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SEA-WEEDS.

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ONCE, the plants which grow in the sea were considered of no value, and therefore were called weeds; a term applied to all kinds of vegetation which interferes with the regular crops of the agriculturist. Later and better inquiry had from time to time exhibited the immense value of these sea-plants; but the term, in its odious signification, remains attached to them, as does likewise the classical name which botanically expresses this family, the ALGÆ of Jussieu, and the *Alga vilis* of the great and familiarly read Latin poet.

It would be impossible to state definitely the number of kinds of sea-weeds to be found in the waters of the globe, and every year adds some quite new to science, either in difference of form or else in specific points.

The Algæ belong to a vast order of plants known as flowerless; but only so, because the organs which are large and prominent in most other plants, are in these rudimentary and minute, requiring the most patient research with the microscope to detect them.

Yet notwithstanding the difficulty of finding the floral parts of these so-called flowerless plants, there are portions of the sea-weeds which bear, at certain seasons of the year,

little bodies containing definitely formed granules which answer for seeds; and on these characters, varying in each genus, the study and arrangement of the several species to a great degree depends. It is obvious, then, that colored plates, or even dried specimens, would be of little value in determining our native species, unless something more than a mere comparison of their external aspect was made.

The sea-weeds have no roots, many float upon the surface of the ocean, and others, firmly affixed to the bottom or to stones and shells, are only anchored for security; their nourishment being derived from the atmosphere, and from the water in which they are periodically or continually immersed.

The narrow and threadlike, or it may be the broad and thickened plant, equally consists of a frond, a word derived from *frons* (Latin), meaning leaf: this frond may be simple or undivided, or cut into many coarser or finer portions, sometimes with great beauty. The color of the frond is usually either green, olive or black and red, varying in intensity, the most beautiful being the different shades of red; those with the paler tints, or with yellow and white, being partially bleached and in an incipient stage of decay.

What we notice in terrestrial vegetation as we ascend from the level of the sea to the summit of mountains, in the belts or zones of plants, certain species growing only in certain conditions of temperature, we can find reversed in the sea-weeds, the finer and more beautiful kinds growing only in deep water, and where the temperature is uniformly low and cold. Collectors of sea-weeds, accordingly, avail themselves of the dredge, or of low tides, or of fierce storms, by which latter agency the deep-water species, torn from the bottom, are cast upon the shore.

If we should visit the rocky coasts of Massachusetts, at Nahant, Swampscot, Marblehead, Cohasset, etc., etc., we should find the shallow pools made by the receding tide filled with the following kinds of Algæ, which, as some are little noticed, may be worth looking at.

Coating the surface of the wet rocks, like a short pile of green velvet, grows the *Calothrix scopulorum;* tread warily upon it lest you catch an unpleasant fall from its sliminess; it will reward you if looked at through the microscope. The surface of the rocks where it shows beneath the water is rich with crimson, owing to the *Hildenbrandtia sanguinea*, a species which I detected in company with a submarine lichen, a dark olive-green crustaceous species, the *Verrucaria maura*, the former being unknown to Professor Harvey as a North American plant when he published his Nereis Boreali-Americana, which describes our sea-weeds. In similar tide-pools I found, at Marblehead near the fort, the singular *Peysonella orbicularis;* and on smooth pebbles under the water, circular patches of a pale-pink crust, which are the *Melobesia*. These, cut with a sharp knife into very thin slices across the warts which rise from the surface of the patches, will show, when magnified, the seeds lodged in minute cavities and the cellular structure of the frond. Lining the sides of these basins are the pretty coral sea-weeds, which fade so soon after drying, once thought to be, and described by Lamaroux, as animals, but now known as lime-bearing sea-weeds (*Corallina officinalis*), the actual frond being covered with a calcareous crust, which the plant has extracted and secreted from the sea. Throw a tuft of it into some diluted muriatic acid, the plant within will be revealed! The seed-vessels are elegantly formed, urn-shaped, but closed caskets, on the very tips of the branches.

Here also grow the glossy green *Cladomorpha*, and the fistulous, swollen *Enteromorpha*, both of many kinds; and where the water is brackish, like the broad overflowed ditches on the salt-marsh in rear of the beach, may be seen in vast floating masses, smooth and slimy, or bullate and bladdery, of a pale yellow-green tint in the sun, and white and like paper when lying dry and dead on the grass, the *Conferva flavescens*, which, taken up by the winds and

transported far into the interior, as once in Europe, was collected on falling in a rain-tempest, and deposited in some royal museum as meteoric paper! Rising with stiff, bristly, and sharp-pointed and jointed dark-green filaments, may be seen, in the deeper and colder tide-pools, the *Chætomorpha melangonium*, looking rich and inviting to the eye; and, lining the bottom, may be detected the dwarfer forms of the Carrageen, or *Chondrus crispus*, and its relative and neighbor the *Gigartina mammillosa*, with its channelled, forked, lobed frond, the segments often covered with tubercules, the color a rich dark purple, becoming, like the carrageen, of the same horny stiffness when dry. Sometimes among the rocks, but oftener lying upon the soft mud, are the beautiful shining smooth green *Ulvæ*, or Laver, of which there are two or three kinds; the seeds are to be looked for in the very substance of the fronds, arranged in fours; one, the *U. latissima*, or oyster-green, grows upon the shells of oysters, and may be frequently seen on piles of living oysters in the market. Served with lemon-juice, it is employed as a salad, and esteemed by the Chinese as salubrious. Hanging on piles and piers in a flaccid, drooping way when the tide is out, but bravely flaunting its gay, rich purple banners to the rushing and incoming return of the sea, is the *Porphyra*, or purple Alga, which I have seen finely luxuriant at East Boston ferry dock, and elsewhere.

A most interesting order of the sea-weeds is the SIPHONACEÆ: green, or else coated with lime, the fronds very variable in form, but made up of hollow, inarticulate filaments, belonging to our warmer seas, but represented in the little feathery *Bryopsis plumosa*, found near Quincy, and given me by my friend, Miss Brewer, of Boston,—something worth looking after on the narrow leaves of the sea-wrack, or Zostera.

The ribbon leaves of this plant, familiarly known as Eel-grass, is often prettily speckled with small patches of a hard thin scale, of an irregular outline. Any one of them care-

fully detached from the leaf, and magnified five hundred diameters, will show a specimen of rare elegance, a sort of shell-like body with three or more lobes, and regularly made up of a great many, somewhat square cells. It is the *Hapalidium phyllactidium* of Kutzing, detected by me a few years ago, and till then new to our flora, but discovered first by Professor Allman in Dublin bay, Ireland.

On the perpendicular faces of the larger rocks, and completely covering the rounded and erratic ones near the beaches, and also on the stone-walls and piles of the wharves, grow the several *Fuci*, whose seeds are to be searched for late in the autumn and on the beginning of winter, lodged in rounded imbedded cells, and of much beauty. The Fuci have a wide geographical distribution, growing very far towards the north pole, and known quite far southwards. According to Professor Harvey the deficiency of species is a very marked feature in our coasts, two only, the *vesiculosus* and *nodosus*, or the bladder and the knotted fuci occurring, and these quite limited in range. It were somewhat rash to differ from such high authority, yet it seems to me more than probable that some of the other European representatives, such as *serratus*, for instance, may be found; and small forms which grow on the hard and compact gravel at high-water mark, which always remind me of *caniculatus:* in confirmation of which a few specimens of fuci, collected and named by Desor in 1850, near Boston, and presented me by my friend, Miss H. B. Stevenson, are now lying before me, indicating an agreement in the same direction. Rising and falling in the surf as it dashes against the rocks, these species seem instinct with sensitive life, and appear to shake themselves in the cool water as if refreshed after partial desiccation and lassitude, while shoals of the smaller fishes and crustaceans dart in and out in security among their exuberant tresses.

To this order belongs the interesting Gulf-weed (*Sargassum*), one species of which floats in vast beds around the

island of Nantucket, and on the yielding surface of which may be seen the blue-eyed Pecten, the common scallop of our coasts, skipping along by opening and closing its valves. I have never met with any kind of gulf-weed in our waters, but some are found on the shores of Rhode Island, of which a beautiful and delicate species was discovered by the late and distinguished Professor Bailey, and dedicated to the great French botanist, Montagne.

Somewhat resembling it is the *Cystoseira*, a genus belonging to the European seas, and "scarcely represented in the New World," the *expansa* being detected in California, more delicate in its character, the frond much divided, the branches so converted into air-vessels, or vesicles, as to look like strings of beads. Here also belongs the Sea-thong (*Himanthalia lorea*), a marvellous plant, which at first grows like a cup, and which expansion is in reality its frond, and when ready to bear seed, throws out from its centre several branching linear straps, which extend from ten to twenty feet in length, although only less than an inch wide. It must be sought for at the very lowest tides, or by the dredge, and although attributed to the coast of North America by Agardh, has hitherto escaped the observation of our botanists.

In such situations, and even at greater depths, occurs the *Desmarestia aculeata*, in long tufted bundles of a dark olive-green color, usually gathered and preserved in its autumnal and winter form, when it loses the delicate and fresh growth it had in warm weather; so different, that it is often considered two distinct species. It may be known by its spine-like branchlets, although soft and yielding when moist. From these profounder deeps are dragged by the storms the huge kelps, Tangle or Devil's-apron, the *Laminaria*, looking like some oar with its stem and blade, and often attached to a large pebble of many pounds weight, clinging with its grasping fingers, or bearing in its embrace a huge mussel, on which it had grown. This really noble plant,

rising upwards from the bottom of the sea to the altitude of twenty feet or more, typifies those gigantic sea-weeds of the North-western coast, which, in the instance of the *Nereocystis*, has a stem three hundred feet long; or the still larger *Macrocystis* of the Southern Pacific, whose fronds, according to Bory St. Vincent, stretch to a length of fifteen hundred feet! Grander these than any forest tree on mountain or plain, in tropical and luxuriant terrestrial vegetation!

Turning from these, and often lying close by among the heaped waifs from the stormy ocean, the inquirer may see the curious Sea-colander (*Agarum Turneri*), with its tenderer and thinner frond, pierced with numerous roundish holes, and growing, when undisturbed, at the depth of ten fathoms of water; in this single species exhibiting on our coast one of the many kinds peculiar to the Northern Atlantic and Pacific shores. To find its seeds one must select the old and battered specimens cast up in early winter, in the thickened portions of which they form dark-colored patches. Quite distinct, but of the same order, the slender Whiplash or Fishing-line fucus, the *Chorda filum*, lays entangled among the rejectamenta, a simple cylindrical tubular frond, transversely divided into separate cavities, the seeds embedded in the whole exterior surface; and the Honeyware, Murlins or Badderlocks of the shores of Scotland and Ireland, is the *Alaria esculenta*, the midrib of which is eaten by the poorer classes of those countries, but here unnoticed or disregarded, though not uncommon on our coasts.

Some rarer sea-weeds, comprised in the order DICTYOTACEÆ, may be looked for in the tide-pools, though usually of a more southern habitat, such as the Dot-bearer (*Stilophora*), the seeds being imbedded in little punctiform dots, which internally are made up of bead-like, clavate, branching filaments; the frond cylindrical, imperfectly tubular, branched; while *Dictyosiphon* has a bristly frond, very much branched, the branches capillary, the seeds solitary, a pretty olive-colored "weed;" and, in allusion to these seed-dots, we are

reminded of the *Punctaria tenuissima*, to be sought on the stems of various other fuci and sea-plants, in dense tufts, the fronds very thin and attenuated towards the tips and base. Still, among the olive-colored Algæ, the order CHORDARIACEÆ embraces many distinct sea-weeds with gelatinous or cartilaginous fronds, whose seeds are concealed within the substance of the frond, of which the *Chordaria* and *Mesogloia*, with conspicuous cylindrical fronds, and *Elachista*, or the Least Alga, consisting of little tufts of minute brown fronds parasitical on the common rock-weeds, or fuci, and the Myriad-thread, or *Myrionema*, which hastens the death of the Red Algæ, are worth the looking for microscopical study.

In the tide-pools grow also the sea-weeds which compose the order ECTOCARPACEÆ; and on our shores are *Ectocarpus brachiatus*, and perhaps *littoralis*, pretty confervoid, branching flaccid algæ with numerous pod-like bodies, readily seen with a lens; the *Sphacelaria cirrhosa*, a small species in little globose tufts, the thread-like branches slightly branched again in a pinnate manner, the seeds in round capsules borne on the sides of these smaller and shorter branches, to be examined with the magnifying glass; and, lastly, the *Cladostephus verticillatus*, with fronds six or eight inches high, and furnished with whorls of smaller branches closely besetting the main stems, and giving them the appearance of cylindrical wands of velvet surface, while the seeds are borne on the sides of the smaller branches like those of the last mentioned.

Enough has been said, then, of the green and olive or blackish sea-weeds, a few words of the red or purple ones:

First are the RHODOMELACEÆ, red or brown-red and purple sea-weeds, with leafy, or else with threadlike articulated fronds, the seeds of two kinds, the proper ones borne in capsules on the ends of the branchlets; the others, called *tetraspores*, in tubercules on the sides or other parts of the fronds. These sea-weeds are fond of a more southern ocean and latitude, but in this vicinity *Chondria tenuissima*, the

most delicate of the genus, may be sought; and several *Rhodomelæ*, very beautiful, blackish-red, feathery, and tufted sea-weeds beside, not forgetting the *Polysiphoniæ* of many forms and sizes, the most common, perhaps, and to me the most interesting, being the blackish one, which grows in tufts on fuci, the *P. fastigiata;* others, far more delicate and of more pleasing colors, likewise occur with us; and with them the *Bostrychia rivulsari* also southern in its habits as a genus, and the beautiful *Dasya*, more at home farther south, is often met with in collections of Algæ gathered hereabouts, *D. Elegans* being one of the comparatively sparse Algæ on the sandy shores of Nantucket.

In the order LAWRENCIACEÆ the fronds are terete or compressed, rarely flattened, the seeds contained in external globose conceptacles, the tetraspores immersed in various parts of the frond. There is much diversity in the color of the several species; usually, however, a lurid purple is the typical one, fading on exposure to the light, and parting with it readily on being immersed in fresh water. The *Laurencias*, on which the order is founded, are southern, but *Champia* occurs at Providence, R. I., at Nantucket, and New York, and may be sought as a parasitical plant farther north.

The SPHÆROCOCCOIDEÆ embrace a vast number of very interesting sea-weeds, mostly resident in tropical and foreign seas. I know of none whose structure has interested me more, and if any species occur to the reader on our shores, in the few which may be sought here, they will afford rare gratification with the microscope, their internal structure varying as much as the outward forms. Some of the finest and most brilliant weeds are to be found, a few only are of a duller tint. The seeds are lodged in elegantly formed conceptacles, which are filled with beaded filaments, on the apices of which the seeds are situated; the tetraspores are in definite groups, or else dispersed over the whole fronds.

The DELESSERIÆ have rosy-red, leaf-like, branched, jag-

ged, delicately membranaceous, symmetrical fronds, with a midrib running through the middle of each. They grow in deep water, and several species are found in Massachusetts Bay. By far the most beautiful of them is *D. Americana*, lately dedicated to Henry Grinnell, Esq., conspicuous in his efforts to find Sir John Franklin; and its generic name, derived from his own, was given by Professor Harvey in his Nereis Boreali Americana, some distinctive structure in the seed-vessel being detected by that botanist. The *Grinnellia* being so abundant in New York harbor, may be sought among our Delesserias.

The GELIDIACEÆ, like the last order, is also tropical or mostly foreign. One or two species occur with us, such as *Gelidium corneum*, a most variable plant, with a forked, branched and pinnately divided frond, of a purplish-red, soon changing color, especially if immersed in fresh water, and finally parting with it altogether, but retaining a glossy or waxy lustre when completely bleached.

A rather singular Alga, found in our waters for the first time perhaps, by George B. Emerson, Esq., is the *Polyides rotundus*, a single genus of a single species, and constituting the order SPONGIOCARPEÆ, the seeds of which are found in irregularly shaped warts extending along the branches, of a pale flesh-color, wholly composed of slender, branched filaments, like those of the bark, or cortex, of the frond; the tetraspores are formed in the upper branches deeply immersed.

Passing over several other Algæ too rare on our coast for notice, or else already adverted to, we come to the order RHODYMENIACEÆ, purplish or blood-red sea-weeds, with inarticulate, flat, compressed, or filiform membranaceous fronds, the seeds lodged in external conceptacles. Among these to be sought is *Rhodymenia palmata*, with a frond six to eight inches long, and four to six inches broad, wedge-shaped at base, cut downwards into several slender ribbons, but sometimes quite simple; the *Euthora cristata*, with a

fan-shaped frond, excessively branched, the color a beautiful lake; the *Plocamium coccineum*, very beautiful and frequently overlooked, but occurring among the cast-up weeds of the sea, — a deep-water species.

Other elegant rosy or red sea-weeds, belonging to still other orders, are more or less common in our bay, of which the *Phyllophora membranifolia*, the *Ahnfeltia plicata*, *Cystoclonium purpurascens*, of which there is a curious variety, the ends of the smaller branches being converted in spirally twisted tendrils, which coil round other sea-weeds; the *Gigartina mammillosa*, already alluded to, with the *Chondrus crispus*, of which many singular forms may be seen in the same pools; the *Chylocladia*, reminding us of Bailey, in a new species; the *Gloiosiphonia capillaris*, a single species, limited to the northern seas of Europe and America, of a brilliant carmine color and very much branched, found at Nahant, Hampton Beach, Chelsea, etc., and why not hereabouts? the *Spyridia filamentosa*, a genus better known in warmer seas; the *Ceramiaceæ*, with numerous delicate rosy and reddish species in *Ceramium rubrum* and its varied forms, in *C. diaphanum*, *fastigiatum* and *arachnoideum* perhaps; in *Ptilota plumva*, beautiful and common, and in its kindred Californian species *P. densa*, etc.; in the rarer *P. serrata* occurring with us; in *Griffithsia*, a beautiful and slender Alga, of a soft gelatinous substance, closely adhering to paper; in the numerous *Callithaminons*, minute, elegant, and curious, some of them parasitical, and all puzzling to decide, many of which the seeker can find on our sea-shores.

So much for the sea-weeds, and for the smaller portion of the interest attached to them, reminding us in their fine names of the glories of the ocean, of its cooling breezes, its fitful aspect, its crested foam and blue surface in rest and repose, sought for eagerly by many a weary and tired citizen, and affording perpetual instruction and pleasure to the naturalist, and in its floral as zoölogical treasures a constant source of study to all.