbricated leaf-like sessile ramuli, about two lines in length, obtuse at the apex, and much attenuated at their base. These *ramuli* are generally simple, but in some specimens they are elongated to half an inch or more, contracted three or four times, and even furnished with a few minute branchlets at the contractions,

exactly as in *G. kaliforme*. *Fructification*; 1. spherical minute capsules, situate on the ramuli, with a pellucid border, and containing a dense deep-red mass of radiating wedge-shaped seeds; 2. *ternate granules* imbedded in the ramuli on distinct plants.

Substance cartilaginous in the stem, tender and gelatinous in the ramuli, adhering to paper in drying. *Colour* pale transparent pinky red, varying to purplish red, and in decay to green and white.

Notwithstanding its different appearance, this curious plant is more nearly related to *G. kaliforme* than any other British species. Specimens in my possession, gathered by Mrs Griffiths in Devonshire, present the elongated contracted ramuli I have described, and when these are again set with the commencement of whorls of smaller ramuli, a fragment might easily be mistaken, as Mr Turner has justly observed, for *G. kaliforme*. The ramuli, in their ordinary simple state, occasionally assume an oblong, and sometimes an ovate form. A plant, found by Mr Turner, adhering to the root of *Himanthalia lorea*, and considered by him as a variety of this species, has the ramuli clustered, nearly globular, and scarcely a line in diameter. Agardh conjectures that it may be his *Chondria uvaria* (the *Gastridium uvarium* of my arrangement), which is not improbable; but in the absence of authentic specimens, I prefer leaving the question to be decided by future investigation.

* * * *Fronde contracted as if jointed.*

3. GASTRIDIVM KALIFORME.

Fronde elongated tubular contracted as if jointed, branches whorled, capsules spherical with a pellucid border.

Gastridium kaliforme, Lyngb. Hydroph. Dan. p. 70.

Chondria kaliformis, Ag. Sp. Alg. v. 1. p. 355. Syst. Alg. p. 207. Spreng. Sp. Pl. v. 4. p. 342.

Gigartina kaliformis, Lamour. Essai, p. 49.

Fucus kaliformis, Gooden. and Woodw. in Linn. Trans. v. 3. p. 206. t. 18. Sm. Eng. Bot. t. 640. Turn. Syn. Fuc. p. 377. Hist. Fuc. t. 29.

HAB. In the sea, on rocks and other *Algæ*. Annual. June to September. Coast of Anglesea, *Rev. H. Davies*. Falmouth, St Michael's Mount, Plymouth, and Mount Edgecombe, *Turner*. Torquay, Budleigh and Sidmouth, *Mrs Griffiths*. Exmouth, *Goodenough*. Dawlish, *Mr Pigott*. Weymouth, *Stackhouse*. Near Swansea, *Dillwyn*. Near Christ Church, *Hudson*. Brighton, *Mr Borrer*. Near

Dublin, *Dr Scott*. About Belfast, *Mr Templeton*. Bantry Bay, *Miss Hutchins*. The little Isles of Jura, *Lightfoot*. Western coast of Scotland, *Mr Menzies*. Iona. Isle of Bute.

Root a minute disk, furnished with creeping fibres. *Fronde* rising with a single stem, one or several from the same base, twelve to eighteen inches in length, filiform, tubular, from the thickness of a crow-quill to that of a goose-quill attenuated at each extremity, much branched, the general outline commonly more or less ovate or pyramidal. The primary branches arise horizontally, alternately or in whorls, along the whole length of the stem, and are set with a second and third series, all of them springing from the contractions, tapering at the base, obtuse at the point; the secondary ones arising more regularly in whorls than the primary ones. The contractions are somewhat irregular in the stem, half an inch or more asunder, and not uniformly conspicuous: in the branches they are more evident and more numerous; in the extreme ramuli often hardly a line apart. *Fructification*: 1. minute spherical capsules with a pellucid border, containing a dense, dark-red mass of wedge-shaped seeds, and situate on the younger branches and ramuli; 2. ternate granules imbedded in the ramuli, on distinct plants.

Substance tender, gelatinous, succulent, adhering closely to paper in drying. *Colour* a fugitive reddish pink, becoming whitish and greenish in decay.

In describing the capsules of this species, I regret to find that I am opposed to my friend Mr Turner. He is of opinion that they are at first spherical, and as they ripen become inversely urceolate. Mr Borrer's authority also is quoted by Mr Turner in support of the fact. Nothing but a very careful analysis of many specimens would render me so hardy as to differ from two such close observers. It appears to me, however, that there is no change in the form of the capsule, and that the arrangement of the seeds is such as to prevent their escape, except by the decomposition of the plant. The seeds are of a wedge-shaped form, and fixed by their base to a central point in the substance of the frond, from which point they radiate, and form a very compact, nearly spherical mass, over which the external membrane of the frond is carried continuously. This is a very different structure from the capsule of *G. clavellusum*, with which it is compared by Mr Turner. The latter contains a mass of minute angular seeds, free, and imbedded in a gelatinous nidus, from which they escape with the

greatest facility through a regular terminal orifice. The seeds of *G. kaliforme* are so compactly united together, that, when removed by force, they generally come away in a body, and it is not easy to separate them on the table of the microscope.

4. GASTRIDIVM PARVULUM.

Frond with scattered entangled branches the contractions nearly equal in length and breadth, capsules ovate containing a spherical mass of wedge-shaped seeds.

Chondria parvula, Ag. Sp. Alg. p. 207. Grev. Crypt. Fl. v. 6. t. 246.

Fucus kaliformis var. *γ nanus*, Turn. Hist. Fuc. v. 1. p. 61.

HAB. In the sea, parasitic on other *Algæ*. Annual. July to September. Torquay, Sidmouth, and other places on the coast of Devonshire, *Mrs Griffiths*. At Brighton, among rejectamenta, *Mr Borrer*.

Root composed of entangled creeping fibres. Fronds numerous, about three inches long, branched, entangled, and, as it were, here and there growing into each other, divided by real dissepiments into joints, which are generally equal in length and breadth, though the former sometimes exceeds the latter: branches irregular, scattered, spreading, obtuse, tapering at their base, bearing smaller ones equally irregular. Fructification: 1. ovate capsules containing a nearly spherical dark-red mass of wedge-shaped seeds, radiating from a centre; 2. ternate granules imbedded in the smaller branches, on distinct plants. Substance between cartilaginous and gelatinous, adhering to paper in drying. Colour a pinky red; changing to yellowish pink, and at length to white.

A small species, without much claim to beauty. It is described by Mr Turner as a variety of *G. kaliforme*, but seems to be truly distinct. Mrs Griffiths, who originally discovered the plant, informs me that it produces its fructification a month later than *G. kaliforme*. The frond is not only contracted externally, but actually divided by internal septa. The ovate capsules form an excellent character to distinguish it from the above mentioned species, and they are, besides, without the pellucid border.

5. GASTRIDIMUM ARTICULATUM.

FronD tubular contracted chain-like, branches fastigate dichotomous and whorled, capsules obtusely conical.

Chondria articulata, Ag. Sp. Alg. v. 1. p. 357. Syst. Alg. p. 207. Grev. Fl. Edin. p. 291.

Spreng. Sp. Pl. v. 4. p. 342.

Lomentaria articulata, Lyngb. Hydroph. Dan. p. 101. t. 30. Gaill. in Dict. Sc. Nat. v. 53, p. 387.

Gigartina articulata, Lamour. Essai, p. 49.

Fucus articulatus, Lightf. Fl. Scot. p. 960. Stackh. Ner. Brit. p. 22. t. 8. Turn. Syn.

Fuc. p. 383. Hist. Fuc. t. 106. Sm. Eng. Bot. t. 1574.

HAB. In the sea, growing upon rocks and other *Algæ*. Annual, May to August. Not unfrequent on all the British shores. Coasts of Cornwall, Devonshire, Dorsetshire, and Sussex, *Hudson*. Dover, *Dillwyn*. Isle of Walney, *Martyn*. Coast of Northumberland, *Winch*. Coast of Ireland, *Miss Hutchins*. Coasts of Jura, Oronsay, Canay, Skye, &c. *Lightfoot*. Orkney, *Rev. C. Clouston*. Iona. Frith of Forth.

Root a minute disk, accompanied with creeping fibres, which form other disks from time to time, till the whole becomes an entangled mass. *FronDs* numerous, bushy, much branched, one to six inches in height, tubular, contracted at regular intervals in such a manner as to present the appearance of a chain or necklace, the links or intervals between the contractions varying, in different specimens, from two or three lines to half an inch in length, and about a line in diameter, those of the main branches being the longest. The primary divisions of the frond are dichotomous or trichotomous: the smaller branches whorled with repeated sets of spreading ramuli, all arising from the contractions. *Fructification*: 1. obtusely-conical minute *capsules*, furnished with a pore, containing angular-ovate seeds, and situate on the smaller branches; 2. *ternate granules* imbedded in the younger branches, on distinct plants.

Substance tender, between membranaceous and gelatinous, adhering imperfectly to paper in drying. *Colour* a fine pinky red, sometimes tinged with yellow or purple.

The principal variations to which this species is subject, consist only in the thickness of the frond, the length of the contractions, and the degree of ramification. In some specimens communicated from Devonshire by Mrs Griffiths, the branches are elongated, flagelliform, and almost capillary, and, when growing, entangled and twisted like ten-

drills round the neighbouring plants. In Ireland, this *Alga* attains a height of six inches, but in Great Britain rarely three or four. In the Frith of Forth it seldom rises above two inches. The contractions in the frond do not generally produce corresponding interruptions of the internal structure. In some varieties, however, where the contractions are strongly marked, the reverse seems to be the case. M. Bory de St Vincent has observed them produce internal septa, which he even compares to those of the CONFERVOIDÆ.

GENUS XXXIV. GRACILARIA, Grev. Tab. XIV.

GEN. CHAR. Frond cartilaginous, filiform, cylindrical or compressed, of a dull red colour. Fructification; 1. capsules containing a mass of minute roundish seeds; 2. roundish or oblong simple granules imbedded in the frond of distinct plants.

OBS. The plants which form this genus are distinguished from the other filiform *Sphærococci* of Agardh, 1. by a softer, more flexible, and more transparent substance; 2. by two modifications of the fructification—capsules, and imbedded granules. The plants in which the latter occur are mostly of a paler colour, and with dilated, or, as it were, inflated, branches. The granules are never ternate. Mrs Griffiths first pointed them out to me; and I find, from an observation in her Herbarium, that she has for several years considered *Gracilaria purpurascens* and *confervoides* as plants with a double fructification. The generic name is expressive of the slender habit of the species. By Lamouroux this group was mingled with his *Gigartina*. In Agardh's System it forms a part of the genus *Sphærococcus*: but it must be confessed, it has little in common with the tribe of *Sphærococcus crispus* and *mamillosus*; or that of the pinnated species *S. coronopifolius*, *cartilagineus*, &c. It comes, indeed, nearest to the filiform and cylindrical species, viz. *S. plicata*, *acicularis*, &c.; but they have a corneous substance, and one mode of fructification.

* *Capsules immersed in the substance of the frond.*

1. GRACILARIA PURPURASCENS.

FronD cylindrical elongated much branched, ramuli setaceous scattered attenuated at each extremity, capsules spherical immersed in the ramuli and younger branches.

Sphaerococcus purpurascens, Ag. Sp. Alg. v. 1. p. 318. Syst. Alg. p. 236. Spreng. Sp. Pl. v. 4. p. 339.

Gigartina purpurascens, Lamour. Essai, p. 136. Lyngb. Hydroph. Dan. p. 46. t. 12. Grev. Fl. Edin. p. 290.

Fucus purpurascens, Huds. Fl. Angl. p. 589. Sm. Eng. Bot. t. 1943. Turn. Syn. Fuc. p. 357. Hist. Fuc. t. 9.

HAB. In the sea, growing on rocks and the larger Algæ. Annual. July to November. Frequent on the shores of England, Scotland, and Ireland.

Root a small disk, throwing out many clasping fibres. *FronDs* nine inches to two feet in length, rising generally with an undivided stem as thick as a crow-quill, attenuated, set from the bottom to the top with numerous branches irregular in length, which in their turn bear a second and a third series, the smallest being only a few lines in length, all of them attenuated at each extremity, and arising at an acute angle. *Fructification*: 1. spherical capsules immersed in the substance of the smaller branches; 2. roundish-ovate granules, with a pellucid border imbedded in the circumference of the branches, in distinct plants.

Substance between gelatinous and cartilaginous, adhering to paper in drying. *Colour* a pale diaphanous brownish or purplish pink.

The branches of this species occasionally terminate in capillary tendrils, which twist themselves round other Algæ. In this state it has been found on the southern coast by Mr Pigott and Mrs Griffiths. I have received specimens in the same state from Professor Hornemann, gathered on the coast of Denmark. A variety is also noticed by Agardh, which was communicated to him by my friend Dr Gillies, from the Orkney Islands: it is characterized, according to that author, by a compressed frond and distichous branches. A third variety is also recorded as having been sent from the same coast by Dr Gillies, only two inches in height, with a roundish general outline, capillary and dichotomous, the ramuli inflated, and containing granules.

* * *Capsules external.*

2. GRACILARIA CONFEROIDES.

Fronde cylindrical irregularly branched, branches elongated mostly undivided bearing scattered setaceous ramuli attenuated at each end, capsules scattered roundish with a subacute orifice.

- Sphaerococcus confervoides*, Ag. Sp. Alg. v. 1. p. 303. Syst. Alg. p. 232. Spreng. Sp. Pl. v. 4. p. 338.
Gigartina confervoides, Lamour. Essai, p. 136. Lyngb. Hydroph. Dan. p. 43.
Fucus confervoides, Linn. Sp. Pl. v. 2. p. 1629. Turn. Syn. Fuc. p. 328. Hist. Fuc. t. 84. Sm. Eng. Bot. t. 1668.
Fucus verrucosus, Huds. Fl. Ang. p. 588. Stackh. Ner. Brit. p. 26. t. 8.
Fucus gracilis, Stackh. Ner. Brit. p. 100. t. 16.
 VAR. β . *procerrima*, branches very long, generally simple, and almost naked. Turn.
Fucus longissimus, Stackh. Ner. Brit. p. 99. t. 16.
 VAR. γ . *albida*, frond compressed, mostly dichotomous, ramuli subulate.
Fucus albidus, Huds. Fl. Angl. p. 588.
 VAR. δ . *geniculata*, frond distorted, and bent as if broken at the tubercles.

HAB. In the sea, growing on the rocks. Perennial. In fruit chiefly from August to October, but occasionally all the year. Coast of Cornwall, *Stackhouse*. Devonshire, very abundant, *Mrs Griffiths*. Shores of the Isle of Wight, *Mr Maimburg*. Coast of Sussex, *Mr Borrer*. Coast of Norfolk, *Mr Wigg*. Coast of Suffolk, *Mrs Fowler*. Coast of Wales, *Dillwyn*. Frith of Tay, *Rev. J. Macvicar*.

Root a small disk. Fronds many from the same base, cylindrical, filiform, three to twenty inches in length or more, as thick as small twine, attenuated upwards, variously branched: sometimes divided near the bottom into a few almost simple long branches; sometimes almost fastigiata, at others dichotomous; the smaller branches irregularly scattered, not unfrequently partially secund, like the primary branches, either few or numerous, remote or crowded: all of them are spreading, attenuated at both ends, and set with a greater or less number of ramuli, a few lines in length. Fructification: 1. sessile roundish capsules, smaller than turnip-seed, terminated with a subacute prominent orifice, situated on every part of the branches, and containing a mass of minute ovate seeds: 2. minute ovate red granules, imbedded in the branches on distinct plants.

Substance cartilaginous and flexible. Colour deep red, or pale purplish-red, becoming greenish, and at last white in decay. In drying, it does not adhere to paper.

The characters of the varieties of this species are sufficient to shew

the changeable nature of the plant. At the same time, the practical botanist will rarely be deceived by any of its forms. The size of the capsules is usually smaller than that of turnip-seed, but on dwarf plants they are sometimes not larger than poppy-seed.

Several more varieties are enumerated by authors, some of which occur on our own shores, but they appear to me to be hardly worthy of being so distinguished. Variety δ , Mr Turner has justly remarked, resembles a *lusus nature* rather than a variety. The impression it conveys to the mind is that of distortion. It is found, however, also on the Continent, and has been communicated to me from the French coast, by my friend M. Chauvin.

A white wart-like excrescence, sometimes as large as the capsules, is occasionally found on this species, and is regularly organized. In the centre are ovate colourless granules, resembling the seeds.

3. GRACILARIA ERECTA. Tab. XIV.

Fronde cylindrical dichotomous erect, branches subsimple, capsules globose, granules in terminal pod-like ramuli.

Sphaerococcus? erectus, Grev. Crypt. Fl. v. 6. t. 357.

HAB. On rocks in the sea. Perennial. February and March. Tor-Abbey, Meadfoot, and Waldon rocks in Torbay, and at Sidmouth, Mrs Griffiths.

Root a thin flat broad disk. *Fronde* many from the same base, about two inches high, erect, cartilaginous, hardly thicker than a stout bristle, twice or thrice dichotomous, the branches nearly erect, somewhat acute. *Fructification*: 1. sessile spherical capsules, the size of poppy-seed, aggregated towards the ends of the branches, and containing a globular mass of ovate-oblong seeds; 2. oblong red granules imbedded in terminal pod-like pale lanceolate receptacles, three or four lines in length.

Substance cartilaginous, gelatinous in the pod-like receptacles. *Colour* pale red. In drying it does not adhere to paper.

At first sight this little plant might be taken for one of the numerous varieties of the preceding species; but it is in reality well distinguished by the fructification, which is only to be found in February and March. There is something very peculiar in its mode of growth, and after the lanceolate deciduous receptacles have fallen off, the branches all appear truncated. It is invariably found growing on the

nearly level bottom of shallow pools left by the recess of the tide, and generally half immersed in sand. I had an opportunity at Sidmouth of tracing the fructification to maturity.

4. GRACILARIA COMPRESSA.

Fronde cartilaginous brittle between cylindrical and compressed dichotomous, branches subdistichous spreading lax gradually attenuated to a subulate point.

Sphærococcus compressus, Ag. Sp. Alg. v. 1. p. 308. Syst. Alg. p. 233. Spreng. Sp. Pl. v. 4. p. 338.

Sphærococcus lichenoides, Grev. Crypt. Fl. v. 6. t. 341.

HAB. In the sea. Annual. August. Sidmouth, Mrs Griffiths.

Root a small disk. Fronds aggregated, six to twelve inches or more in length, from a crow-quill to nearly a common quill in thickness, attenuated at the base and apex, divided from the base in a manner between dichotomous and pinnated, the main branches long, lax, patent, mostly somewhat curved, gradually tapering to a subulate point, set with others one or two inches in length, alternate, rather distant, often partially secund, attenuated like the rest: all the branches are distichous, and there are rarely more than three series, though I have seen four and even five. Fructification: 1. sessile globoso-hemispherical capsules, with a prominent orifice, as large as turnip-seed, containing oblong seeds, and situated on every part of the frond: 2. ovate reddish granules imbedded in the branches on distinct plants.

Substance between cartilaginous and gelatinous, succulent, fragile, adhering pretty closely to paper in drying. Colour a transparent dull red.

A very fine Alga, discovered by Mrs Griffiths in Devonshire, as long ago as 1813. From specimens which she collected more recently, and observations which accompanied them, I was induced to coincide with her in believing it to be the *Fucus lichenoides* of Linnæus and Turner's *Historia Fucorum*, and published it under that name in my *Cryptogamic Flora*. We have, however, committed an error, for authentic specimens subsequently received from Agardh of his *Sphærococcus compressus*, do not in any respect differ from our plant. The two species approach exceedingly near to each other, and except in its faded colour, Mr Turner's figure (a) might almost have been drawn from some of the Devonshire specimens. The structure of the frond is the same in both, being cellular, and faintly reticulated on the surface.

The capsules also appear to be similar. The smaller and slender variety of Mr Turner's *Fucus lichenoides* differs far more in habit.

From the succulent and brittle nature of this species, it is easily injured, and is apt to break even with its own weight, but after having been once dried it becomes tough. Under the impression that it was really the *Fucus lichenoides* which is eaten in the east, Mrs Griffiths, among other experiments, made a pickle and a preserve from fresh specimens, and in both cases it proved excellent.

GENUS XXXV. CHONDRUS, *Stackh. Lamour.* Tab. XV.

GEN. CHAR. Frond cartilaginous, dilating upwards into a flat, nerveless, dichotomously divided frond, of a purplish or livid red colour. Fructification subspherical capsules in the substance of the frond (rarely supported on little stalks), and containing a mass of minute free seeds.

The type of this genus, first suggested by Stackhouse, and afterwards confirmed and established by Lamouroux, is the *Fucus crispus* of Linnæus. The species are characterised by a scutate root, a stem cylindrical at the base, and expanding into a flat frond, without a midrib, the general outline of which, is usually roundish or fan-shaped: the whole is divided in a dichotomous manner, the segments either linear or dilated upwards. The fructification is mostly situated in the disk of the segments, and more or less imbedded in their substance: in two or three exceptions the capsules are stalked, and in *C. membranifolius* often spring from the stem. In *C. Brodiaei* the capsules are sessile on the extremity of the frond. The capsules contain a mass of very minute, roundish, free seeds, lying in a gelatinous mucus. No other modification of the fructification has been observed, unless certain incrustations in the frond of some species be regarded in that light. These occur in *C. membranifolius*, *Norvegicus* and *Brodiaei*. In the first of these species they are very common and conspicuous, being large, and of a dark blood-red colour. In *C. Norvegicus* they are commonly mistaken for the capsules. Under the microscope they are evidently composed of a dense mass of vertical parallel moniform filaments, named by Agardh *nemathocia*; and it is probable that some

degree of reproductive power ought to be ascribed to them. No assistance, however, can be derived from them in the construction of genera, at least not till we know more of the whole family, for they are present in *Phyllophora rubens* and in *Gigartina Griffithia* and *plicata*. The substance of the *Chondri* is for the most part between horny and cartilaginous, thick, and more or less opaque. In *C. membranifolius* it is thinner, and between cartilaginous and membranaceous. The colour is often almost a black purple or brownish-red, but whatever the shade of red or purple may be, there is a peculiar livid hue when fresh, except in *C. Brodiaei* (which is a doubtful *Chondrus*), where it is a purer red. In decay, some species are apt to acquire a rusty red colour; some become greenish, but at length most of them change to a yellowish-white.

The generic name is characteristic of the substance of the frond, being derived from the Greek word signifying *cartilage*. In Agardh's system all the species belong to his vast genus *Sphærococcus*.

I. CHONDRUS MAMILLOSUS.

FronD somewhat channelled dichotomous the segments linear-wedge-shaped, capsules spherical scattered on the disk of the frond and supported on little short stalks.

Sphærococcus mamilloeus, Ag. Sp. Alg. v. 1. p. 260. Syst. Alg. p. 220. Lyngb. Hydroph. Dan. p. 14. t. 5. Grev. Fl. Edin. p. 295. Spreng. Sp. Pl. v. 4. p. 336.

Fucus mamillosus, Gooden. and Woodw. in Linn. Trans. v. 3. p. 174. Turn. Syn. Fuc. p. 237. Hist. Fuc. t. 218. Sm. Eng. Bot. t. 1054.

Fucus polymorphus, fourth series, Lamour. Dissert. p. 3. t. 17. f. 37. t. 18. f. 38.

Fucus echinatus, Stackh. Ner. Brit. p. 65. t. 12.

HAB. On rocks and stones in the sea. Perennial. Winter. Common on the coasts of Great Britain and Ireland.

Root scutate. Fronds tufted, three to eight inches high, cylindrical at the base, but immediately beginning to flatten and expand insensibly into a plane frond, divided from near the base in a regularly dichotomous manner, the segments divaricated, one to four lines in width, in the lower part of the frond channelled, but towards the extremities quite flat, and dilated. Fructification, spherical capsules, of the size of turnip-seed, on short peduncles, produced copiously on the disk of the upper or broader segments, and containing a mass of minute roundish red seeds. Substance tough and cartilaginous. Colour a rich deep brownish purple, semitransparent, and often pinkish at the ends: sometimes a pale semitransparent greenish-brown: in passing to

a state of decay, and after having been exposed to the atmosphere, the shades of red pink and brown it often acquires are very beautiful.

In some respects this species is exceedingly changeable, and therefore the unpractised botanist will do well to attend principally to the fructification, in which there is no ambiguity, and if that be not present, to the channelled frond, which is a constant character, especially towards the base. The varieties depend upon the width and form of the segments and the appearance of the fructification. In some specimens the segments of the frond divide at short intervals, are half an inch wide at the extremity, and broadly wedge-shaped. In others, to take an opposite extreme, the whole plant is linear, hardly two lines wide, divided at long intervals, and channelled throughout its entire length. Every state intermediate between these extremes may be found. The extremity of the segments is sometimes simply rounded, but is often notched, and not unfrequently terminates in several sharp, or even lanceolate, or subulate points. The capsules are often so numerous as to cover the surface, and give the frond a very peculiar appearance: they are very variable in their peduncles, which, in common cases, are about a line in length: but in some narrow varieties of the frond, are much longer, twisted and curved, and, when situated at the apices of the segments, have much the appearance of tendrils.

The frond of this species is highly proliferous, and occasionally throws out little flat processes, less than a line in width, and several lines in length from the margin. Similar processes sometimes take the place of the capsules on the disk of the frond, and in that case become the supporters of the fructification. I possess a specimen, communicated by Mrs Griffiths, with sterile processes on the disk half an inch long, a quarter of a line wide, and so much branched as to look like complete plants in miniature; and, what is more curious, the segments of the frond terminate in similar productions. I have also specimens in which the proliferous disposition is so strongly marked, that the whole frond on the disk and margin is covered with oblong-elliptical flat frondlets.

The most remarkable varieties that have come under my observation, are those collected by Mrs Griffiths in Devonshire, a country singularly rich in marine productions.

2. CHONDRUS CRISPUS. Tab. XV.

FronD plane dichotomous the segments linear-wedge-shaped, capsules subhemispherical, imbedded in the disk of the frond.

Chondrus crispus, Lyngb. Hydroph. Dan. p. 15. t. 4.

Chondrus polymorphus, Lamour. Essai, p. 39.

Sphaerococcus crispus, Ag. Sp. Alg. v. 1. p. 256. Syst. Alg. p. 219. Grev. Fl. Edin. p. 294. Spreng. Sp. Pl. v. 4. p. 335.

Fucus crispus, Linn. Syst. Nat. v. 2. p. 718. Turn. Syn. Fuc. p. 226. Hist. Fuc. t. 216-217. Sm. Eng. Bot. t. 2285. Stackh. Ner. Brit. p. 63. t. 12.

Fucus polymorphus, Lamour. Dissert. p. 1., excluding the fourth series, t. 1-17. f. 1-33. and 35, 36.

Fucus ceranoides, Gmel. Hist. Fuc. p. 115. t. 7. f. 1. Huds. Fl. Angl. p. 582. in part.

Fucus stellatus, Stackh. Ner. Brit. p. 53. t. 12.

Fucus lacerus, Stackh. Ner. Brit. p. 50. t. 11.

Fucus filiformis, Huds. Fl. Angl. p. 585.

Fucus patens, Gooden. and Woodw. in Linn. Trans. v. 3. p. 173.

HAB. On rocks and stones in the sea. Perennial? Spring. Very common on every part of the British coast, where rocks are present.

Root a disk, throwing up tufts of many fronds. Fronds two to twelve inches high, very narrow and subcylindrical at the base, but immediately becoming flat, generally dilating from the base till it becomes three or four lines wide, and then dividing repeatedly and dichotomously; each division spreading, becoming narrower than the preceding one, and taking place at shorter and shorter intervals: the summits are bifid, the segments varying greatly in length, rounded or acute, straight or curved, and often twisted in such a manner as to give the curled appearance denoted by the specific name. Fructification roundish or roundish-oval subhemispherical capsules, imbedded in the disk of the frond, prominent on one side, and producing a concavity on the other, containing a mass of minute roundish red seeds. Substance cartilaginous, in some varieties approaching to horny, flexible and tough. Colour a deep purple-brown, often tinged with purplish-red, paler at the summit, becoming greenish, and at length white in decay. When dry it is considerably darker, almost horny, and adheres imperfectly to paper.

This is the Proteus of marine Algæ. The varieties are innumerable, and pass into one another so insensibly, that it is almost impossible to define them. As in the preceding species, so in the present one there is a great range in regard to the width of the frond: some specimens throughout their whole length are scarcely more than a line, while others are fully an inch in the widest part. Sometimes the frond divides at very short intervals, sometimes at remote ones; sometimes

the dichotomous mode of division prevails regularly throughout the plant, at others, the lower branches only are dichotomous, and then, at the summit of each branch springs a number of condensed ramifications, almost in a palmate manner. The ultimate segments are most inconstant in their form, being rounded, simply acute, jagged, or lengthened out into long subulate points. Whenever the plant grows more or less exposed to the influence of fresh-water, a still greater change is wrought in its appearance. The main divisions are much broader, fewer, and exceedingly irregular, while the margin and extremity are beset with such a vast number of small segments, that the whole suggests the idea of monstrosity. In such specimens, the frond, when held between the eye and the light, is thinner and more transparent, and frequently mottled with green. It occasionally happens that the margin is somewhat raised, so as to render the frond slightly channelled, but seldom so much so as to allow of its being mistaken for *C. mamillosus*. The fructification, which might be expected to be more uniform, differs almost as much as the frond in regard to size. The capsules are frequently above a line in diameter, often not half a line, and vary besides in being round or oval, scattered or clustered together; the mass of pink seeds is very conspicuous when held between the eye and the light. When fully ripe, the capsules fall away entire, and leave the frond full of holes.

It is difficult in words to convey any idea of the variableness of this species, yet a little practical experience removes every perplexity. The numerous synonyms would seem to imply the contrary; but we must recollect that it is not many years since the marine *Algæ* began to be studied according to systematic views. It is only recently that their relative structure and affinity have been investigated: but already much that was formerly obscure is now easily understood, and, by the introduction of genera, the species have been gradually defined by more permanent and satisfactory characters.

3. CHONDRUS NORVEGICUS.

FronD dichotomous the segments linear flat rounded at the end, capsules minute imbedded in the disk of the frond near the summit, or, in the place of capsules, sessile round masses of vertical filaments.

Chondrus Norvegicus, Lamour. Essai, p. 39. Lyngb. Hydroph. Dan. p. 16.
Sphaerococcus Norvegicus, Ag. Sp. Alg. v. 1. p. 255. Syst. Alg. p. 218. Spreng. Sp. PL.
 v. 4. p. 335.

Fucus Norvegicus, Gunn. Fl. Norv. Part 2. p. 122. t. 3. f. 4. Turn. Syn. Fuc. p. 222.
Hist. Fuc. t. 41. Sm. Eng. Bot. t. 1080. Stackh. Ner. Brit. t. 18.
Fucus Devonienis, Grev. in Wern. Trans. v. 3. p. 396.

HAB. On rocks in the sea. Annual? September to March. Dover, *Dillwyn*. Exmouth, plentifully, *Sir Thomas Frankland*. Torquay, Sidmouth, and on the Cornish coast, *Mrs Griffiths*. Rocks by the Mumbles Lighthouse, near Swansea, *Dillwyn*. Abundantly on the coast between Torquay and Exmouth.

Root a flattish disk. Fronds tufted, one to three inches high, flat, linear, nearly two lines wide, dichotomously branched from nearly the very base, the segments divaricated, often undulated, sometimes twisted, the apices rounded. Fructification, capsules about the size of poppy-seed, imbedded in the substance of the frond, and aggregated in the disk of the ultimate segments, containing a mass of free, very minute roundish seeds: but far more commonly occur roundish depressed, dark red masses, often a line broad, composed entirely of vertical moniliform filaments (*nemathecia* of Agardh). Substance cartilaginous. Colour a deep blood-red, pink in the young shoots, changing to yellowish and brownish as it approaches decay. In drying it becomes darker, and does not adhere to paper.

From *C. mamillosus* and *crispus* this species is distinguished by its smaller size, linear frond, division from the base, much redder colour, and, above all, by the fructification, which, in the form at least of *nemathecia*, I have never seen wanting. The true capsules were unknown till discovered by Mrs Griffiths some years ago, at which time, taking the *nemathecia* to be the true fruit of *C. Norvegicus*, I described the capsuliferous frond as a new species. Subsequent investigation has convinced me of my error. The plants which produce true capsules are still exceedingly rare, and have not, I believe, been seen growing by any one except the lady above mentioned.

4. CHONDRUS MEMBRANIFOLIUS.

Stem cylindrical filiform branched the branches expanding into many-cleft wedge-shaped frondlets, capsules ovate shortly pedicellate and arising from the stem.

Sphaerococcus membranifolius, Ag. Lyngb. Hydroph. Dan. p. 10. t. 3. Ag. Sp. Alg. v. 1. p. 240. Syst. Alg. p. 214. Grev. Fl. Edin. p. 298. Spreng. Sp. Pl. v. 4. p. 335.

Fucus membranifolius, Gooden. and Woodw. in Linn. Trans. v. 3. p. 120. t. 16. f. 1. Lamour. Dissert. t. 20, 21. f. 3. Turn. Syn. Fuc. p. 25. Hist. Fuc. t. 74. Sm. Eng. Bot. t. 1965.

Fucus simbriatus, Huds. Fl. Angl. p. 574.

HAB. On rocks in the sea. Perennial. October to March. Not unfrequent. Anglesea, *Rev. H. Davies*. Shores of Weymouth and Cromer, *Turner*. Isle of Portland, *Goodenough*. Dover, *Dillwyn*. Brighton, *Mr Borrer*. Lyme Regis, *Mr Pigott*. On the Devonshire coast, abundantly, *Mrs Griffiths*. Bantry Bay, *Miss Hutchins*. Orkney, *Rev. C. Clouston*. Frith of Forth.

Root an expanded disk. *Fronde* tufted, three to twelve inches in height, furnished with a cylindrical stem, as thick as small pack-thread, generally two or three inches long, and then branched somewhat dichotomously, the branches either simple or repeatedly divided, expanding into nerveless, broadly wedge-shaped, often palmated, leaves or frondlets, about an inch in length: the branches are often also set towards the extremity with distichous wedge-shaped leaves, of various sizes, supported on small foot-stalks. The branches are given off at no fixed point, and at no regular angle; being sometimes almost horizontal, at others only slightly spreading. *Fructification* ovate capsules, supported on short stalks, and arising from the branches, rarely from the leaves, containing a mass of minute free roundish red seeds. On the leaves are also frequently observed blood-red spots, several lines in length and breadth, occupying both sides of the frond, which are occasioned by a dense mass of vertical moniliform filaments (*nemathecia*, Ag.). *Nemathecia* almost invariably occur in distinct individuals, both in this and other *Algæ*, but a solitary exception was discovered by *Mrs Griffiths*, in a plant of the present species, which produced both *nemathecia* and capsules in abundance; a portion of this specimen is in my possession. *Substance* cartilaginous, rather thin, semitransparent. *Colour* a deep brownish, or livid purplish-red, paler at the extremity, and in young plants purplish-pink: in decay greenish, and at length white. In drying it does not adhere to paper, and scarcely changes colour.

Many varieties are produced by this species; the principal of which *Mr Turner* has thus defined:

β *lacer*; leaves dichotomous, segments linear, apices acute.

γ *stellatus*; apices of the leaves cleft into very numerous narrow segments.

δ *fimbriatus*; leaves fringed at the margin.

ε *latifolius*; leaves membranaceous, semiorbicular, multifid in a palmate manner, segments shortish, rounded at the apices.

ζ *angustissimus*; leaves very narrow, nearly linear, irregularly divided, proliferous from the margin.

Besides these varieties, another is mentioned by Mr Turner under the name of *roseus*; distinguished by a simple or nearly simple stem expanded at its apex into a single, oblong, simple, leaf. It is represented at *m* in Mr Turner's plate. I have examined it carefully in a growing state, and have succeeded in tracing it to *C. Brodiaei*. The much thinner and more transparent frond, added to the truly cylindrical stem, serve to distinguish this species from the preceding ones, independently of the fructification. Its nearest affinity is the recently discovered *Sphærococcus flabellifolius* of Bory, brought by M. Durville from the coast of Chili, and which I consider as provisionally belonging to this genus: the absence, however, of fructification, and the distinctly fibrous root, render its real situation somewhat uncertain. The stem of *C. membranifolius* is often nearly of the same thickness to the very apex, and even the branches partake frequently of the same character, and sometimes never expand into frondlets, so that even when given off, as they sometimes are, at a right angle, they seem rather a continuation, as it were, of the stem than true branches. The leaves or frondlets have consequently, in many instances, especially in old plants, the appearance of proliferous productions.

5. CHONDRUS BRODIAEI.

Stem cylindrical filiform somewhat dichotomous the branches expanding into oblong mostly forked frondlets proliferous from their marginal extremity, capsules spherical sessile at the apices of the frondlets.

Sphærococcus Brodiaei, Ag. Lyngb. Hydroph. Dan. p. 11. t. 3. Ag. Sp. Alg. v. 1. p. 239. Syst. Alg. p. 213. Grev. Fl. Edin. p. 295.

Sphærococcus membranifolius, in regard to the synonym, *S. Brodiaei*, Spreng. Sp. Pl. v. 4. p. 335.

Delesseria Brodiaei, Lamour. Essai, p. 33.

Fucus Brodiaei, Turn. Hist. Fuc. t. 73. Sm. Eng. Bot. t. 1966.

Fucus membranifolius, Lamour. Dissert. p. 17. t. 21. f. 1. 2.

VAR. β *simplex*; stem short, mostly simple, expanding into an oblong mostly simple, or once forked rose coloured frond.

Fucus membranifolius, var. *roseus*, Turn Hist. Fuc. t. 74. f. m.

HAB. On rocks in the sea, rare. Perennial. Winter and spring. At Lossiemouth, on the east coast of Scotland, *Mr Brodie*. Opposite Caroline Park, near Edinburgh, *Mr Stewart*. Joppa and Portobello, near Edinburgh, *Dr Richardson*. Near Dundee, *Rev. J. Macvicar*. Isle of Bute. Black Rocks, opposite Leith, plentiful. Var. β on the Devonshire coast at Sidmouth, Torquay and elsewhere, *Mrs Griffiths*.

Root a flattened disk. Fronds tufted, one to eight inches in length,

furnished with a stipes as thick as fine pack-thread, cylindrical and filiform, very variable in regard to length, more or less divided in an irregularly dichotomous manner, the branches gradually expanding into flat nerveless oblong-wedge-shaped simple or forked frondlets, two to four lines in width, the segments sometimes acute, but more generally somewhat truncate and proliferous at the end, the young shoots rising with a short cylindrical foot-stalk, and then dilating like the parent frond, and so on for several series. Instead of being dichotomous, the stem is sometimes beset towards its summit with a number of unequal branches, crowded together, and almost distichous. The branches in some cases begin to expand into the frondlet immediately, but, in others, they remain filiform for one or two inches, or even to their very extremity. *Fructification*, spherical dark red capsules about twice the size of poppy-seed, sessile at the apices of the frond. *Substance* cartilaginous, rather thin, but opaque in the frond. *Colour* a deep dull purplish-red, in the young shoots pink, and somewhat transparent; becoming greenish, and at length white in decay. It does not adhere to paper in drying, and scarcely changes colour.

The var. β is membranaceous, of a beautiful rose colour, darker after having been dried, and frequently having a roundish dark red spot, above a line broad in the disk of the frond, composed of a dense mass of vertical moniliform filaments (*nemathecia*, Ag.) which is at length deciduous, leaving a whitish scar behind. This variety grows in erect tufts, about two inches in height: the oblong leaf is about three lines wide and an inch long.

The capsules of this plant are exceedingly curious: they appear to be destitute of any external membrane, and to consist of a spongy substance composed of a thick mass of compound granules in radiating lines, while the centre is occupied by similar granules, only considerably larger, and in no arrangement. In the young state, the external portion seems to be composed of jointed filaments, but in a ripe capsule their real nature is sufficiently perceptible. The granules of this part are roundish, but at the same time angular, and made up of three or four smaller ones, the whole connected together so as to form an interrupted filament. In its fructification, therefore, it is evident this plant differs from its congeners, as well as in its more decided red colour. At Sidmouth I had an opportunity of tracing the var. β from its usual simple form, until it became repeatedly proliferous, more cartilaginous in substance, and deeper in colour; in short, until it became identified with some states of *C. Brodiaei*.

Sprengel has somewhat boldly annihilated the species in his edition of the Species Plantarum.

GENUS XXXVI. PHYLLOPHORA, Grev. Tab. XV.

GEN. CHAR. Frond cartilaginous or membranaceous, of a purple rose-red colour, plane, proliferous from the disk, furnished with a more or less imperfect or obscure midrib. Fructification: 1. Capsules, containing a mass of minute roundish free seeds: 2. Sori of simple granules in little foliaceous processes. (In two species *nemathecia* have been observed, but no granules.)

OBS. The plants which constitute this genus are arranged by Professor Agardh, in a distinct section among the *Sphærococci*. By Lamouroux three were described as *Delesseria*. Two of them, *P. vittatus* and *pristoides*, have a distinctly twofold fructification; in two others, *P. nervosus* and *rubens*, granules have not been discovered, but in place of them we find *nemathecia* at the base of little foliaceous processes situated on the disk of the frond; and in the two remaining species,—doubtful ones—*P. seminervis* and *lactuca*, no fructification whatever has been observed: the form of the frond is mostly oblong or linear, more or less attenuated at the base, sometimes provided with a short stem, furnished with a midrib obscurely developed, and generally disappearing at a short distance from the base, but in all cases before reaching the summit. Except in *P. lactuca* and *seminervis* (species little understood), the frond is proliferous from the disk. The root is scutate, sometimes partially fibrous. The colour is quite a different kind of red from that of the preceding genus, being destitute of the dull livid hue so common among the *Chondri*.

The generic name is derived from two Greek words, and signifies leaf-bearing, in allusion to the proliferous character of the frond.

1. PHYLLOPHORA RUBENS. Tab. XV.

Stem very short expanding into a linear-wedge-shaped frond, obscurely ribbed and repeatedly branched with proliferous shoots resem-

bling the primary frond, fructification, hemispherical sessile very rugose capsules on the disk of the frond.

Sphaerococcus rubens, Ag. Sp. Alg. v. 1. p. 237. Syst. Alg. p. 213. Grev. Fl. Edin. p. 296.

Spreng. Sp. Pl. v. 4. p. 335.

Chondrus rubens, Lyngb. Hydroph. Dan. p. 18.

Delesseria rubens, Lamour. Essai, p. 38.

Fucus rubens, Linn. Sp. Pl. v. 2. p. 1630. Turn. Syn. Fuc. p. 216. Hist. Fuc. t. 12.

Sm. Eng. Bot. t. 1053.

Fucus prolifer, Lightf. Fl. Scot. p. 949. t. 30.

Fucus crispus, Huds. Fl. Ang. p. 580.

HAB. On stones and rocks in the sea. Perennial. Winter. Common on the English coast. On the western coast of Scotland, *Light-foot*. Very rare on the eastern coast. Orkney, *Rev. C. Clouston*. Plentiful in Belfast Lough, *Dr Drummond*.

Root a hard flattened disk. *Fronde*s tufted, three to seven inches long; *stem* a few lines only in length, cylindrical, expanding gradually into a frond, about an inch and a half long, two to four lines wide, wedge-shaped or linear-wedge-shaped, entire or forked, obtuse or acute at the apex, flat, and furnished with a very obscure midrib. Towards the end of this primary frond arise one or more others from the plane surface, similar in form, and in this manner several series of proliferous branches are produced. *Fructification*: 1. capsules about the size of poppy-seed, sessile, hemispherical, much wrinkled and crisped, containing a small mass of very minute ovate seeds: 2. minute roundish subpeltate leaflets on distinct plants, their little stalk, and part of their inferior surface incrassated with a blackish-red mass of dense parallel moniliform filaments (*nemathecia*, Ag.). *Substance* thin, between membranaceous and cartilaginous, rather rigid, semitransparent, not in the least gelatinous. *Colour* a fine, but dull opaque red, in the young shoots pink. In drying it becomes darker, and does not adhere in the least degree to paper.

There is no British plant with which it is possible to confound this species, the proliferous manner of growth being uniformly present, except in very young plants. The only variation of any importance that occurs is in the shape of the frond, which is sometimes linear, sometimes wedge-shaped: both forms are often present, even in the same individual. In one specimen, communicated by my friend *Dr Drummond*, from the Irish coast, the proliferous frondlets are all linear, and about two inches in length. The *nemathecia* are very beautiful under the microscope, attenuated at each extremity, and apparently composed of a double parallel series of red spherical granules, connected by a colourless filament.

According to the Linnean Herbarium, it would appear that Linnæus, by *Fucus rubens*, intended the present plant; but I entirely coincide with Mr Dawson Turner, that Linnæus, in his description, seems to have associated more than one species.

GENUS XXXVII. SPHÆROCOCCUS, *Stackh.* Tab. XV.

GEN. CHAR. Frond cartilaginous, compressed, two-edged, linear, distichously branched. Fructification, mucronate capsules containing a mass of ovate shortly pedicellate red seeds.

OBS. Two species probably constitute this genus: *Fucus coronopifolius* of Goodenough and Woodward, and *F. crinitus* of Gmelin, both arranged by Agardh in one of the sections of *Sphærococcus*. My specimen of *F. crinitus* is too imperfect to allow me to speak with any certainty about it, but the two-edged stem and mucronate capsules, along with the habit of the plant, indicate a near affinity. Of *Fucus coronopifolius* of authors, I have perfect individuals in all states, and it is upon this species that I found my genus. The frond is not pinnated as in *Gelidium*, but rather alternately branched throughout, the smaller branches ciliated with the capsules and minute processes. In addition to the frond being two-edged, the branches, in *Sphærococcus coronopifolius* at least, if viewed with a moderate magnifier, are found to be obliquely and transversely striated; and, upon dissection, a kind of midrib and lateral veins are sufficiently evident, being composed of distinctly elongated cellules. The capsules themselves are not lodged in the substance of the frond as in *Gelidium*, but are distinct, and the seeds, instead of forming a mere globular mass, are supported upon very delicate pedicels.

Being averse to dismiss entirely the name of *Sphærococcus*, I have retained it for this place. It will be conceded, that, if the genera proposed by Lamouroux deserve to be sustained, his names must be received in right of their priority, unless manifestly objectionable. Under such circumstances, I have no alternative but to adopt *Sphærococcus* as a newly defined genus, devoting to it, however, two plants, admitted to be species by my friend Agardh himself.

I. SPHÆROCOCCUS CORONOPIFOLIUS. Tab. XV.

Fronde cartilaginosa much branched in a distichous and alternate manner compressed and two-edged below nearly flat upwards the branches acute at the apex, capsules spherical mucronate on little stalks fringing the smaller branches.

Sphaerococcus coronopifolius, Ag. Sp. Alg. v. 1. p. 291. Syst. Alg. p. 229. Spreng. Sp. Pl. v. 4. p. 337.

Gelidium coronopifolium, Lamour. Essai, p. 41.

Desmia Hornemanni, Lyngb. Hydroph. Dan. p. 35. t. 7.

Fucus coronopifolius, Gooden. and Wood. Linn. Trans. v. 3. p. 185. Turn. Syn. Fuc. p. 288. Hist. Fuc. t. 122. Sm. Eng. Bot. t. 1478, very bad. Lamour. Dissert. t. 33.

HAB. In the sea. Biennial. Autumn. All along the coast of Cornwall, *Stackhouse*. At Looe, Penzance, and elsewhere on the same coast, *Mr E. Forster junior*. Coast of Devonshire, *Goodenough*. Sidmouth and Torquay, *Mrs Griffiths*. Coast of Dorsetshire, *Pulteney*. Shores of the Isle of Portland, *Turner*. At Weymouth, *Mr E. Foster junior*, and the *Rev. J. M. Berkeley*. Shores of the Isle of Wight, *Miss E. Everett*. Near Belfast, *Mr Templeton*. Larne, near Belfast, *Dr Drummond*. Bantry Bay, *Miss Hutchins*. Isle of Bute, extremely rare.

Root an irregular roundish disk. Frond from six to eighteen inches long, very much branched, about two lines wide in the lower part, where it is also compressed and two-edged, becoming narrower and flatter upwards, and at length terminating in narrow, acute segments. Branches distichous, spreading in every direction, the principal ones given off near the base, and divided somewhat dichotomously, the smaller ones divided more regularly in an alternate pinnate manner, and fringed at the margin with numerous minute ciliæ and the fructification. Along the branches runs a faint narrow midrib, from which proceed obscure lateral parallel veins. Fructification, minute spherical capsules, supported on little slender stalks less than a line in length, obliquely mucronate, containing a mass of ovate pedicellate red seeds. Substance cartilaginous. Colour a fine scarlet, very dark in the primary branches, in the young shoots pink. In drying it adheres imperfectly to paper, and becomes horny in the thicker parts.

One of the most beautiful of the British *Algæ* when in its perfect state; but it is very often more or less mutilated by the action of the waves, before it comes into the hands of the botanist. Mr Turner's figure is exceedingly characteristic, but is from a partly injured speci-

men, and the curious structure is overlooked in the magnified portions. The representation in "English Botany" is bad in the extreme, but the obscure venation is there mentioned as having been first observed by Mr J. Sowerby. In common with most authors I have described the capsules as pedicellate. Strictly speaking, however, they are sessile, and the little stalk is nothing more than one of the minute ramuli or marginal ciliæ, the extremity of which forms the mucro or little point beyond the capsule: in fact, the capsules are sometimes found sessile at the margin of the branches. Mr Turner is just in his remark, that this plant bears a considerable affinity with *Plocamium coccineum*, both in colour and the disposition of the ramuli, which, at the ends of the branches, are secund. In regard to structure, the two are very different.

S. coronopifolius is unknown on the eastern coast of the Island. In Ireland it is frequent; but in Scotland, even on the western side, it is of very rare occurrence; indeed, I am not aware of its having been found, except by myself, on the shores of the Isle of Bute.

GENUS XXXVIII. GELIDIUM, *Lamour.* Tab. XV.

GEN. CHAR. Frond between cartilaginous and horny, compressed, linear, more or less regularly pinnated. Fruetification: 1. capsules imbedded in the substance of the ramuli, containing a mass of minute roundish seeds: 2. ternate or otherwise compound granules in the ramuli, on distinct individuals.

OBS. A genus established by Lamouroux in his *Essai*, and named by him *Gelidium*, because, in the majority of the species, the frond is almost entirely reducible to a gelatinous substance, by boiling or maceration. It appears to me to be a very natural one, and though merged in *Sphærococcus* by Agardh, is retained by Messrs Gaillon and Bory de St Vincent. The root is generally accompanied by creeping fibres; the frond elegantly pinnated, but liable to great variation: the colour a fine red, but in some species changeable and evanescent, so that on the same individual there is often a variety of shades: in decay the

whole plant becomes white. The capsules are usually placed at the ends of the ramuli, which they render turgid.

The inhabitants of many countries bordering the Indian Ocean, make use of *algæ* belonging to this genus, to render more palatable their hot and biting condiments, and from some species are constructed the celebrated edible swallow's nests of the Chinese.

Two species referred by Algologists to this group, *Fucus coronopifolius* of Linnæus, and *F. crinitis* of Gmelin, I have separated, as they differ in many respects very materially.

1. GELIDIUM CARTILAGINEUM.

Fronde several times pinnated the pinnæ horizontal alternate, capsules elliptical mucronate terminating the smaller pinnulæ.

Gelidium concatenatum, Lamour. Essai, p. 41.

Gelidium versicolor, Lamour. Essai, p. 41.

Sphaerococcus cartilagineus, Ag. Sp. Alg. v. 1. p. 286. Syst. Alg. p. 227. Spreng. Sp. Pl. v. 4. p. 338.

Fucus cartilagineus, Linn. Sp. Pl. v. 2. p. 30. Turn. Syn. Fuc. p. 284. Hist. Fuc. t. 194. Sm. Eng. Bot. t. 1477.

HAB. On rocks in the sea. Perennial. Fresh water Bay in the Isle of Wight, *Dr Withering*.

Root composed of a mass of creeping fibres. *Fronde* numerous, linear, compressed, eight to twenty inches in height, rising with a stem, which is usually naked for two or three inches, and then either continued simple, or divided into two or more branches, pinnated alternately, and at short intervals: *pinnæ* nearly horizontal, very unequal in length, some scarcely one inch, others several inches long, resembling the stem, scarcely a line broad, set with *pinnulæ* scarcely an inch in length, which, in their turn, produce a third, and even fourth series, each narrower and smaller than the preceding one, the last scarcely a line long, and not a line apart, all terminating obtusely. *Fructification*: 1. ovate-elliptical capsules, or rather, spherical capsules imbedded in the ultimate ramuli, and rendering them turgid and elliptical, and containing a mass of free minute ovate seeds: 2. compound granules surrounded with a pellucid border, and imbedded in the ultimate ramuli on distinct individuals. *Substance* cartilaginous, thick and tough. *Colour* a fine red, soon changing on exposure to the air, and passing through purple, orange, yellow, and "light green," to white.

It is exceedingly doubtful whether this fine species really vegetates upon our coast. I am not aware of its having been obtained by any

person except Dr Withering, and he does not inform us whether it was found growing or cast on shore. That it was the true plant there can be no question, as Mr Dawson Turner saw the specimens communicated by Dr Withering to Mr Woodward. There is at the same time every reason to conclude, in the absence of positive evidence, that it is only wafted from warmer regions, a supposition which its excessive rarity contributes to support. Bishop Gunner was certainly deceived if he imagined the coast of Finmark was a station for it; the *alga* might easily have been washed ashore along with the cocoa-nuts and other exotic productions, which occasionally reach the western coasts of Ireland, Scotland, and Norway. It is singular that Mr Dawson Turner, who admitted it as an unquestionable native in his *Synopsis Fucorum*, should omit the British station in his *Historia Fucorum*, and by some oversight fail to allude to it in any way as a British plant. Upon the whole, I consider its claim to be admitted into this work no stronger than that of *Sargassum vulgare* and *bacciferum*.

The mode of growth, and the colours of this species are so beautiful, that it is often brought, under various ornamental forms, from the Cape of Good Hope, where it occurs in greater abundance than in any other part of the world.

2. GELIDIUM CORNEUM. Tab. XV.

FronD between cartilaginous and corneous plane-compressed distichously branched, branches pinnate or bipinnate, pinnæ spreading or horizontal obtuse, capsules spherical immersed in the extremities of the ramuli.

Gelidium corneum, Lamour. Essai, p. 41.

Sphaerococcus corneus, Ag. Sp. Alg. v. 1. p. 279. Syst. Alg. p. 225. Greav. Fl. Edin. p. 296. Spreng. Sp. Pl. v. 4. p. 337.

Fucus corneus, Huds. Fl. Angl. p. 585. Stackh. Ner. Brit. p. 61. t. 12. Turn. Syn. Fuc. p. 272. Hist. Fuc. t. 257. Sm. Eng. Bot. t. 1970.

HAB. On rocks in the sea, generally at the margin of the pools and cavities left by the tide, but always filled with water. Perennial. Summer. On most of the rocky coasts of Great Britain and Ireland.

Root scutate, but always accompanied with creeping fibres. **FronDs** much tufted, of a firm *substance*, varying from cartilaginous to horny; and, in regard to *colour*, from a deep blackish purple to fine deep red, pink, and even pinkish amber colour. **Fructification**; 1. spherical

capsules immersed in the substance of the extremity of the ramuli, containing a mass of minute ovate or oblong seeds, apparently mixed with some filaments; 2. *ternate granules* imbedded in the ramuli, in distinct individuals. The common, or, if we may make use of the expression, the proper form of the plant, is that indicated in the specific character: the height of the frond is two or three inches, its width about half a line in the main stem: it is between compressed and plane, rising with a simple or divided *stem*, the *branches* sometimes naked below, but often pinnated along their whole length at intervals of about a line: *pinnæ* either horizontal or spreading, narrower than the branches, varying in length on the same specimen from a few lines to two inches, attenuated at their base, obtuse at the apex, bearing one or two series of *pinnulæ*, similar to the *pinnæ*, except in being shorter and finer, and, like them, decreasing in length as they approach the summit.

The varieties of this species are almost endless, and some of them so singular, that, without practical knowledge to guide us in our investigation, they might be taken for very distinct species.

Var. β *sesquipedalis*; frond long between compressed and flat linear tripinnate *pinnæ* attenuated at their base, ramuli linear oblong short obtuse.

Fucus cornuus, var. *sesquipedalis*, Turn. Hist. Fuc. t. 257. f. f.

HAB. In a deep rocky pool below Peakhead, near Sidmouth.

Frond four to eight inches high, pinnated from near the base; the ultimate ramuli much attenuated at their insertion, one or two lines long, rounded at the apex, often contracted so as to appear proli-ferous.

Var. γ *pinnatum*; frond narrow tripinnate, the *pinnæ* patent nearly linear bluntish, Turn.

Fucus pinnatus, Huds. Fl. Angl. p. 586.

Fucus hypnoides, Desf. Fl. Atl. v. 2. p. 426.

HAB. Coasts of Cornwall, Devonshire, and Sussex, everywhere, and at Scarborough, Hudson. Exmouth, Goodenough. Isle of Bute.

Frond two to six inches high, narrow, cartilaginous rather than horny, the *branches* narrow, the *pinnæ* nearly linear or slightly dilated upwards with an elliptical apex.

Var. δ *uniforme*; all the pinnæ patent, attenuated at the base, obtuse at the points and scattered.

Fucus corneus, var. *uniformis*, Turn. Hist. Fuc. v. 4. p. 146.

HAB. Ilfracombe, Goodenough.

This variety has not come under my own observation.

Var. ϵ *capillaceum*; frond narrow, pinnæ clustered towards its summits, nearly setaceous and somewhat erect. Turn.

Fucus capillaceus, Gmel. Hist. Fuc. p. 146. t. 15. f. 1.

HAB. King's Cove, Cornwall, Turner. Rocks at the base of Peak-head, near Sidmouth.

In my specimens the frond is six inches high, the greater part of the stem naked, and the pinnæ given off at the top, almost in the form of an umbel.

Var. ζ *latifolium*; frond broad nearly flat, pinnæ linear-lanceolate mostly simple set with numerous short setaceous pinnulæ.

HAB. Trevone Bay, Cornwall, and Waldon rocks, Torbay, Mrs Griffiths. Sidmouth and Torquay.

A very beautiful variety, that I do not find clearly indicated by Turner or Agardh. Frond two to three inches long, simple or slightly branched, one to near two lines broad; pinnæ linear lanceolate, a line broad in the widest part, attenuated at the extremity, and either obtuse or lengthened out into a setaceous point; pinnulæ very numerous, setaceous, two or three lines long, nearly horizontal, simple or bearing a few minute ramuli. Fructification is very common on this variety, the capsules swelling the ends of the pinnulæ, or often rising at once from the pinnæ, intermixed with the pinnulæ, and supported upon a minute peduncle. This plant comes nearest to Fig. *b.* in Mr Turner's Plate.

Var. η *confertum*; frond compressed repeatedly pinnated, pinnæ and pinnulæ long very thin acute and irregularly divided.

Fucus corneus, var. *confertus*, Turn. Hist. Fuc. v. 4. p. 146.

HAB. Paignton, Devonshire, Mrs Griffiths. Black Rocks, near Bamborough. Isle of Bute.

Frond entangled, two or three inches high, of a yellowish red or amber colour, so slender as to be sometimes almost capillary.

Var. θ *aculeatum*; frond compressed very thin pinnated very irregularly, pinnæ divaricated irregularly divided and set with minute

divaricate subulate ramuli crowded towards the summit of the frond.

HAB. Mount's Bay, Cornwall, *Mrs Griffiths*.

*Fron*d one to two inches high, branched, the length of the *pinnæ* and *pinnulæ* exceedingly irregular, and often forming a kind of tuft at the summit of the frond: the ramuli minute, divaricated, acute and spinose.

Var. ι *abnorme*; frond compressed irregularly branched, branches and *pinnæ* producing at their extremities little tufts of partly deflexed ramuli.

Fucus corneus, var. *abnormis*, Turn. Hist. Fuc. t. 257. f. r.

HAB. North of Cornwall, *Mrs Griffiths*.

*Fron*d about two inches high, and scarcely half a line broad. The little tufts which terminate the *pinnæ* are composed of somewhat obtuse ramuli, one or two lines in length, and have very much the appearance of proliferous shoots as they sprout forth after an injury.

Var. κ *pulchellum*; frond capillary compressed tripinnate, *pinnæ* between linear and clavate obtuse. *Turn*.

Fucus corneus, var. *pulchellus*, Turn. Hist. Fuc. t. 257. f. p.

HAB. Bantry Bay, *Miss Hutchins*.

This variety I have never seen.

Var. λ *clavifer*; frond subcylindrical capillary irregularly divided, the ultimate ramuli or *pinnulæ* obovate edged with minute scattered teeth.

Fucus corneus, var. *clavifer*, Turn. Hist. Fuc. t. 257, f. q.

HAB. Bantry Bay, *Miss Hutchins*.

This variety also has never come under my observation: judging of it from Mr Turner's figure, it appears to be rather an accidental state of the species than a distinct variety.

Var. μ *clavatum*; frond capillary, between cartilaginous and membranaceous decumbent creeping, ramuli in the form of inverse-ly lanceolate or ovate leaves much attenuated at their insertion.

Sphaerococcus corneus var. *clavatus*, Ag. Sp. Alg. v. 1. p. 284. Syst. Alg. p. 227.

Gelidium clavatum, Lamour. Essai, p. 41.

Gelidium intricatum, Lamour. Essai, p. 41, according to Agardh.

Fucus clavatus, Lamour. Dissert. p. 22, t. 22, f. 1, 2.

Chondria pusilla, Hook. Fl. Scot. Pt. 2. p. 106. Grev. Crypt. Fl. t. 79.
Fucus pusillus, Stackh. Ner. Brit. p. 16. t. 6. Turn. Hist. Fuc. t. 108.
Fucus cœspitosus, Stackh. Ner. Brit. p. 59, t. 12.

HAB. Sidmouth, and at St Michael's Mount, *Stackhouse*. At Brighton, and elsewhere on the Sussex coast, *Mr Borrer*. Rocks opposite Caroline Park in the Frith of Forth, *Dr Richardson*.

Fronde matted, creeping, half an inch to an inch in length, irregularly and loosely branched, capillary, compressed, dilated here and there, and bearing scattered leaf-like ramuli one or two lines in length, rounded at the end.

I have never seen capsules on this variety, but ternate granules are not unfrequently imbedded in the flattish leaf-like ramuli. It is very abundant on the range of sandstone rocks running out into the sea, opposite Sidmouth, where Mr Stackhouse first found it. *Gelidium intricatum* is the *Fucus intricatus* of Professor Mertens' MSS., and is quoted by Agardh on the authority of specimens.

Var. *crinalis*; frond setaceous subcylindrical somewhat dichotomously branched, sometimes three-forked at the top, and bearing a few elliptical-oblong ramuli attenuated at their insertion.

Sphaerococcus corneus var. *crinalis*, Ag. Sp. Alg. v. 1. p. 285. Syst. Alg. p. 227.
Fucus crinalis, Turn. Hist. Fuc. t. 198.

HAB. On the coast of Norfolk, *Turner*. Sidmouth, *Mrs Griffiths*. Near Ilfracombe, *Mr Hare*. Kilmouth, in Cornwall, *Mr Rashleigh*. At Brighton, on the flat chalk-rocks about low-water-mark, *Mr Borrer*. Belfast Lough, *Mr Templeton*.

Fronde one to three inches high, growing in a matted half-creeping manner upon the rocks, capillary or setaceous, variously branched, generally of a blackish or dark purple red colour. The small leaf-like ramuli, which occur towards the summit, frequently contain ternate granules, but I have failed in my endeavours to discover capsules. In the *Historia Fucorum*, the plant, as distinguished by a trifid apex, is said, on the authority of Professor Mertens, to grow on the west coast of France. It is also frequent on the coast of Devonshire. This and the preceding variety pass insensibly into each other; and Agardh has acted correctly in uniting both with *Gelidium corneum*.

GENUS XXXIX. GIGARTINA, *Lamour*. Tab. XVI.

GEN. CHAR. Frond horny or cartilaginous, filiform, cylindrical, irregularly branched. Fructification uniform: spherical sessile capsules containing a globose mass of seeds.

Obs. The most imperfect of all the genera proposed by Lamouroux was that denominated by him *Gigartina*, a name derived from a Greek word signifying a grape-stone, or, according to his view, the grape itself, because the capsules were mostly semitransparent. The species to which I propose to limit it are comparatively few, and mostly contained in the seventh section of the genus *Sphaerococcus*, as it stands in the Agardhian System. They are conspicuous for their filiform, tufted, and generally rigid mode of growth, a purple red colour often approaching to black. The fructification, as far as it is known, is composed of sessile spherical capsules, containing a mass of ovate or roundish free seeds, imbedded in gelatine. In *G. plicata*, *Griffithsia*, *congesta*, *spinella*, *ustulata* (a doubtful species), *divergens*, and *subulata*, capsules have not been observed. *Fucus helminthochorton* of La Fourette, I am compelled to allow to remain among the *Gigartina* for the present, as the fructification, scarcely ever seen, does not exist in my specimens. The structure of the frond, however, is very peculiar, being exceedingly lax and cellular, with a consistence similar to that of the stems and leaf-stalks of some aquatic herbaceous phænogamous plants, and having the appearance of articulations which do not actually exist. I consider this *Alga, sui generis*. Nemathecia are found on *Gigartina plicata* and *Griffithsia*, and have been described by authors as wart-like fructification.

1. GIGARTINA PISTILLATA.

Frond cartilaginous filiform subcylindrical or compressed subdichotomous the branches set somewhat distichously with short subulate horizontal ramuli, capsules near the apex of the ramuli.

Gigartina pistillata, Lamour. Essai, p. 49. Gall. Dict. Sc. Nat. v. 53. p. 365.

Fucus pistillatus, Gmel. Hist. Fuc. p. 159. t. 18, f. 1. Lamour. Dissert. p. 51. t. 27.

Fucus gigartinus, Linn. Syst. Nat. v. 2. p. 719. Gooden. and Woodw. in Linn. Trans. v. 3. p. 183. t. 17, f. 3, 4. bad. Sm. Eng. Bot. t. 908. Turn. Syn. Fuc. p. 280. Hist. Fuc. t. 28. excellent.

HAB. In the sea. Perennial. Spring. Very rare. Coast of Cornwall, *Dr Wenman*. Mounts-Bay, near Newlyn, *Dr Macculloch*. Rocks near Padstow, *Miss Hill*.

Root a flat disk. *Fronds* tufted, three to six inches in length, generally more or less compressed, but sometimes almost cylindrical, filiform, one or two lines in diameter, branched a few times in an irregularly dichotomous manner, naked below, but producing on the upper parts numerous subulate ramuli, two lines to half an inch long, arising horizontally in a somewhat distichous arrangement. *Capsules* sessile, as large as turnip-seed, solitary, or two or three together, lateral on the subulate ramuli, rarely terminal; composed of a cellular transparent coat, and a dark red internal mass, formed by a number of little distinct ovate parcels of angular seeds. *Substance* cartilaginous, hard and horny when dry. *Colour* a dull bluish purple. It does not adhere to paper.

One of the rarest of the British species, and confined to the shores of Cornwall. The station of St Ives, however, recorded by Goodenough and Woodward in the Transactions of the Linnean Society, is erroneous, as we are informed by Sir J. E. Smith, in English Botany. Læfing gathered the plant at St Ubes, in Portugal, and communicated specimens to Linnæus, in whose Herbarium St Ives was read by mistake for St Ubes. The fructification is curious, and in the seeds being collected into distinct parcels, differs from all the other FLORIDÆ I am acquainted with.

2. GIGARTINA ACICULARIS. Tab. XVI.

Fronde cartilaginosa cylindrica filiformi subdichotoma, ramuli horizontali elongati acuminati, capsulae sphaericae sessiles dispersae.

Gigartina acicularis, Lamour. Essai, p. 49. Gall. Dict. Sc. Nat. v. 83. p. 365.

Sphaerococcus acicularis, Ag. Sp. Alg. v. 1. p. 322. Syst. Alg. p. 237.

Fucus acicularis, Wulfen. Crypt. Aquat. No. 50. Turn. Hist. Fuc. t. 126. Sm. Eng. Bot. t. 2190.

HAB. On rocks in the sea. Annual? Winter. Cornwall, very rare, Mr *W. Rashleigh*. Ilfracombe, Lupton Cove, and near Torquay, Mrs *Griffiths*. Sidmouth, Miss *Cutler*.

Root a minute disk. *Fronds* tufted, two to four inches in height, divided somewhat distichously into spreading branches of nearly equal length, so as to form a roundish general outline; branches cylindrical, about half a line in diameter, acuminate, either again divided dichotomously or irregularly, or pinnated with acute ramuli from a few lines

to an inch or more long, and these also sometimes bear minute scattered spines: not unfrequently the ramuli are partly secund, and, as well as the branches, curved inward at the apex, especially in the barren state. *Fructification*, spherical sessile capsules about half the size of turnip-seed, scattered upon the ramuli, containing a mass of minute ovate or oblong seeds. *Substance* cartilaginous. *Colour* dull purple-red. In drying it becomes darker, and adheres very imperfectly to paper.

In the *Historia Fucorum* and "English Botany" this species was figured from British, but sterile specimens; and the plant was so rare, that a doubt is expressed in the former work, whether it ought to be regarded as really a native of our shores. Under such circumstances, it is with great pleasure that I find myself enabled to describe it from individuals, found growing in several parts of Devonshire: and to add that fructification was detected in the most perfect state, near Torquay in January 1829, by the indefatigable Mrs Griffiths. The species is variable in its habit of growth: the sterile fronds communicated to me from Sidmouth by Miss Cutler and Mrs Griffiths, are robust, compared with the fertile ones, less, and more simply branched, of a paler colour, the branches with a tendency to throw out radicles or attachments, and to extend themselves by creeping. The extremities are also often more or less involute. In the Ilfracombe specimens, the frond is only once or twice divided, and the upper part of the stem and branches more or less closely pinnated with subulate horizontal ramuli, one or two lines in length. The structure of the frond consists of a beautiful cellular tissue, most lax in the centre, and apparently almost filamentous when removed, as represented in Mr Dawson Turner's figure: strictly speaking, however, this appearance is a deception, and arises from the lax nature and elongated form of the cellules.

G. acicularis is most nearly related to the preceding species, and in the capsule (the outer substance of which is transparent) the seeds have a disposition to form themselves into groups; at least, they are not equally distributed in the space they occupy.

3. GIGARTINA GRIFFITHSIÆ.

Frond between horny and cartilaginous cylindrical filiform dichotomous fastigiate, fructification in the form of oblong warts (nemathecia) surrounding the stem.

Sphærococcus Griffithsiæ, Ag. Sp. Alg. v. 1, p. 316. Syst. Alg. p. 235. Spreng. Sp. Pl. v. 4. p. 339.

Polyides Griffithsiæ, Gall. Dict. Sc. Nat. v. 53. p. 365.

Fucus Griffithsiæ, Turn. Hist. Fuc. t. 37. Sm. Eng. Bot. t. 1926.

HAB. On rocks in the sea. Perennial. Autumn and winter. On the rocks opposite Sidmouth, in a little channel formed by sea-water, as it runs off during ebb-tide: also at Paignton rocks, and Tor-Abbey rocks, *Mrs Griffiths*. Exmouth, *Miss Filmore*, *Rev. J. Jervis*. Balbrigen, near Dublin, *Dr Scott*.

Root minutely scutate. Fronds tufted, entangled, one to three inches high, cylindrical, filiform, about as thick as a hog's bristle, many times divided in a dichotomous manner, the branches divaricated at their axils, mostly of equal height and fastigiate, the apices rather obtuse, sometimes compressed or flattened, and occasionally reflexed. Fructification unknown, except in the form of *nemathecia*, producing oblong warts, which creep, as it were, round the stem and branches, composed of beautiful, parallel, articulated, moniliform filaments, attenuated at each extremity. Substance cartilaginous, or slightly horny, tough and flexible. Colour dark, bluish or blackish purple. In drying it becomes still darker, and does not adhere to paper.

Ignorant as we are of the perfect fructification of this plant, I conceive that sufficient characters remain to distinguish it from all other species; and therefore dissent from my friend and correspondent, Professor Agardh, who considers it as a state of *Gigartina acicularis*.* In regard to *Fucus ustulatus* of Mertens' MSS., which he also believes to be a variety of *G. acicularis*, he is probably correct, as Mr Dawson Turner is of the same opinion. It would also seem that some of these plants are not generally perfectly understood on the Continent, as a specimen communicated to me by Agardh, from Italy, under the name of *Sphærococcus acicularis*, is certainly one of the endless varieties of *Gelidium corneum*. At the same time, the specimens of *Gigartina Griffithsiæ*, which he gathered at Venice, and had the kindness to send me, are the true plant.

* Aufzählung einiger in den österreichischen Ländern gefundenen neuen Gattungen und Arten von Algen, nebst ihrer Diagnostik und beigefügten Bemerkungen von C. A. Agardh.

M. Gaillon has arranged this species under the genus *Polyides*; but the *nemathecia* have no real affinity with the peculiar fructification of *Polyides lumbricalis*, which contains tubercles of distinct seeds. The *nemathecia* of *Gigartina Griffithsiæ* appear to divide at the articulations, commencing at the apex, as Agardh observes, and joint by joint to separate into oval red seeds or granules.

Mrs Griffiths is the discoverer of this *Alga*, and her name was deservedly bestowed upon it by Mr Dawson Turner.

4. GIGARTINA PLICATA.

Fronde horny rigid cylindrical filiform equal entangled, the branches numerous horizontal mostly secund, warts (*nemathecia*) oblong embracing the stem.

Gigartina plicata, Lamour. Essai, p. 48. Lyngb. Hydroph. Dan. p. 42. Grev. Fl. Edin. p. 266.

Sphaerococcus plicatus, Ag. Sp. Alg. v. 1. p. 313. Syst. Alg. p. 234. Spreng. Sp. Pl. v. 4. p. 339.

Fucus plicatus, Huds. Fl. Ang. p. 589. Stackh. Ner. Brit. p. 23. t. 7. Turn. Syn. Fuc. p. 323. Hist. Fuc. t. 180. Sm. Eng. Bot. t. 1069.

Scytoesthion Hippuroidea. Lyngb. Hydroph. Dan. p. 63. t. 14.

HAB. On rocks in the sea. Perennial. Very common.

Root a small disk. *Fronde* numerous, tufted, wiry and entangled, three to ten inches long, about as thick as a hog's bristle, cylindrical, equal in thickness or nearly so from the base to the apex, branched dichotomously or irregularly, the whole set with horizontal ramuli of various lengths, scattered or crowded, mostly pointing in one direction, but sometimes to every side, obtuse at the apex. Occasionally the ramuli bear a series of still smaller ones, also generally secund. *Fructification* unknown, except in the form of *nemathecia*, which produce small, elliptical or oblong, dark coloured warts, embracing the frond, and composed entirely of parallel obscurely articulated filaments. *Substance* horny, rigid and wiry. *Colour* blackish purple, changing, as it undergoes decay, to reddish brown, yellow, and at length to white. In drying it does not adhere to paper.

In addition to the warts composed of the articulated filaments (*nemathecia*, Ag.), others are very common, of a roundish form, some very minute, others larger and resembling the base of a broken branch: these have no connection with fructification, as far as may be ascertained from their structure, in which they do not differ from the rest of the frond. The plant is liable to vary in its mode and degree of

branching; the summit is generally crowded with ramuli, but in some larger varieties the branches are elongated for two or three inches in a simple form. The whole is so entangled, so tough and wiry, that there is little chance of its being mistaken for any other species.

GENUS XL. GRATELOUPIA, Ag. Tab. XVI.

GEN. CHAR. Frond cartilagino-membranaceous, plane, sometimes pinnated with branchlets, or fringed with foliaceous processes. Fructification: minute aggregated tubercles furnished with a pore, and containing a mass of free elliptical or roundish seeds.

OBS. Of this genus I can say little from my own experience. It is named by Agardh in honour of Dr Grateloup, a French naturalist, who has paid particular attention to the *Algæ*. It includes but few species. The *Fucus ornatus* of Linnæus (*erinaceus*, Turner), and *Grateloupia hystrix*, first described by Agardh, belong to it. The root is scutate. The nature of the fructification is well detailed in Plate xxvi. of Mr Dawson Turner's work; and the opinion of that gentleman is strongly corroborative of the propriety of what Agardh has done. He observes, in his description of his *Fucus erinaceus*, "that it has in external appearance no affinity to that of the globuliferous Fuci, and seems rather to approach to that of the *Fuci proprii*, from which the plant itself is in substance and habit as widely removed as possible." The fructification is also equally peculiar. The two exotic species mentioned above are natives of the Cape of Good Hope.

1. GRATELOUPIA FILICINA. Tab. XVI.

Frond linear attenuated simple or divided irregularly pinnated with ramuli attenuated at each extremity.

Grateloupia filicina, Ag. Sp. Alg. v. 1. p. 224. Syst. Alg. p. 241. Spreng. Sp. Pl. v. 4. p. 334.

Delesseria filicina, Lamour. Essai, p. 38.

Fucus filicinus, Wulf. in Jacq. Coll. v. 3. p. 157. t. 15. f. 2. Turn. Hist. Fuc. t. 150.

HAB. On rocks and different submarine substances. Perennial? Producing fructification in the autumnal months. Sidmouth and Ilfracombe, *Miss Cutler*.

Root scutate. *Fronds* somewhat tufted, two to six inches high, pinnate or bipinnate, the main stem linear, attenuated, mostly less than a line wide, flexuose, and unequal in breadth in different parts, set irregularly with nearly horizontal pinnæ, of various lengths, from two lines to two inches, sometimes crowded, sometimes remote, attenuated at each extremity, towards their apex mostly naked, but at their lower part often bearing a smaller series of a similar description, and equally irregular. *Fructification*, consisting of clusters of very minute tubercles in the substance of the pinnæ or pinnulæ, furnished with a pore, and scarcely at all prominent. *Seeds* very minute, elliptical-ovate. *Substance* between cartilaginous and membranaceous, somewhat lubricous. *Colour* pinkish or purplish red, turning greenish, and at length white in decay. In drying it adheres slightly to paper, and becomes rather firm and corneous.

This recent and highly interesting addition to the botany of this country we owe to the activity of Miss Cutler of Sidmouth, from whom I have had the pleasure of receiving specimens in perfect fructification. As she has found it on both coasts of Devonshire, it is probably not very unfrequent in the south-west of England, and may have been passed over for *Gelidium corneum*, which it resembles more than any other British *Alga*. The Devonshire specimens are much smaller than those I have from the coast of France and the Mediterranean, and less uniformly pinnated: some of them, indeed, are composed only of a mere flexuose stem, and three or four simple elongated branches. Others, again, are very closely pinnated for a limited space, the pinnæ not being more than three or four lines in length.

The plate given by Mr Dawson Turner of this species will be of little assistance to the British botanist; for, though it be undoubtedly correct, it represents an unusual state of the plant; at least, one that I have never seen, and which is very unlike the British specimens.

GENUS XLI. CHÆTOSPORA, *Ag.* Tab. XVI.

GEN. CHAR. Frond subgelatinous, filiform, branched, rose-colour, ultimate ramuli setaceous, swelling into lanceolate receptacles, composed of naked, branched filaments

radiating from an axis, in the centre of which is situate the obscure fructification: (minute seeds or capsules).

Obs. This highly curious genus is placed by Professor Agardh among the CONFEROIDÆ; and it must be acknowledged there is something very paradoxical in its appearance. I cannot, however, perceive the least trace of any interruption of continuity in the stem or branches, and am therefore induced to transfer it to the FLORIDÆ. The structure of the stem is cellular, the cellules large in the centre, and gradually smaller towards the circumference. In regard to the fructification, I have in vain attempted to obtain a satisfactory analysis. Mr Dawson Turner describes it as composed of extremely minute, oblong, dark red, sessile seeds.

It has been very justly remarked, that the nature of the ramuli seem to indicate some affinity with *Mesogloia*. The same observation, however, cannot be made of the stem and branches, whose structure is totally different. So few opportunities have occurred of studying the plant in a perfect state, that we are probably still ignorant of the real or fully developed fructification. The generic name is expressive of the seeds being accompanied or protected by filaments.

1. CHETOSPORA WIGGII, Tab. XVI.

Chetospora Wiggii, Ag. Syst. Alg. p. 146.

Fucus Wiggii, Turn. in Linn. Trans. v. 6. p. 135. t. 10. Syn. Fuc. p. 362. Hist. Fuc. t. 102. Sm. Eng. Bot. t. 1165.

Cladostephus Wiggii, Spreng. Sp. Pl. v. 4. p. 347.

HAB. In the sea. Annual. Summer. Yarmouth beach, *Mr Lilly Wigg*. Beach at Brighton, *Mr Borrer*. Folkstone, *Miss Everett*, Sidmouth, *Mrs Griffiths*. Bantry Bay, *Miss Hutchins*.

Root a minute disk. Frond three to eight inches long, cylindrical, filiform, the main stem nearly half a line in thickness, gradually attenuated to the extremity, simple, once or twice divided, beset with branches throughout its whole length: branches springing from all sides of the stem, from one to several inches in length, nearly horizontal, mostly undivided, two or three lines apart, bearing a second and shorter series, and sometimes even a third. All the branches are more or less beset with little ramuli from one to three lines in length, simple or forked, and as fine as a hair. Fructification, very imperfectly understood. A number of little ramuli swell into a lanceo-

late form, and are composed of dichotomously branched, jointed, obtuse, crowded filaments, radiating at a right angle from a longitudinal axis running through the whole ramulus, the surface of which is formed by the naked apices of the filaments. A pink line marks the axis, and in the widest part swells into an elliptical dark mass, apparently the immediate seat of the fructification; but whether seeds or capsules actually exist there, I have not been able to satisfy myself, still less their form or nature. *Substance* tender and somewhat gelatinous. *Colour* a lively rose-pink. In drying it becomes darker and less brilliant, shrinks considerably, and adheres closely to paper.

From its delicate nature, this elegant sea-weed is extremely liable to injury, and most of the specimens that the botanist is fortunate enough to find are generally mutilated. When deprived of its ramuli, and battered by the waves, it has a close resemblance to *Ceramium rubrum*. It occurs extremely rarely on the coast of Normandy, from whence a specimen has been kindly presented to me by M. Chauvin.

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GENUS XLII. PTILOTA, Ag. Tab. XVI.

GEN. CHAR. Frond compressed or flat, pectinato-pinnate, of a red colour, between membranaceous and cartilaginous. Fructification minute, aggregated; capsules surrounded by an involucre.

OBS. This is one of the most beautiful, as well as the most natural genera of marine *Alga*. The four species of which it is composed are elegantly pinnated and feathered with numerous and regular branches, whence the name appropriated by Agardh. By Lamouroux it was included in his ill-defined genus *Plocamium*; he was probably, however, unacquainted with any of the species subsequently discovered, or he could not have failed to have been struck with the singularly natural characters exhibited by the fructification, as well as the habit, of the individuals—characters that impressed the excellent Turner at once with the conviction that they would at some future time be associated.

1. PTILOTA PLUMOSA. Tab. XVI.

FronD compressed filiform branched, branches several times closely pinnated, the pinnæ opposite, fructification terminating the ultimate pinnulæ.

Ptilota plumosa, Ag. Sp. Alg. v. 1. p. 385. Syst. Alg. p. 195. Lyngh. Mycoph. Dan. p. 38. Grev. Fl. Edin. p. 297. Spreng. Sp. Pl. v. 4. p. 344.

Plocamium plumosum, Lamour. Essai, p. 50.

Fucus plumosus, Linn. Syst. Nat. v. 2. p. 718. Huds. Fl. Angl. p. 567. Turn. Syn. Fuc. p. 296. Hist. Fuc. t. 60. Sm. Eng. Bot. t. 1308.

VAR. β *capillaris*, frond flaccid, very narrow, the pinnæ jointed, nearly cylindrical.

Fucus plumosus, var. *capillaris*, Turn. Hist. Fuc. t. 60. f. g-k.

Ptilota plumosa, var. *tenuissima*, Ag. Sp. Alg. v. 1. p. 386. Syn. Alg. p. 195.

HAB. In the sea. Perennial. Summer and autumn. Var. α frequent, especially in Scotland, almost always growing upon the stems of *Laminaria digitata*. Var. β always growing on the perpendicular sides of rocks. Not uncommon on the southern shores of England, Turner. At Torquay and Peakhead rocks, near Sidmouth. Lossiemouth, in the north of Scotland, Mr Bródie. Staffa. Isle of Bute. Frith of Forth.

Root a small disk. Fronds compressed, mostly somewhat tufted, three to twelve inches or more in length, irregularly branched; the main stem and branches from half a line to a line in width, attenuated towards the extremity: branches commencing near the base, few or numerous, simple or subdivided, distichous, varying greatly in length, the lower ones sometimes only a little shorter than the entire plant, all of them closely set with distichous horizontal pinnæ half a line or a line apart: these pinnæ are opposite, and vary so much in different specimens, that, while the width of the branches, including the pinnæ, in some cases is less than half an inch, in others it is two inches. The pinnæ are also set with two or three series of pinnulæ, each smaller and finer than the preceding one, and given off at shorter intervals. The general outline of the termination of the branches is elliptical. Fructification, two or three minute spherical capsules, with a pellucid border, surrounded by an involucre, and terminating some of the ultimate pinnulæ. Involucre composed of several linear incurved segments. Capsules containing three or four roundish seeds. Besides this kind of fructification, there is another which is sometimes found on distinct individuals, consisting simply of roundish seeds or granules, having a pellucid limbus, solitary or several clustered together, and

situate on any part of the ultimate pinnulæ, but never surrounded by an involucre. *Substance* cartilaginous. *Colour* a fine dark purplish red, sometimes pink in the young shoots, becoming brownish and greenish-white in decay.

In var. β , the fronds are tufted and aggregated, from two to six inches long, bushy, much branched, the main stem and branches very slender and nearly cylindrical, the pinnæ and pinnulæ crowded, short and capillary; the colour a black purplish-red; the substance flaccid and membranaceous. No fructification has been observed upon this variety, except the granules destitute of an involucre above described.

Both varieties are somewhat darker when dried. β adheres closely to paper, α imperfectly.

So opposite are the two extremes of this plant, that they have quite the aspect of distinct species; but Mr Dawson Turner's observation is equally correct—"That no *Fucus* whatever exhibits more regular gradations between the most narrow and delicate, and the broadest and most cartilaginous individuals." The most remarkable difference between the two varieties recorded, consists in the absence of the involucre fructification, and the extreme flaccidity of variety β . The latter character appears to be in some way or other connected with locality, for it is not observable in the narrowest and most delicate specimens growing on *Laminaria digitata*. Variety β has the aspect and texture of a delicate *Conferva*, and in its structure approaches the jointed *Algæ*.

The smaller branches, pinnæ and pinnulæ, are distinctly divided by pellucid dissepiments into nearly square joints. In variety α the same structure is only evident in the pinnulæ, and at the extremity of the branches. As a young pinna becomes elongated into a branch, smaller cellules are added to the margin of the simple series of larger ones of which it was at first composed; thus a kind of symmetrical net-work is formed, the whole consolidating, and becoming more and more obscure as the part advances in age and increases in thickness.

The finest specimens I have ever seen of this species, were communicated to me from the Orkney Islands, by the Reverend Mr Clouston. One of these now lying before me is intermediate between the broadest and narrowest varieties, a foot in length, and completely covers a large folio sheet of paper, many of the long branches lying over each other.

The clusters of granules above described, which were formerly supposed to occur only in variety β , I have found plentifully on the broadest forms of variety α ,

ORDER X.—GASTROCARPÆ.

Plants all marine, with a scutate root, of a pink, red, or purplish red colour, most of them not changing much on exposure to the atmosphere, of a carnose, gelatino-cartilaginous or gelatinoso-membranaceous substance; the structure, consisting of a cellular external coat or membrane, and a pellucid gelatinous internal mass, mostly traversed by colourless jointed filaments arising from the outer membrane. Frond cylindrical, compressed, or flat, continuous, destitute of midrib or veins. Fructification, roundish clusters or globules of red seeds imbedded in the internal gelatinous substance of the frond; and often unaccompanied by an external pore.

GENUS XLIII. IRIDÆA. Bory. Tab. XVII.

GEN. CHAR. Frond flat, expanded, carnose or gelatinoso-cartilaginous, more or less of a purplish red colour. Fructification, globules of roundish seeds imbedded between the two coats of the frond.

OBS. The present genus is proposed by Bory de St Vincent, in the *Dictionnaire Classique d'Histoire Naturelle*, under a name once suggested by Stackhouse for some other plant. As it seems to be founded in nature, and not to agree with the other *Halymenia* of Agardh, I willingly adopt it. I cannot think, however, of following M. Bory de St Vincent, so far as to acquiesce in his ordinal arrangement, and place it among the LAMINARIÆ, with which it has absolutely no points in common except a flat frond, and the ocean for its habitation. The *Fucus edulis* of Stackhouse is the type of this genus, and representatives may be found in *Fucus cordatus* and *reniformis* of Turner, *Iridæa micans*, *laminaroides*, and *Augustinæ* of Bory, and perhaps in *Fucus bracteatus* of Gmelin. The *Iridææ* have the frond composed of two coats, constructed of a parallel series of vertical, moniliform, coloured filaments, while the intermediate space is gelatinous

and occupied by a lax network of fine filaments, articulated at remote intervals. It is in this part that the globules of seeds are situated, and, in some species at least, destitute of any orifice by which they might escape. In the species figured by M. Bory in the botanical part of Duperrey's Voyage, an orifice appears to be present; but, in this instance, as well as in others, formerly mentioned, his analyses are so indefinite, that little information can be gathered from them. In *Fucus bracteatus* of Gmelin, I apprehend there is none. The globule of seeds being enveloped in a tenacious gelatinous kind of limbus, favours the idea, as it must escape entire if it escape at all, before the decomposition of the part. The *Fucus palmatus* of authors, I conceive neither to be an *Iridæa*, according to Bory, nor an *Halymenia*, according to Agardh, but rather a *Rhodomenia*: the structure is different, and the fructification, as far as we know, is, as we have already seen, composed of semi-imbedded ternate granules, exactly similar to those of the genera *Delesseria* and *Rhodomenia*.

The generic name is expressive of the prismatic or iridescent tints which most of the species reflect from their surface, while in a growing state.

I. IRIDÆA EDULIS. Tab. XVII.

FronD between fleshy and coriaceous obovate rounded at the summit (often cleft by the waves) attenuated below into a short stem.

Iridæa edulis, Bory in Dict. Class. d'Hist. Nat. v. 9. p. 15.

Halymenia edulis, Ag. Sp. Alg. v. 1. p. 202. Syst. Alg. p. 242. Spreng. Sp. Pl. v. 4. p. 333.

Delesseria edulis, Lamour. Essai, p. 38.

Ulva edulis, Decand. Grev. Fl. Edin. p. 296.

Fucus edulis, Stackh. Ner. Brit. p. 57. t. 12. Turn. Syn. Fuc. p. 180. Hist. Fuc. t. 114.

Sm. Eng. Bot. t. 1307. Hook. in Fl. Lond. New Series, with a figure, (the analysis incorrect.)

HAB. On rocks in the sea, generally near low water-mark. Biential. October. Menabilly, Fowey, Acton Castle. Penzance, &c., *Stackhouse*. Portluney, Carhayes, and on the coast of Hampshire, *Mr E. Foster junior*. Torquay, Sidmouth, and many other places in Devonshire. Coast of Anglesea, *Rev. H. Davies*. Near Abergele, *Mr Griffith*. Rocks near the Caves at Dover, plentiful, *Dillwyn*. Shore at Yarmouth, *Mr Wigg*. At Seaford and Brighton, rare, *Mr Borrer*. Coast of Northumberland and Durham, *Winch*. Near Belfast, *Dr Drummond*. Orkney Islands, *Rev. C. Clouston*. Shore at Leith, *Sir J. E. Smith*. Frequent at low tides to the east of Prestonpans, *Dr Hasell*. Many places on the western coast of Scotland.

Root an expanded red disk. *Plants* tufted, numerous, rising for a few lines with a cylindrical stem as thick as a crow-quill, then immediately beginning to expand into a flat, obovate, or oblong wedge-shaped frond, six to eighteen inches in length, and two to eight or ten inches in width, smooth and glossy, much rounded at the summit, generally split by the action of the waves into two or several segments, sometimes down to the base, the margin always flat and entire. *Fructification* situate towards the extremity, in wide patches, sometimes occupying the whole of the end for several inches, composed of spherical, unequal clusters or globules of minute ovate seeds, immersed throughout the central substance of the frond. *Substance*, thick and fleshy, or somewhat coriaceous. *Colour*, a fine deep blood-red, paler in young plants, changing in decay to green and dirty white. It adheres to paper in drying, and generally becomes almost black, except when held between the eye and the light, when it exhibits a fine purplish red. Some specimens, however, scarcely change colour at all.

It is remarkable that this plant should have been long confounded with *Fucus palmatus* of authors, an alga that I have found necessary to remove even to another genus. This is the more difficult to account for, as both species are highly characteristic, especially that under consideration, of which Mr Dawson Turner remarks, that he knows of no one liable to fewer variations of shape.

It seldom happens that a specimen of *Iridæa edulis* of any considerable size, can be procured entire. Though of a thick substance, it is succulent and easily injured, and even when not split by the violence of the waves, is generally perforated and mutilated by crabs and other marine animals, to whom it is a grateful food. Much of its reputation as a vegetable for the table, has arisen in consequence of its having been so long confounded with *Rhodomènia palmata*. It goes by the name of *Dulse* in the south-west of England, according to Stackhouse, and is eaten by the fishermen, either in a raw state, or after having been pinched between hot irons, when it is said to taste like roasted oysters. It is comparatively rarely eaten in Scotland, but Mr Neill informs us, is sometimes preferred for roasting in the frying-pan.

Mr Dawson Turner has justly remarked, that if it be moistened after having been once dried, it becomes so tender, and imbibes so much water, that it speedily decays, and can seldom support its own weight, when held up by the root. Mr Stackhouse observed the frond to give out a fine purple colour to the water in which it was macerat-

ing; and the Rev. W. Gregor obtained a fine lake from an infusion with the assistance of alum:

2. IRIDÆA RENIFORMIS:

Stem very short, suddenly expanding into a cartilagino-carnose roundish simple entire frond (generally much cleft by the waves), globules of seeds minute, scattered all over the frond.

Iridæa reniformis, Bory, Dict. Class. d'Hist. Nat. v. 3. p. 16.

Halymenia reniformis, Ag. Sp. Alg. v. 1. p. 201. Syst. Alg. p. 241. Spreng. Sp. Pl. v. 4. p. 333. Gall. Dict. Sc. Nat. v. 53. p. 361.

Fucus reniformis, Turn. Hist. Fuc. t. 113. Sm. Eng. Bot. t. 2116.

HAB. Submarine rocks, extremely rare. Perennial? Summer and autumn. On the beach at Niton, in the Isle of Wight, *Miss Everett*. Budleigh and near Torquay, *Mrs Griffiths*. Coast of Cornwall, *Mr Rashleigh*.

Root a dark red disk. Stem one line to near half an inch in length, simple, or divided into two or three branches, which expand abruptly into the fronds. Frond two to eight inches in length, sometimes as broad, or broader than it is long, obovate, roundish or kidney-shaped, at first simple, but rarely attaining its full size, without splitting into several segments, which often increase both in length and breadth after division. The whole frond is perfectly flat and even, and the margin entire. Fructification: 1. dark red unequal scattered globules, about the size of poppy-seed, composed of ovate-oblong minute seeds adhering tenaciously together, and not furnished with any orifice. 2. Very minute ternate granules, scattered unequally over the whole frond on distinct individuals. Substance thickish, between cartilaginous and fleshy. Colour, a fine blood-red, pinker in the youngest plants. In drying it adheres to paper, and scarcely changes colour.

This remarkably fine species was discovered by Miss Everett, in the Isle of Wight, cast upon the beach. Mrs Griffiths has the merit of finding it, in a growing state, upon some rocks close to Torquay, where I had subsequently an opportunity of seeing it myself. To Mrs Griffiths we are also indebted for a knowledge of the existence of the ternate granules, which require the assistance of the microscope to perceive. In full-grown plants, it will generally be found that the individuals without globules of seeds possess ternate granules. A plant kindly presented to me by M. Chauvin, as a new species of *Halymenia*, with the specific name of *Dubyi*, appears to belong to this

place. It was gathered by M. Chauvin on the coast of Normandy, where it is extremely rare.

A very beautiful and singular plant, found by Miss Hill, at Ilfracombe, is described and represented by Mr Dawson Turner as a variety of this species. It differs in the frond, being more attenuated at the base, of a more irregular outline, a more tender substance, and paler colour. Agardh refers this variety to *Iridæa edulis*. I regret that I have not materials to enable me to determine the question. The difficulty, on the contrary, has been rather increased by a specimen found by Miss Cutler, also at Ilfracombe, and clearly the same as Miss Hill's plant. This specimen is partly injured, but what remains is a perfect segment, ten inches long, and near two inches broad, producing a number of lobes all along the margin and at the apex; the lobes of various sizes, from half an inch to two inches long, of an obovate form, two or three lines wide at their origin, and expanding to an inch or more in the broadest part. Miss Cutler informs me, that, when recent, it was as thick as *Iridæa edulis*; in its dried state, on paper, it has more the colour and appearance of *Iridæa reniformis*. *I. edulis* has never any tendency to become lobed, but a disposition to that character is sometimes observed in *I. reniformis*. I am inclined to coincide with Mr Dawson Turner, and suspect it will eventually form a distinct species; in which case, it may bear the name of *Iridæa Hilliana*.

I. reniformis is, I believe, the only example in the Order, where ternate granules are known to be present.

GENUS XLIV. HALYMENIA, Ag. Tab. XVII.

GEN. CHAR. Frond nearly flat, or cylindrical, gelatinoso-membranaceous, of a pinky red colour, more or less dichotomous, the segments often lacinated. Fructification, punctiform globules of seeds imbedded in the central substance of the frond.

Obs. The habit of the plants composing this genus, is very peculiar. Unlike the widely expanded and simple form, which distinguishes the frond of the preceding genus, it is here much divided, the divisions more or less dichotomous in their disposition, and often variable in their

length and breadth, having also a general tendency in most instances to subdivide in a lacinated manner. In this respect, *Halymenia* differs also from the following genera of the order, which are more simple in their ramification. The substance is thinner, more tender and gelatinous than in *Iridæa*, the structure more simple, especially in the external membrane, and there is a less complicated tissue of fine filaments occupying the interior. I have not been able to perceive the least trace of any orifice for the escape of the seeds.

To this genus belong *Fucus floresius* of Clemente, *Halymenia variegata* and *Durvillæi* of Bory, *Fucus usnea* of Brown, *Halymenia furcellata* and *trigona* of Agardh, and perhaps also *Halymenia platyna* of the same author.

The literal interpretation of the generic name is *Sea-membrane*.

1. HALYMENIA LIGULATA. Tab. XVII.

Fronde between compressed and plane irregularly dichotomous the axils rounded the segments linear attenuated towards the apex, and often throwing out simple frondlets from the margin.

Halymenia ligulata, Ag. Sp. Alg. v. 1. p. 210. Syst. Alg. p. 244. Spreng. Sp. Pl. v. 4. p. 333.

Halymenia elongata, Ag. Sp. Alg. v. 1. p. 209. Syst. Alg. p. 243.

Ulva ligulata, Woodw. in Linn. Trans. v. 3. p. 54. Sm. Eng. Bot. t. 420. a bad figure.

Ulva rubra, Huds. Fl. Angl. p. 571. Sm. Eng. Bot. t. 1627.

Dumontia inaequalis, Lamour. in letter, according to Agardh.

Mesogloia Hudsoni, Ag. Syst. Alg. p. 50.

Mesogloia multifida, Spreng. Sp. Pl. v. 4. p. 370, as far as regards the synonym of *Ulva rubra*.

HAB. On rocks and stones in the sea. Annual. Summer. On Yarmouth Beach, *Mr Wigg*. On rocks at Cromer, *Mr Woodward*. At Sheringham, *Turner*. Beach at Gorton and Gunton, Suffolk, *Mrs Fowler*. At Christ Church, *Hudson*. Coast of Anglesea, *Rev. H. Davies*. Brighton, *Dillwyn*. Weymouth, *Rev. M. J. Berkeley*. Sidmouth, *Mrs Griffiths*. Ilfracombe, *Miss Cutler*.

Root a small disk. Fronds tufted, two to near twelve inches in length, attenuated at the base, between compressed and flat, dichotomously divided, the segments very few or very numerous, from two lines to three-fourths of an inch in width, either equal and rounded, or attenuated at the extremity, the axils of the dichotomies obtuse, the margin entire, or sometimes fringed with little simple or forked frondlets, an inch in length or more, and attenuated at their base. Fructification very minute globules of seeds scattered over the whole

frond, and imbedded in the gelatinous central substance. *Substance* gelatinous and membranaceous, somewhat transparent. *Colour* a pinky red, the globules of seeds darker. In drying, it adheres closely to paper, and does not change colour.

By means of specimens collected by Miss Cutler at Ilfracombe, I have been induced to refer *Halymenia elongata*, Ag. without any hesitation, to this species. These specimens are ten inches in length, nearly an inch wide, only twice dichotomous, the terminating segments either rounded or emarginate, the margins quite entire. From this state of the plant, I possess specimens which lead insensibly to *Ulva rubra* of Hudson,—the opposite extreme, which unquestionably belongs to this place, and is probably a dwarfish state, owing to some peculiarity of situation. A specimen kindly communicated by the Rev. Mr Berkeley, from Weymouth, under the name of *Ulva rubra*, is little more than an inch in length, but is nevertheless in fructification. Sprengel has adopted an error of Lyngbye, and united the *Ulva rubra* to *Mesogloia multifida* of Agardh.

It is worthy of remark, that the smaller specimens are the most irregular in the division of the frond. Some present not unfrequently, lacinate extremities, others have them palmated.

2. HALYMENIA FURCELLATA.

Frond gelatinoso-membranaceous uniformly dichotomous the segments filiform cylindrical, the extremities sublanceolate.

Halymenia furcellata, Ag. Sp. Alg. v. 1. p. 212. Syst. Alg. p. 244. Spreng. Sp. Pl. v. 4. p. 333.

Ulva furcellata, Turn. in Schrad. Journ. v. 2. p. 301. Sm. Eng. Bot. t. 1881.

Dumontia triquetra, Lamour. Essai, p. 45.

HAB. On rocks and stones in the sea. Annual. Summer. At Sheringham, Norfolk, *Turner*. Shore at Yarmouth, *Mr Wigg*. Coast of Suffolk, *Mrs Fowler*. Southampton, *Miss Biddulph*. Sidmouth, *Mrs Griffiths*. Torquay.

Root a minute disk. *Frond* one to four inches long, filiform, cylindrical, divided from the base many times in a regularly dichotomous manner, segments about a line in thickness, somewhat erect, crowded, distended with moisture so as to appear inflated, the ultimate ones elliptic-lanceolate. *Fructification* minute punctiform globules of seeds imbedded beneath the membranaceous cellular coat of the frond, which is not perforated by any orifice. *Substance* gelatinous and membra-

naceous, the cavity filled with a pellucid semifluid mass, and a fine network of delicate filaments. Colour a pale pinkish-red. In drying, it adheres closely to paper, and does not change colour.

The fructification of this, like that of the preceding species, appears to the naked eye like very minute dots, of a darker colour than the frond. The globules of seeds are so firmly invested by a kind of tenacious gelatinous limbus, that it is with the utmost difficulty they can be broken down upon the table of the microscope. The lower part of the frond is said to be occasionally three-sided, but I have not observed this conformation in any of the specimens I have examined in a recent state, and suspect it may have been the result of partial exsiccation. This appearance is represented in one of the figures in "English Botany," while the other has been evidently drawn, both plant and analyses, from dried individuals.

GENUS XLV. DUMONTIA, *Lamour*. Tab. XVII.

GEN. CHAR. Frond cylindrical, simple or branched, membranaceous, tubular, gelatinous within, of a red or purplish-red colour. Fructification, globules of seeds attached to the inner surface of the membrane of the frond.

Obs. This genus was dedicated by the late Professor Lamouroux to his friend M. Dumont, one of the authors of the *Dictionnaire d' Histoire Naturelle*.

The type of the species I consider to be the *Ulva purpurascens* of "English Botany," (not of Hudson), the fructification being more clearly understood than in the other individuals of this group. The globules and seeds are much larger than in the last genus; the seeds are not so tenaciously aggregated, and evidently attached to the inner surface of the membrane of the frond, but furnished with no orifice, while the whole structure is more simple. Besides, the species mentioned as the type, *Halymenia ventricosa* and *saccata* of Agardh, and *Dumontia fastigiata* of Bory, belong this genus. Of *Halymenia ramentacea*, Ag. I cannot speak with any certainty, having no specimen in fructification. It is arranged by Agardh after his *Halymenia filiformis* (*Dumontia filiformis* of this work), but from his account, I

suspect it will constitute a distinct genus. The specimen represented by Mr Dawson Turner is unfortunately also without fructification.

I. DUMONTIA FILIFORMIS. Tab. XVII.

Fronde filiforme gelatinoso-membranaceo attenuato ad utramque extremitatem ramulato-paniculato modo rami simplices elongati attenuati ad basem.

Dumontia incrassata, Lamour. Essai, p. 45.

Halymenia filiformis, Ag. Sp. Alg. v. 1. p. 214. Syst. Alg. p. 245.

Chondria purpurascens, Grev. Fl. Edin. p. 290.

Gastridium filiforme, Lyngb. Hydroph. Dan. p. 68. t. 17. Fl. Dan. t. 1664.

Solenia filiformis, Spreng. Sp. Pl. v. 4. p. 368.

Ulva purpurascens, Sm. Eng. Bot. t. 641.

Ulva incrassata, Fl. Dan. t. 653.

Ulva spongiformis, Fl. Dan. t. 763. f. 2.

Ulva filiformis, Fl. Dan. t. 1490. f. 2.

VAR. β . *crispata*: fronde compressa undata curvata et torquata, et colore purpureo.

Halymenia purpurascens, var. *crispata*, Grev. Crypt. Fl. t. 240.

HAB. On rocks and stones in the sea. Annual. Summer. Very common. Var. β . in the Frith of Forth, opposite Seafeld Baths, Leith.

Root minute, scutate. Fronds solitary or somewhat tufted, cylindrical, filiform, six to eighteen inches in length, varying in thickness from a crow-quill to a goose-quill, or even more, flexuose, attenuated both at the base and apex, more or less branched: the branches sometimes numerous, given off almost in a distichous and pinnated manner, sometimes few and fastigiate, but always flexuose, attenuated at each extremity, and mostly undivided, varying greatly in length, some very short, others as long as the entire plant. Fructification, globules or clusters of large ovate seeds, attached to the inner surface of the coat of the frond, and scattered plentifully throughout the whole plant, giving it a mottled appearance to the naked eye. Substance membranaceous, very gelatinous within. Colour varying from pale yellowish dull red, to a deep brownish-red, livid or purple, changing to a dirty green in decay. In drying, it adheres closely to paper, and does not change colour materially.

The *Ulva purpurascens* of Hudson, being, on the authority of Mr Dawson Turner, my *Gastridium kaliforme*, it becomes requisite to adopt the name under which the true plant is described in the Flora Danica. It is a species of very frequent occurrence on our shores, and sportive in its habit, but there is no other British alga for which it

can be mistaken. In some situations it is very liable to lose the extremities of the branches, which then become obtuse, somewhat thickened and erose, frequently also of a greenish hue. It gives out a pink dye very freely on immersion in fresh water, and is apt to stain the paper, under pressure, the same colour.

GENUS XLVI. CATENELLA, *Grev.* Tab. XVII.

GEN. CHAR. Fronds filiform somewhat compressed, creeping, throwing up numerous branches, contracted as if jointed in a moniliform manner, composed interiorly of branched filaments radiating from the centre. Fructification unknown.

Oss. The peculiarity of the internal structure of this alga has induced me to separate it from all others, even in the absence of fructification, and, in conjunction with its habit, to place it among the GASTROCARPÆ. It has ever been considered in the light of a doubtful plant, and has successively held the title of *Ulva*, *Fucus*, *Rivularia*, *Gigartina*, *Chondria*, *Halymenia*, *Lomentaria*, and, lastly, *mirabile dictu*, of *Chordaria* in Sprengel's '*Systema Vegetabilium*!' I have endeavoured—not I think without sufficient cause—to afford this almost universal trespasser, something more like a "local habitation and a name."

The generic name signifies a little chain, in allusion to the chain or necklace-like form of the frond.

I. CATENELLA OPUNTIA. Tab. XVII.

Chordaria Opuntia, Spreng. Sp. Pl. v. 4. p. 330.

Lomentaria Opuntia, Gall. Dict. d'Hist. Nat. v. 53. p. 367.

Halymenia ? Opuntia, Ag. Sp. Alg. v. 1. p. 217. Syst. Alg. p. 245.

Chondria Opuntia, Hook. Fl. Scot. Pt. 2. p. 106. Grev. Fl. Edin. p. 292.

Gigartina Opuntia, Lamour. Essai, p. 49.

Gigartina pilosa, Lamour. Essai, p. 49, according to specimens sent to Agardh.

Rivularia Opuntia, Sm. Eng. Bot. t. 1868.

Fucus Opuntia, Gooden. and Woodw. In Linn. Trans v. 3. p. 209. Turn. Syn. Fuc. p. 307. Hist. Fuc. t. 107.

Fucus cæspitosus, Stackh. Ner. Brit. p. 59. t. 12.

Fucus repens, Lightf. Fl. Scot. p. 961.

Ulva articulata, var. β . Huds. Fl. Ang. p. 569.

HAB. On sea side rocks within high water-mark. Perennial. Coasts of Devonshire and Cornwall, *Mrs Griffiths*. On the naked rocks at

St Michael's Mount Pier, and at Tenby, in South Wales, *Stackhouse*. In the Blackwater at Maldon, Essex, *Mr E. Forster junior*. Rocks opposite Priestholm Island, Anglesea, *Dillenius*. Shores of the Isle of Wight, *Mr Maimburg*. Hastings, *Turner*. On the rocks about Dover, *Dillwyn*. Coasts of Durham and Northumberland, *Winch*. Bay of Dublin, *Dr Scott*. Bantry Bay, *Miss Hutchins*. Near Musselburgh, in Scotland, *Lightfoot*. Many other places on the shores of the Frith of Forth, and common on the western coast of Scotland. Orkney Islands, *Rev. C. Clouston*.

Root creeping, passing insensibly into the *fronds*, which are densely matted and entangled, half an inch to one inch in height, scarcely half a line in thickness, between cylindrical and compressed, more or less contracted at intervals, so as to resemble a chain or necklace, the joints, if so they may be termed, generally becoming larger towards the apex of the branches: branches suberect, arising from the creeping stem without order, simple or divided, the summits obtuse, or sometimes terminating in a slender somewhat tendril-like prolongation. Within, the frond is composed of a lax tissue of dichotomously branched jointed filaments, the branches divaricated and numerous, radiating, as it were from the centre to the circumference of the frond; for they are horizontally disposed, and the joints become smaller and smaller, till their extremities terminate in the substance of the external coat of the frond. *Fructification*, unknown. *Substance* membranaceous or slightly cartilaginous, soft, tender, and full of moisture. *Colour*, a dark, livid, somewhat transparent purple, the creeping portion much paler. In drying, it becomes darker, and adheres imperfectly to paper.

The fructification of this small species is involved in the greatest obscurity. Lightfoot and others, imagined that the joints, formed by the contractions of the frond, were full of minute seeds, and performed the office of capsules. Sir James Edward Smith believed the smaller joints of the internal filaments to contain the seeds. Mr Dawson Turner describes certain minute black bodies, which are not unfrequent on the frond, as doubtful fructification. None of these, however, appear to me to be true fructification.

In regard to the habit of growth, it is ordinarily found on the perpendicular sides of rocks and blocks of stone, especially in crevices and spots least exposed to the sun. In such situations, it covers large spaces, extending itself like a mat. The species that comes nearest to it in this respect, is variety *clavatum* of *Gelidium corneum*, which is often found in its neighbourhood, as well as *Ceramium Rothii*, *Calothrix scopulorum*, and both species of *Lichina*.

ORDER XI.—ULVACEÆ.

Plants found in the sea, in fresh water, or on damp ground, &c.; of an herbaceous green or fine purple colour, of a thin tender membranaceous substance, and reticulated structure, rarely gelatinous. Frond with a very minutely scutate root, expanded, or tubular and continuous. Fructification, roundish and mostly quaternate granules, or minute sporular grains imbedded in the delicate membrane of the frond.

GENUS XLVII. PORPHYRA, *Ag.* Tab. XVIII.

GEN. CHAR. Frond plane, exceedingly thin, and of a purple colour. Fructification; 1. scattered sori of oval seeds; 2. roundish granules mostly arranged in a quaternate manner, and covering the whole frond.

OBS. This genus, remarkable among the ULVACEÆ for the colour of all the known species, was separated from *Ulva*, by Prof. Agardh, in his "Systema Algarum." The name he has bestowed upon it is derived from the Greek term for a purple colour. Besides the peculiarity of hue, the twofold fructification entitle these plants to the distinction the author above mentioned has conferred upon them. When carefully dried, the surface is delightfully smooth and glossy, and they form beautiful specimens for the herbarium.

I. PORPHYRA LACINIATA.

Fronds aggregated deeply cleft the segments dilated variously cut and waved.

Porphyra laciniata, *Ag. Syst. Alg.* p. 190.

Ulva laciniata, *Lightf. in Fl. Scot.* p. 374. t. 33. *Ag. Sp. Alg.* v. 1. p. 404.

Ulva umbilicalis, *Sm. Eng. Bot.* t. 2286. *Lyngb. Hydroph. Dan.* p. 28. according to a specimen communicated to Agardh. *Spreng. Sp. Pl.* v. 4 p. 368.

HAB. On rocks and stones in the sea. Annual. Spring to autumn. Abundant on most parts of the British coast.

Root a very minute disk. *Fronde* aggregated; three to eight inches in length, narrow at the base, but immediately dilated, deeply and irregularly cleft, cut, and waved. Sometimes the attachment is within the margin of the frond, or more or less central, and then forms the variety *umbilicata* of Agardh. *Fructification*: 1. roundish granules arranged in fours, and covering the whole frond in the delicate membrane of which they are imbedded; 2. *sori* of smaller ovate granules scattered without order chiefly towards the margin of the frond. *Substance* very tender, delicately thin and membranous. *Colour* reddish purple, in age becoming tinged with green. When dried, the frond is firmer, more transparent, and a finer purple.

This and the following species are well known in most parts of England under the name of *Laver*, in Scotland under that of *Sloke*, and with some people are a favourite article for the table. They require, however, to be stewed for several hours, in order to make them sufficiently tender. Lightfoot mentions, that the "inhabitants of the Western Isles gather it in the month of March, and after pounding and stewing it with a little water, eat it with pepper, vinegar, and butter. Others stew it with leeks or onions. In England, it is generally pickled with salt, and preserved in jars; and when brought to table, is stewed, and eaten with oil and lemon-juice."

The quaternate granules in this species are much larger than in the following one. They are of a purple colour, and, in fact, give the colour to the frond; for, by removing the granules, which may be done with care, under the microscope, the membrane is left perfectly colourless and diaphanous.

2. PORPHYRA VULGARIS.

Frond ovate-lanceolate, the margin more or less waved.

Porphyra vulgaris, Ag. Aufzählung in den österreichischen Ländern, &c. p. 18.

Porphyra purpurea, Ag. Syst. Alg. p. 191.

Ulva purpurea, Roth. Cat. Bot. v. 1. p. 209. t. 6. Lyngb. Hydroph. Dan. p. 29. Ag. Sp. Alg. v. 1. p. 405.

Ulva umbilicatis, var. *elongata*, Grev. Fl. Edin. p. 299.

Ulva umbilicatis, Lightf. Fl. Scot. p. 967. in part.

HAB. On rocks and stones in the sea. Annual. Spring to autumn. Coast of Devonshire. Near Belfast, *Dr Drummond*. Very common on the coast of Scotland.

Root a very minute disk. *Fronds* aggregated or solitary, one to two feet long, two or three inches wide, narrow at the base (except when the attachment is central, which sometimes happens), but expanding immediately into an ovate, ovate-linear, or nearly linear frond, waved at the margin. *Fructification*: 1. minute quaternate granules covering the whole surface; 2. irregular scattered *sori* of larger ovate granules, mostly situate towards the base. *Substance* very thin, and membranous, but somewhat tenacious. *Colour* purple, acquiring a violet tint in the dried state.

A more beautiful species than the preceding one, somewhat brighter, and more transparent. I have not observed the *sori*, which are therefore given on the authority of Agardh, who speaks of the ovate granules composing them as three times larger than the quaternate granules. The latter are about half the size of the quaternate granules of *Porphyra laciniata*. Although in its ordinary state this species is about twelve or sixteen inches in length, it sometimes attains a much larger size. I have seen a specimen found by my friend Dr Hasel, which measured not less than three feet and a half. The margin of the frond is very thin, and sometimes so slightly waved as to appear almost flat.

3. PORPHYRA LINEARIS. Tab. XVIII.

Frond linear or linear-lanceolate acute, the margin nearly flat.

Ulva purpurea, var. *elongata*, Lyngb. Hydroph. Dan. p. 20.

HAB. On rocks and stones within high water-mark. Annual. April and May. Rocks beneath Peakhead, near Sidmouth, abundantly.

Root a very minute disk. *Fronds* aggregated, three to five inches in length, two to three lines in width, linear or linear-lanceolate, acute, always rising with a distinct, though exceedingly short stem, the margin very slightly waved. *Fructification*, oval granules, not arranged in a quaternate manner, but partly scattered and partly in lines. *Substance* thin, very tender and flaccid. *Colour* a reddish purple.

A beautiful and singularly neat-looking little plant, and uniformly constant in its form. The rocks, at the only spot where I observed it, were rendered purple by its delicate fronds. The different arrangement of the granules preclude its being regarded as a miniature state of either of the preceding species; at the same time, I believe it to be

the plant described by Lyngbye as a variety of his *Ulva purpurea*, which is of a lanceolate form, scarcely a span long, half an inch wide, and found growing at high water-mark on the rocks of the Faroe Islands.

GENUS XLVIII. ULVA, *Linn.* Tab. XVIII.

GEN. CHAR. Frond membranaceous, of a green colour, plane (in some cases saccate and inflated in the young state). Fructification, minute granules mostly arranged in fours.

OBS. The word *Ulva* seems to have been in common use at an early period, and occurs frequently in the Latin poets, but in so vague and indefinite a sense, that it would apply to any or to all marsh-plants. It is said by De Théis to be derived from the Celtic *ul*, water; and it is therefore highly probable that, in its original sense, it was a general designation for aquatic vegetables. Linnæus is considered as the first botanical authority for the genus, but so little was known about these plants in the time of our great master, that some of his *Ulvæ* have suffered the same fate as many of his *Fuci* and *Conservæ*.

The *Ulvæ*, as at present defined, are of very general distribution. Species occur in salt and fresh water, and on the surface of damp ground, the shaded roofs of old thatch-covered buildings, and even on walls and stones. Some do not exceed a line, others are not less than one or two feet in length.

* *Species confined to the sea.*

1. ULVA LATISSIMA.

Frond plane widely oblong or roundish waved of a full green colour and very tender substance.

Ulva latissima, Linn. Fl. Suec. p. 433. Ag. Sp. Alg. v. 1. p. 407. Syst. Alg. p. 188.
Ulva Lactuca, Sm. Eng. Bot. t. 1551. Grev. Fl. Edin. p. 299.
Ulva Lactuca, var. *latissima*, Lightf. Fl. Scot. p. 971.

HAB. Attached to rocks, stones, shells, &c. in the sea, very common. Annual. Summer and autumn.

Root a very minute disk. *Fronds* aggregated, six to twenty inches long or more, of a roundish or broadly oblong figure, waved, and sometimes lobed at the margin, frequently much perforated by marine animals. *Fructification*, very minute quaternate granules densely covering the whole frond. *Substance* extremely thin, but somewhat opaque, excessively tender. *Colour* a full bright herbaceous green, becoming tinged with brown in old age and decay. In drying, it does not adhere perfectly to paper, but contracts and lacerates.

Although this species be the *Ulva latissima* of the Flora Suecica, it is not the plant described under that name in the Species Plantarum, which Sir James E. Smith has ascertained, by the specimen in the Linnean Herbarium, to be nothing more than *Laminaria saccharina*. Most authors have confounded this and the following species together, yet they are perfectly distinct. It is known by the names of *Green Sloke*, *Green Laver*, and *Oyster-green*, and is found on the coasts of India, New Holland, South America, and the Cape of Good Hope. According to Lightfoot, the Scottish Islanders ascribe to it an anodyne virtue, and bind the leaves about the front and temples to assuage the headach in fevers, and to procure sleep. This, too, is the Laver, says Sir J. E. Smith, "so often introduced at fashionable tables, within a few years past, being stewed and seasoned with lemon-juice, which moderates its salt bitterish flavour 'and sea-weed scent;' nor is this dish unpleasent, after a short trial, to most palates. We suspect it to have been originally contrived with a medical intention, for the benefit of scrophulous patients, how numerous, alas! in the gay circles of the opulent and great." It is inferior, however, to *Porphyra laciniata*, which is generally regarded as a delicacy, and is rarely taken when the latter can be procured.

2. ULVA LACTUCA.

Frond at first obovate saccate inflated at length cleft down to the base, the segments plane unequal laciniated semitransparent.

Ulva lactuca, Linn. Sp. Pl. v. 2. p. 1632. Lightf. Fl. Scot. p. 970. in part. Ag. Sp. Alg. v. 1. p. 409. Syst. Alg. p. 189. Lyngb. Hydroph. Dan. p. 30. in part. Grev. Crypt. Fl. t. 313.

HAB. In the sea, attached to rocks and stones, shells, corallines, and marine plants. Annual. May and June. Coast of Devonshire. Shores of the Isle of Bute and Frith of Forth.

Root a very minute disk. *Fronde*s aggregated, three to six inches in length, in the young state obovate and saccate, but very soon bursting and lacerating, at length cleft irregularly down to the base, the segments flat, variously lacinated and cut, somewhat waved. *Fructification*, quaternate granules covering the whole frond. *Substance* slightly gelatinous, exceedingly thin and tender, semitransparent. *Colour* a pale yellowish green. When dry it adheres so closely to paper as to resemble a drawing, and the surface shines as if varnished.

Thin and tender as is the frond of *Ulva latissima*, that of the present species is much more so. It is also a smaller plant, and when preserved in the herbarium, infinitely more beautiful. In its growing state it is often very crowded; and, on account of the jagged and cut appearance which it presents—somewhat similar to endive, it has received the name of *Lettuce Laver*. I doubt whether this species has ever been brought to table. Like the last, it seems to have a wide geographical range, having been collected on the coasts of New Orleans and New Holland. It is impossible to know what plant Sprengel has in view in his edition of the *Species Plantarum*; he has no *Ulva latissima*; and his two only references, the one to the *Ulva lanceolata* of Linnæus, and the other to the *Solenia Linza* of Agardh, cannot surely be intentional.

3. ULVA LINZA.

Fond linear-lanceolate attenuated at each extremity waved at the margin.

Ulva Linza, Linn. Sp. Pl. p. 1633. Lightf. Fl. Scot. p. 973. Ag. Sp. Alg. v. 1. p. 413.

Lyngb. Hydroph. Dan. p. 32. Grev. Fl. Edin. p. 299. Spreng. Sp. Pl. v. 4. p. 368.

Ulva lanceolata, Linn. Syst. Nat. p. 719.

Solenia Linza, Ag. Syst. Alg. p. 185.

HAB. On rocks and stones in the sea. Annual. Summer. Sheerness, *Withering*. On the beach near Sunderland, *Mr Weighell*. Near Hartley, Northumberland, *Mr Winch*. Abundant in the Frith of Forth.

Root a minute disk. *Fronde*s aggregated, sublinear or linear-lanceolate, six to eighteen inches or more in length, half an inch to one inch and a half in breadth, much attenuated at each extremity, the margin beautifully waved and curled. *Fructification*, minute granules arranged in twos or fours, covering the whole frond. *Substance* thin, but composed of two closely united membranes. *Colour* a full, rather

bright herbaceous green—fading in age, or, when exposed in shallow water to much sun, to a delicate pale yellowish-green or greenish-white, and then becoming also semitransparent. In drying, it adheres more or less to paper, and does not change colour.

In his "Species Algarum," Agardh expresses his doubts whether this be a really distinct species; but after a careful investigation, I am led to an opposite result. Neither can I follow the same author in placing it among the *Soleniæ* (my *Enteromorpha*); for the habit is altogether that of a true *Ulva*; and the structure, though more obscure, accords better with the *Ulve*, as does also the fructification. It must be confessed, at the same time, that the plant is peculiar in having the frond composed of two membranes, so closely united as to appear like a single one. In this respect, it certainly seems to approach near to *Enteromorpha intestinalis* and *compressa*, with which Agardh has associated it. I have never, however, seen it really tubular.

* * *Species found in fresh water.*

4. ULVA BULLOSA.

Frond obovate saccate gelatinous at length irregularly expanded floating waved and bullate.

Ulva bulbosa, Roth. Cat. Bot. v. 3. p. 329. Ag. Sp. Alg. v. 1. p. 414. Syst. Alg. p. 190.
Sm. Eng. Bot. t. 2320. Spreng. Sp. Pl. v. 4. p. 368.
Ulva Lactuca, var. β . Huds. Fl. Angl. p. 567. Lightf. Fl. Scot. p. 971.

HAB. In fresh water pools and ditches. Annual. Spring and summer. In the Meadows, behind Newington, *Dillenius*. Henfield, in Sussex, *Mr W. Borrer*. In Scotland, *Lightfoot*. Ditch surrounding Duddingston Loch, near Edinburgh.

Fronds aggregated, fixed in their young state, obovate and tubular, one to five inches long, soon lacerating and expanding into a plane membrane, which detaches itself and floats on the surface of the water. At this period it is very irregular in form, waved, and distended with air-bubbles. *Fructification*, quaternate granules scattered over the whole frond. *Substance* excessively tender, thin, and gelatinous. *Colour* a fine pale green, yellowish in age. In drying, it adheres most closely to paper.

There can be no difficulty in recognizing this very distinct species,

growing, as it invariably does, in fresh and mostly stagnant water. When seen floating on the surface of the water, it retains the air that happens to be disengaged beneath it, and has all the appearance, as Lightfoot has observed, of being in a state of fermentation. The frond is infinitely more tender and gelatinous than the preceding species, and can hardly be held in the hand without breaking into pieces and slipping through the fingers.

This plant may be regarded as intermediate between *Ulva* and the genus *Tetraspora* of Link, adopted by Agardh, in his *Systema Algarum*, for *Ulva lubrica* of Roth, *Ulva cylindrica* of Wahlenberg, and *Ulva gelatinosa* of Vaucher. The discovery of all these in this country may be anticipated.

* * * *Species found on damp ground, walls and rocks.*

5. ULVA CRISPA.

Fronde crowded deep green rounded inflated much wrinkled and folded.

- Ulva crispera*, Lightf. FL Scot. p. 972. Ag. Sp. Alg. v. 1. p. 416. Syst. Alg. p. 190.
 Grev. FL Edin. p. 299. Spreng. Sp. Pl. v. 4. p. 368.
Ulva terrestris, Roth. Cat. Bot. v. 1. p. 211.
Ulva Lactuca, var. γ , Huds. FL Ang. p. 567.
Tremella terrestris, Dill. Hist. Musc. p. 52. t. 10. f. 12.

HAB. On damp ground in shady places, near houses and walls, and on old thatched roofs. Annual. Winter and spring. Common.

Fronde not an inch in height, lying on the surface of the ground, without any apparent root, and forming a crowded stratum; inflated, folded and wrinkled. *Fructification*, quaternate granules beautifully arranged so as to form parallel lines—and those lines, again, squares with vacant intervals between them. *Substance* very thin, and rather tender, but not gelatinous. *Colour* a dark green. In drying, it does not adhere to paper.

A plant of no beauty, with somewhat of the habit of *Tremella*, for a species of which it was taken by Schreber and Willdenow. Agardh compares the arrangement of the fructification to the walks and parterres of a garden. It is singular that no British figure should exist of this vegetable, except the very indifferent one of Dillenius.

6. ULVA FURFURACEA. Tab. XVIII.

Fronds very minute roundish-ovate distinct suberect, forming a thin crowded stratum.

Ulva furfuracea, Fl. Dan. t. 1488. Lyngb. Hydroph. Dan. p. 32. Ag. Sp. Alg. v. 1. p. 417. Syst. Alg. p. 190. Grev. Crypt. Fl. p. 265. Spreng. Sp. PL v. 4 p. 368.

HAB. On stone-walls, and even planks of wood, in damp shady places. Appin, *Capt. Carmichael*. On the walls of King's College, Cambridge, *Rev. M J. Berkeley*.

Plant producing a furfureous stratum. *Fronds* scarcely a line long, crowded, somewhat erect, of a roundish-obovate form, attached by a minute attenuated base: margin entire or somewhat lobed, and frequently more or less inflexed. *Fructification*, minute quaternate granules, generally so arranged as to form square masses with vacant intervals. *Substance* thin and tender. *Colour* a full dark green.

A very interesting discovery and addition to the British Flora; made in Scotland by the late Captain Carmichael, and in England by my acute friend Mr Berkeley. It is the smallest known species.

7. ULVA CALOPHYLLA.

Fronds minute linear twisted entangled, forming a dense thin dark-green stratum.

Ulva calophylla, Spreng. Sp. Alg. v. 4. p. 368. Grev. Crypt. Fl. (Synopsis) p. 42. *Bangia calophylla*, Carmich. in Grev. Crypt. Fl. t. 220.

HAB. On a block of stone near the Clergyman's house in the Island of Lismore. October. *Capt. Carmichael*.

Plant tufted, forming a thin velvety stratum. *Fronds* two or three lines in length, plane, linear, some quite narrow, others broad, straight or curiously curved and twisted, the apex rounded, the base attenuated. *Fructification*, quaternate granules arranged in lines, a single line being found in the narrowest fronds, while in the broadest there are as many as ten or twelve. *Substance* thin and transparent. *Colour* a fine dark green.

The most singular and beautiful of the minute *Ulvæ*, and very nearly related to *Ulva velutina* (*Scytosiphon velutinus*, Lyngb.) which, however, is an aquatic species. *Ulva calophylla*, in the only station observed by its discoverer, covered a large stone with a dark-green velvet-like stratum; and, if diligently searched for, will probably be found to exist in many other places.

GENUS XLIX. BANGIA, *Lyngb.*

GEN. CHAR. Frond flat, capillary, membranaceous, of a green, reddish, or purple colour. Fructification, granules arranged more or less in a transverse manner.

OBS. Having had occasion to examine some remarkably fine specimens of *Bangia fusco-purpurea*, since I commenced the description of the ULVACEÆ for this work, I have been led to study the *Bangia* attentively, in regard to their affinities. The result induces me to remove them from the CONFEROIDEÆ, where they are arranged by Agardh, and to place them in the present Order. Their plane fronds possess a structure very similar to that of the *Ulvæ*, to which they approach very closely, *Ulva calophylla* and *velutina* being in fact exceedingly similar in habit and size to some *Bangia*. Like them, the *Bangia* are apt to vary in the width of the fronds, and often even in the same frond. When a frond is so narrow as to contain only one series of cellules, it has then much the appearance of a *Conferva*, the cellules having the aspect of joints; the granules, under similar circumstances, are sometimes so uniform as to look like annular bodies within a tube, and then it resembles an *Oscillatoria*, or a *Scytonema*. The species truly belonging to this genus appear to be *Bangia crispa* and *B. fusco-purpurea* of Lyngbye, and *B. torta* of Agardh. *Bangia Laminariæ* is doubtful.

It is a source of regret to me, that, in consequence of the plates being completed and in the hands of the colourer, I cannot in the present edition give a figure illustrative of the genus. The name it bears was appropriated to it by Lyngbye, in honour of his friend Hofmann Bang, who has made several discoveries in this department of botanical science.

1. BANGIA FUSCO-PURPUREA.

Fronds capillary, dark purple or brownish purple, often waved and crisped at the extremity, granules densely arranged.

- Bangia fusco-purpurea*, Lyngb. Hydroph. Dan. p. 83. t. 24. Grev. Fl. Edin. p. 302. Spreng. Sp. Pl. v. 4. p. 361.
- Bangia atro-purpurea*, Ag. Syst. Alg. p. 76.
- Conferva fusco-purpurea*, Dillw. Brit. Conf. t. 92. Sm. Eng. Bot. t. 2055.
- Conferva atro-purpurea*, Roth. Cat. Bot. v. 3. p. 208. t. 6. Dillw. Brit. Conferv. t. 103. Sm. Eng. Bot. t. 2085.

HAB. On rocks and planks of wood in the sea. Annual. Spring and summer. Rocks about high water-mark, near Dunraven Castle, *Mr Young*. On piles in the sea, at Brighton, *Mr Borrer*. Coast of Cornwall, *Mr Rashleigh*. On the top of a large rock, accessible at low tides, opposite the Peakhead, near Sidmouth, in great abundance. Bantry Bay, *Miss Hutchins*. On Burntisland pier, in the Frith of Forth, *Mr Walker Arnott*.

Fronde growing in a thickly tufted and extensively aggregated manner, one to three inches in length or more, capillary, flexuose, somewhat crisped at the extremity, some of them much finer than the others. *Fructification*, granules arranged in numerous transverse series, and variable in form and number, but more or less quadrate. *Colour* a dark glossy purple or greenish purple. *Substance* membranaceous. In drying it does not change colour, and adheres slightly to paper.

The fronds of this species are remarkable for a want of uniformity in width, and by a young botanist might easily be taken for different species. The root is composed of a tuft of minute fibres. I cannot perceive any essential difference between the *Conferva fusco-purpurea* and *atro-purpurea* of authors: their habit is much the same, and a browner shade of colour is of little importance. Both are distinguished for covering rocks to a great extent with their crowded and glossy filaments. The rock on which I found a dark purple variety, near Sidmouth, was within reach of the spray of the sea at high tide, and was quite covered with it for many square feet.

GENUS L. ENTEROMORPHA, *Link, Ag.* Tab. XVIII.

GEN. CHAR. Frond tubular, hollow, membranaceous, of a green colour, and reticulated structure. *Fructification*, three or four roundish granules aggregated in the reticulations.

OBS. This genus, formerly constituting a section of the genus *Ulva*, was separated by Agardh in his "Systema Algarum," under the name of *Solenia*. This name, however, had been long before given to a genus of *Fungi* by Hoffmann, and, though discontinued for

a time, is now resumed by modern mycologists. *Enteromorpha*, consequently, a name proposed by Link for the same group, must now be adopted, having the claim of priority over the *Ilea* of Fries. It is, besides, characteristic, as it denotes the appearance and variable nature of the species; being compounded of two Greek words, the one signifying form or figure, the other an intestine.

The specific distinctions of these plants are rather obscure. All of them produce varieties; and in regard to mere size, *Enteromorpha intestinalis* varies from two or three inches to near three feet in length, and in width from four inches to the fineness of a hair. They are found, some in fresh or brackish water, others in the sea.

The fructification, as described by Agardh in his generic character, "sporidia minutissima, densissima," I have not been able to perceive; but in some species three or four granules are distinctly imbedded in the reticulations—a character which farther confirms the arrangement of the *Enteromorpha* with the ULVACEÆ.

I. ENTEROMORPHA INTESTINALIS.

FronD simple inflated sinuated (often found floating).

- Enteromorpha intestinalis*, Link, Hor. Phys. Ber. p. 5.
Solenia intestinalis, Ag. Syst. Alg. p. 185. Spreng. Sp. Pl. v. 4. p. 367.
Solenia Bertoloni, Ag. Syst. Alg. p. 185. Spreng. Sp. Pl. v. 4. p. 367.
Ulva intestinalis, Linn. Huds. Fl. Ang. p. 568. Ag. Sp. Alg. v. 1. p. 418.
Scytosiphon intestinalis, Lyngb. Hydroph. Dan. p. 67.
Fistularia intestinalis, Grev. Fl. Edin. p. 300.
Ilea intestinalis, Gaill. Dict. Sc. Nat. v. 53. p. 373.
Tetraspora intestinalis, Desv. Fl. Ang. p. 17.
Conferva intestinalis, Roth. Cat. Bot. v. 1. p. 159.
 VAR. β *crispa*, frond compressed, the margin crisped and curled.
Solenia intestinalis, var. *crispa*, Ag. Syst. Alg. p. 185.

HAB. In the sea, and in brackish or fresh water ditches. Annual. Summer. Common.

FronDs attenuated at the base, and fixed by a scutate root, often becoming detached and floating on the surface, simple, two inches to two feet long or more, from a line to three inches or more in diameter, waved, wrinkled, and more or less crisped and curled, inflated, sometimes compressed, obtuse, and often rounded at the extremity. *Substance* thin, tender, and membranaceous. *Colour* passing from a full herbaceous green to a pale semitransparent yellow green, changing to white in decay. In drying, it adheres imperfectly to paper.

The variety of this species, denominated *maxima* by Agardh, is only

a larger form of the plant; and an illustration of it, may be seen at figure 7. in the ninth plate of Dillenius' "Historia Muscorum." The frond, according to Agardh, is nearly an inch in diameter. Like the following species, however, the gradation from one form to another is quite insensible. I have specimens, from the Isle of Buts, between two and three feet in length, and, in the upper part, above three inches in diameter. But the most remarkable individual that has come under my notice, is one communicated by M. Chauvin; it is about a foot in length, and from three to four inches in width, lobed, crisped, and curled in the most extraordinary manner all along the margin, or rather over the whole surface.

When floating so as to cover the surface of the water in ditches, the frond often becomes inflated with air-bubbles, as if in a state of fermentation.

2. ENTEROMORPHA COMPRESSA. Tab. XVIII.

Frond tubular, compressed, regularly reticulated, filiform, branched, the branches simple, attenuated at their base.

Solenia compressa, Ag. Syst. Alg. p. 186. Spreng. Sp. Pl. v. 4. p. 367. Bory, in Duperrey Voy. (Bot.) p. 201.

Fistularia compressa, Grev. Fl. Edin. p. 300.

Ulva compressa, Linn. Fl. Suec. p. 433. Lightf. Fl. Scot. p. 969. Ag. Sp. Alg. v. 1. p. 490. Smith, Eng. Bot. t. 2739.

Ilea compressa, Gall. Dict. Sc. Nat. v. 53. p. 373.

Conserva compressa, Roth. Cat. Bot. v. 1. p. 161.

VAR. β *prolifera*, frond somewhat inflated, throwing out capillary branches on all sides.

Solenia compressa, var. *prolifera*, Ag. Syst. Alg. p. 186.

Ulva prolifera, Fl. Dan. t. 763. f. 1.

Scytosiphon compressus, var. *crispatus*, Lyngb. Hydroph. Dan. p. 64. t. 15.

HAB. On rocks and stones and piles in the sea. Annual. Spring and summer. Extremely common.

Root a minute disk. *Fronds* six to twelve inches in length, and from the fineness of a hair to several lines in diameter, aggregated, filiform, branched, tubular, more or less compressed, frequently constricted here and there, and mostly increasing insensibly in diameter from the base to the middle, or even to the summit; branches usually arising near the base, simple, elongated, and much attenuated towards their insertion, the apex obtuse. *Substance* tender, thin, membranaceous. *Colour* a fine herbaceous green, paler towards the base, changing to white in decay. In drying it retains its colour, and adheres imperfectly to paper.

In variety β , a number of capillary ramuli arise from the whole surface of the frond in a proliferous manner. Agardh suggests that it may possibly prove a variety of *E. intestinalis*. A specimen presented to me by M. Chauvin, I should refer to the species before us; at the same time, a highly proliferous variety, of what seems otherwise to be *E. intestinalis*, is represented in the *Dictionnaire des Sciences Naturelles*. Another variety of *E. compressa* is entirely capillary, almost like a *Conferva*; this is the *Conferva crinita* of Roth (Cat. Bot. v. 1. t. 1. f. 3.), and the *Ulva capillaris* of Lamouroux. I am not aware that it has been found in this country.

The structure of this plant is described by Agardh as regularly reticulated, and the reticulations disposed in parallel lines. The latter part of the character I have never been able to perceive distinctly, and have represented the result of my own microscopical investigation.

The shores of almost every country from the Arctic to the Antarctic Ocean produce this species. In the Sandwich Islands it forms an article of food.

3. ENTEROMORPHA CLATHRATA.

Frond tubular, filiform, much branched, irregularly reticulated, branches capillary, attenuated.

Solenia clathrata, Ag. Syst. Alg. p. 186. Spreng. Sp. Pl. v. 4. p. 368.

Scytosiphon clathratus, Lyngh. Hydroph. Dan. p. 65. t. 16.

Scytosiphon paradoxus, Fl. Dan. t. 1595. f. 2.

Ulva clathrata, Ag. Syn. p. 46.

Ilea clathrata, Gaill. Dict. Sc. Nat. v. 53. p. 373.

Conferva clathrata, Roth. Cat. Bot. v. 3. p. 175.

Conferva paradoxa, Dillw. Brit. Conf. (Syn.) p. 70. t. F. Sm. Eng. Bot. t. 2328.

VAR. β *erecta*, branches very long, somewhat erect, nearly simple or set with small scattered ramuli.

Scytosiphon erectus, Lyngh. Hydroph. Dan. p. 65. t. 15.

Fistularia erecta, Grev. Fl. Edin. p. 300.

Solenia clathrata, var. *confervoides*, Ag. Syst. Alg. p. 187.

VAR. γ *uncinata*, frond much branched, the ramuli short, crowded and spreading.

Solenia clathrata, var. *uncinata*, Ag. Syst. Alg. p. 187.

Ulva uncinata, Mohr. Cat. Alg. according to Agardh.

Ulva ramulosa, Sm. Eng. Bot. t. 2137.

Ulva confervoides, Lamour. Essai, p. 65. according to Agardh.

HAB. In the sea. Said also to grow in fresh water. Annual. Spring and summer. Probably common. In the sea near Bangor, *Mr Templeton*. Brighton, *Mr Borrer*. Var. β , in the Frith of Forth not unfrequent, and on the shores of the Isle of Bute. Var. γ , in Bantry Bay, *Miss Hutchins*.

Root minutely scutate. *Fronds* from two or three inches to a foot or more in length, filiform, cylindrical and tubular, varying from the fineness of a hair to a line in diameter in the main stem, much branched: branches arising on all sides throughout the whole frond, very unequal in point of length, some a few lines, others many inches, irregularly subdivided, beset with numerous, very short, spreading, often curved ramuli, all attenuated toward the extremity. *Fructification*, small clusters of roundish granules occupying some of the reticulations. *Substance* tender and membranaceous. *Colour* varying from a very deep to a pale yellowish green. In drying, it adheres imperfectly to paper, and does not change colour.

Var. β is distinguished for its pale colour, its erect mode of growth, long and almost undivided branches, and the small number of minute ramuli. In this variety, the granules of the fructification are to be distinctly seen. It looks like a distinct species, but I hardly know what to seize upon for a good specific character.

Var. γ (the *Ulva ramulosa* of English Botany) has a deep green colour, and its branches much attenuated; they are beset on every side with ramuli, half a line to two lines in length, some of them curved upwards, some downwards. The figure in "English Botany" is a very inadequate representation of the plant, as it is sometimes above a foot in length, and the branches are generally quite capillary.

The structure of this species is an irregular somewhat quadrate kind of reticulation, but much more distinct than that of *Enteromorpha compressa*.

4. ENTEROMORPHA LINKIANA.

Frond cylindrical, tubular, filiform, reticulated, pellucid, of a very pale green colour, membranaceous (rigid when dry), much branched, branches attenuated.

HAB. In the sea. Annual. Summer. Coast of Appin, *Captain Carmichael*.

Root a minute disk. *Frond* six to twelve inches in length, filiform, cylindrical, tubular, inflated, rising with a main stem about one line in diameter, on all sides of which, and along the whole length, the branches are inserted: branches two to six inches long, smaller in diameter than the stem, between erect and spreading, set with a second

series one or two inches long, which, in their turn, bear a third, which are quite capillary, all of them much attenuated toward the extremity. The *structure* distinctly reticulated, the reticulations roundish, but angular. *Fructification*, three to four subglobose granules within many of the reticulations. *Substance* membranaceous, but firm and somewhat cartilaginous when dry, adhering very imperfectly to paper. *Colour* a very pale yellowish green.

This species, which appears to be very well distinguished by its comparatively rigid substance, I have dedicated to the celebrated naturalist whose name for the present genus I have adopted. It is upon this species in particular, that *Myrionema strangulans* (Crypt. Fl. t. 300.) is parasitic. The fructification is remarkably conspicuous under the microscope, and very evidently composed of three or four clustered granules.

ORDER XII.—SIPHONEÆ.

Plants found in the sea, in fresh water, or on damp ground, &c.; of an herbaceous green colour. Frond either composed of membranaceous, filiform, continuous, simple or branched tubes, or formed of a combination of similar tubes, and then presenting a lax spongy body of various forms, crustaceous, globular, cylindrical or flat. Fructification, vesicles (Coniocytae, Ag.) produced on the outer surface of the tubes filled with a dark green granular mass.

In Botrydium, the entire plant is little more than a hollow green globule with a radicating tuft of fibres: the fructification may be considered as unknown. Agardh looks upon the hollow globule as a vesicle.

GENUS LI. CODIUM, Stackh., Ag. Tab. XIX.

GEN. CHAR. Frond spongy, dark green, (crustaceous, globular, cylindrical, or flat), composed of an interwoven mass

of tubular continuous filaments. Fructification, opaque vesicles attached to the filaments, near the surface of the frond.

OBS. Few genera among *Algæ* are more natural than the present one. Differing almost as much as possible in form, their singular spongy substance, and green velvet-like surface, totally destitute of epidermis, characterize the species at the first glance. The most careful dissection confirms the indication of their external character; and so similar are the tubular filaments and the fructification to the frond and fruit of the *Vaucheriæ*, that their union in the same order is indispensable, at least according to natural principles. Agardh even observes, that the whole frond seems to be composed of distinct individuals, associated in a determinate form, and that *Codium* differs from *Vaucheria* chiefly in this respect. The root is an expanded mass similar in substance to the frond. If the frond be minutely examined, it is found to consist externally of parallel, crowded, club-shaped filaments, connected at their base, within the plant, by a network of branched and paler filaments. The vesicles of the fructification arise from the side of the club-shaped filaments. At one period of the year, in some species (if not in all), long and very delicate filaments arise from the side or apex of the club-shaped ones, and cover the frond with a kind of mucous fringe, connected probably in some way with the fructification. The tubes are coloured by an internal green mass, as in the *Vaucheriæ*.

The name of this genus is formed from the Greek word for the skin of an animal, denoting particularly a soft and woolly or velvet-like covering. It was proposed by Stackhouse expressly for the *Fucus tomentosus* of Hudson (Ner. Brit. preface, p. 24). Lamouroux, in his "Essai," substituted the name of *Spongodium*, on the ground that *Codium* had not been received by naturalists. He himself, however, being the first systematic writer upon marine Algæ, ought to have recognized it. Professor Agardh has done so, but by some oversight omits to acknowledge Stackhouse as the author. Bory de St Vincent acts as a *corps de reserve* on the part of Lamouroux, and is excessively indignant at the innovation, as he terms it, of Agardh; he restores the name of *Spongodium*, and is either actually ignorant of, or "remembers to forget" the primary claim of *Codium*, which, having justice on its side, will, it is hoped, survive the contest.

1. CODIUM TOMENTOSUM. Tab. XIX.

Fronde cylindrical, dichotomous, not dilated at the axils.

Codium tomentosum, Stackh. Ag. Sp. Alg. v. 1. p. 452. Syst. Alg. p. 177. Spreng. Sp. Pl. v. 4. p. 365.

Spongodium tomentosum, Lamour. Essai, p. 73. Gall. Dict. Sc. Nat. v. 53. p. 376.

Spongodium commune, Bory. Voy. Duperrey, (Bot.) p. 210.

Lamarkia vermililaria, Olivi Zool. Adriat. p. 258. t. 7.

Agardhia dichotoma, Cabrera in Phys. Salsk. Arsber. according to Agardh.

Fucus tomentosus, Huds. Fl. Angl. p. 584. Stackh. Ner. Brit. t. 7. Turn. Syn. Fuc. p. 300. Hist. Fuc. t. 135. Sm. Eng. Bot. t. 712.

HAB. On rocks in the sea, generally uncovered at low spring tides. Perennial. Summer. Coast of Cornwall, *Ray*. King's Cove and St Michael's Mount, plentiful, *Turner*. St Ives, and Menabilly, *Stackhouse*. On the long rock between Marazion and Penzance, plentiful, *Hon. Dr Wenman*. Lizard Point, *Mr E. Forster junior*. Near Exmouth, *Hudson*. Near Torquay, *Mrs Griffiths*. Ilfracombe, *Miss Hill*. Sidmouth, and Portland Island, *Pulteney*. Sunderland beach, *Mr Weighell*. Coast of Yorkshire, *Hudson*. Coast of the county of Clare, *Mr Mackay*. County of Antrim, *Dr Scott*. Bantry Bay, abundantly, *Miss Hutchins*. Iona.

Plant, in the first instance, spreading over the surface of the rock, in flat irregular velvet patches, then throwing up the fronds. *Fronde* four to twelve inches long or more, about the thickness of a goose-quill, cylindrical, filiform, branched from near the base in a dichotomous manner, the branches generally of nearly equal height. *Structure* filamentous, the substance of the frond being composed of tubular filaments, those in the centre forming a network, and giving origin to numerous club-shaped continuous filaments, which are disposed in a radiated manner, so that their apices form the outer surface. *Fructification*, dark green, ovate, or ovate-oblong vesicles, attached to the side of the club-shaped filaments; the latter, at the same period with the fructification, produce other very fine yellowish filaments, two or three lines in length, which give the plant a slippery feel, and soft woolly appearance. *Substance* soft and spongy. *Colour* a deep grass-green. In drying, it adheres slightly to paper, becomes flat and often glossy under pressure, and retains its colour, or becomes a little darker.

A highly curious and interesting plant, which it is not possible to confound with any British alga. The only exotic one that comes near to it is the *Codium elongatum* or *Fucus tomentosus*, variety γ of Tur-

ner, of which a bad figure is given in the Dictionnaire des Sciences Naturelles. The frond in that species is compressed, dilatated at the axils, and towards the upper part becomes flat. Mr Turner's variety δ , a native of the Mediterranean, and six feet in length, is also referred by Agardh to his *Codium elongatum*, with which it hardly seems to accord.

Some individuals have regarded both this and the following species as belonging to the animal kingdom; and, if I mistake not, they are still so considered by a few naturalists. By early writers they were denominated Sponges. Their vegetable nature, however, seems now to be admitted as unquestionable by all who have made the *Algæ* their peculiar study.

Codium tomentosum is found in many parts of the world: it is common on the shores of the Mediterranean, and at the Cape of Good Hope; it occurs also in the Pacific Ocean, from the north-west coast of America, to the western shores of New Holland.

2. CODIUM BURSA.

Frond spherical hollow.

- Codium Bursa*, Ag. Sp. Alg. v. 1. p. 457. Syst. Alg. p. 178. Spreng. Sp. Pl. v. 4. p. 366.
Spongodium Bursa, Lamour. Essai, p. 73. Gall. Dict. Sc. Nat. v. 53. p. 376.
Lamarkia Bursa, Ollivi Zool. Adriat. p. 258.
Agardhia Bursa, Cabrera, according to Agardh.
Fucus Bursa, Turn. Hist. Fuc. t. 136. Sm. Eng. Bot. t. 2183.
Alcyonidium Bursa, Linn. Syst. Nat. p. 1295.

HAB. On rocks in the sea. Perennial? Summer. "Coast of Sussex, plentifully, *Pallas*" (*Turner*). Shores of Cornwall, *Mr Rashleigh*. Near Torquay, Devonshire, *Mrs Griffiths*. Near Belfast, *Mr Templeton*.

Root apparently none. *Frond* a globular, spongy, hollow ball, one to eight inches in diameter, composed interiorly of a spongy network of interwoven filaments, from which arise parallel, club-shaped, crowded filaments, radiating towards the circumference, and by their extremities forming the outer surface of the ball or frond. *Substance* soft and spongy. *Colour* a deep grass green, changing in decay to a brownish-white.

The fructification of this extraordinary plant has not been observed. It is very rare, and seems to be confined to the south-western shores of the Island. Both this and the last species imbibe water like a sponge, and are to a certain degree elastic, in consequence of being formed of myriads of inflated tubular filaments.

GENUS LII. BRYOPSIS, *Lamour.* Tab. XIX.

GEN. CHAR. Frond membranaceous, filiform, tubular, cylindrical, glistening, branched, the branches imbricated, or distichous and pinnated, filled with a fine green, minutely granuliferous fluid.

OBS. One of the most beautiful genera of the Marine Flora, and so perfectly natural, that it is most difficult to define the species. The substance of the frond is delicately thin and pellucid, and quite hyaline after the escape of the fluid colouring matter that fills the tube. The fructification is unknown, but, from analogy, we should expect to find it developed externally. When dried upon paper, it has a shining glistening appearance as if varnished. *Bryopsis Rosæ*, the most charming of the whole—a native of the Malouine or Falkland Islands, is twelve inches in length, and compared by Bory de St. Vincent to an Italian Poplar in miniature. The generic name is compounded from two Greek words, and expresses the resemblance which the species bear to some kinds of Feather-Moss.

I. BRYOPSIS PLUMOSA. Tab. XIX.

Frond filiform the branches scattered, spreading, once twice or thrice pinnated, the pinnæ approximated pectinate.

Bryopsis plumosa, Ag. Sp. Alg. v. 1. p. 448. Syst. Alg. p. 178. Grev. Fl. Edin. p. 307.
Bryopsis Lyngbyei, Fl. Dan. t. 1063. Lyngb. Hydroph. Dan. p. 75. t. 19. Spreng. Sp. Pl. v. 4. p. 365.

Bryopsis composita, Ag. Sp. Alg. v. 1. p. 451. Syst. Alg. p. 179.
Uva plumosa, Huds. Fl. Angl. p. 571. Sm. Eng. Bot. t. 2375.

HAB. On rocks and stones in the sea. Annual. Summer and autumn. On the coast of Devonshire at Exmouth, *Hudson*. Ilfracombe, *Dillwyn*. Coast of Anglesea, *Rev. H. Davies*. Shore at Yarmouth, *Mr Wigg*. In little rocky pools filled daily by the tide, at Cromer, *Mr Woodward*. Brighton, *Mr Borrer*. At Joppa in the Frith of Forth, *Dr Richardson*. Coast of Appin, *Captain Carmichael*.

Root composed of a few interwoven filaments. Frond one to three inches in length or more, the main stem scarcely half a line in thickness, mostly undivided, and generally naked towards the base, beset

with an indefinite number of branches; branches inconstant in their length, the lower ones one to three inches, naked towards their insertion, spreading horizontally, pinnated in distichous manner, the pinnæ mostly opposite, approximated, and often set with one or even two series of pinnulæ, each shorter than the preceding one. *Substance* membranaceous, somewhat gelatinous, very tender and delicate. *Colour* a bright grass-green. In drying the fluid green colouring matter collapses irregularly, and generally leaves the stem and branches pellucid. It adheres closely to paper, and shines as if varnished.

The young and simpler forms of this elegant plant resemble a feather, and in the more branched individuals, each branch suggests the same idea, the naked portion serving to represent the quill. The frond is singularly weak and flaccid. I do not possess any authentic specimen of *Bryopsis composita*, but having individuals of *B. plumosa* answering to the description of that species in the ramification of the frond, I cannot perceive any character by which they can be kept apart.

2. BRYOPSIS HYPNOIDES.

FronD slender very much branched, the branches long, the ramuli capillary irregularly inserted somewhat erect, the lower ones elongated.

Bryopsis hypnoidea, Lamour. Journ. Bot. 1809. p. 135. t. 1. f. 2, according to Agardh. Spreng. Sp. Pl. v. 4. p. 365.

Bryopsis Arbuscula, Ag. Sp. Alg. v. 1. p. 451. Syst. Alg. p. 179.

HAB. On rocks and stones in the sea. Annual. Summer and autumn. At Southernness (or Saturness), in the county of Kircudbright, *Sir William Jardine Bart.* Prestonpans, in the Frith of Forth, *Dr Hasell.*

FronD two to four inches long, very slender, cylindrical, branched in a lax bushy manner, the branches very fine, elongated, bearing one or two series of somewhat erect capillary scattered ramuli, arising without regularity, and in a scattered manner, the lower ones elongated. *Substance* tender, confervoid, and somewhat gelatinous. *Colour* a bright pale green. In drying, it adheres closely to paper, and shines as if varnished.

Although I have thought it right to give this plant a distinct place, I am not by any means convinced that it is not a variety of the preceding species. The habit is certainly different, and the ramuli are more

or less erect, and irregular in their insertion. I have, however, observed a want of uniformity more than once in the pinnulæ of *B. plumosa*, especially in large specimens, and the other characters may not be constant.

GENUS LIII. VAUCHERIA, *De Cand.* Tab. XIX.

GEN. CHAR. Fronds aggregated, tubular, continuous capillary, coloured by an internal green pulverulent mass. Fructification, dark green homogeneous vesicles (coniocystæ, Ag.) attached to the frond.

OBS. This most natural and well defined genus, was originally proposed by M. Vaucher, of Geneva, under the name of *Ectosperma*, in an excellent work, entitled "Histoire des Conferves d'eau douce." De Candolle, however, in compliment to the acumen of M. Vaucher, and with a view to perpetuate his name, denominated it *Vaucheria*. This arrangement has been universally admitted, except by M. Bory de St Vincent, who protests against the change. "Nulle bonne raison," he observes, "n'autorisant cette mutation qu'adoptèrent les botanistes peu versés dans l'hydrophytologie, (!) nous avons cru la devoir regarder comme non avenue dans notre Dictionnaire Classique d'Histoire Naturelle; et respectant une antériorité injustement méconnue, nous avons réservé le nom de M. Vaucher pour désigner un autre genre de lui, qu'il avait fort bien établi, mais assez mal à propos appelé *Prolifera*, désignation qui pêche contre les règles de la nomenclature."

The structure of the frond of *Vaucheria* is exactly similar to that of *Bryopsis*, and of the tubular filaments which compose the frond of *Codium*. Its precise nature, however, is not obvious, there being no traces either of cells or reticulations. The habit is that of the *Confervæ*: some float in masses in the water, others form an interwoven stratum on the surface of damp ground, the edge of waterfalls, or beneath the gentle trickling of springs. Many are branched in a dichotomous manner, others irregularly. The fructification, which is either terminal or lateral, is generally more or less spherical, and seems to consist only of a little case or vesicle, filled with a dense dark green pulverulent mass. When mature, it is deciduous, and the development of

the young plant has been frequently traced by means of the microscope.

One of the species of *Vaucheria* (*V. clavata*) is connected with an extraordinary theory, recently prevalent in Germany, that some vegetable bodies possess successively an animal and a vegetable nature, and that they pass from one state to the other without disorganization. This theory is considered to apply to the *Oscillatoria*, a tribe of *Algæ*, which exhibit a kind of motion; to the *Protococcus nivalis* or colouring matter of the Red Snow, and some other minute plants. The observations upon the *Vaucheria clavata* were made by M. Franz Unger. He watched the filaments till they developed their terminal vesicles; he saw the summit burst and the vesicle escape; but, instead of becoming at once quiescent as a vegetable organ might be expected to become, it swam about, in all respects like an animal endowed with voluntary locomotion. After having been exceedingly active for about the space of an hour, the globule slightly changed its form and colour, lost its apparent animality, became stationary, and in a short time put forth, first, a radicle, then a stem, fixed itself to the nearest substance, and in about eleven days bore fructification in its turn. These singular observations were many times repeated by M. Unger, with the same result. The subject is a curious one, and in whatever way the appearances are to be accounted for, they are exceedingly interesting, and should be farther investigated*.

* *Vesicles solitary.*

I. VAUCHERIA DICHOTOMA.

Frond setaceous dichotomous fastigiate, the vesicles solitary globose sessile.

Vaucheria dichotoma, Ag. Lyngb. Hydroph. Dan. p. 75. t. 19. Ag. Sp. Alg. v. 1. p. 460. Syst. Alg. p. 171. Grev. Fl. Edin. p. 305. Spreng. Sp. PL v. 4 p. 364.
Conferva dichotoma, Linn. Sp. PL p. 1635. Dillw. Brit. Conf. t. 15. Sm. Eng. Bot. t. 932.
 VAR. β , *submarina*, frond more slender, the vesicles ovate or elliptical.
Vaucheria dichotoma, var. *submarina*, Lyngb. Hydroph. Dan. p. 76. t. 20.

HAB. In ponds and ditches. Annual. Spring and summer. Common. Var. β . At Weymouth, *Rev. M. J. Berkeley*.

Plant growing at the bottom of ditches, and often filling them with its entangled matted nearly erect fronds, which are as thick as a hog's

* The reader will find the experiments of M. Unger detailed with more minuteness in the fourth number of the Magazine of Natural History.

bristle, a foot long or more, dichotomously branched towards the upper part. *Fructification* solitary, subglobose, sessile, dark green vesicles, scattered upon the branches, and visible to the naked eye. *Substance* membranaceous. *Colour* generally a pale transparent green, but sometimes dark and even blackish. In drying, it does not adhere to paper.

The largest of the genus, being sometimes two feet in length. Sir James E. Smith, from its size and appearance, conjectured it might even belong to *Chara*, and thought he saw some resemblance between the vesicles and the capsules of that genus. This, however, it is hardly necessary to observe, was quite an erroneous view: the species agrees in all its generic relations with the rest. After maturity, it separates from its attachment, and floats in faded and large masses on the surface.

The variety *submarina* is much finer in the frond, only a few inches long, and the vesicles mostly ovate-elliptical. My friend Mr Berkeley did me the favour to communicate a specimen from Weymouth.

2. VAUCHERIA DILLWYNII. Tab. XIX.

Fronds flexuose, forming a thin terrestrial stratum, the vesicles lateral sessile globose.

Vaucheria Dillwynii, Ag. Lyngb. Hydroph. Dan. p. 77. t. 21. Ag. Sp. Alg. v. 1. p. 464.

Syst. Alg. p. 173. Grev. Fl. Edin. p. 305.

Ceramium Dillwynii, Roth. Cat. Bot. v. 3. p. 117.

Conferva frigida, Dillw. Brit. Conf. t. 16.

HAB. On the ground in damp shady places, ditch-banks, &c. Annual. Spring and autumn. Very common.

Fronds scarcely more than an inch long, flexuose, irregularly branched, nearly of equal thickness throughout, obtuse at the extremity, forming a thin interwoven stratum. *Fructification*, scattered globose sessile vesicles, darker than the frond. *Substance* membranaceous. *Colour* a bright green.

A very common species on the bare soil under shady hedges and similar situations, forming a continuous stratum of a delightfully soft green colour.

3. VAUCHERIA TERRESTRIS.

Fronds straight, forming a lax somewhat bristly terrestrial stratum, the vesicles lateral hemispherical on the side of a horn-shaped peduncle or rather receptacle.

Vaucheria terrestris, De Cand. Ag. Sp. Alg. v. 1. p. 465. Syst. Alg. p. 173. Spreng. Sp. Pl. v. 4. p. 364. in part.
Ectosperma terrestris, Vauch. Conf. p. 27. t. 2. f. 3.

HAB. On the ground in moist shady places. Annual. Spring.

*Fronde*s more straight and rigid than in the preceding species, forming a more lax and less interwoven stratum, the summits of the little branches often erect, and giving the whole a bristly appearance. The filaments are about an inch in length, and irregularly branched, obtuse at the apex. *Vesicles* scattered, hemispherical, sessile, and situated laterally on little short horn-like processes or receptacles, which project at a right angle from the branches. *Substance* and *colour* similar to the preceding.

Professor Agardh has another species, *V. frigida*, similar in its habit and mode of growth to the two last. It is the *Vaucheria terrestris* of Lyngbye, and is distinguished by globose vesicles attached to a curved peduncle or receptacle. This plant has not come under my own observation; it seems, however, too nearly related to the species we have just described.

* * *Vesicles two or more together.*

4. VAUCHERIA SESSILIS.

*Fronde*s entangled in floating masses, vesicles oval sessile in pairs, with an intermediate little horn-like process.

Vaucheria sessilis, De Cand. Sm. Eng. Bot. t. 1765. Lyngb. Hydroph. Dan. p. 80. t. 22.
 Ag. Sp. Alg. v. 1. p. 466. Syst. Alg. p. 174. Spreng. Sp. Pl. v. 4. p. 364.
Ectocarpus sessilis, Vauch. Conf. t. 2. f. 7.

HAB. In pools and ditches. Annual. In the autumn, according to Agardh. In February, according to "English Botany," and Lyngbye.

*Fronde*s capillary, irregularly branched, several inches in length, forming broad patches, or floating masses on the surface of the water. *Vesicles* lateral, ovate or ovale, sessile, in pairs, with a little curved horn-like process between the individuals which form each pair. *Substance* membranaceous, slightly elastic. *Colour* a rather dull green.

Being destitute of authentic specimens, and having never found this plant myself, I am under the necessity of trusting to the descriptions and representations of others. Agardh quotes the figure in "English Botany" doubtfully, but it appears to agree sufficiently with the ac-

count of the species given by other writers. The specimens were communicated by Mr Borrer, from the county of Sussex.

5. VAUCHERIA ORNITHOCEPHALA.

Fronds capillary loosely branched entangled in dense floating masses, vesicles unilateral binate or quaternate oblique upon short straight peduncles with a short beak and pellucid border.

Vaucheria ornithocephala, Ag. Sp. Alg. v. 1. p. 467. Syst. Alg. p. 174. Grev. Fl. Edin. p. 306.

Conferva vesicata, Dillw. Brit. Conf. t. 74.

HAB. In pools and ditches. Annual. Autumn. Near Bristol, Mr Young. About Edinburgh.

Fronds forming dense, very intricate floating masses, branched at remote intervals, very slender, the branches spreading horizontally. Vesicles unilateral, mostly in pairs, sometimes quaternate, ovate, oblique, furnished with a pellucid limb, supported upon a short straight peduncle, and generally tipped with a short point or beak. Substance membranaceous, brittle. Colour dull or brownish-green.

Not an uncommon species in still waters. Filaments three to nine inches long, very fragile. The little beak at the summit of the vesicle gives it some resemblance to the head of a bird, whence the specific name.

6. VAUCHERIA GEMINATA. Tab. XIX.

Fronds dichotomous very slender forming dense floating masses, vesicles ovate opposite laterally pedunculate on a horn-shaped process or receptacle.

Vaucheria geminata, De Cand. Sm. Eng. Bot. t. 1766. Lyngb. Hydroph. Dan. p. 80. t. 23. Ag. Sp. Alg. v. 1. p. 467. Syst. Alg. p. 174. Grev. Fl. Edin. p. 306. Spreng. Sp. Pl. v. 4. p. 365.

Ectosperma geminata, Vauch. Conf. p. 29. t. 2. f. 5.

HAB. In pools and ditches. Annual. Summer. Sussex, Mr Borrer. In the neighbourhood of Edinburgh.

Fronds forming dense floating entangled tufts, very slender, somewhat tenacious, nearly straight, dichotomously branched. Vesicles

N

ovate, sometimes obovate, attached by means of little partial stalks to the side of a horn-like common stalk or receptacle: in general one pair of opposite vesicles is present; there are, however, sometimes two pair on the same common stalk, sometimes only a solitary vesicle: the summit of the common stalk is curled, often reflexed. *Substance* membranaceous, somewhat tenacious. *Colour* a rather light green.

A well marked species. It once existed in a tub of water in the old Botanic Garden of Edinburgh.

7. VAUCHERIA CÆSPITOSA.

Fronds subdichotomous forming dense spongy masses, vesicles in terminal pairs, the summit of the branch projecting beyond them.

Vaucheria cæspitosa, Ag. Lyngb. Hydroph. Dan. p. 81. t. 23. Hook. Fl. Scot. Pt. 2. p. 92. Ag. Sp. Alg. v. 1. p. 468. Syst. Alg. p. 174. Spreng. Sp. Pl. v. 4. p. 365.
Ectosperma cæspitosa, Vauch. Conf. p. 28. t. 2. f. 4.
Conferva amphibia, Dillw. Brit. Conf. t. 41.

HAB. On the margin of rivulets, the wood-work of mill-dams, and banks exposed to the constant trickling of water. Annual. At all seasons, but producing fructification in the spring. Very common.

Fronds densely interwoven into a widely spreading and thick spongy mass, the extremities of the branches often causing the surface to resemble the pile of coarse velvet. The branches appear to be irregularly dichotomous; it is impossible to ascertain the length of the filaments, they are so densely matted together; and their lower extremity loses its colour, and dies, while the upper part is in a state of progressive vegetation. *Vesicles* spherical, dark green, sessile, situated in opposite pairs just beneath the apex of the branches. *Substance* of the filaments tender and membranaceous. *Colour* a rich dark green, changing to a dirty white in decay.

One of the most common species of the genus, inhabiting places where there is a constant supply of trickling moisture, especially upon a muddy or clayey surface. The masses which it forms often become pendant by their own weight, holding water like a sponge, and presenting the most beautiful green surface. Immediately beneath the surface, however, the filaments become pale and at last colourless. When growing by the side of a rivulet, the frond occasionally loses its closely matted character, and is carried out for several inches. Dr

Hooker, in his *Flora Scotica*, has referred Dillwyn's *Conferva amphibia* to *Vaucheria ornithocephala*, but the figure given by Dillwyn is very characteristic, and, though destitute of fructification, accords entirely with our plant, as does also the description.

It is suggested by Agardh, that this species may be only a variety of *V. Dillwynii*, modified by situation: in confirmation of this opinion, he mentions that he has occasionally observed in that plant terminal pairs of vesicles, precisely similar to those of *V. cæspitosa*.

8. VAUCHERIA RACEMOSA.

Fronde capillary forming dense entangled floating masses, vesicles in pedunculate racemose clusters.

Vaucheria racemosa, De Cand. Lyngb. Hydroph. Dan. p. 82. t. 23. Ag. Sp. Alg. v. 1. p. 469. Syst. Alg. p. 175. Grev. Fl. Edin. p. 306. Spreng. Sp. PL v. 4. p. 365.
Ectosperma racemosa, Vauch. Conf. t. 3. f. 8.

HAB. In ponds and ditches. Annual. Summer. In the neighbourhood of Edinburgh.

Fronde very slender, several inches in length, floating in large entangled masses, flexuose, subdichotomously branched. Vesicles ovate, dark green, five in number or more, sessile or subsessile in a clustered manner upon a common peduncle or receptacle, given off at a right angle from the branches. Substance membranaceous. Colour a bright green.

This species is easily distinguished by the fructification. In mode of growth it most resembles *V. geminata*.

GENUS LIV. BOTRYDIUM, Wallr. Tab. XIX.

GEN. CHAR. Plant a spherical vesicular receptacle, filled with a watery fluid, dehiscent at the apex, terminating below in a radicate tuft of fibres.

OBS. Very little is known of the real nature of this plant. It associates so incongruously with the *Vaucheriæ*, that no botanist, consult-

ing the generic character, would ever think of looking for it among them. Agardh speaks of very short filaments descending from the vesicle, green in their upper part, but colourless below. The vesicle or receptacle certainly possesses a very short neck, which divides into two or three main branches, and the branches into fine fibres, but in no part resembling the filaments of the *Vaucheria*, any more than does the receptacle itself resemble the vesicles of those plants. I regret that I can offer nothing respecting this curious plant, beyond what is already known, having failed in my attempts to procure fresh specimens to examine, for this work, and no satisfactory analyses can be made from dried ones.

There is also another plant arranged doubtfully with the *Vaucheria* by Agardh, and unhesitatingly by Lyngbye and Sprengel. I allude to the *Conferva multicapsularis* of Dillwyn. According to Dillwyn, the frond is decidedly jointed: and the vesicles, as he has represented them, especially in his Supplement (tab. D. f. 4.) contain a number of distinct granules, similar to those which occur in *Monema*, *Schizoneema*, &c.

1. BOTRYDIUM GRANULATUM. Tab. XIX.

- Botrydium argillaceum*, Wallr. Ann. Bot. p. 153.
Hydrogastrium granulatum, Desv. Fl. Ang. p. 19.
Vaucheria granulata, Lyngb. Hydroph. Dan. p. 78.
Vaucheria radicata, Ag. Sp. Alg. v. 1. p. 465. Syst. Alg. p. 173.
Coccochloris radicata, Spreng. Sp. Pl. v. 4. p. 372.
Tremella granulata, Huds. Fl. Angl. p. 566. Sm. Eng. Bot. t. 324.
Ulva granulata, Linn. Sp. Pl. v. 2. p. 1633. Lightf. Fl. Scot. p. 976.

HAB. On damp clayey ground, dried up ditches and ponds, shady paths in gardens, &c. Annual. Spring and autumn. At Camberwell, on the mud of ditches and ponds, "*English Botany*." On the perpendicular banks of rivers and lochs in shady places, not unfrequent, *Lightfoot*. On borders and pathways in the Botanic Garden, Glasgow, *Hooker*.

Plant about the size of a large pin's head, sessile upon the surface of the ground, covering a large space in a densely crowded manner, composed of a hollow spherical vesicle or receptacle, not homogeneous as in the genus *Vaucheria*, but filled with a watery fluid, which escapes by an irregular terminal orifice. The receptacles at length collapse, become cup-shaped, and then cover the ground with a thin greenish crust, like that of some Lichens. At its under part, each receptacle

is terminated by a very short neck, which divides into a radiating tuft of pale fibres. *Substance* fragile and membranaceous. *Colour* a pale green.

The fructification of this plant is unknown. Does the watery fluid contain it? The structure of the receptacle seems to be minutely granular. By Lightfoot it is said to grow sometimes as large as peas. Those I have met with myself rarely exceeded the size of mustard-seed.

ADDITIONS AND CORRECTIONS.

Page 52. *Punctaria latifolia*. Since the description of this plant was printed, I have been indebted to Mrs Griffiths for more perfectly developed specimens, gathered by herself, at Torquay. Some of them are nearly three inches wide. The surface is covered with a minute and almost invisible fringe of colourless articulated filaments, about a line in length. The substance of these specimens, Mrs Griffiths describes as thick and gelatinous.

P. 70. *Polyides rotundus*. Some individuals of this species have been detected by Mrs Griffiths at Sidmouth, having the extremities of the frond somewhat thickened, and containing roundish dark coloured scattered granules imbedded in the surface. In such plants the ordinary spongy fructification is absent.

P. 88. *Rhodomenia polycarpa*. Under the description of this plant I have hazarded a query, whether it has any relation with the *Fucus Sarniensis* of Mertens, and stated Mr Arnott's opinion in favour of the question. Since that portion of my work was printed, I have procured a copy of the *Catalecta Botanica*, and have received an authentic specimen of *Fucus Sarniensis*, the handwriting of Professor Mertens being attached to it. I am thus enabled to say, that my plant is perfectly distinct from *Fucus Sarniensis*, which is really only a variety of *Rhodomenia palmata*, producing even the cloud-like *sori* of ternate granules belonging to that *alga*.

- P. 93. *Rhodomenia palmata*. A specimen found by Mrs Griffiths at Torquay, in December 1828, exhibits what appears to be a morbid state of the fructification, resembling minute imperfectly developed capsules, scattered equally over some of the segments; but nothing can be distinctly perceived on dissection, and the ordinary cloud-like spots of ternate granules are seen in the other segments of the same frond.
- P. 96. *Rhodomenia Teedii*. A specimen of this species, recently found by Mrs Griffiths on Tor Abbey Rocks, is seven inches in length and breadth.
- Page 104. *Rhodomela subfusca*. Mrs Griffiths finds both capsules and receptacles of ternate granules, on old plants, in February.
- P. 166. *Catenella Opuntia*. Erase the synonyme *Fucus caespitosus*, Stackh.

The *Systema Vegetabilium* of Professor Sprengel is, by mistake, quoted throughout as *Species Plantarum*.

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— <i>lanceolata</i> , L.	173	— <i>Hypoglossum</i> , Spr.	75
— <i>latissima</i> , L.	171	— <i>lacerata</i> , Spr.	83
— <i>ligulata</i> , Woodw.	162	— <i>ocellata</i> , Spr.	78
— <i>Linza</i> , L.	173	— <i>punctata</i> , Spr.	79
— <i>maxima</i> , Gunn,	31	— <i>ruscifolia</i> , Spr.	76
— <i>multifida</i> , Sm.	60	— <i>sanguinea</i> , Spr.	72
— <i>palmata</i> , Lyngb.	93	— <i>sinuosa</i> , Spr.	73
— <i>Pavonia</i> , L.	62	<i>Zonaria atomaria</i> , Ag.	58
— <i>plumosa</i> , Huds.	187	— <i>dichotoma</i> , Ag.	57
— <i>prolifera</i> , Fl. Dan.	180	— <i>multifida</i> , Ag.	60
— <i>purpurea</i> , Roth.	169	— <i>Pavonia</i> , Ag.	62
— <i>purpurascens</i> , Sm.	165	— <i>parvula</i> , Grey.	63
— <i>ramulosa</i> , Sm.	181	— <i>plantaginea</i> , Ag.	53
— <i>rubra</i> , Huds.	162	— <i>tenuissima</i> , Ag.	54
— <i>spongiformis</i> , Fl. Dan.	165		

PLATES.

EXPLANATION OF THE PLATES.

PLATE I. FUCOIDEÆ.

SARGASSUM. Fig. 1. Portion of the Frond of *S. vulgare*; natural size. 2. Portion of one of the Pinnæ. 3. An Air-vesicle divided. 4. Section of a portion of a Receptacle. 5. Seeds; magnified.

HALIDRYS. Fig. 1. The base and the extremity of the Frond of *H. siliquosa*. 2. Section of an Air-vessel; natural size. 3. Section of a Receptacle. 4. Filaments as they arise from the sides of the Loculi or cavities, with a Seed. 5. Filaments from the Loculi. 6. Seeds; magnified.

PLATE II. FUCOIDEÆ.

CYTOSEIRA. Fig. 1. Portion of the Frond of *C. granulata*; natural size. 2. The extremity of a small branch with two Receptacles, and an Air-vessel. 3. A transverse slice of a Receptacle. 4. Filaments arising from the side of one of the Loculi, with a Seed. 5. Seeds; magnified.

FUCUS. Fig. 1. The upper part of the Frond of *F. vesiculosus*; natural size. 2. Section of a Receptacle. 3. One of the Globules of Seeds and Filaments removed from the Receptacle. 4. The Filaments and Seeds of which the globules are composed. 5. The Filaments which issue from the pores on the surface of the Frond; magnified.

PLATE III. FUCOIDEÆ.

HIMANTHALIA. Fig. 1. An entire plant of *H. lorea*. 2. 2. Young plants; natural size. 3. A transverse slice of the Receptacle. 4. One of the Globules of Seeds and Filaments removed from the Receptacle. 5. Filaments and Seeds; magnified.

PLATE IV. LAMINARIÆ.

ALARIA. Fig. 1. The lower part of an immature Frond of *A. esculenta*. 2. One of the fructifying Leaflets of the stem of a mature plant; natural size. 3. Section of one of the Leaflets. 4. Seeds. 5. Filaments that issue from the minute pores on the surface of the Frond; magnified.

PLATE V. LAMINARIÆ AND SPOROCHNOIDEÆ.

LAMINARIA. Fig. 1. Fronds of *L. debilis*; natural size. 2. Appearance of the frond under the microscope.

DESMARESTIA. Fig. 1. Portion of the Frond of *D. ligulata*; natural size. 2. Portion of the Frond of *D. aculeata*. 3. Portion of the young frond of the same species; natural size.

PLATE VI. SPOROCHNOIDEÆ AND LICHINEÆ.

DICHLORIA. Fig. 1. Portion of the Frond of *D. viridis*; natural size. 2. Portion of a Branchlet. 3. Section of the Stem. 4. Cellular structure of the Stem. 5. Structure of the branches, cells intermixed with filaments; magnified.

SPOROCHNUS. *S. rhizodes*; Fig. 1. Portion of the Frond; natural size. 2. Portion of the Frond. 3. Transverse slice of the Frond, and one of the warts of fructification. 4. Filaments, with incrassated fructifying summits.—*S. pedunculatus*; Fig. 1. A branch; natural size. 2. One of the Receptacles terminated by its tuft of filaments. 3. Section of a Receptacle. 4. Filaments, with the

Receptacle from the centre to the circumference. 4. Seeds; magnified. 5. Termination of a Frond with the ovate-lanceolate tips; natural size.

POLYIDES. Fig. 1. and 2. A plant of *P. rotundus*, in fructification; natural size. 3. Section of the Frond and Fructification. 4. A portion of the same. 5. One of the clusters of Seeds surrounded by its pellucid limbus. 6. Seeds fixed by their base; magnified.

PLATE XII. FLORIDEÆ.

DELESSERIA. Fig. 1. Plant of *D. Hypoglossum*, with Sori, or spots of ternate granules. 2. A Leaf with a capsule; natural size. 3. Portion of the Frond, with sori. 4. Ternate Granules. 5. Capsule. 6. Seeds from the capsules. 7. Portion of the Frond, to shew the structure; magnified.

NITOPHYLLUM. Fig. 1. A portion of the extremity of the frond of *N. punctatum*, with spots of ternate granules. 2. One of the ultimate segments with capsules; natural size. 3. Portion of the frond with a capsule, and shewing also the highly reticulated structure. 4. A mass of seeds removed from the capsule, shewing them to be fixed to a gelatinous base, which forms the centre of the capsule. 5. Seeds detached. 6. Ternate granules; magnified.

RHODOMENIA. Fig. 1. Plant of *R. Palmetta*, with capsules. 2. Portion of a plant, with sori of ternate granules; natural size. 3. One of the Segments shewing the cloud-like manner in which the granules are scattered. 4. A portion of the same. 5. Ternate Granules. 6. A Capsule. 7. Seeds from the capsule; magnified.

PLOCAMIUM. Fig. 1. A small branch of *P. coccineum*, with capsules; natural size. 2. A Branch with pod-like Receptacles. 3. Pod-like Receptacles. 4. Granules from the receptacles, one of them separating into its ultimate parts. 5. A Capsule. 6. Seeds from the capsule; magnified.

PLATE XIII. FLORIDEÆ.

MICROCLADIA. Fig. 1. A Branch of *M. glandulosa*, with capsules. 2. Part of an entire plant, with ternate granules in the branchlets; natural size. 3. Portion of a Branch with a capsule. 4. Capsule removed from the involucre. 5. Seeds. 6. A Branchlet with ternate granules in the swollen ends. 7. Granules. 8. A portion of a Branch, to shew the reticulated appearance; magnified.

ODONTALIA. Fig. 1. A Branch of *O. dentata*, with capsules. 2. A Branch with pod-like Receptacles; natural size. 3. Capsules on their common peduncle. 4. Capsule. 5. Seeds. 6. Pod-like Receptacles, containing ternate granules. 7. Ternate Granules; magnified.

RHODOMELA. Fig. 1. A branch of *R. pinastroides*, with capsules. 2. Ramuli, with pod-like Receptacles; natural size. 3. One of the Ramuli, with capsules. 4. Seeds. 5. Pod-like Receptacles, containing ternate granules. 6. Ternate Granules. 7. A portion of a Branch, to shew the external articulated appearance. 8. A portion of the same, longitudinally divided, to shew that the articulated appearance is occasioned by the parallelism of the cellular structure; magnified.

BONNEMAISONIA. Fig. 1. A Branch; natural size. 2. A portion of a Branch, shewing the arrangement of the capsules and ramuli. 3. A Capsule. 4. The pedunculated compound Seeds, in their young and mature state. 5. A portion of the Stem, to shew the reticulation; magnified.

PLATE XIV. FLORIDEÆ.

LAURENCIA. Fig. 1. Termination of the Frond of *L. pinnatifida*, with capsules; natural size. 2. Portion of one of the Ramuli, with capsules. 3. Seeds. 4. Ramuli, with ternate granules. 5. Ternate Granules; magnified. Fig. 6. A plant of the cylindrical variety, with disk-like receptacles; natural size. 7. A portion of one of the branches. 8. A section of one of the disciform Receptacles. 9. One of the extraordinary bodies with which the receptacles are filled; magnified.—Fig. 10. A branch of a plant, with

fertile summits. 5. A portion of one of the terminating Filaments of the Receptacle; magnified.

LICHINA. *L. pygmaea*; Fig. 1. Tuft; natural size. 2. Part of an entire Frond. 3. A Capsule. 4. Portion of a transverse slice of the Capsule. 5. Seeds. 6. An old Capsule.—*L. confinis*; Fig. 1. Tuft, natural size. 2. An entire plant. 3. A Capsule. 4. A Capsule divided. 5. A transverse slice of the Capsule. 6. Seeds; magnified.

PLATE VII. CHORDARIEÆ AND DICTYOTEÆ.

CHORDARIA. Fig. 1. A small plant of *C. flagelliformis*; natural size. 2. Portion of the Frond shewing the minute Filaments with which it is covered. 3. A transverse slice shewing the cellular internal structure surrounded by the club-shaped fructiferous Filaments. 4. 4. Fructiferous Filaments; magnified.

CHORDA. Fig. 1. A plant of *C. Filum*. 2. A portion of the Frond artificially unrolled, to shew its spiral structure; natural size. 3. A small portion of the Frond, shewing its cellular structure, and the position of the fructification. 4. Portion of the Frond in fructification, shewing one of the transverse Septa. 5. Seeds; magnified.

PLATE VIII. DICTYOTEÆ.

DICTYOSIPHON. Fig. 1. Portion of the Frond of *D. fœniculaceus*; natural size. 2. Portion of the Frond taken from the main stem. 3. Small portion of the same, shewing the structure and fructification. 4. Seeds; magnified.

HALISERIS. Fig. 1. Plant of *H. polypodioides*; natural size. 2. Portion of the Frond, with one of the Sori or masses of fructification. 3. Seeds, from the same, one of them having escaped from its pellucid case. 4. A portion of the Frond having scattered seeds. 5. Seeds. 6. A portion of the Frond marked with map-like lines; magnified.

PLATE IX. DICTYOTEÆ.

ASPEROCOCCUS. Fig. 1. Plants of *A. echinatus*; natural size. 2. A portion of the Frond with a mass of fructification. 3. Seeds. 4. Apiculi, or short Filaments, with which the Seeds are intermixed; magnified.

PUNCTARIA. Fig. 1. Plant of *P. plantaginea*; natural size. 2. A portion of the Frond with Fructification. 3. Seeds; magnified.

STRIARIA. Fig. 1. Portion of a plant of *S. attenuata*, natural size. 2. Portion of the Frond, shewing the disposition of the fructification. 3. Portion of the Frond, with a group of Seeds. 4. Seeds; magnified.

PLATE X. DICTYOTEÆ.

DICTYOTA. Fig. 1. A portion of the Frond of *D. dichotoma*, with aggregated clusters of Seeds; natural size. 2. Portion of the Frond to shew the structure, and one of the clusters. 3. Cluster of Seeds, shewing the manner in which they are attached to the frond. 4. Seeds removed; magnified. 5. Portion of the Frond, with scattered Seeds; natural size. 6. Portion of the same. 7. Seeds; magnified.

PADINA. Fig. 1. Plant of *P. Pavonia*; natural size. 2. Portion of the Frond, to shew the structure. 3. A transverse section of one of the concentric lines of fructification. 4. Seeds; magnified.

CUTLERIA. Fig. 1. Part of a plant of *C. multifida*; natural size. 2. Portion of the Frond, in fructification. 3. A portion of the Frond, to shew the structure, composed of interlacing filaments within a reticulated membrane. 4. A piece of the external membrane. 5. A group of Capsules. 6. Capsules; magnified.

PLATE XI. FURCELLARIÆ AND SPONGIOCARPEÆ.

FURCELLARIA. Fig. 1. Plant of *F. fastigiata*, in fructification; natural size. 2. Section of a Receptacle. 3. A small portion of the

HALYMENIA. Fig. 1. A part of a frond of *H. ligulata* ; natural size. 2. Portion of the Frond. 3. Vertical section of the Frond, with globules of seeds. 4. A Globule of seeds. 5. Seeds ; magnified.

CATENELLA. Fig. 1. Tuft of *C. Opuntia* ; natural size. 2. A plant separated from the tuft. 3. A transverse section of the Frond ; magnified.

DUMONTIA. Fig. 1. The lower half of a plant of *D. filiformis* ; natural size. 2. A portion of the Frond, shewing the appearance of the internal masses of seeds. 3. The inner surface of the tubular frond, with the fructification attached to it. 4. One of the clusters of fructification, composed of obovate seeds ; magnified.

PLATE XVIII. ULVACEÆ.

ULVA. Fig. 1. Tufts of *U. furfuracea* ; natural size. 2. Fronds. 3. Portions of a Frond ; magnified.

PORPHYRA. Fig. 1. Plants of *P. linearis* ; natural size. 2. Base of the Frond. 3. Portion of the Frond ; magnified.

ENTEROMORPHA. Fig. 1. Plants of *E. compressa* ; natural size. 2. Portion of the Frond. 3. The same ; magnified.

PLATE XIX. SIPHONÆ.

CODIUM. Fig. 1. Part of a Frond of *C. tomentosum*, in its barren state ; natural size. 2. A transverse section of the frond. 3. Filaments of which the frond is composed ; the club-shaped ones form the circumference ; magnified. 4. A portion of the Frond in fructification ; natural size. 5. Fertile filaments, with fructification (vesicular capsules) arising from the club-shaped filaments. 6. One of the vesicular capsules ; magnified.

BRYOPSIS. Fig. 1. A plant of *B. plumosa* ; natural size. 2. Extremity of a branch. 3. Part of a Branch, with portions of the pinulæ ; magnified.

VAUCHERIA. Fig. 1. Tuft of *V. Dillwynii*; natural size. 2. Filaments with fructification; magnified. 3. Filaments of *V. geminata*; natural size. 4. Portion of a Filament, with fructification. 5. A Peduncle, with vesicular capsules; magnified.

BOTRYDIUM. Fig. 1. A group of plants of *B. granulatum*; natural size. 2. Plants growing. 3. A plant with its root. 4. Old plants collapsed, and become concave; magnified.

FINIS.

large spurious capsules ; natural size. 11. One of the Ramuli, with similar capsules. 12. One of the same capsules, discharging from the orifice the bodies with which it is filled, and which precisely resemble those in the disciform receptacles ; magnified. Fig. 13. A small Branch of *L. dasyphylla* ; natural size. 14. One of the Ramuli with capsules. 15. Seeds. 16. One of the ramuli with ternate granules. 17. Ternate Granules ; magnified.

GASTRIDIDIUM. Fig. 1. A Branch of *G. ovale* ; natural size. 2. Portion of a Branch, with capsules. 3. Capsule. 4. Seeds. 5. Ramuli, with ternate granules. 6. Ternate Granules. 7. One of the Ramuli elongated, and contracted in the manner of *G. kaliforme* ; magnified.

GRACILARIA. Fig. 1. Tuft of *G. erecta*, with capsules. 2. Tuft with pod-like Ramuli containing granules ; natural size. 3. Termination of one of the Fronds, with capsules. 4. Capsule. 5. Seeds. 6. One of the pod-like Ramuli. 7. A transverse slice of the same organ, shewing the structure and the manner in which the granules are imbedded. 8. The oblong simple or at most binate granules ; magnified.

PLATE XV. FLORIDEÆ.

PHYLLOPHORA. Fig. 1. Part of a plant of *P. rubens*, with capsules ; natural size. 2. Capsule. 3. Part of a capsule divided. 4. Seeds ; magnified. 5. A portion of a Frond, with peltate, nemathecium-bearing leaves ; natural size. 6. One of the peltate leaves removed, and viewed from beneath, shewing the mass of nemathecium at its base. 7. Filaments or nemathecium ; magnified.

CHONDRUS. Fig. 1. Plant of *C. crispus*, with capsules ; natural size. 2. Segment, with capsule. 3. A Segment and Capsule vertically divided. 4. Seeds ; magnified.

SPHÆROCOCCLUS. Fig. 1. A small Branch of *S. coronopifolius*, in fructification ; natural size. 2. Portion of a Branch, with capsules. 3. A Capsule. 4. A Capsule divided. 5. Seeds. 6. A portion of a Branch, to shew the venation ; magnified.

GELIDIUM. Fig. 1. A plant of *G. corneum* ; natural size. 2. Termination of a Frond, with capsules in the ramuli. 3. One of the Ramuli, with a capsule. 4. Seeds. 5. Termination of a Frond, with ternate granules in the ramuli. 6. One of the Ramuli. 7. Ternate granules ; magnified.

PLATE XVI. FLORIDEÆ.

GIGARTINA. Fig. 1. A Branch of *G. acicularis*, in fructification ; natural size. 2. One of the Ramuli, with a capsule. 3. Section of a Capsule. 4. Seeds ; magnified.

GRATELOUPIA. Fig. 1. Plant of *G. filicina* ; natural size. 2. A portion of one of the Pinnæ, with tubercles. 3. The same. 4. Seeds ; magnified.

CHÆTOSPORA. Fig. 1. A Branch of *C. Wiggii* ; natural size. 2. Part of a Branchlet. 3. One of the Ramuli (receptacles?). 4. A transverse section of the Receptacle, the seeds supposed to be lodged in the centre. 5. The Filaments which radiate from the centre of the receptacle. 6. Section of the stem of the frond ; magnified.

PTILOTA. Fig. 1. Part of a plant of *P. plumosa* ; natural size. 2. A portion of a Branch, with one of the pinnæ in fructification. 3. One of the Involucre containing three capsules. 4. A Capsule. 5. Seeds. 6. Termination of one of the Pinnulæ ; magnified.

PLATE XVII. GASTROCARPEÆ.

IRIDÆA. Fig. 1. A young plant of *I. edulis*. 2. A small portion of the Frond in fructification ; natural size. 3. portion of the Frond in fructification. 4. Vertical section of the Frond, with globules of seeds. 5. One of the Globules of seeds. 6. Seeds ; magnified.



Sargassum

R.K.G. del.

S. vulgare



Halidrys

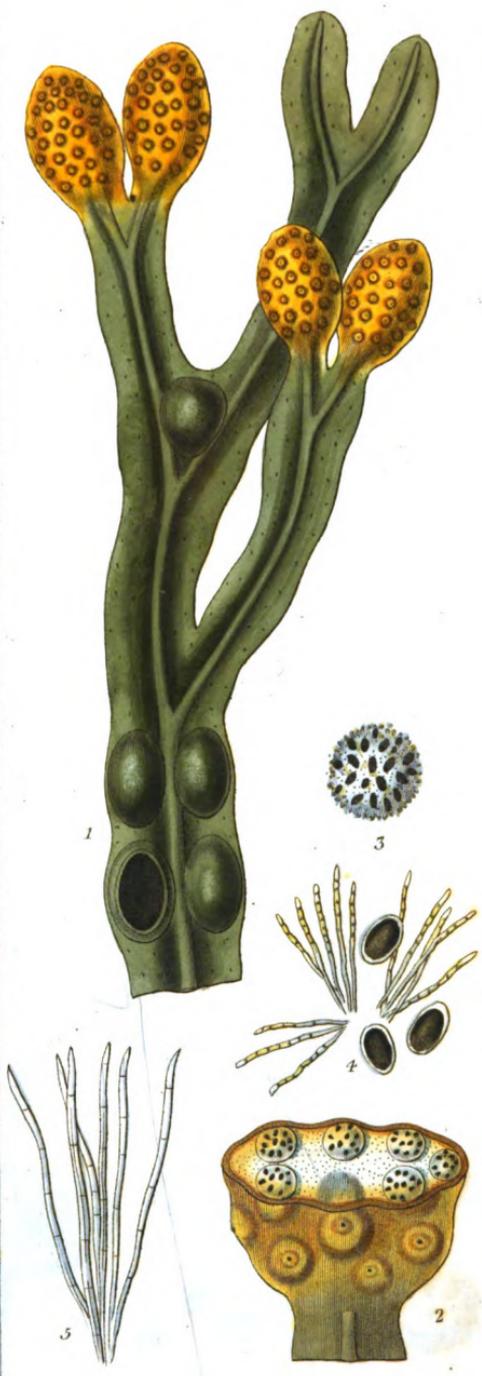
H. siliquosa

Swan Sc.



Dictyosira. C. granulata.

R. K. G. del.



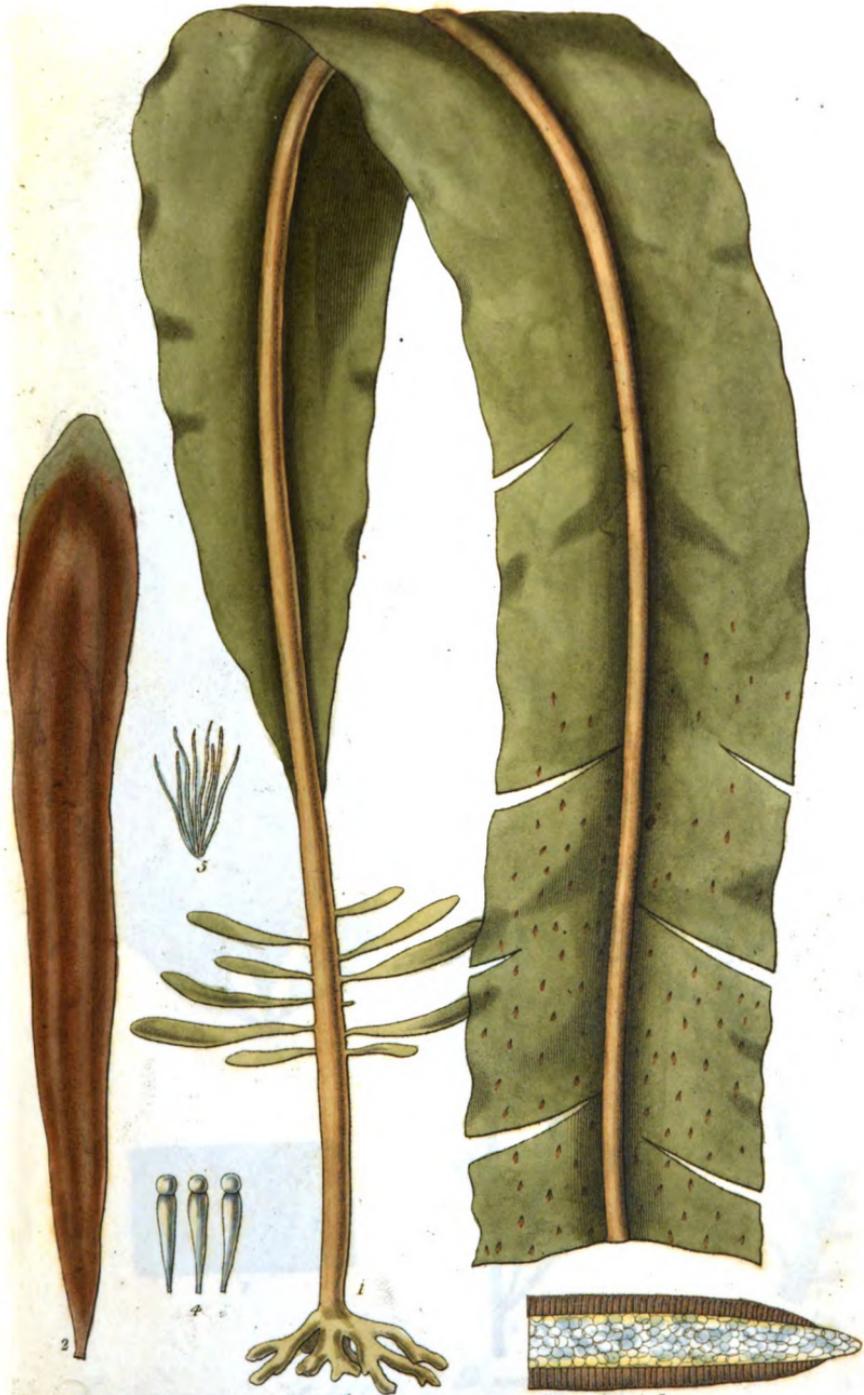
Fucus. F. vesiculosus.

Swan. Sc.



Himantalia.

H. lorea.



Alaria!

A. esculenta!

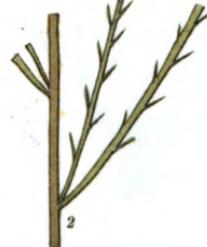


2

Laminaria. L. debilis.



3



2

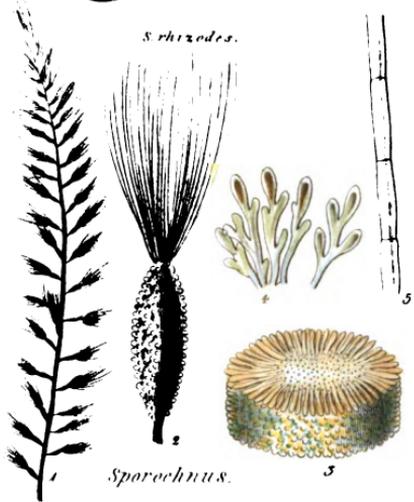
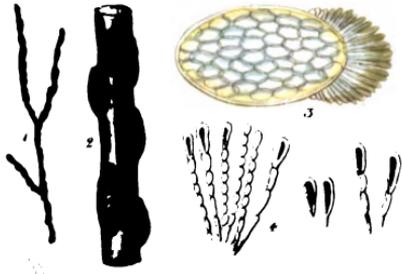
D. aculeata.

Desmarestia.



Gelidaria

G. viridis



S. rhizodes

Sporochneis

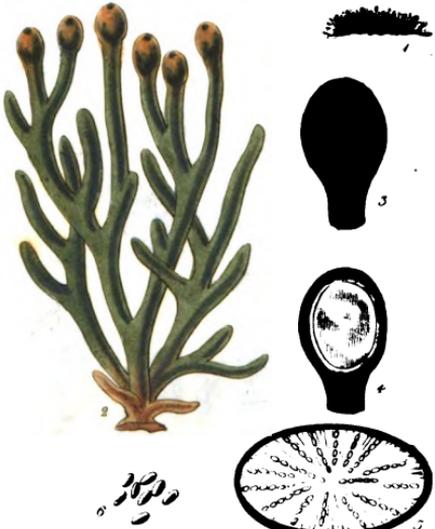
S. pedunculatus

LICHINEÆ



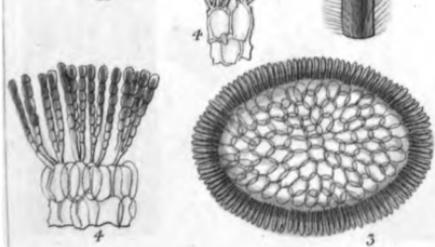
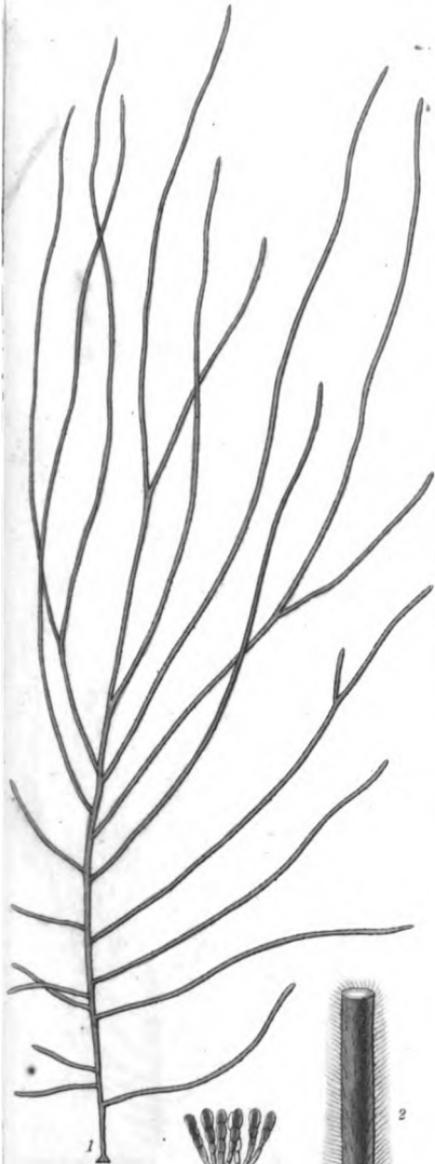
Peltigera
H.K. del.

Peltigera

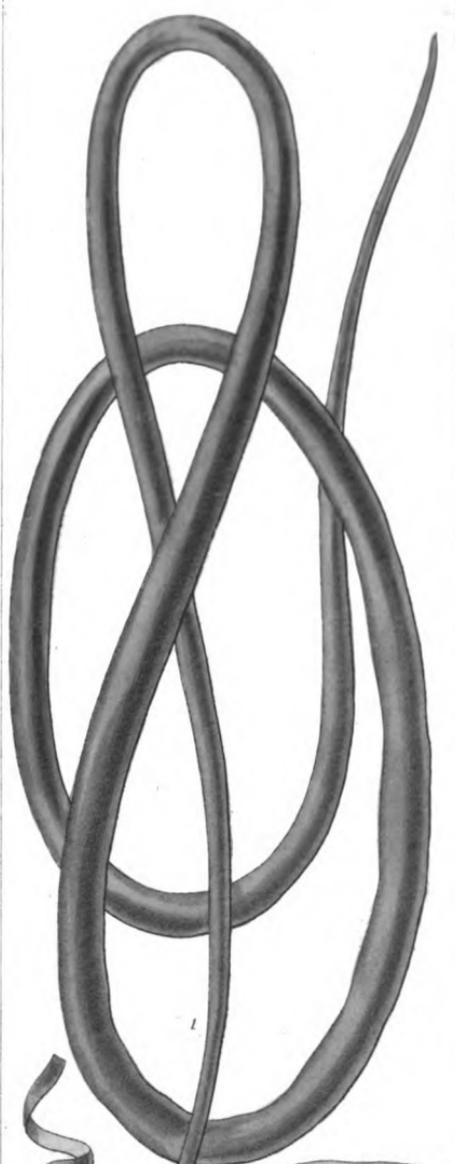


P. confinis

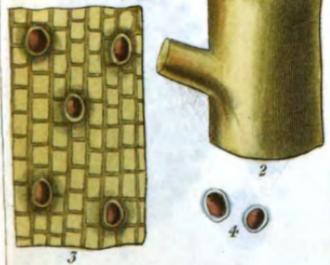
Scap. Sc.



Chordaria. C. flagelliformis.



Chorda. C. filum.



Dictyosiphon.
D. fasciculatus.



Halysericus.



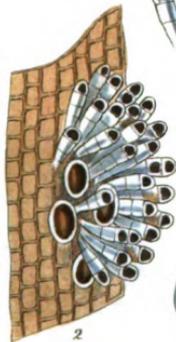
L. polypodoides.



1



4



2



3

A. echinatus
Asperococcus



1

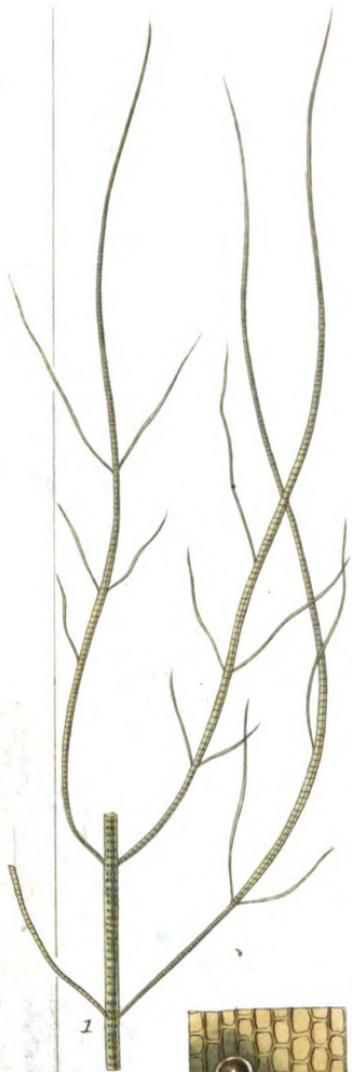


3



2

P. plantaginica
Punctaria



1



3

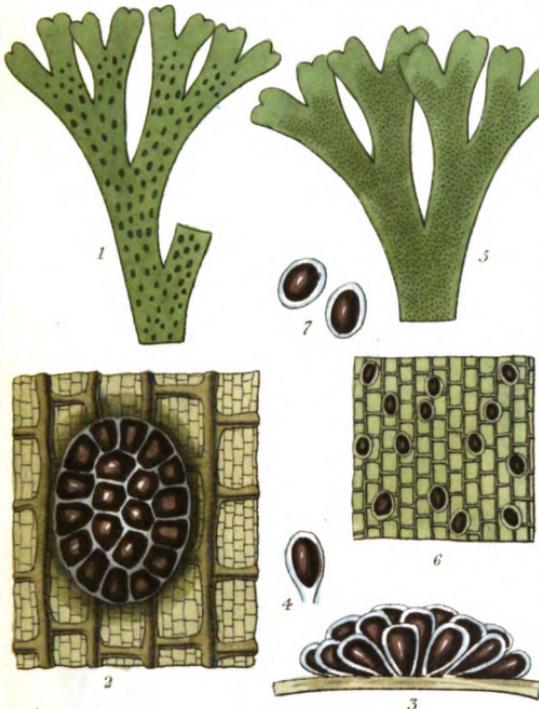


2



4

S. attenuata
Staurium



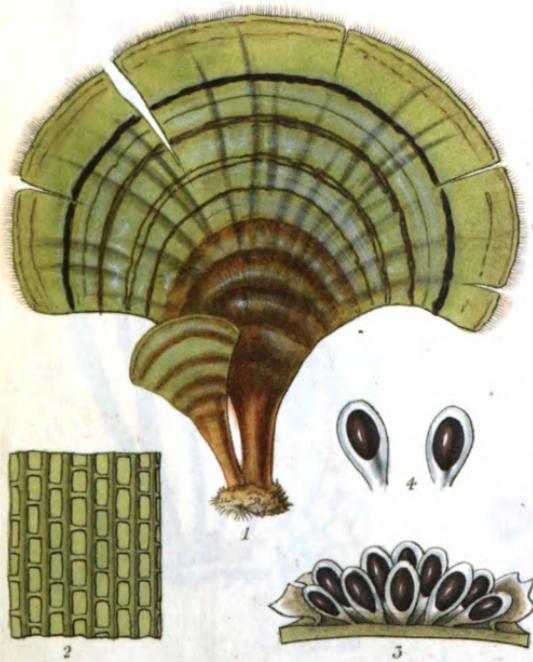
Dictyota.

D. dichotoma.



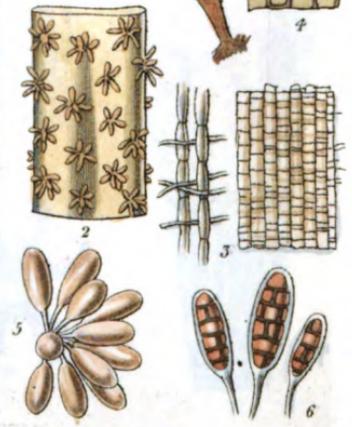
1

4



Padina.

P. Pavonia.



1

2

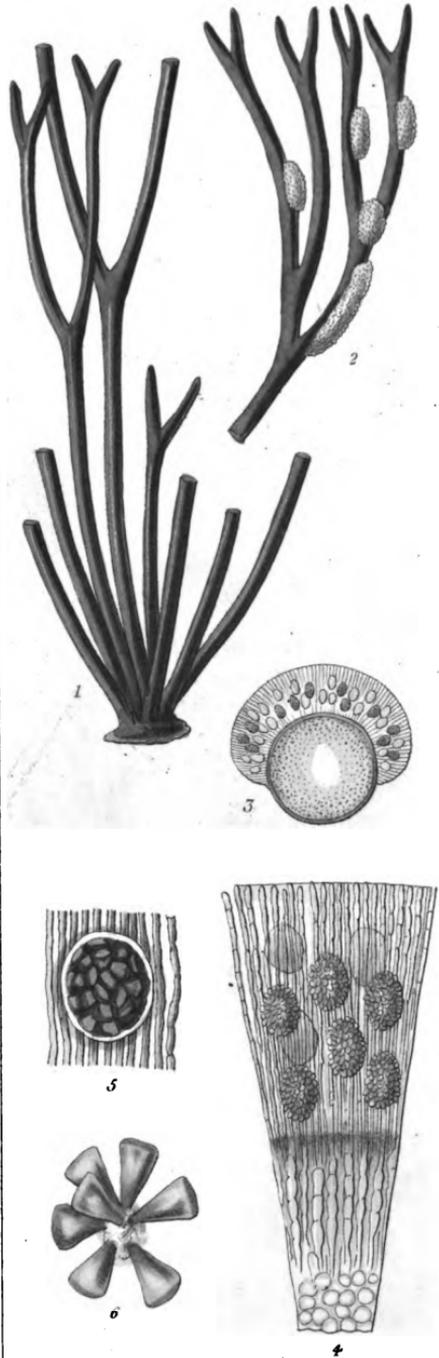
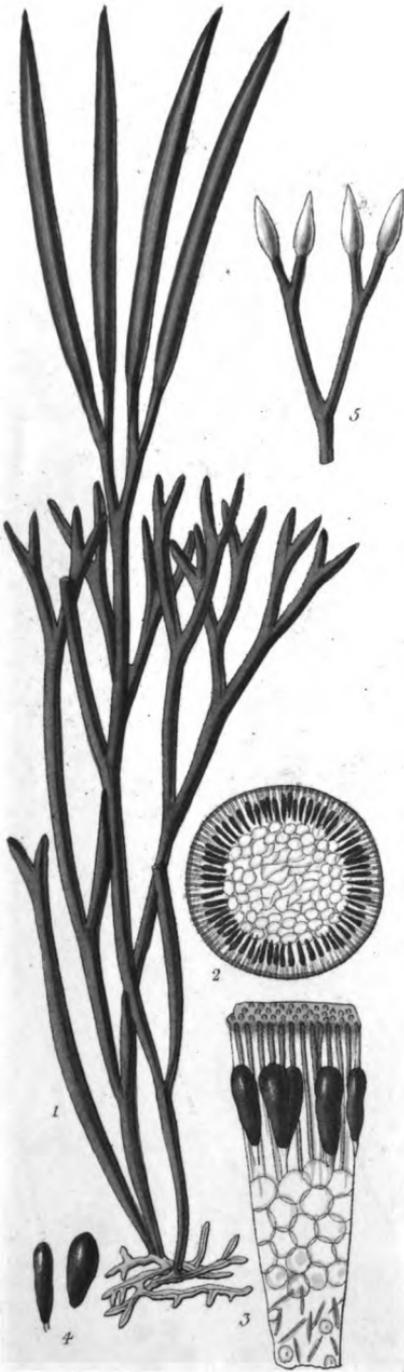
3

5

6

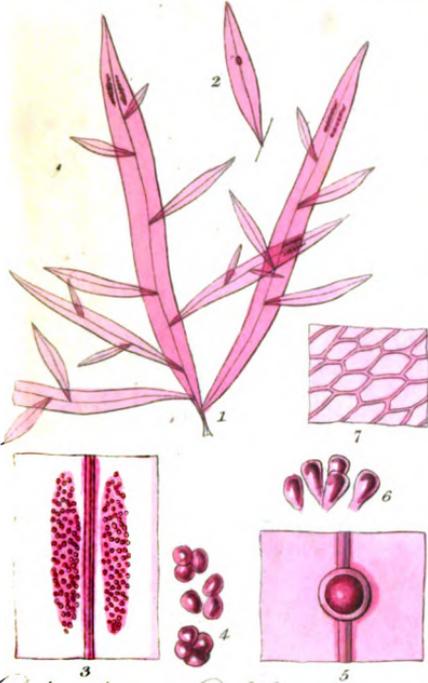
Cutleria.

C. multijida.

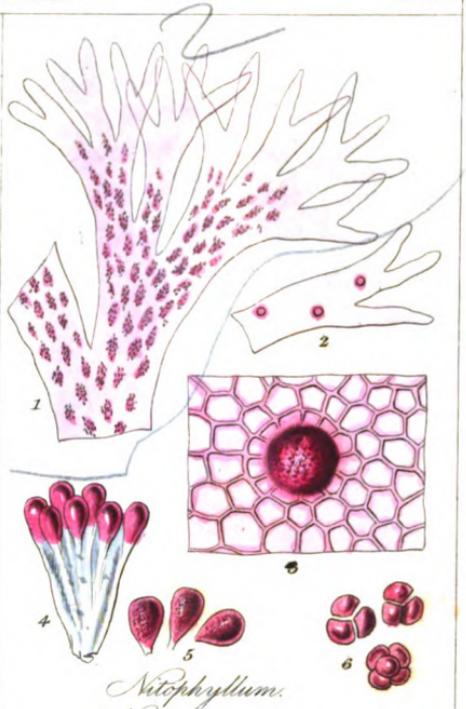


Furcellaria. F. fastigiata.

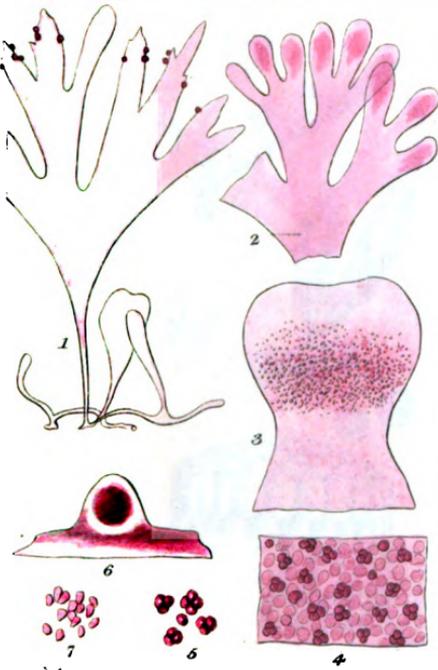
Polydes. P. protundus.



Delasseria. *D. Hypoglossum.*



Nitophyllum.
N. punctatum.



Rhodomenia. *R. Palmella.*

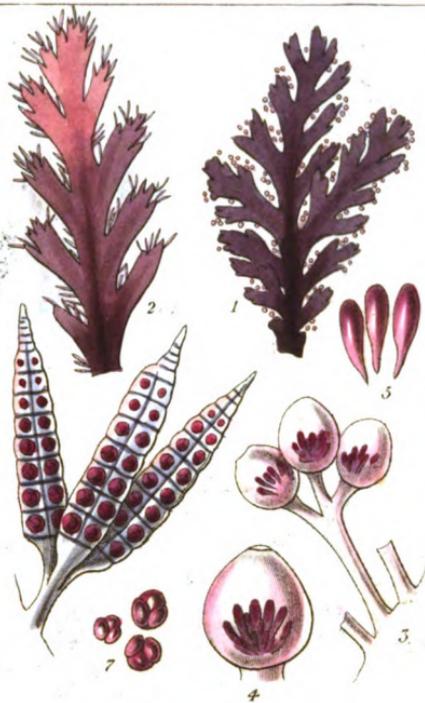


Plocamium. *P. coccineum.*

R.R. G. del.



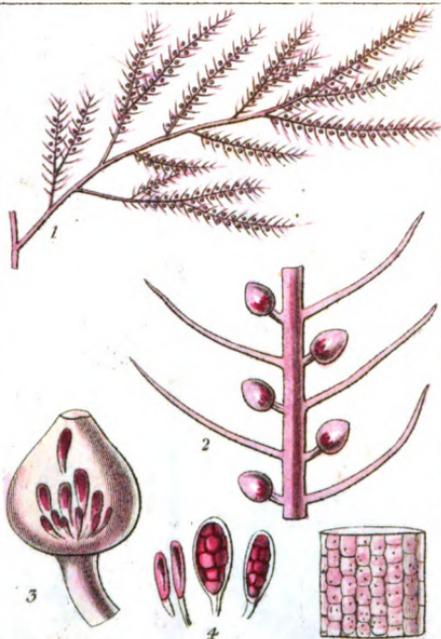
Microcladia. M. glandulosa.



Odonthalia. O. dentata.



Rhodomela. R. pinastroides.



Bonnemaisonia. B. asparagoides.

100

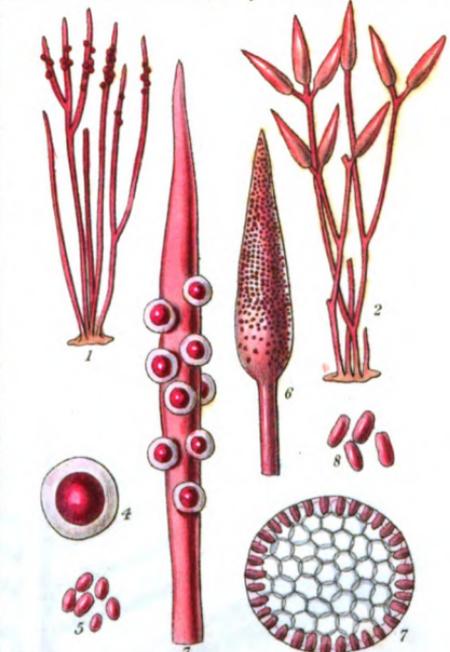
100



Laurencia. 1-12 *L. pinnatifida*. 13-17 *L. dasyphylla*.



Chondria. *C. ovalis*.



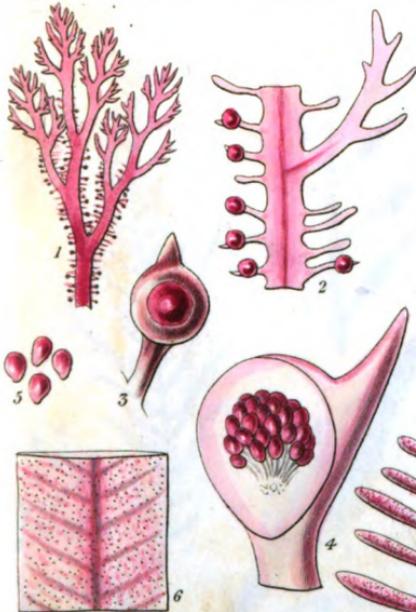
Smicilaria. *S. erecta*.



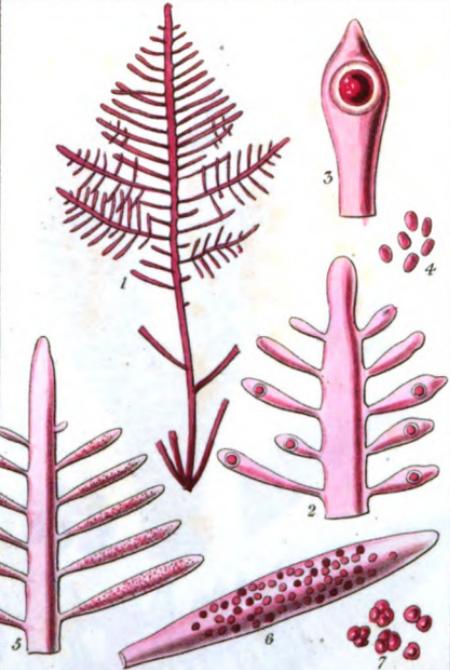
Phyllophora. *P. rubens.*



Chondrus. *C. crispus.*



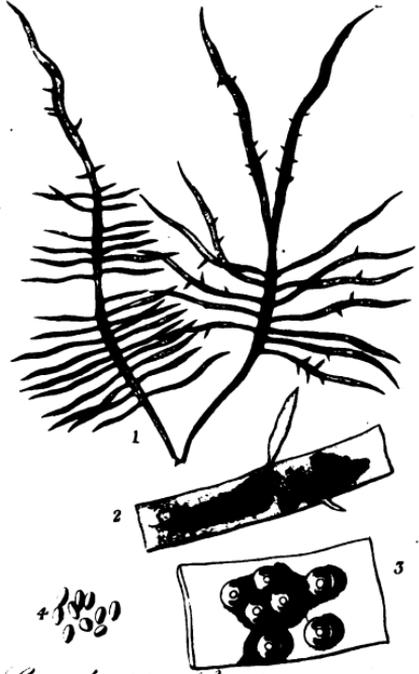
Sphaerococcus. *S. coronopifolius.*



Gelidium. *G. corneum.*



Sigartina. S. acicularis.



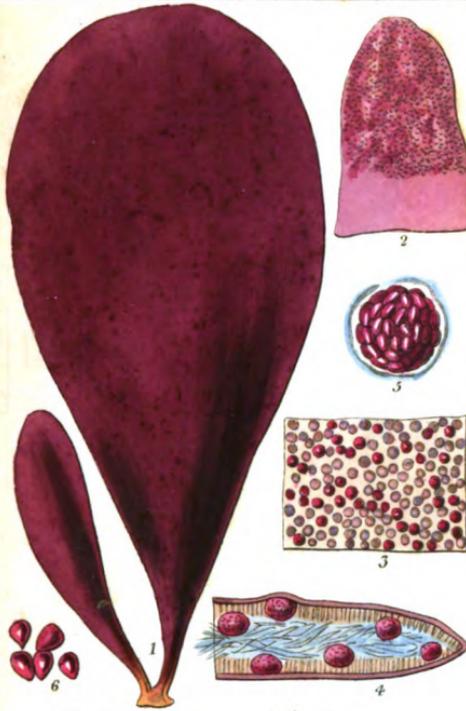
Grateloupia. G. filicina.



Phytospora. P. Hoggii.



Ptilota. P. plumosa.



Iridaea.

I. edulis.



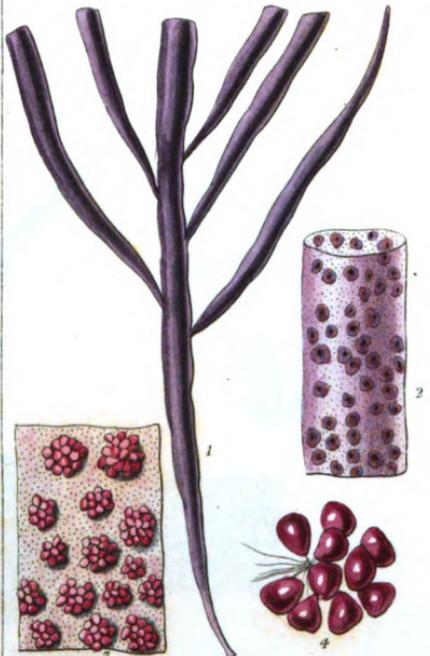
Halymenia.

H. ligulata.



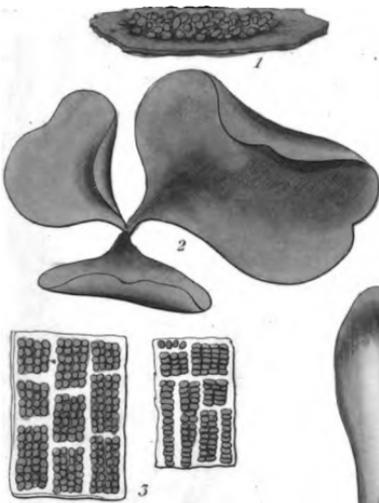
Costenella.

C. opuntia.

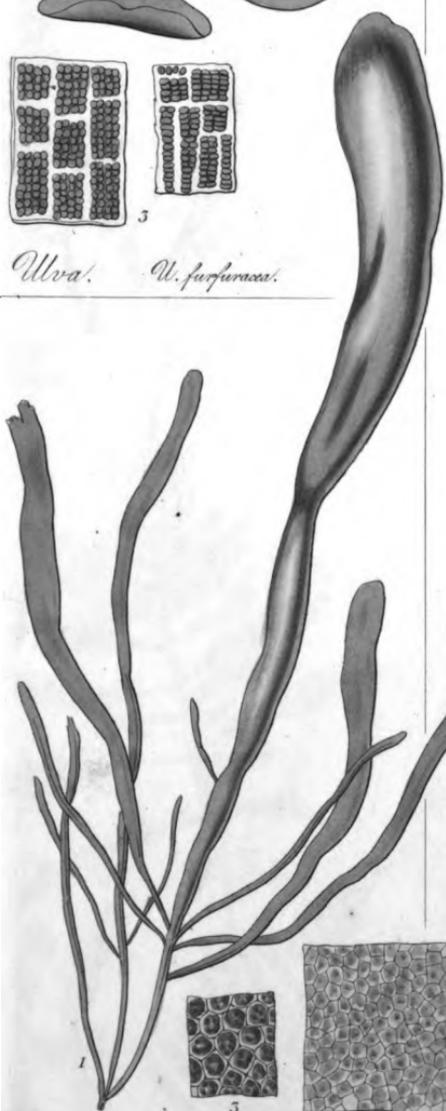
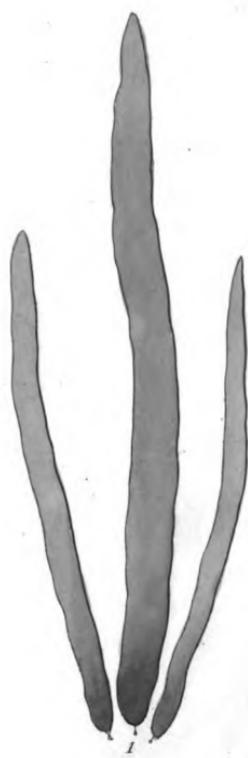


Dumontia.

D. filiformis.



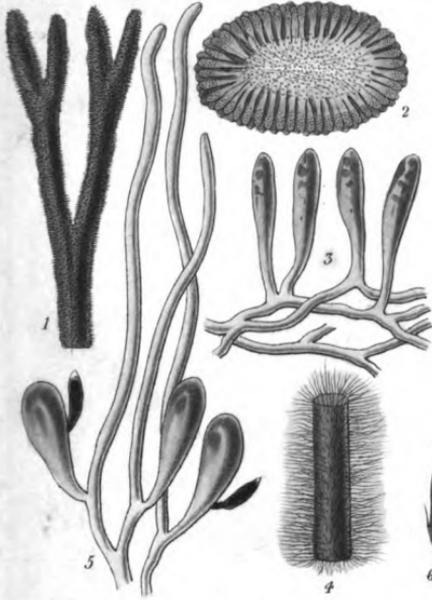
Ulva. U. furfuracea.



Enteromorpha: E. compressa.

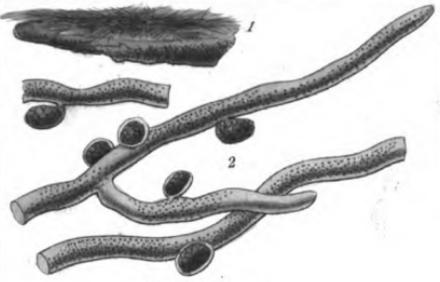


Porphyra: P. linearis.



Codium!

C. tomentosum!



V. Dillwynii!



Vaucheria!
V. geminata!

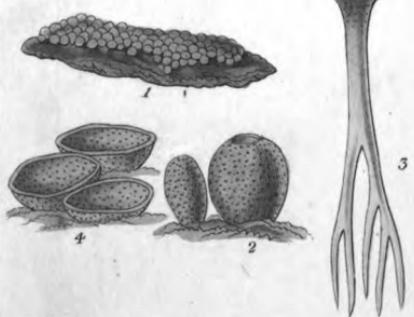


1



Bryopsis!

B. plumosa!

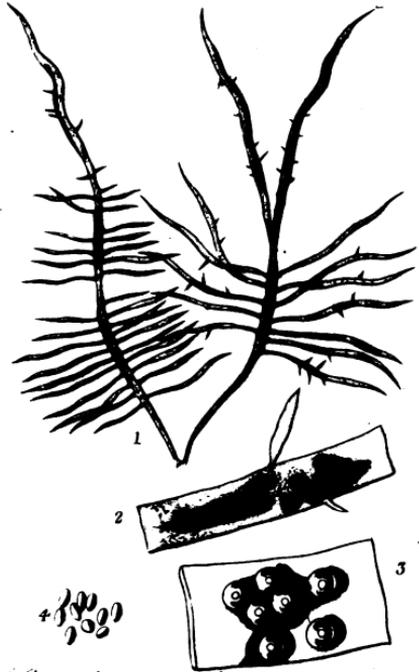


Botrydium!

B. granulatum!



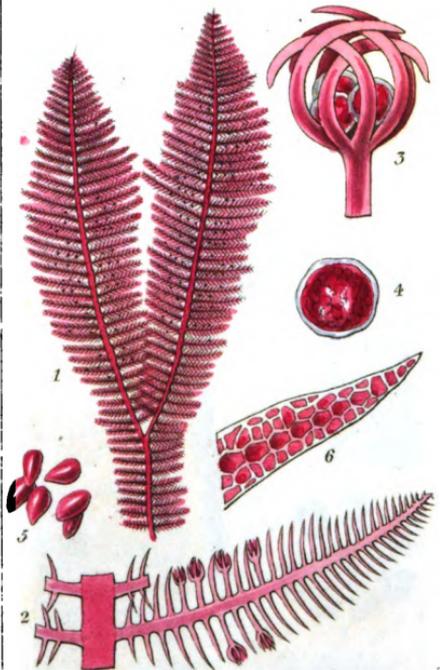
Sigartina. S. acicularis.



Grateloupia. G. filicina.



Rhodospora. R. Wiggi.

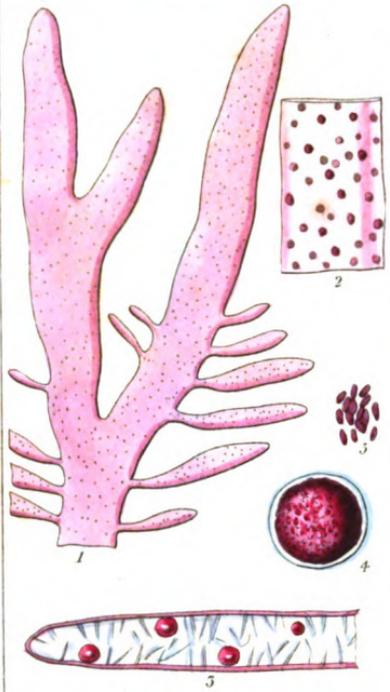


Ptilota. P. plumosa.



Iridacea.

I. edulis.



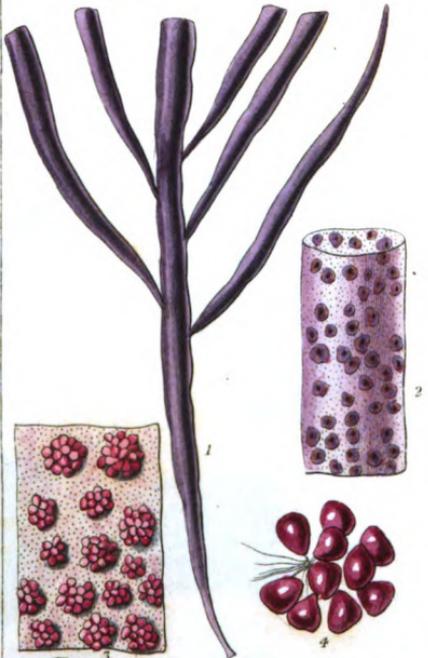
Halymenia.

H. ligulata.



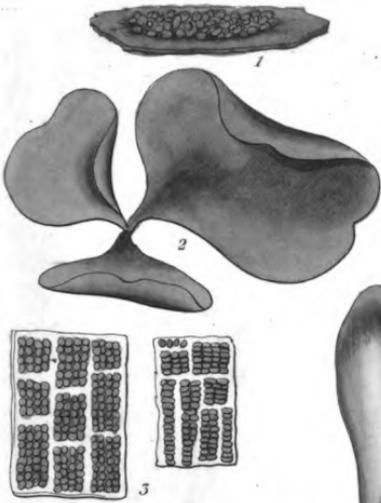
Catenella.

C. punctata.

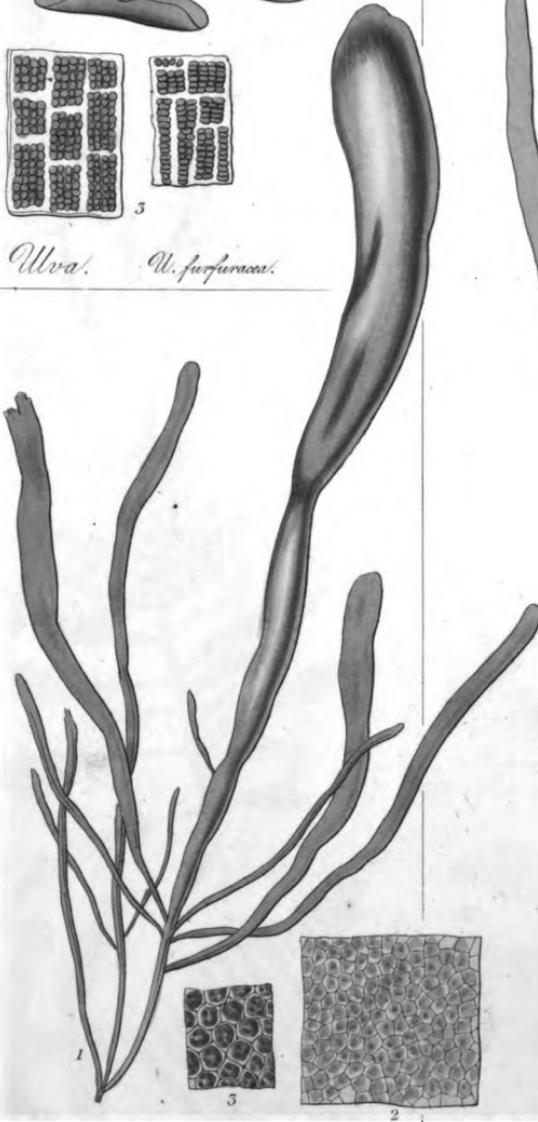
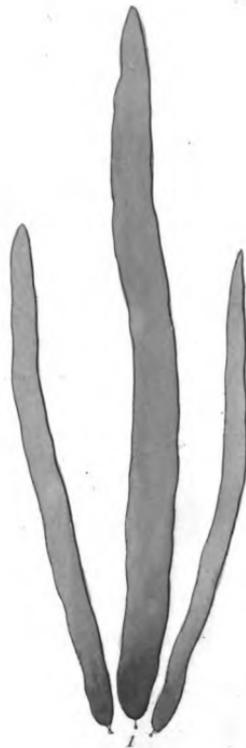


Dumontia.

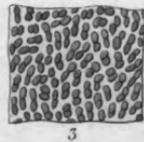
D. filiformis.



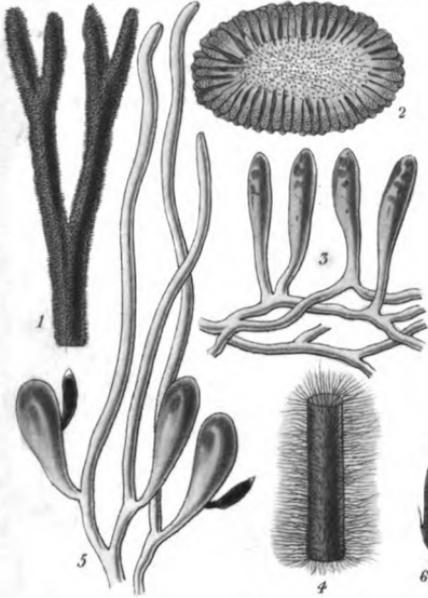
Ulva furfuracea.



Enteromorpha complexa.

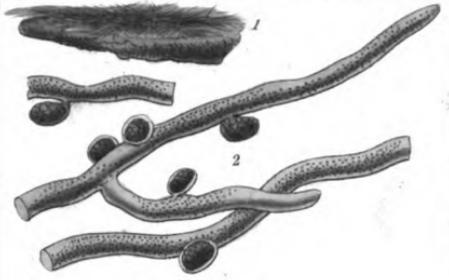


Porphyra linearis.

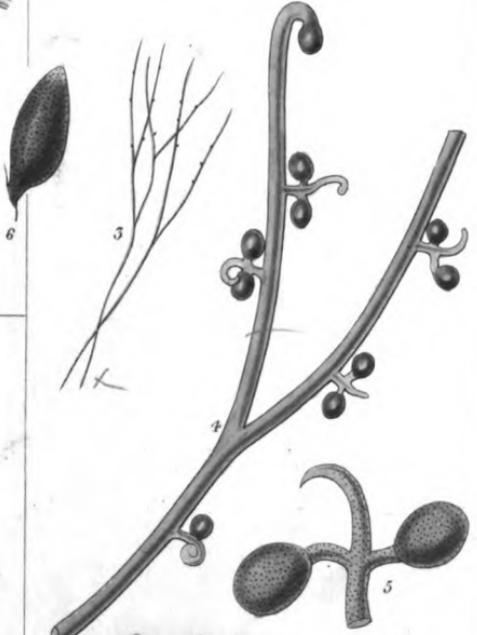


Codium!

C. tomentosum!



V. Lillwynii.

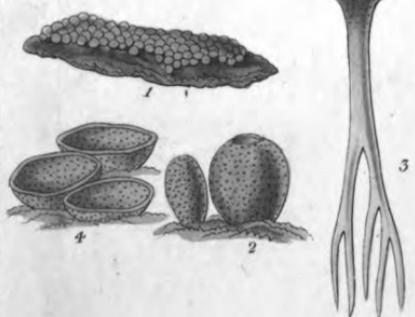


Vaucheria!
V. geminata.



Bryopsis!

B. plumosa.



Botrydium!

B. granulatum!

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