



SEA
WEEDS

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SEA-WEEDS.



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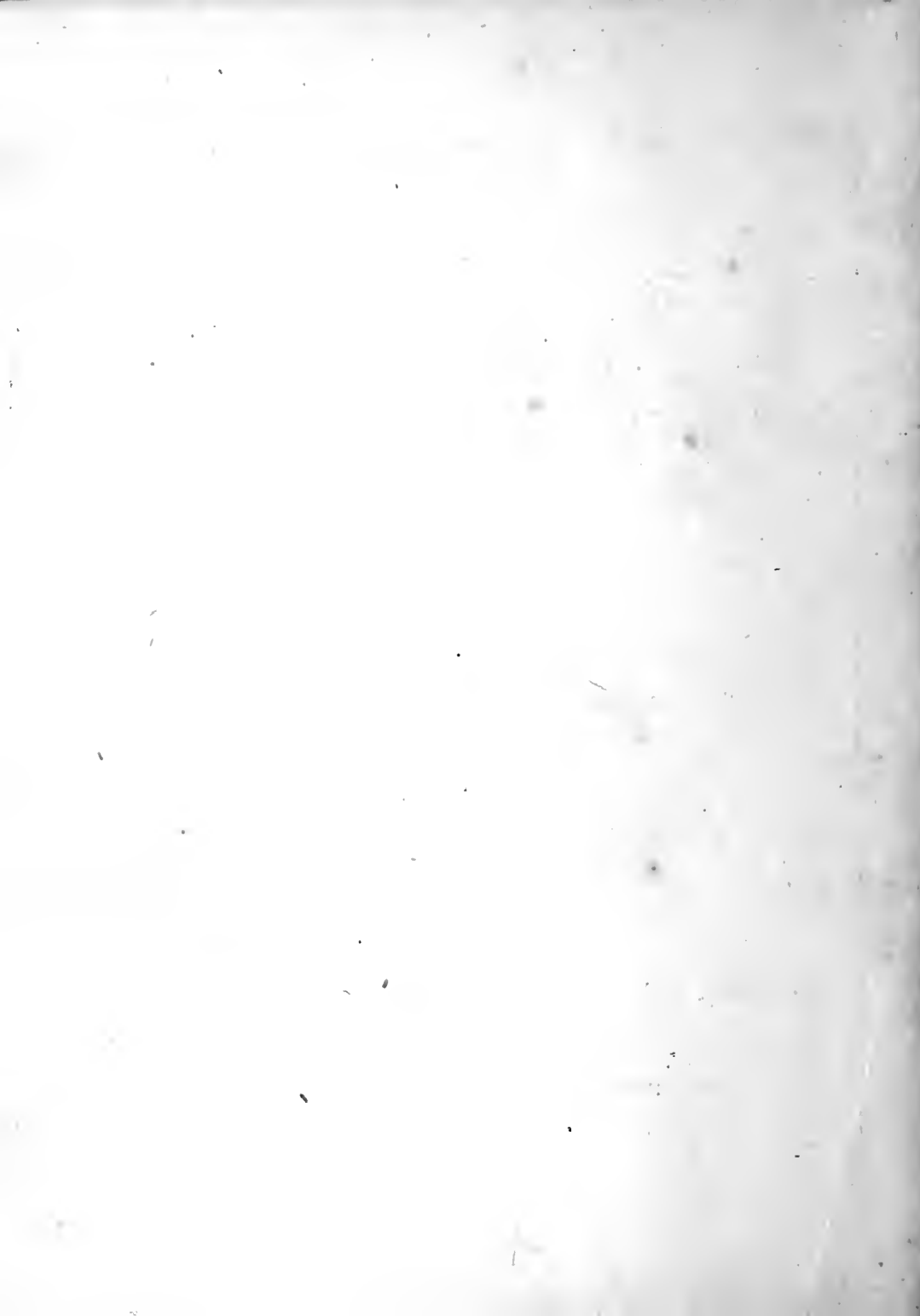
SEA-WORDS.

PUBLISHED UNDER THE DIRECTION OF
THE COMMITTEE OF GENERAL LITERATURE AND EDUCATION,
APPOINTED BY THE SOCIETY FOR PROMOTING
CHRISTIAN KNOWLEDGE.

By C. A. Johns

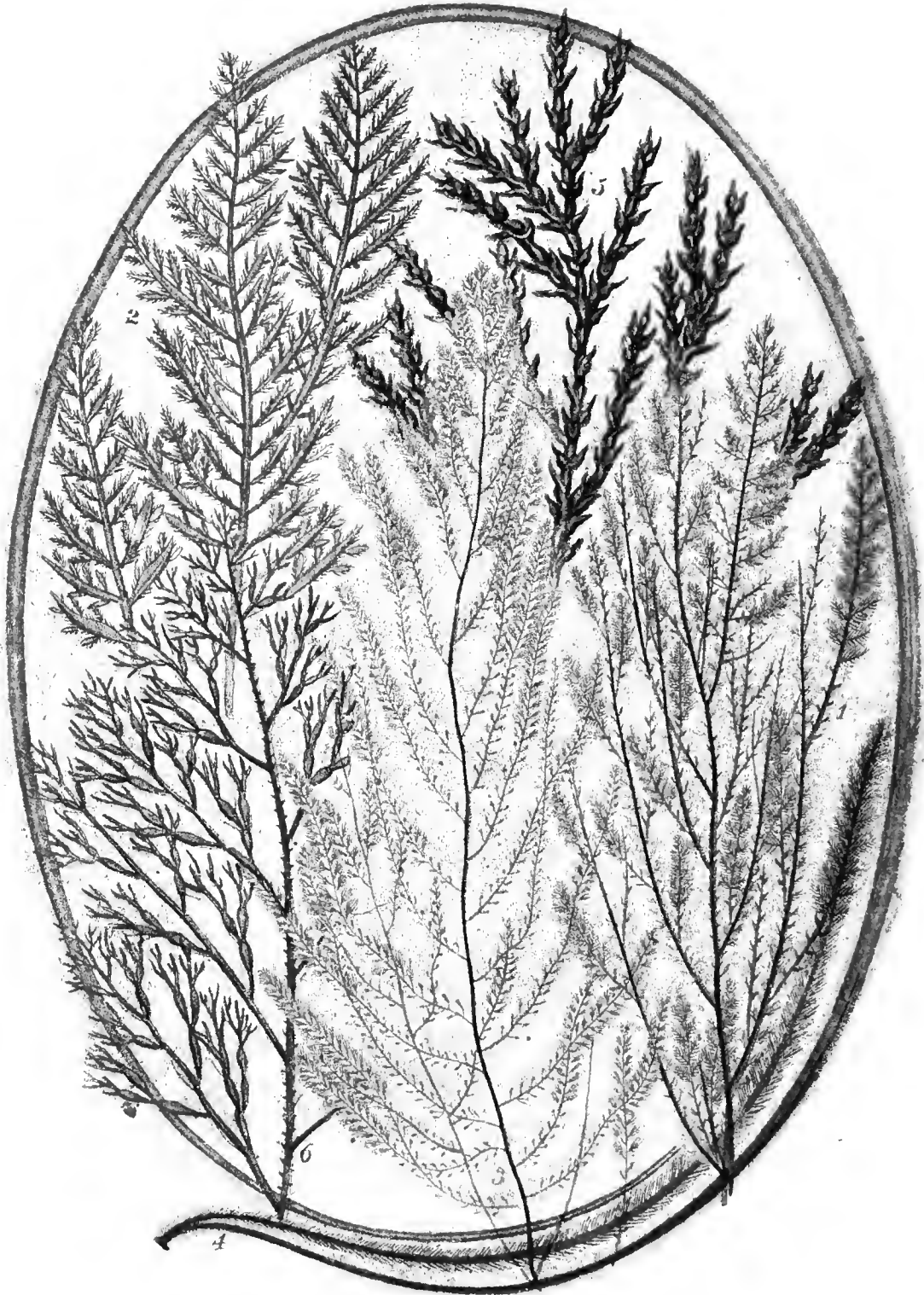
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SEA-WEEDS.—I.

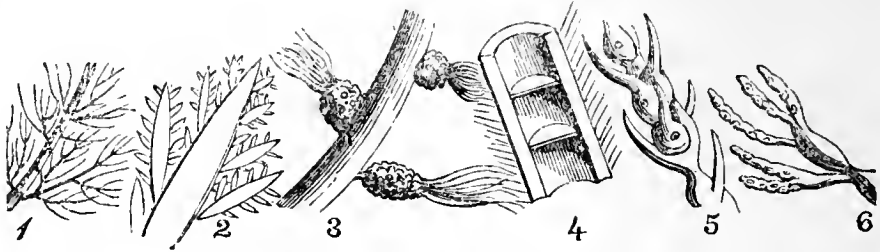
THERE are still, and I suppose there ever will be, many parts of the English coast inaccessible by railway. Let us suppose that we have alighted from a train at a station some few miles distant from the shore, and that we are reduced to the necessity (so pleasant to a lover of Nature) of performing the rest of our journey on foot. Accustomed as we are to keep a sharp eye on the hedges, we notice that the vegetation in its general features closely resembles that of our inland neighbourhood. The hedges, perhaps, are somewhat less vigorous in their growth, and the leaves, though summer is not yet far advanced, are shrivelled at the edge. As we proceed, we remark that the trees do not lift their branches so high; the oaks especially are flat-topped, and all spread their branches in one and the same direction, namely, *from* the sea. This proves clearly that the sea-breeze, charged as it is with particles of salt, has nipped all the buds which were exposed to its direct influence, but being, as it were, partially sifted by its passage through the branches, has permitted the landward boughs to continue their lateral growth. As we advance they grow more and more stunted and depressed, till at last we begin to doubt whether on the actual sea-coast we shall find any vegetation at all. The doubt is soon dissolved. With springy step we mount the last sloping upland, and stand fronting the broad ocean on a thickly matted turf no less elastic than that of our inland commons, but composed almost exclusively of plants that we have never seen before, of humble growth, it is true, but showing, by the brightness and freshness of their flowers, that the sea-breeze brings only health to them at least. All inland birds we have left behind us but the lark and the wheatear. We stay not now to notice the tall blue rush-like grasses which bind the soil of the sand-hills, nor the salt, juicy herbage which clothes even the muddy shore. We are in quest of SEA-WEEDS, not “sea-side weeds,” and the presence of these we shall most probably detect in the scent wafted from “the pebbly length of shore.”

C. A. J.

MELANOSPERMS, OR OLIVE SEA-WEEDS.

SEA-WEEDS are placed by botanists in the order ALGÆ, an extensive assemblage of plants of cellular structure, producing no proper flowers, and destitute of true roots, living entirely under water salt or fresh, or in damp places, and imbibing nutriment by their whole surface from the medium in which they grow. Sea-weeds are distributed into three primary groups, which are named from the predominant colour of their substance—MELANOSPERMS, or OLIVE SEA-WEEDS; RHODOSPERMS, RED, or BROWN-RED SEA-WEEDS; and CHLOROSPERMS, or GRASS-GREEN SEA-WEEDS.

In the division OLIVE SEA-WEEDS are included all the common coarse



Magnified portions of Figures 1—6.

kinds which, under the names of oar-weed, sea-wrack, &c., enter largely into the characteristic features of the sea-coast. Figures of these are necessarily excluded from these narrow limits, because they would either require to be reduced so much that they would fail to be recognized; or, if represented on a larger scale, a portion of a single specimen would occupy all the available space. Among the smaller species the following are tolerably common, and of a convenient size for preserving:—

1. *Desmarestia aculeata*.—Frond very narrow, flat, divided from near the base into numerous alternate branches, which in their young state are fringed at the margin with opposite tufts of bright-green fibres; when old, with alternate slender spines. Common in deep water up to low-water mark: one to three feet long. (Fig. 1.)

2. *D. ligulata*.—Frond narrow, flat, tapering towards each extremity; branches numerous, opposite, some leaf-like, others like the main stem; the former margined with minute points, which in young plants produce tufts of delicate fibres. Common in deep water and rocky pools: one to six feet long. (Fig. 2.)

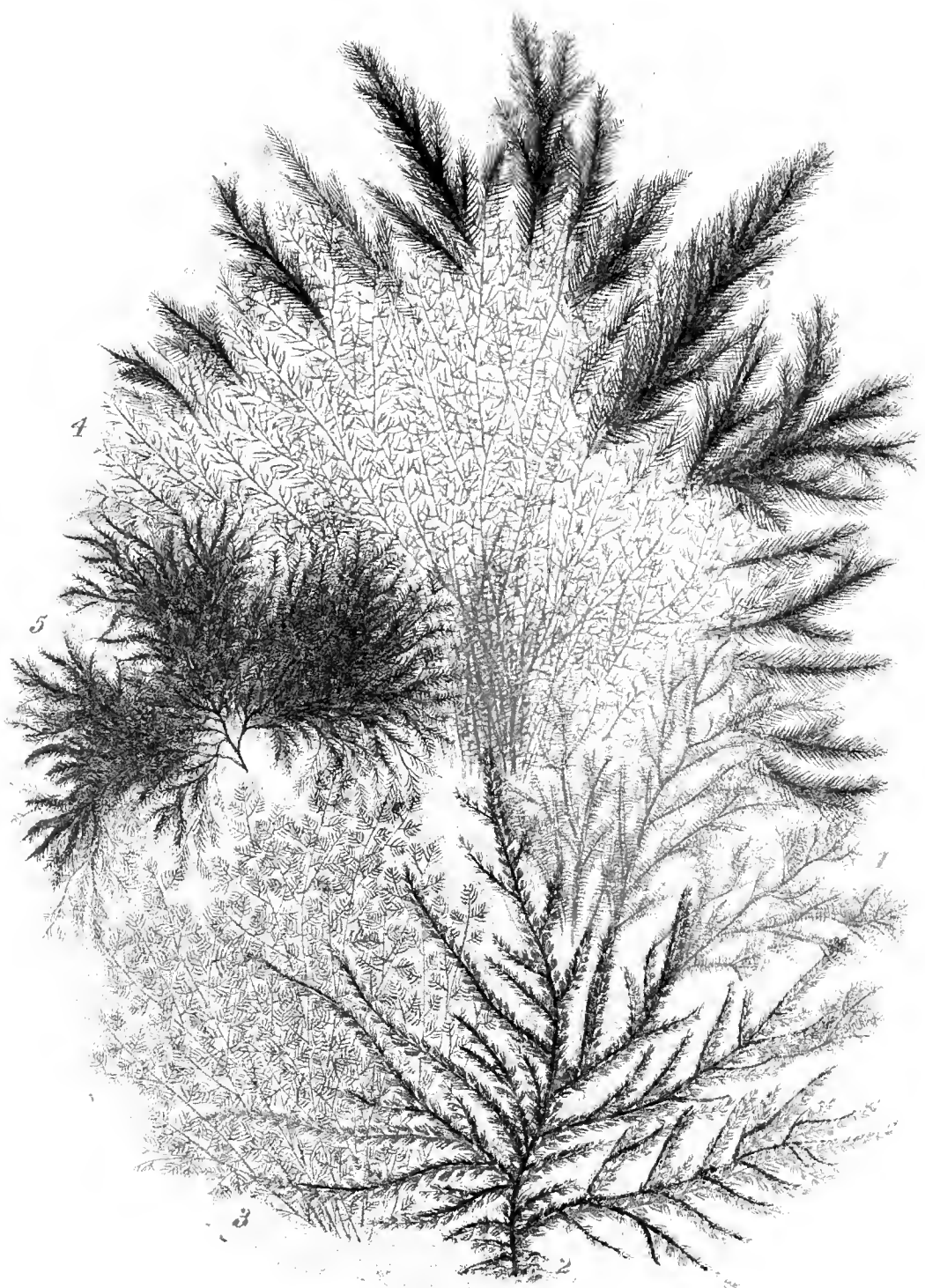
3. *Sporochñus pedunculatus*.—Stem thread-like, not forked, but having numerous hair-like branches, which are margined by tufts of fibres proceeding from the minute elliptical fructification. Not common. To be searched for by dredging, or thrown upon the beach: six to eighteen inches long. (Fig. 3.)

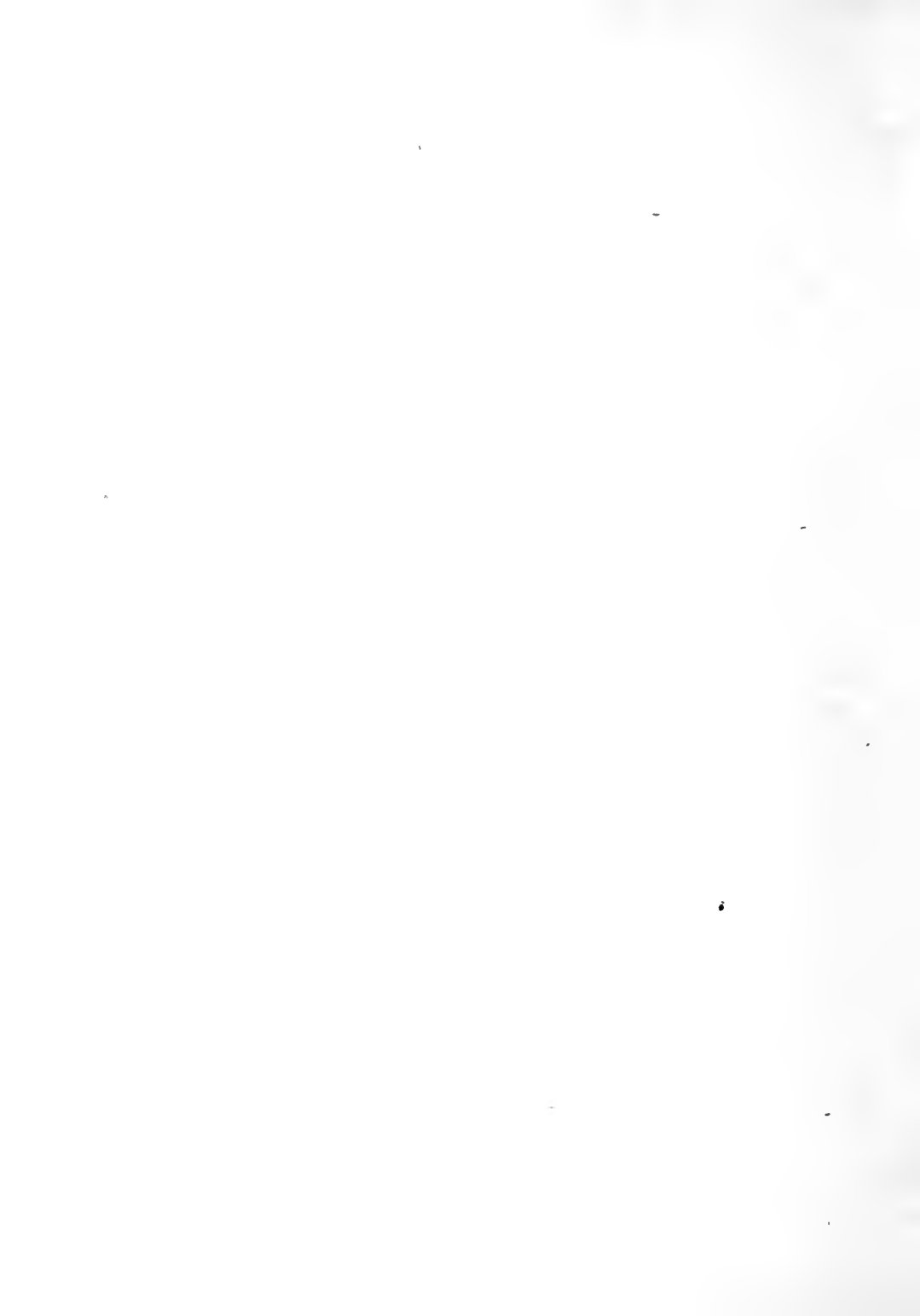
4. *Chorda filum*.—Frond simple, cord-like, slimy, tapering towards each end, covered when young with gelatinous fibres. Common: one to twenty feet long, or more. (Fig. 4.)

5. *Cystoseira ericoides*.—Frond stout, much branched, densely set with sharp leaves or branchlets, with here and there an air-bladder, shrinking and turning black when dry. Frequent in the south and west: twelve to eighteen inches long. (Fig. 5.)

6. *Cystoseira fœniculacea*.—Frond much branched, rough, with thorn-like points; branchlets repeatedly forked, and having below each fork a small narrow elliptical air-vessel. Not uncommon in the south of England: one to two feet long. (Fig. 6.)

C. A. J.



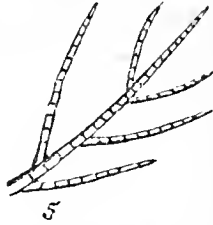


SEA-WEEDS.—II.

“HERE samphire-banks and salt-wort bound the flood,
There stakes and SEA-WEEDS withering in the mud;
And higher up, a ridge of all things base,
Which some strong tide has roll'd upon the place.”

It is here that we make our first acquaintance with sea-weeds, and, sooth to say, we are not much prepossessed in their favour. The “ridge” is a mass of objects, many of which are unsightly, clammy to the touch, and of an unpleasant odour, especially in hot weather. After a storm, in winter, such a bank may sometimes be seen several feet in height, and extending for miles. When this is the case, it becomes the business of the neighbouring land-owners to carry it away by the help of carts, mules, and donkeys, to some place of security above high-water mark, where, after being allowed to rot, it becomes valuable manure. A slight examination of the weeds most recently cast up by the waves suffices to show that the arrangement made by botanists into “Olive-Brown,” “Red,” and “Green Sea-weeds,” is founded in nature. Many sea-side wanderers, becoming reconciled to the peculiar odour, or even in time learning to like it, pass away their time pleasantly enough in strolling along this sea-line, picking up weeds and shells and corals, and countless other curious things. We must be careful to recollect, however, that by exposure to the air, and, yet more, to the action of rain, many of the sea-weeds, especially the “Reds,” or RHODOSPERMS, are speedily decomposed, changing their colour to dirty green, yellow, or white, or from purple to crimson. The “Olive-Browns,” or MELANOSPERMS, are less affected; but many of these we shall see to greater advantage growing on the rocky part of the shore between high and low water marks. Some of these are of a stout, leathery substance, furnished with bulky stems, and attaining a very large size. They were formerly much employed in the manufacture of kelp, and are still used in the preparation of iodine. Some of them bear well enough exposure to air, sun, and rain at low-water; others grow wholly submerged; but for the most part they attain the largest size in tolerably deep water, and if found growing in shallows, or in places where much fresh water enters, they become stunted, and otherwise alter their characters.

C. A. J.



Ectocarpus fasciculatus. (Magnified.)

MELANOSPERMS—*continued*.

1. *Padina Pavonia*.—Fronds growing in tufts, flat, fan-shaped, regularly marked with concentric lines, fringed with orange-coloured jointed threads: two to five inches long. This singular sea-weed, which in a dried state resembles externally some of the species of fungus (*Polyporus*) found growing on decayed stumps of trees, almost equals in brilliancy of colouring, when seen under water in a living state, the tail of the peacock, from which it derives its name, "Pavonia." It is abundant on the shores of many tropical countries, and is of common occurrence in the Mediterranean. In England it has only been found in rocky pools on the south coast, but is worth searching for elsewhere. (Fig. 1.)

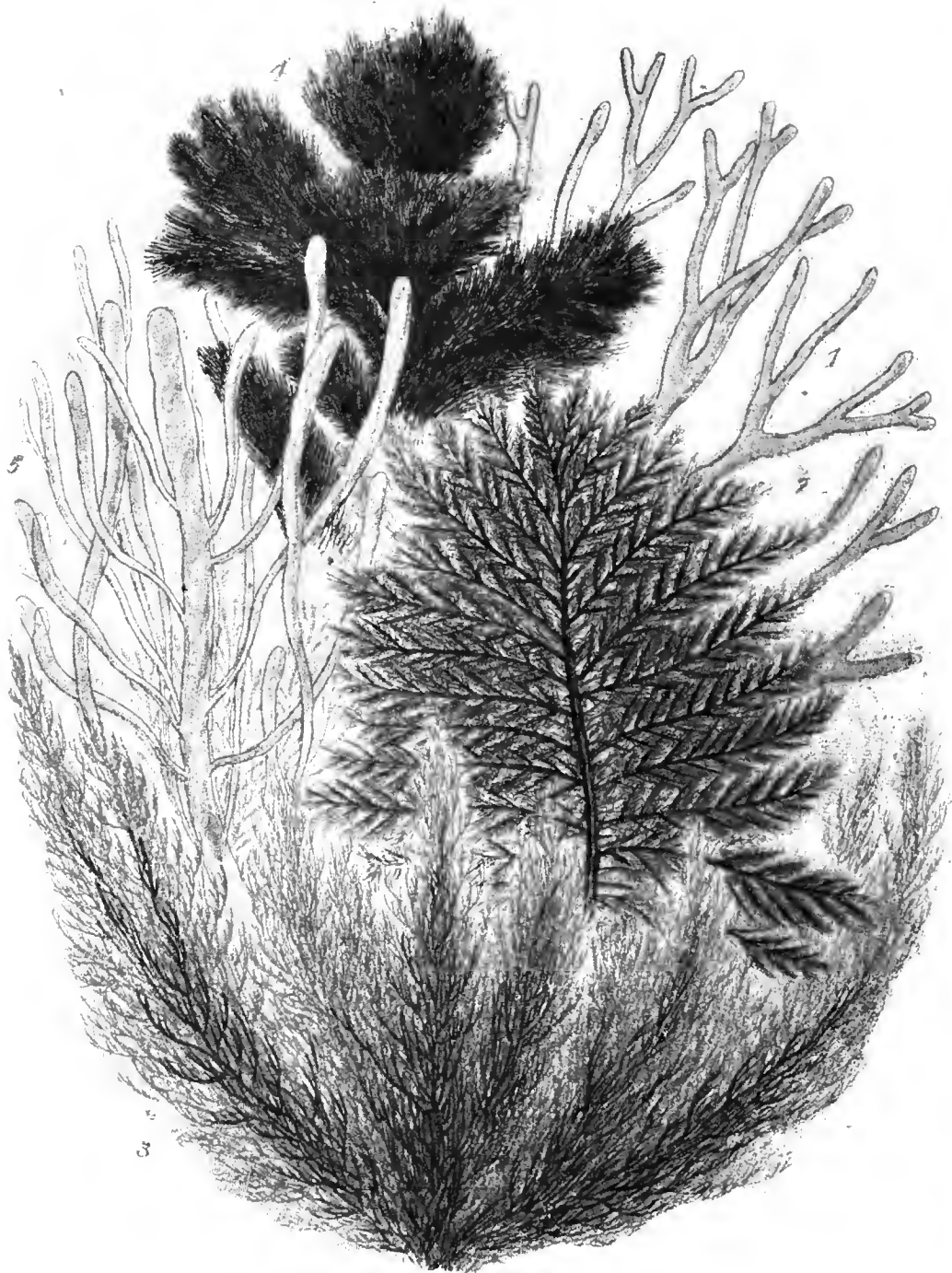
2. *Dictyota dichotoma*.—FronD flat, without ribs, repeatedly twice forked, reticulated. A common sea-weed on most parts of the coast, varying in the width of the branches, which are sometimes much narrower than in the figure, and, less frequently, broader in proportion to the length. The fructification is contained in minute dark masses imbedded in the frond: three to twelve inches long. (Fig. 2.)

3. *Striaria attenuata*.—Fronds tufted, tubular, tapering at each extremity, repeatedly branched, all the branches tapering like the main stem. Fructification arranged in transverse lines (*striæ*), whence its name. Several parts of the coast; parasitical; not common: three to twelve inches long. (Fig. 3.)

4. *Asperococcus compressus*.—FronD unbranched, apparently flat, but in reality a tube, two opposite sides of which cohere at numerous points. Fructification in numerous dark scattered dots. Southern coast of England; rare: six to eighteen inches long. (Fig. 4.)

5. *Ectocarpus fasciculatus*.—Whole plant composed of dense tufts of delicate, jointed threads, which are variously forked and subdivided. Towards the extremities the branchlets are closely set and crowded into bundles, and among them are found pod-like organs (*silicules*), which comprise the fructification. Between high and low water mark, abundant, growing parasitically on the larger sea-weeds, especially *Laminaria digitata* (Sea-tang, or Sea-girdles): three to six inches long. (Fig. 5.)

C. A. J.

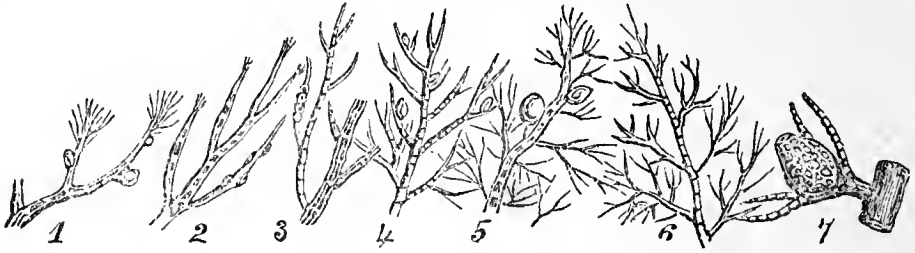


SEA-WEEDS.—III.

As we advance it is necessary that we should step cautiously along the rocks, nearly everywhere covered, between tide-marks, by several kinds of *Fucus*—cautiously, I say, for they are slippery, and make the footing insecure. Beneath, the rock is thickly studded with limpets and sea-acorns, shells which have mercilessly mangled the hands and knees of many an unwary collector. And no less cautiously must we proceed between the rocks, for often what appears to be a mass of weed is a water-trap, perhaps a few inches, or perhaps a foot or more deep—the occasion in one case of a wet foot, in the other of a broken shin. Every step is accompanied by a crackling noise, which proceeds from the air-bladders bursting beneath our feet. The use of these is to buoy up the plant when covered by water. In one species these air-bladders are globose, and imbedded in pairs in the plane frond. The short plants, we observe, which grow in shallow water, are entirely without them. In another kind they are much larger, elliptical in form, and strung, as it were, on a tough, narrow stem. These are too horny in substance to burst with the mere pressure of the foot. Children often make them into whistles, or, not satisfied with this amount of noise, carry them home, and throw them into the fire, where they burst with a loud report. Near low-water mark, both above and below, the rocks are covered with a yet more robust kind, a mass of tangled roots adhering by button-like discs to the rock, and supporting a stout stem, which might serve as a club, and terminates in a broad, fan-like expansion. Other kinds are also to be found, but are less conspicuous, and for these we must search. If we wish to preserve specimens of the coarser kinds, we must either select small plants, or carry away characteristic portions only, wash them in fresh water, to get rid of the salt, and dry them under gentle but increasing pressure between sheets of blotting-paper. C. A. J.

RHODOSPERMS—RED, OR RED-BROWN SEA-WEEDS.

“A RED colour of greater or less purity, in some verging on purple, in others passing into brown, and fading through all tints of red, green, and yellow into dirty white, is the most obvious characteristic of the plants of this sub-class.”—(*Harvey's Manual of British Marine Alge.*) They grow in deep water, or in pools among rocks, where they are little under the influence of light; those species which grow in situations exposed to the rays of the sun assuming the tints either of the Melanosperms or Chlorosperms. Most of them become darker in drying, and some turn quite black, especially those contained in the tribe Rhodomels (Red-black sea-

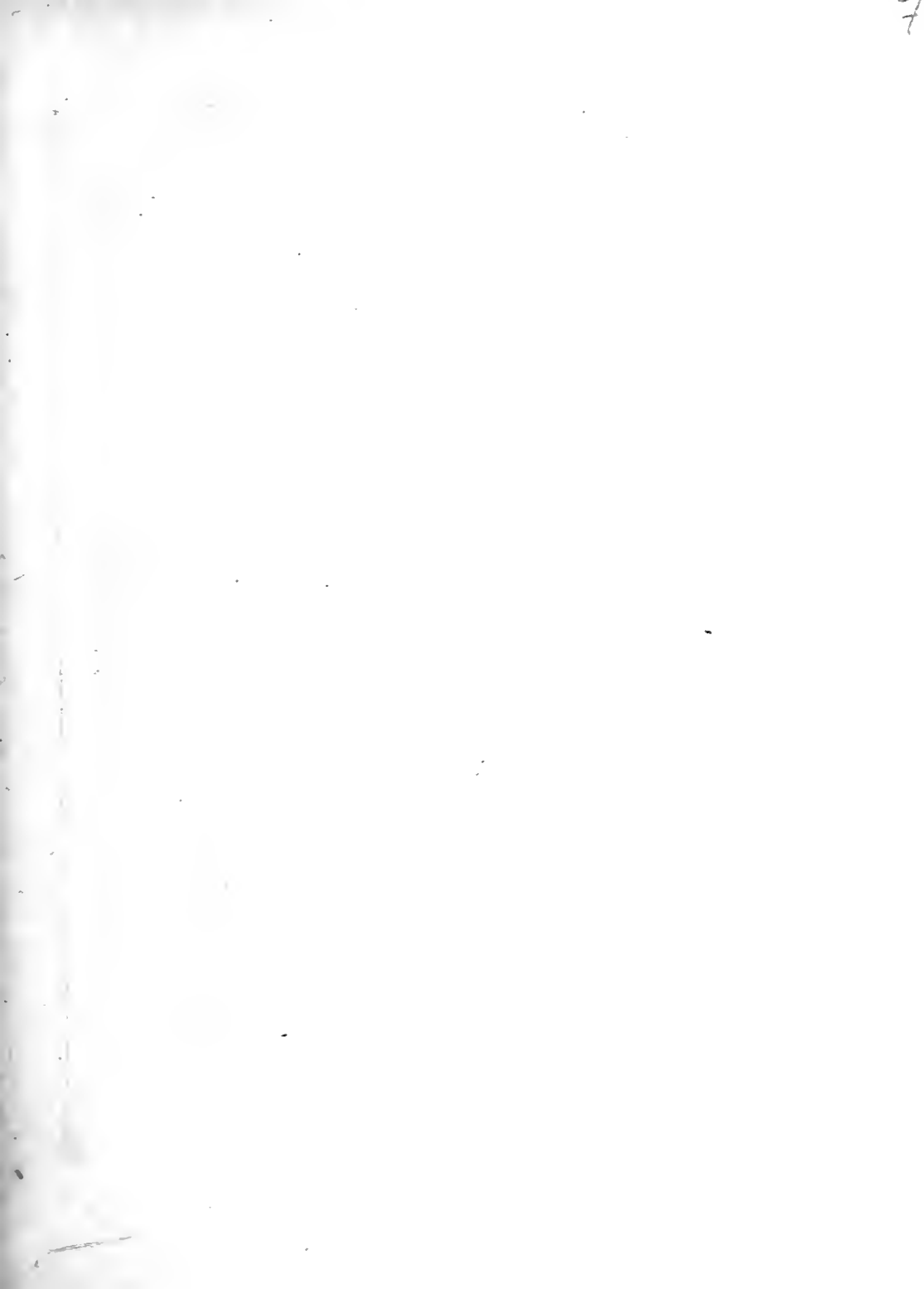


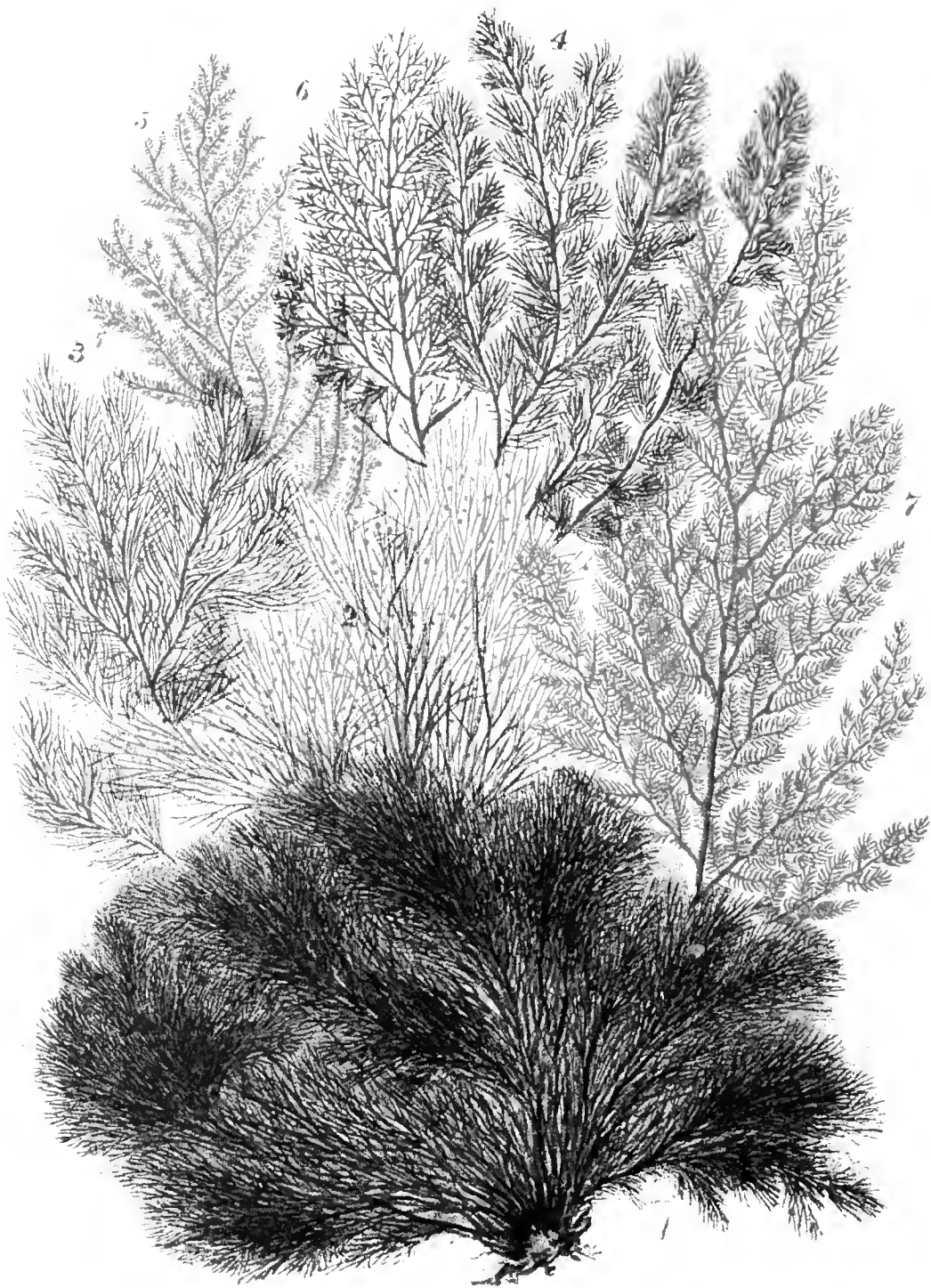
Magnified portions of Figures 1—7.

weeds). Many of them are much heightened in colour by being thrown up on the beach and exposed to sunshine. Others when plunged into fresh water instantly change their colour, or rapidly decompose, discharging their colouring matter with a faint explosion. The fructification is of two kinds, and always on separate plants.

Polysiphonia.—Of this genus there are more than twenty different British species, many of them not only difficult to be discriminated from one another, but varying so much according to season and situation that an unskilled observer is by no means unlikely to consider some forms of the same plant different species, and, on the other hand, to give the same name to plants really distinct. To determine them therefore accurately, patience, observation, and skill are necessary, a microscope, or at least a good lens, and careful reference to a trustworthy book on the subject. "Harvey's Manual," quoted above, is only excelled by his more expensive work, "*Phycologia Britannica*." The plants of this genus agree in having a tufted habit of growth; the fibres are jointed and striated lengthwise; the fructification is of two kinds, each on a separate plant. 1. *P. fibrata*, a densely-tufted species, common on rocks and in pools near low-water mark. 2. *P. elongata*, also common, is a longer and stouter plant, with a much less tufted habit; it is subject to great variations. 3. *P. violacea*, is of a purplish hue, much tufted upwards, but nearly simple below; somewhat rare. 4. *P. Brodiaei*. A large and handsome species, six to twelve inches long, of a purplish-brown hue, and having its long and slender branches copiously set with bundles of fibres. 5. *P. byssoides*. Stem rigid, branched, densely clothed with delicately fine tufts; colour, light crimson; common, and very beautiful. 6. *P. nigrescens*. Densely tufted throughout, of a somewhat coarse habit, and dark colour, especially below; three to twelve inches long; common. 7. *Dasya coccinea*. Stem stoutish, branched in two opposite directions, branches once or twice divided in a feathered manner; six to eight inches; beautiful rose-red; common.

C. A. J.





SEA-WEEDS.—IV.

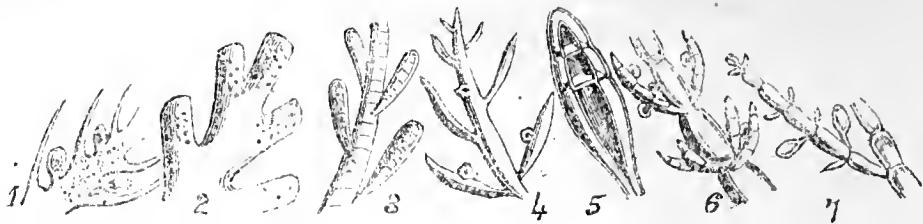
“AMONG these joys, ’tis one at eve to sail
On the broad river with a favouring gale;
When no rough waves upon the bosom ride,
But the keel cuts, nor rises on the tide;
Safe from the stream the nearer gunwale stands,
Where playful children trail their idle hands;
Or strive to catch long grassy leaves that float
On either side of the impeded boat.”

The “long grassy leaves,” here so pleasantly described, do not belong to the tribe of SEA-WEEDS, though they grow wholly submersed in salt water. The internal structure of the sea-weeds is very simple; their roots, for the most part, are mere extensions of the substance of the frond, and serve only to attach the plants to something fixed, be it rock, mud, shells, or parasitically to other sea-weeds; the stems are of the same consistence throughout, not being divisible into bark, wood, and pith; the extended portions, though sometimes called leaves, are not leaves in reality, as their structure exactly resembles that of the stems, being either an assemblage of simple cells; or, in some cases, the whole plant is a single, elongated, branched cell. Flowers they have none, nor any representatives of them, and what we should be inclined to call “seeds” are excessively minute bodies, the various shapes of which are only to be distinguished by aid of the microscope, some of them endowed, at certain periods of their existence, with spontaneous motion. The “long grassy leaves,” however, belong to a plant (*Zostera marina*, or grass wrack) which has roots, stems, leaves, and seeds, like land plants. Boatmen, who cannot be supposed to be acquainted with these differences, call by the name of “oar-weed” all weeds that impede them in rowing. The one which children most delight to catch hold of and trail after them “for a fishing-line,” is that which is figured on No. I.—*Chorda filum*, or “Sea-Laces.”

C. A. J.

RHODOSPERMS—continued.

1. *Bonnemaisonia asparagoïdes*.—Frond thread-like, not jointed, slightly flattened, repeatedly branched, the branches margined by two opposite rows of delicate branchlets, among which are interspersed stalked elliptical capsules. A beautiful plant; to be found here and there in deep water, or thrown upon the shore. The upper branches are gradually shorter than



Magnified portions of Figures 1-7.

the lower, giving the plant the general form of asparagus run to seed. Crimson: four to twelve inches long. (Fig. 1.)

2. *Laurencia pinnatifida*.—Frond flattened, somewhat solid, repeatedly branched in a feather-like manner (pinnate), the branchlets flat and blunt. Abundant between high and low water mark, and submersed. Purple, varying to brown and greenish-yellow: two to twelve inches long. (Fig. 2.)

3. *L. dasyphylla*.—Something like the last, but the frond is cylindrical, and less regularly pinnate; the branchlets are contracted at the base, so as to be club-shaped. Purple-brown, varying to pale pink or yellow: three to six inches long; common. (Fig. 3.)

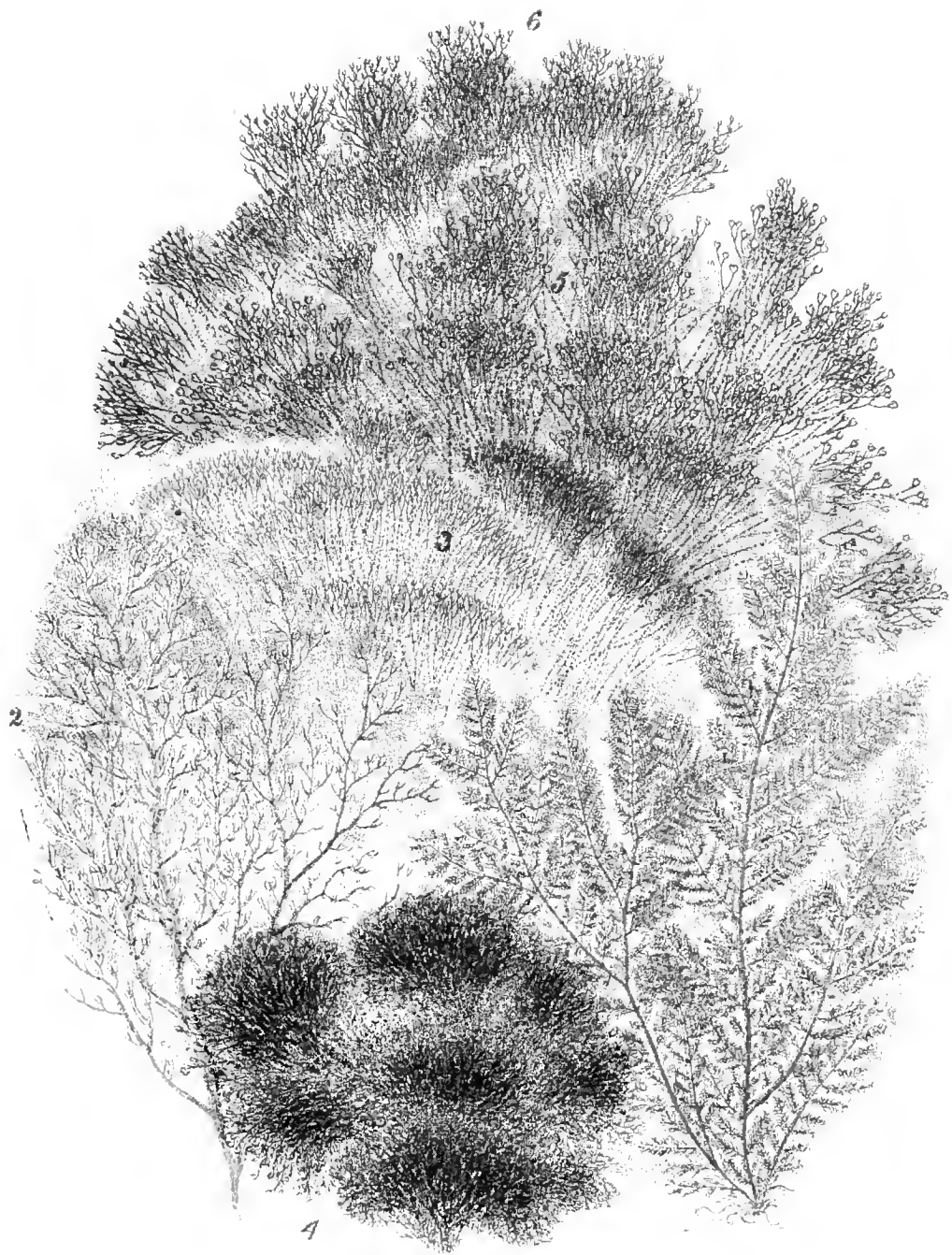
4. *Chrysomenia clavellosa*.—Frond tubular, filled with watery juice, having no appearance of being jointed, repeatedly pinnate; branchlets tapering to the base. Pinky-red: four to twelve inches long; common near low-water mark and in deeper water. (Fig. 4.)

5. *Chylocladia ovalis*.—Frond much as in the last, but irregularly forked; extreme branchlets tubular, elliptical, resembling, in a fresh state, small bladders, and when dry, veinless leaves. Purple-red, fading in old age: three to ten inches long. Southern shores; common. (Fig. 5.)

6. *C. kaliformis*.—Frond as in the last, but contracted at intervals, and jointed, tapering towards each extremity; branches originating from the contractions, repeatedly divided; extreme branchlets having the appearance of a string of beads. Purple tinged with green, but varying according to situation and age: six to twenty inches long; common. (Fig. 6.)

7. *Corallina officinalis*.—Frond branched, jointed, stony. For a long period the Corallines were considered to belong to the zoophytes, and to be cognate with the true corals. It is now, however, beyond a question that they are of vegetable origin, the frond consisting of a central thread incrustated with carbonate of lime, and bearing fructification analogous to that of other undoubted sea-weeds in the same group. The present species is common on all parts of the coast between tide-marks, varying in length from one to six inches, and more or less branched. Purple, fading into pink on exposure, and finally turning white. (Fig. 7.)

C. A. J.





RHODOSPERMS—*continued.*

1. *Delesseria sanguinea*.—Fronde rose-red, flat, traversed by an evident mid-rib; fructification of both kinds produced in winter on the mid-rib of old leaves which have lost their membrane; margin of the leaves entire. In deep pools among rocks; common: from a few inches to nearly a foot in length, but most frequently three to four inches. A great favourite among collectors of sea-weeds, who value it for its exquisite colour, which, though uniform, appears of two shades in dried specimens, owing to certain portions of the frond overlapping each other. The shape of the leaf too is most elegant, and the evident mid-rib associates it so clearly with the leaves of land plants, that it may be fancied to have been plucked from some gorgeous submarine tree. Common in shady pools on most parts of the coast. (Fig. 1.)

2. *D. sinuosa*.—In this species the main frond is from four to six inches in length, furnished with an evident mid-rib, from which proceed at regular intervals pairs of secondary ribs, which run out to the margin, and in time become the mid-ribs of other leaves like the first, the whole at length assuming the appearance of a dense tuft of small crimson oak-leaves. Common; parasitical on Sea-tang and other substances. (Fig. 2.)

3. *D. alata*.—Stem repeatedly forked, and winged throughout its whole length with a pellucid crimson membrane. Common in similar situations with the last: four to eight inches long. (Fig. 3.)

4. *D. ruscifolia*.—Fronde repeatedly branched, and producing from the mid-rib oblong blunt crimson leaves. Tolerably common: two to six inches long. (Fig. 4.)

5. *D. Hypoglossum*.—Resembling the last, but of a brighter colour and thinner substance, and bearing narrower leaves, which taper towards each extremity. Common: two to eight inches long. (Fig. 5.)

6. *Nitophyllum punctatum*.—Fronde rose-pink, flat, thin, and pellucid, destitute of veins, repeatedly but irregularly forked. Fructification in the form of dots scattered over the frond. Varying in size from a few inches to several feet in length, and of no definite shape, yet generally having the margin divided into two forked lobes. Common on many parts of the coast. (Fig. 6.)

7. *Plocamium coccineum*.—Fronde crimson, flat; branches all in the same plane; branchlets fringing the upper branches, three or four on one side, and then three or four on the other, and in large specimens being themselves similarly fringed. "A well-known, abundant, and beautiful species, and an especial favourite with amateur weed-collectors and manufacturers of sea-weed pictures."—(Harvey.) (Fig. 7.)

C. A. J.



SEA-WEEDS.—V.

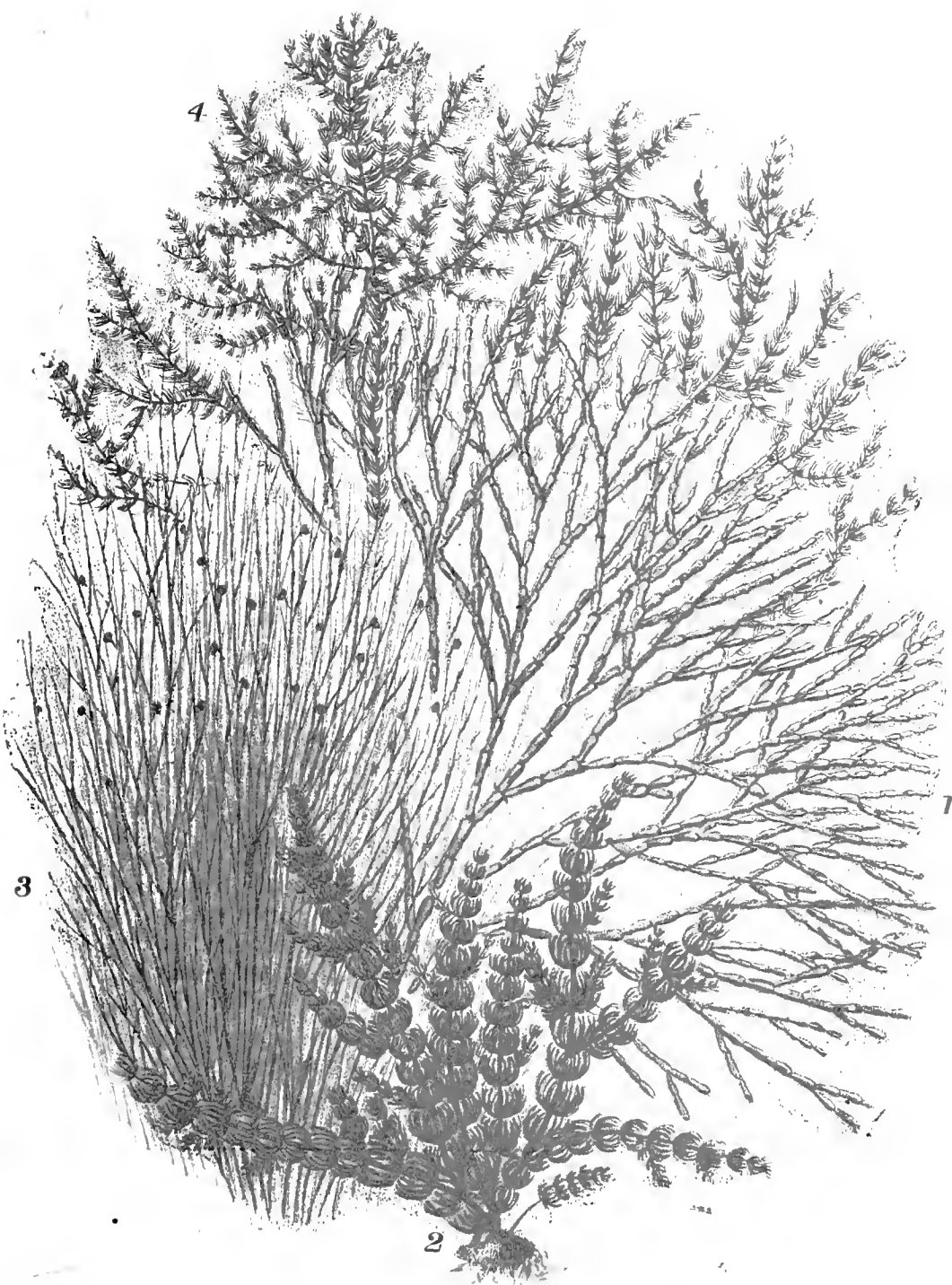
“ Now is it pleasant in the summer eve,
Where a broad shore retiring waters leave,
A while to wait upon the firm fair sand,
When all is calm at sea, all still on land,
And there the ocean’s produce to explore,
As floating by or rolling on the shore.”

Yes, pleasant, indeed; and there are not a few sea-weeds which can only be thus obtained, unless we set about the work in right earnest, embark in a good sea-worthy boat, with a strong-backed sailor to help us, let down a dredge, and drag them up along with star-fishes, sea-hedgehogs, shells, and the countless other creations with which GOD has so abundantly and so beautifully stocked the depths of the sea. And this all in good time we must do if we desire to be students of marine botany, and not collectors of scraps. Much pleasant occupation, however, lies at our feet ashore. Could we descend in safety to the submarine gardens we should find that

“ Arborets of jointed stem are there,
And plants of fibres fine as silkworm’s thread :
Yea, beautiful as mermaids’ golden hair
Upon the waves dispread.
Others that like the broad banana growing,
Raise their long wrinkled leaves of purple hue,
Like streamers wide outflowing.”

On some parts of the coast, at seasons when the water is not made turbid by storms or mud brought down by a river, and its surface is unruffled by the wind, we may drift quietly along and see with our own eyes that this description is not a mere poet’s fancy. And if we discern no mermaids nor sea-nymphs, we shall not be surprised that in fabulous times, when the poets peopled the air with sylphs and the woods with dryads, they invented intelligent beings to admire and inhabit the coral caves and crimson bowers of the deep.

C. A. J.





SEA-WEEDS.—VI.

At present we will rest contented with what we can find ashore. Leaving the ridge, and exploring among the oar-weedy rocks between tide-marks, we will

“Search for crimson weeds which spreading flow,
Or lie like pictures on the sands below.”

Twice a month, as everybody knows, two or three days after new and full moon, spring-tides occur, when the water rises and falls much beyond the average. At these periods we should set to work about an hour before low water, and search carefully in the little pools and among the coarse weeds close to the water's edge. Again and again should the same ground be diligently examined, for many of the sea-weeds are of rapid growth. At our first visit, for instance, we shall probably find minute, delicate specimens, which in the course of a fortnight will have increased in size, and become modified in their characters. Both of these states of the plant should be secured and preserved, to be compared with the specimens which we shall subsequently find in the same locality, by that time fully developed, and perhaps bearing fructification. Of other kinds specimens should be collected at more distant intervals, and notes should be made, with dates of the time and place when and where each was gathered. This is important, for it frequently happens that forms of the same plant at various stages of growth differ even more in external appearance than some allied species, which are in reality quite distinct. Others, again, belonging to the same species, vary greatly, according as they are exposed to more or less light, or in proportion to the amount of fresh water which falls into the sea near their place of growth. “*Nulla dies sine linea*”—“Not a day without a line,” is a good motto for a lover of natural history. Write down every day something that you have seen, taking extreme care to be as honestly accurate as if some great stake depended on your veracity, and you will find hereafter that many of your notes, and among them, perhaps, those which at the time you thought of little importance, will have acquired a great value.

C. A. J.

RHODOSPERMS—*continued.*

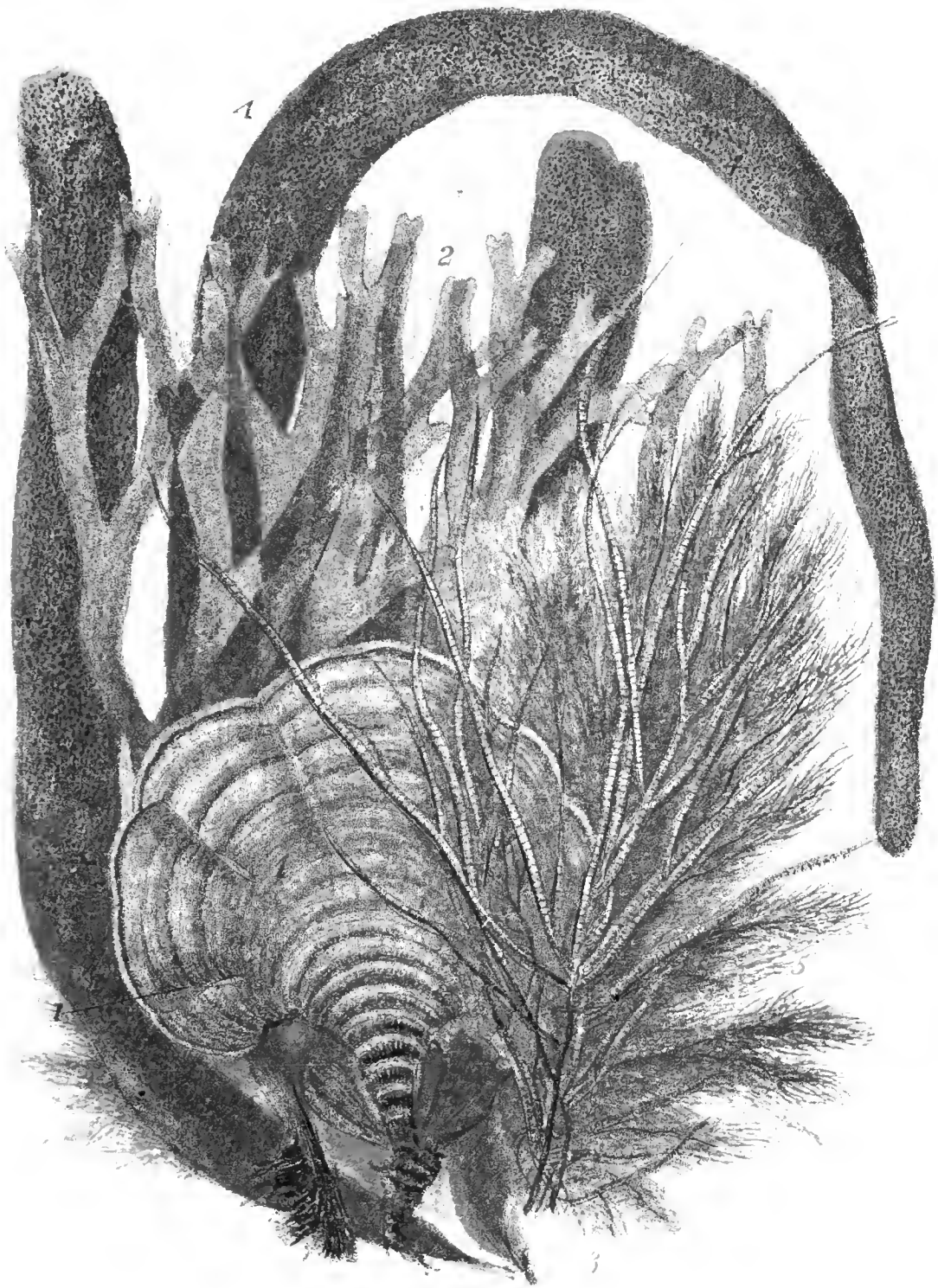
1. *Rhodymenia laciniata*.—Frond flat, thickish, bright red, not pellucid, divided into numerous wedge-shaped segments, which are again variously subdivided, and blunt at the extremity. Margin of fertile fronds curled, and fringed with the fructification. From three to ten inches long, but varying greatly in outline and width of the divisions. Common on rocks and stones in the sea, and frequently thrown upon the shore. (Fig. 1, young; Fig. 1a, mature; Fig. 1b, in fruit.)

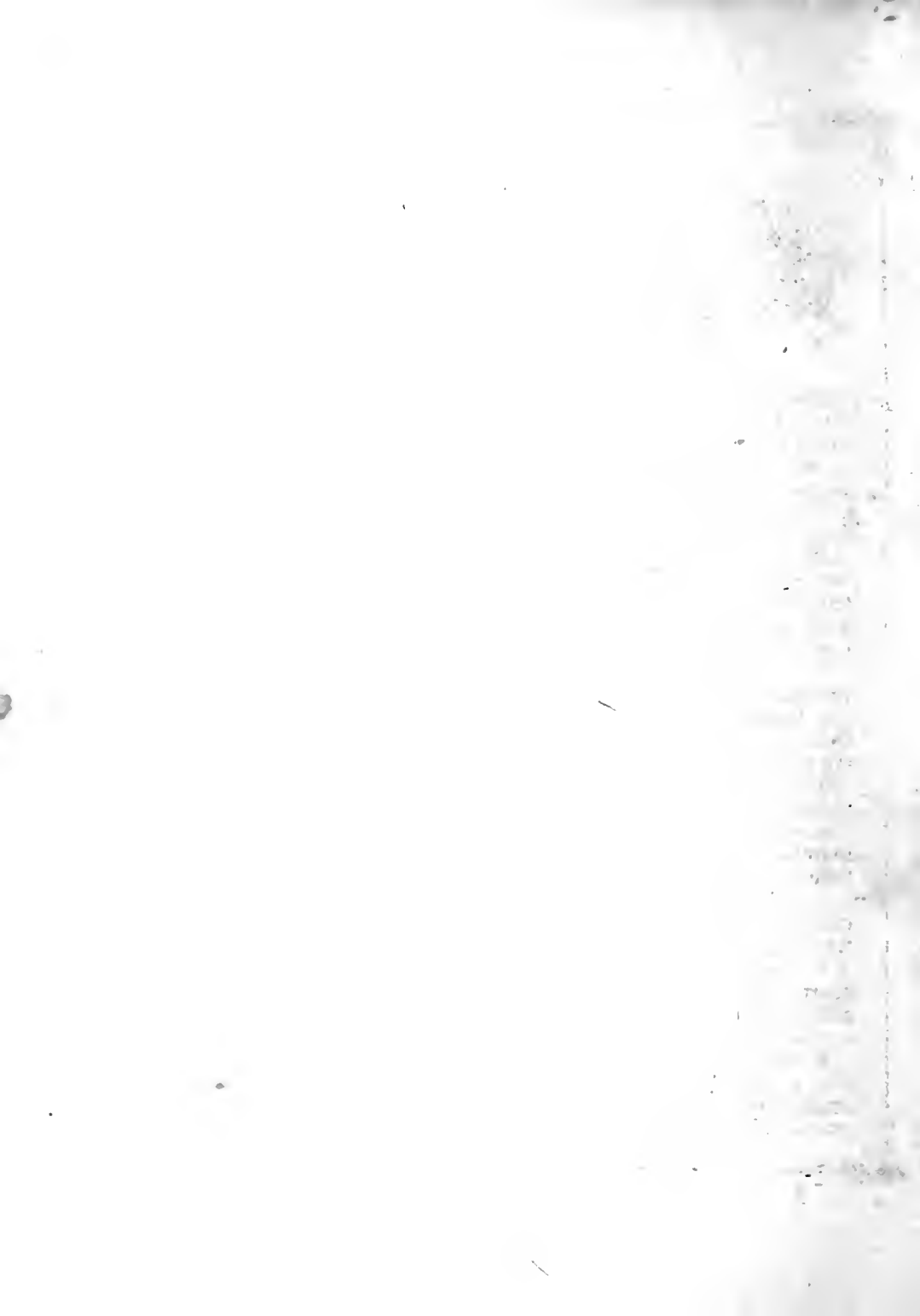
2. *R. jubata*.—Frond flat, thick, dull purple-red, opaque, tapering at each end, and divided into similarly shaped branchlets or fronds, which are variously beset with numerous, simple or branched, thread-like bodies bearing the fructification, which, however, is not often met with. In rocky pools between tide-marks. Common. (Fig. 2.)

3. *Sphaerococcus coronopifolius*.—Frond crimson, stoutish, flat, two-edged, repeatedly branched; branches all in the same plane, irregularly divided, ending in many-cleft, fan-shaped, lesser branches, the margins of which are fringed; fructification borne on the fringe: from four to twelve inches long. Common on the south coast of England, where it is usually found thrown on shore after a storm. (Fig. 3.)

4. *Gracilaria confervoides*.—Frond dull purple, cylindrical, irregularly but not copiously branched; branches long, almost simple, erect; branchlets few, tapering at each end. Fructification scattered, roundish. From four to twenty inches long; growing on rocks in the sea. Frequent. (Fig. 4.)

C. A. J.





SEA-WEEDS.—VII.

RIDGES of rock stretching out from the shore sea-ward, dangerous neighbours to boats when covered by breakers, afford at low water a rich harvest to zealous collectors. But there must be no dread of wet feet, for the utmost care will be found insufficient to prevent this accident. Sea-water, owing to the stimulating property of the salt which it contains, is not so likely to give cold as fresh water; so that many people can paddle about on the shore for hours, and receive no damage, provided that they put on dry clothes as soon as they cease moving about. We will be bold to-day, and venture to a short distance along the ridge, for we shall thus have an excellent opportunity of observing how much more luxuriantly some species grow in deep water than they do in the shallows. There is a strong difference perceptible even between those which grow on opposite sides of the ridge, according as they are more or less exposed to the current, and to the action of light. The great sea-tangles are in some places infested with tufts of smaller weeds, specimens of which we must save for future examination; in other places they bear nothing but a few minute zoophytes, or the lovely little limpets streaked with emerald, to which conchologists have given the name of *Patella pellucida*. Many of the common weeds, too, which, when picked up on the ridge, are of a uniform sombre colour, when looked down upon as they grow in their native bowers, flash with the radiant colours of all precious stones:

“There gems bud forth, and wave the sea-green flowers
With graceful motion, as the currents flow.”

C. A. J.



Magnified portion of *Hypnea purpurascens*.

RHODOSPERMS—*continued*.

1. *Hypnea purpurascens*.—Frond dull purplish red, not jointed, branched in a bushy manner; branches alternate, long, and tapering, thickly clothed with slender, compound branchlets; fructification immersed in the branchlets. From six inches to two feet long. Common on all parts of the coast between tide-marks. (Fig. 1.)

2. *Gelidium cornutum*.—Frond flattened, somewhat horny, branched in an irregularly pinnated manner; branches tapering at each end, and bearing branchlets either simple, or divided like themselves. Deep purple below, with light-red branches; but so variable is this plant that extreme specimens might be mistaken by the unskilled collector for totally different species. In size it varies from half an inch to four inches in length; and the width, insertion, and shape of the branches differ greatly. Common in rocky pools and between tide-marks. (Fig. 2.)

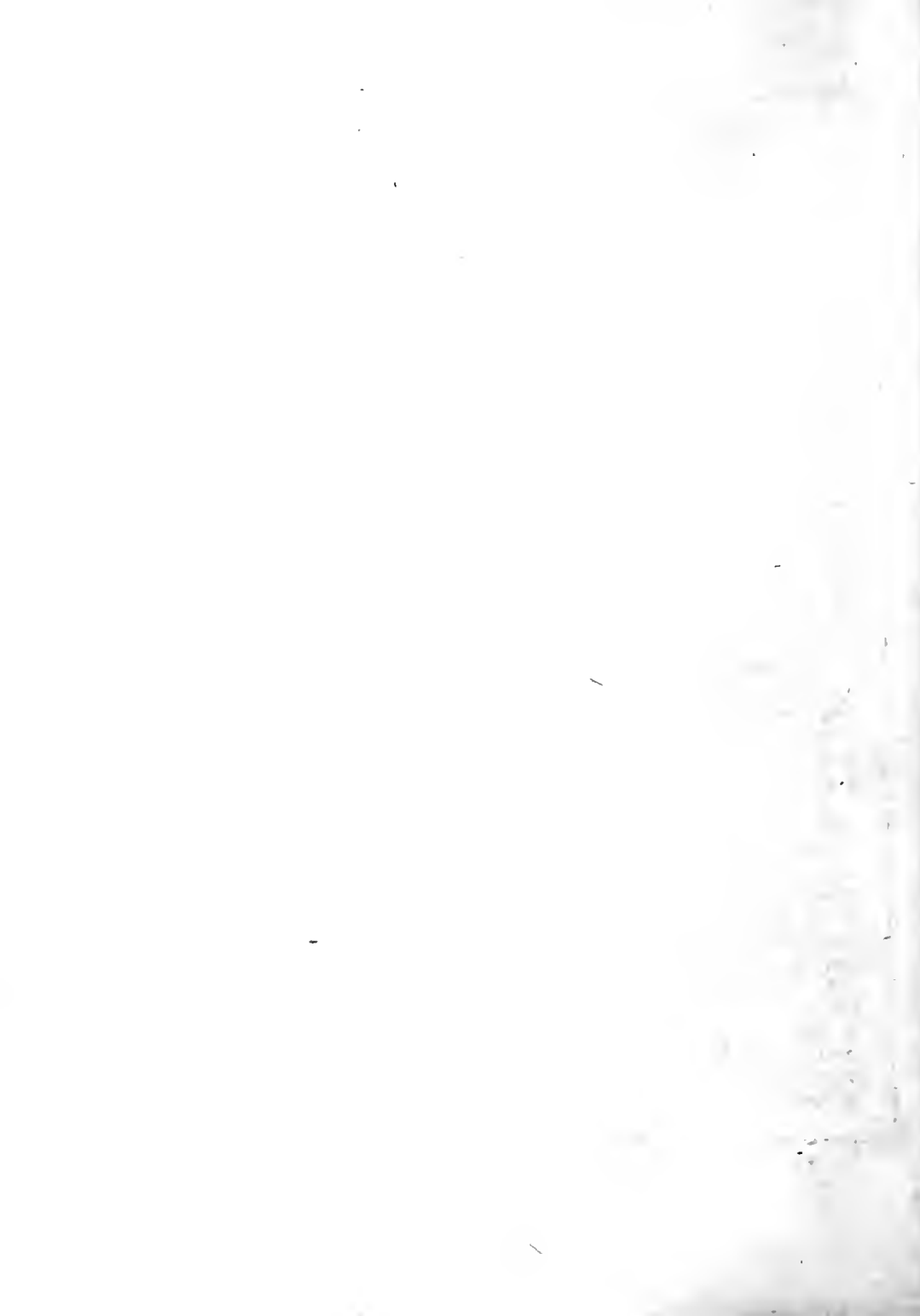
3. *Gigantina mamillosa*.—Frond purplish red, nearly cylindrical at the base, flattened upwards, and finally expanding into numerous forked branches, which are themselves repeatedly subdivided; margins of the branches incurved so as to form a portion of a cylinder; fructification scattered over the frond in the form of wart-like excrescences. Common on rocks near low-water mark: four to eight inches long. (Fig. 3.)

4. *Chondrus crispus*.—Frond fan-shaped, stalked, thickish, flat, or curled (not channelled like the last); repeatedly forked in a wedge-shaped manner; fructification oblong, scattered and imbedded in the frond; concave on one side. Varying greatly in the size of the branches, which are often much wider than in the figure; the colour, too, ranges from yellowish-green to purple and brown. Abundant everywhere between tide-marks and in deep water: two to ten inches long, usually three to four. This and the preceding species form the "carrigeen moss" of the shops. (Fig. 4.)

5. *Phyllophora rubens*.—Stem very short, expanding into a deep purple-red, flat, wedge-shaped, tough frond, which is obscurely mid-ribbed. This is either simple or forked, and sends forth from its surface near the extremity one or more similar fronds of a lighter hue. Fructification various, scattered over the fronds. Common on the rocky sea-shore: three to ten inches long. (Fig. 5.)

C. A. J.





SEA-WEEDS.—VIII.

“THERE shells of pleasant forms and nameless hues
To alabaster columns cling ; and there
Such flowers spring up, as never drank the dews,
Nor breathed the freshness of the upper air ;
But fairer, lovelier far their tints that glow
On the pure sand, like rainbow hues on snow.”

Not poets alone insist on the resemblance between sea-weeds and flowers ; even botanists, unimaginative people, whose sole vocation, some think, is to dry plants and coin hard words, have had taste and discrimination enough to call the Rhodosperms “Florideous Sea-weeds;” and the latter name is on some accounts the better of the two: for though red is the predominant colour, it is liable to great variations. The common *Chondrus crispus* (Plate VII., fig. 4), when it grows in deep water, or in a pool shaded by a rock, is of a dark purple hue, lustrous, like opal or mother-of-pearl, with prismatic colours. When more exposed, it becomes of a brighter red, and when it grows in shallow water, and basks all day long in the rays of the sun, its colour is often dull green, or even dirty yellow, scarcely tinged with red. So also *Corallina officinalis* (Plate IV., fig. 7), formerly considered to be a zoophyte, though of a rosy pink hue in tolerably deep water, may be observed growing high up on the beach, almost white. This plant is singularly rigid in its habit, and is made up of a series of stony joints. Its first introduction to the sea-side wanderer will probably be as a shattered tuft of white jointed stems lying on the sand, so frail as to fall to pieces when an attempt is made to take it up. The CHLOROSPERMS, the simplest of all in structure, are most abundant near high-water mark. Like land plants, they seem to require plenty of light in order to perfect their characteristic green ; but among them, *Porphyra*, commonly called “laver,” is, when in fructification, of a decided purple hue. It may often be seen stretched over a rock to a considerable extent, quite dry, and resembling transparent animal membrane, but recovering its flaccid character on the return of the tide.

C. A. J.



Magnified portions of Figures 4—5.

RHODOSPERMS—*continued.*

1. *Dumontia filiformis*.—Fronde cylindrical, wavy, tubular, filled with watery jelly, tapering to each extremity; pinnated with long, simple branches like the main stem. Colour varying from pale yellow to dull purple. Two to twenty inches long: rocks between tide-marks; common. (Fig. 1.)

2. *Halymenia ligulata*.—Fronde gelatinous, flattened, rose-red, irregularly forked, often having club-shaped, simple or forked, branchlets; fructification scattered in the form of minute dots through the substance of the frond. Not unfrequent on the southern shores in deep water, but rare in most other places. Six to twelve inches long, or more. (Fig. 2.)

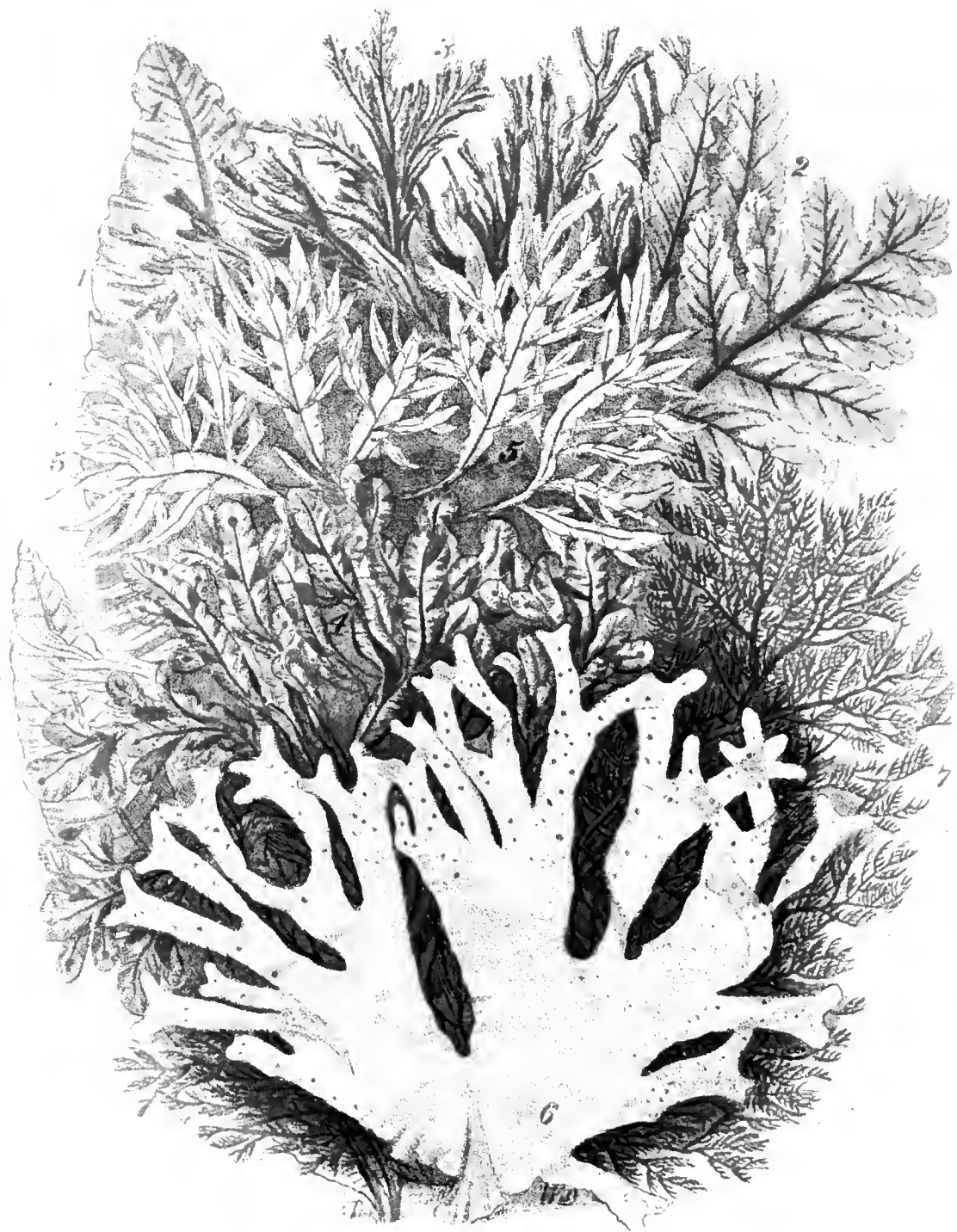
3. *Iridaea edulis*.—Fronde, several from the same root, dull purplish red, battledoor shaped, with a short stalk, undivided. On the rocky shore common; six to twelve inches long. Freshly-gathered fronds, after having been subjected to a rude cookery, by holding them between hot tongs, become eatable, but form a sorry food. (Fig. 3.)

4. *Gloiosiphonia capillaris*.—Fronde rose-red, cylindrical, tubular, gelatinous, tapering to each extremity; destitute of branches below, but bearing, upwards, numerous branches like the main stem, and these are beset with similar but smaller branches until they all terminate in delicate fibres. In rocky pools or deep water, principally on the south coast of England; three to twelve inches long. (Fig. 4.)

5. *Catenella opuntia*.—Fronde dull purple, variously branched, contracted at intervals so as to resemble a necklace of elliptical beads (hence its name, "a little chain"); growing in dense tufts, and forming patches on rocks near high-water mark on many parts of the coast; from half an inch to an inch high. Its name *opuntia* it takes from the resemblance borne by its fronds to the proliferous leaves of the prickly pear, *Cactus opuntia*. (Fig. 5.)

C. A. J.





SEA-WEEDS.—IX.

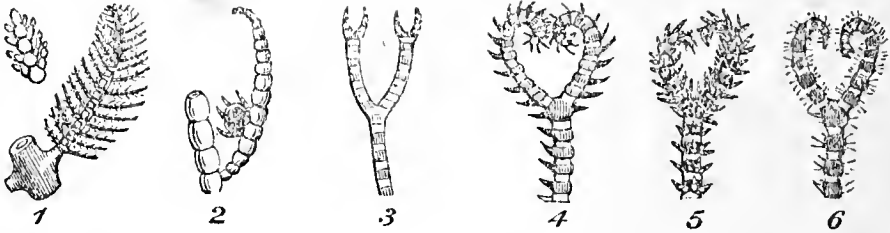
I WOULD gladly say something about the fructification of SEA-WEEDS, but the organs in them, which represent the flowers and seed of land plants, are so exceedingly minute, that it is needful that one should have some skill in managing the microscope to see them aright; moreover, it is next to impossible to describe them accurately without using terms, the meaning of which is clear enough when they stand for things that one has seen, but which are otherwise likely to slip from the memory and leave no impression. Suffice it then to state, that two terms are employed in printed descriptions of seaweeds, the meaning of which it is indispensable that we should know, *frond* and *spore*. The frond includes every part of the plant, root, stem, branches, and leaves. Spores are the minute bodies which represent seed-vessels and seeds in flowering plants, but differ from them essentially. In the Melanosperms the spores are generally of an olive-green, or olive-brown colour, and are either imbedded in the frond in definite masses or ill-defined groups, or appear as external knobs. In the Rhodosperms the spores are of two kinds, and of a red colour; in some cases they are imbedded in the frond, in others raised on stalks. In the beautiful plant, *Delesseria sanguinea* (Plate V., fig. 2), the leaf-like expansion dies away in winter, and is succeeded by a fringe of spores of two kinds, one raised on short stalks, the other imbedded in minute leaves. The Chlorosperms, which are the simplest in structure of all the sea-weeds, and indeed of all plants, have the spores dispersed throughout the whole of the frond, any part of which is therefore capable of being converted, under favourable circumstances, into a new plant. They are, with a few exceptions, of a bright green colour. Seaweeds of all kinds, whether germinating spores or developed plants, derive no nutriment through their roots from the substance on which they grow, but imbibe nutriment by their whole surface from the water in which they float, though many of them, perhaps the majority, show some preference in the substance to which they attach themselves.

C. A. J.

RHODOSPERMS—*continued*.

1. *Ptilota sericea*.—Fronds rose-red, not jointed, tufted, delicate, much branched, the branches growing all in one plane; branchlets and fibres opposite, the latter composed of a single row of cells; fructification among the fibres. An elegant little plant, two to four inches long, growing on rocks between tide-marks; common. (Fig. 1.)

Ceramium.—Of this beautiful genus thirteen different species are described and figured by Harvey. Of these the greater part are difficult of



Magnified portions of Figures 1—6.

discrimination, even with the help of dried specimens and a magnifying glass. The accompanying sketch therefore professes only to assist the collector in determining the *genus* of his specimens; but it will be hardly safe for him to decide on the *species* under any guidance less trustworthy than that of Harvey in the admirable works quoted above. The characters of all the species are: Frond rose-red or purple, thread-like, tufted, jointed throughout, the knots opaque, repeatedly forked; fructification of two kinds, one stalked, the other sessile.

2. *C. rubrum*.—Frond of the same colour throughout, robust, irregularly forked; the terminal fibres hooked inwards. Abundant on all parts of the coast; two to twelve inches long. (Fig. 2.)

3. *C. fastigiatum*.—Knots coloured rose-red, with the intervals colourless, four to six times longer than broad, branches forked, level at the top; hooked inwards at the points; near low-water mark. "One of the rarest and most beautiful of the British species."—*Harvey*. (Fig. 3.)

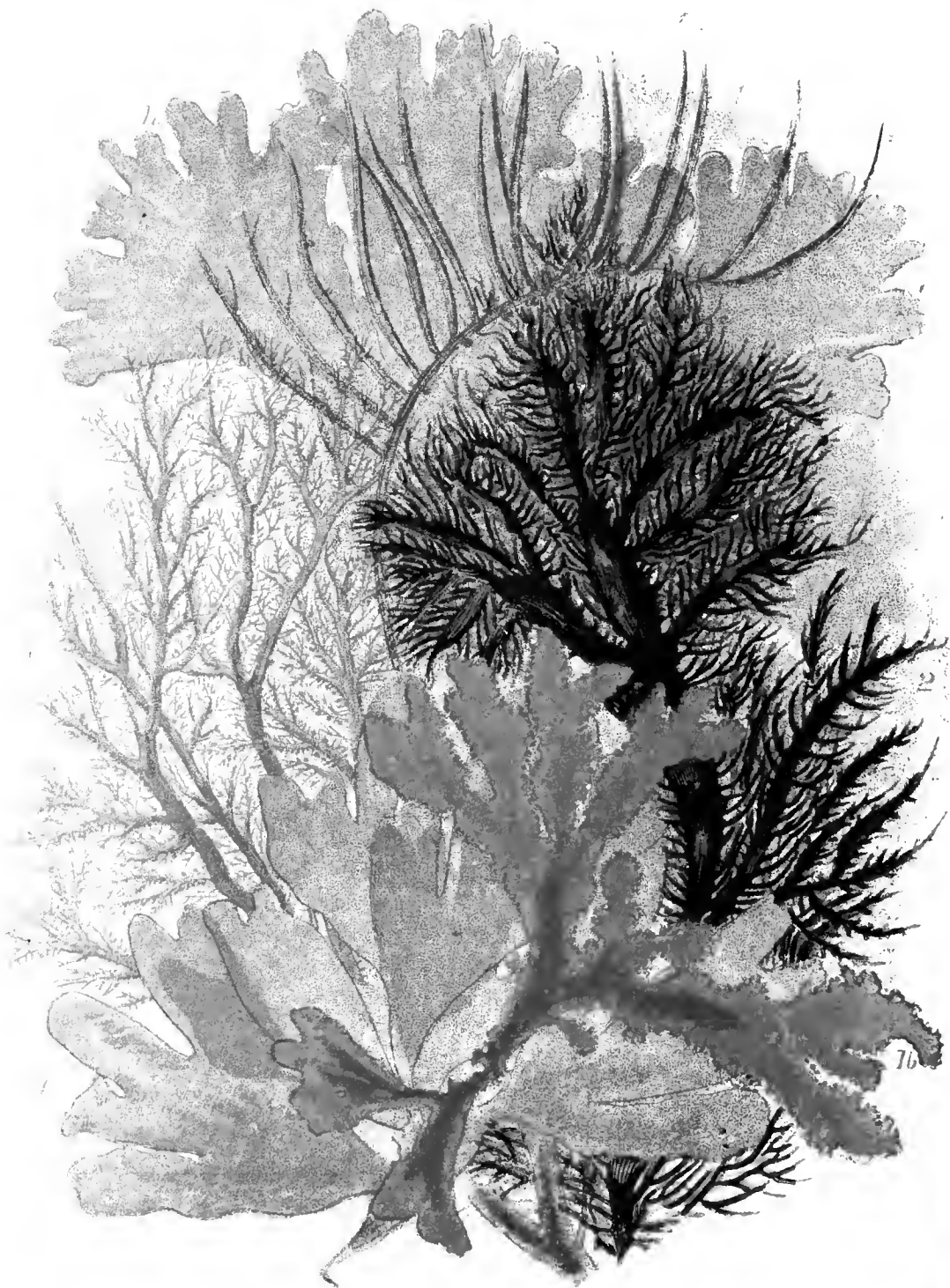
4. *C. acanthotum*.—Knots coloured purple, with long, colourless intervals, contracting upwards; branches rigid, slender; points strongly rolled inwards; knots armed on the outer edge with a single, stout, three-jointed prickle. Densely tufted; growing on rocks near low-water mark; not uncommon. (Fig. 4.)

5. *C. ciliatum*.—Knots coloured purplish-red, narrow; intervals colourless; branches rigid, and rather brittle; points strongly rolled inwards; knots armed with a whorl of stout, three-jointed prickles. Densely tufted; three to six inches long. Tidal pools, or near low-water mark, frequent. (Fig. 5.)

6. *C. echinotum*.—Knots coloured purple; intervals colourless, the lower ones longer than broad, diminishing in length as they ascend; branches rigid, repeatedly forked, strongly hooked at the top; knots armed with several one-jointed prickles. A densely-tufted plant, harsh to the touch, growing between tide-marks on several parts of the south-western coast, but not general: three to six inches long. (Fig. 6.)

C. A. J.





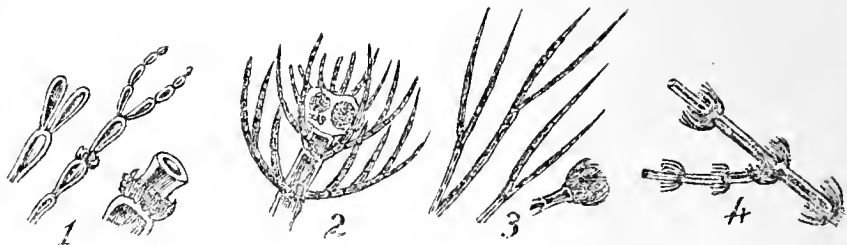
SEA-WEEDS.—X.

BEGINNERS in the study of Natural History are much in the habit of asking when they have found a specimen of something they have never seen before, "Is it rare?" And if their inquiry is unwisely met, as it probably will be, with the answer, "No!" they are too apt to throw the object aside, and to take no further interest in it. Now this is a habit which ought to be discouraged. The mere collector ought to have his collection perfect, which, unless the very commonest things are included, it cannot be; and the naturalist ought to make himself thoroughly acquainted with the most familiar objects in his particular branch of study, or he will have little chance of distinguishing the really rare ones when they occur. The right method is, undoubtedly, to make a prize of, and examine, everything that is unknown, and every new form of what is familiar. There are many rare things to be found on every coast, and among them, here and there, one that may be new, new to England, to Europe, to the world! These discoveries, be assured, fall only to those who, by diligent investigation, have made themselves well acquainted with everything common, so that when a novelty or rarity occurs, they know it to be so at once, not because it is beautiful or otherwise, but for the reason that it is not set down in the inventory of their memory. Nor will it do to confine your attention to exposed rocks, and

—shallow pools that stand so clear,
The bottom does the top appear;"

these, indeed, have their treasures, and there perhaps the least conspicuous may chance to be the rarest. But the muddy shore must also be explored, and it will be worth your while to examine closely every tuft of red fibres which you see lying on the ooze. These should be placed severally in little bags, and, when they have been washed in clean water, be studied at home with the help of the microscope.

C. A. J.



Magnified portions of Figures 1—4.

RHODOSPERMS—*continued.*

Griffithsia.—This genus, named by Agardh in honour of the late Mrs. Griffiths, “the most distinguished of British algologists,” contains seven British species, several of which are very beautiful, and being not unfrequent soon attract the attention of the collector. Like others, however, they require to be studied with the help of a manual. In all the species the fronds are rose-red, thread-like; branches jointed throughout.

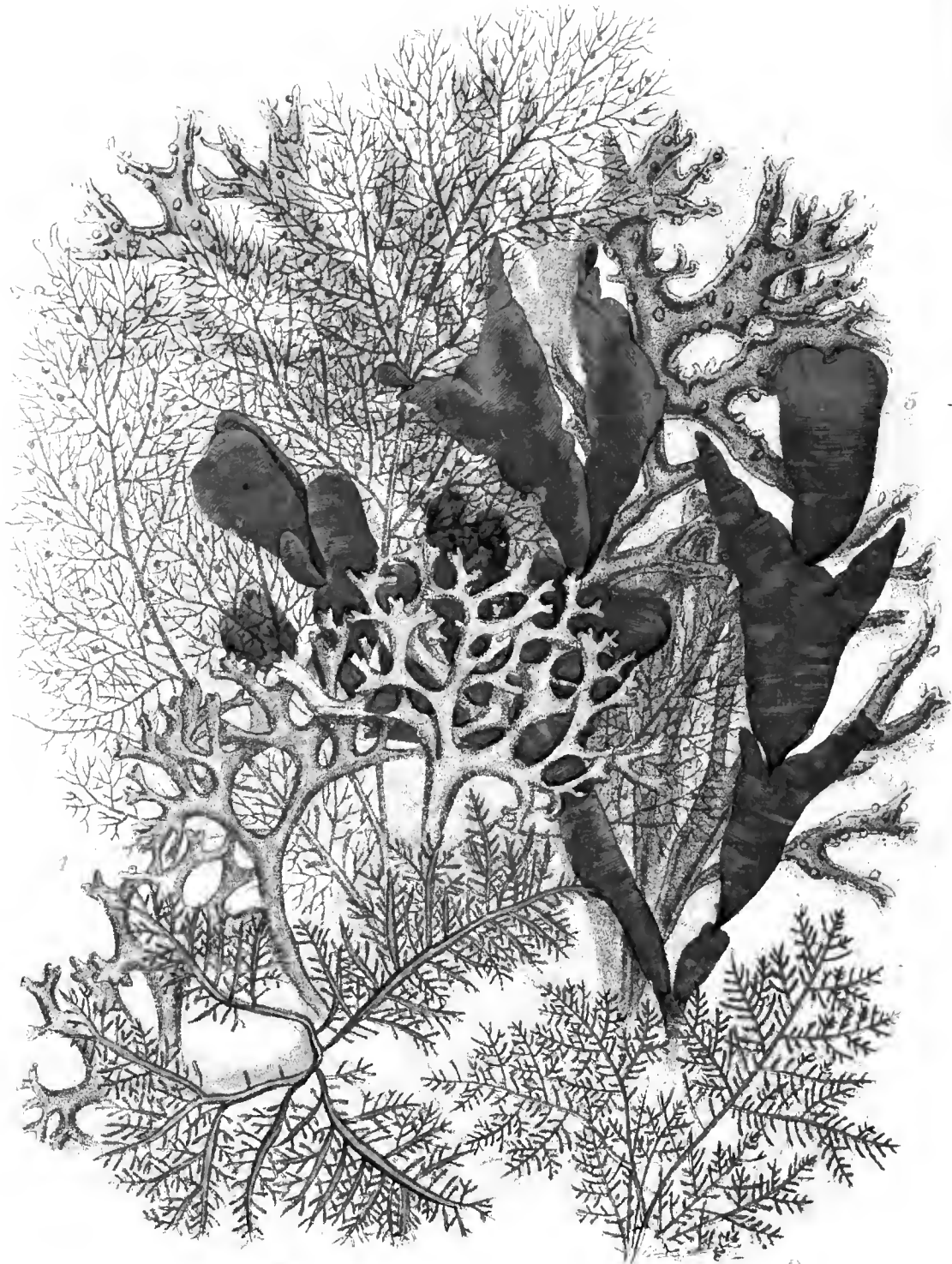
1. *G. corallina*. Stems repeatedly forked, gelatinous; the intervals of the joints (internodes) swollen, club-shaped; fructification stalked. In deep pools near low-water mark; two to six inches long. It received its specific name from its resemblance in form to *Corallina officinalis*, figured in Plate IV. (Fig. 1.)

2. *G. equisetifolia*.—Stems robust, much branched, clothed throughout with tufts of short incurved fibres, which in the young branches are regularly whorled, but in the older form a shaggy pile. On the southern and western shores frequent near low-water mark; three to nine inches long. (Fig. 2.)

3. *G. setacea*.—Stems bristle-shaped, straight, rigid, repeatedly forked; internodes cylindrical (not swollen as in *G. corallina*); five or six times longer than broad; branchlets pointed; fructification stalked: three to eight inches long. “A long-known and beautiful plant, found on all the British shores, and widely dispersed throughout the ocean.” This and other species, though crisp and firm in substance while recent, if dropped into fresh water suddenly become flaccid, burst asunder the membrane of their cells, and discharge the colouring matter with violence. Dr. Harvey kept a specimen in a growing state for more than two years in a closed bottle of seawater. (Fig. 3.)

4. *Wrangelia multifida*.—Fronds rose-red, thread-like, jointed, branched in a pinnate manner, each joint having a pair of opposite (or whorled with numerous) tufts of slender, branched fibres; internodes many times longer than broad. On the perpendicular sides of deep pools near low-water mark. Frequent on the southern shores: four to eight inches long. (Fig. 4.)

C. A. J.

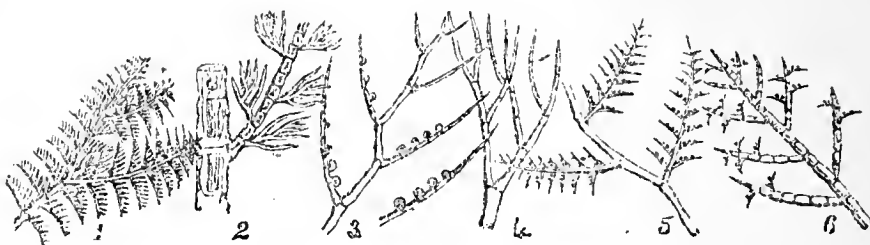


SEA-WEEDS.—XI.

AND now that we have collected a considerable number of specimens, we must consider what we are to do with them. If we suffer them to remain long in the mass, they will become putrid, and offensively useless; if laid in the sun to dry, they will retain their colour to a certain extent, but curl up and lose their form. We must therefore follow some general rules for preserving them, as far as may be, in their natural form. The more robust ones should simply be washed in fresh water, laid on stout unglazed paper, and placed between thick layers of blotting-paper, with a board below and another above. To preserve the more delicate kinds, place each specimen singly in a dish of cold fresh water; with the finger or the feather-end of a pen, or a camel's-hair pencil, separate the branches until the plant assumes its usual habit of growth. Then slip underneath a piece of white paper; lift it gently, allowing the water to run off, and when it has been allowed to drip for a short time, place beneath it a layer of blotting-paper, and above it a piece of fine linen or oiled paper, then another layer of blotting-paper, and on this another specimen, placed as before on white paper, inserting a board from time to time. When the pile is completed, place on the top of the last board a weight; shop weights are very good, but if they are not to be had, large pebbles or bags of sand will do quite as well. Next day transfer the plants to dry blotting-paper, and subject them to a somewhat heavier pressure; but the exact amount depends upon the nature of the specimens. Repeat this process every day, or twice a day, still increasing the weight, and when they are quite dry, many of the specimens will be found to have attached themselves to the paper by their own gluten; others may be fastened on by artificial means. Care should be taken to leave them in the fresh water the shortest time possible, and it may be desirable to have several piles of blotting-paper and boards, so that those specimens may be kept together which require the same amount of pressure. C. A. J.

RHODOSPERMS—*continued.*

Callithamnion.—This name, the meaning of which is "beautiful little shrub," is given, and with reason, to a genus of sea-weeds which contains upwards of thirty British species. Many of these are difficult of discrimination without the aid of the microscope and a careful examination of specimens in different stages of growth. Among them the collector may find some of the following:—



Magnified portions of Figures 1—6.

1. *C. Plumula*.—Frond rose-red, thread-like, densely tufted, jointed, branched in two opposite directions; each joint bearing a pair of recurved branchlets, which are fringed on the upper margin. Fructification among the terminal branchlets. On rocks and sea-weeds, above and below low-water mark, frequent: two to six inches long. (Fig. 1.)

2. *C. tetragonum*.—Frond bristle-like, brownish-red, somewhat opaque, veiny; extreme branchlets fan-shaped, springing alternately from a jointed branch. Two to four inches long; common on the larger sea-weeds, especially sea-tang. (Fig. 2.)

3. *C. roscum*.—Fronds loosely branched, purple-lake, branches long, wavy, crowded towards the top with pinnate branchlets, the fibres of which are long and curved; articulations of the branches four to five times as long as broad. Three to four inches long; on rocks and sea-weeds near low-water mark; not uncommon. (Fig. 3.)

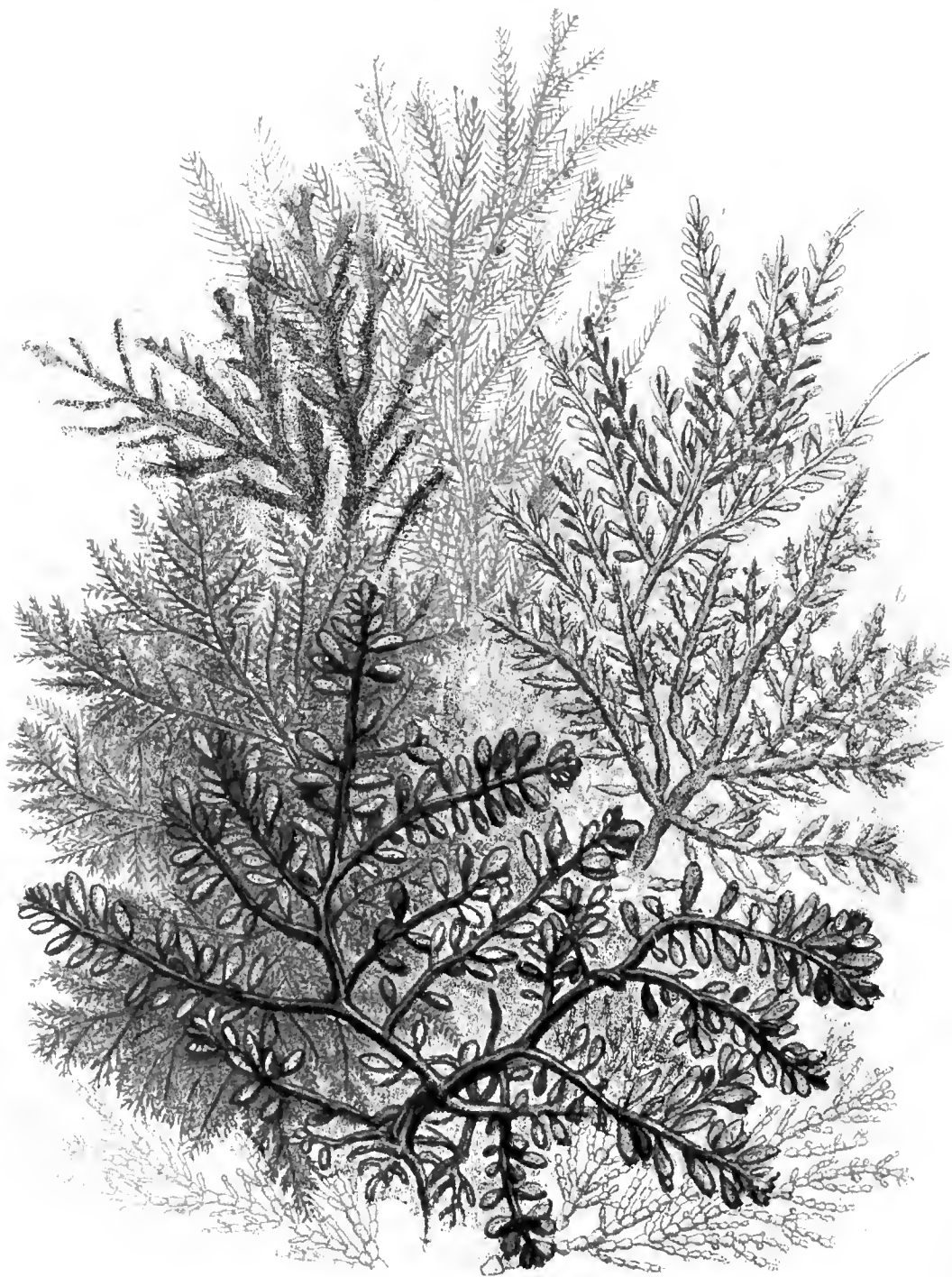
4. *C. pedicellatum*.—Fronds bristle-like, pellucid, jointed, loosely divided; rose-red; fructification stalked, springing from the angles of the short blunt final branchlets. Near low-water mark, or in deep water on most parts of the coast, but rather rare: two to eight inches long. (Fig. 4.)

5. *C. polyspermum*.—Tufts globose; stems slender, delicate, brownish-red, much branched below; final branchlets pinnate, the fibres short, spreading, pointed, bearing fructification on their upper margin; internodes of the branches four or five times as long as broad, with a narrow central, coloured tube. On the larger sea-weeds common, often completely investing them; one to two inches long. (Fig. 5.)

6. *C. tetricum*.—Frond rigid, shrubby, dull brownish-red, densely covered with branchlets, shaggy below, feathery above; extreme branchlets simply pinnate; articulations twice or thrice as long as broad. Two to eight inches long; common in the west of England, near low-water mark; less frequent on the eastern coast. (Fig. 6.)

C. A. J.





SEA-WEEDS.—XII.

If you should wish to *study* the sea-weeds as well as to collect and preserve them, and have no one at hand to whom you can apply for instruction or assistance, you will do well to show a limited number of your specimens, selecting those which differ most from one another, to some naturalist acquainted with this branch of science, and ask him to write the name of each on the back of the paper to which it is stuck. You can then at your leisure compare each specimen with the description given in "Harvey's Manual,"* or some other trustworthy book. You will there find noted the characters by which it is distinguished from all other species in the same genus; on these depends its second, called the *specific*, or *trivial*, name. Having verified this description, turn to the heading of the section in the book where the characters of the genus are given; on these the first, or *generic*, name depends. This will lead you back to the yet more comprehensive characters belonging to a *group of genera*, which should be studied in like manner; and the next step will be to discover whether it belongs to the Melanosperms, Rhodosperms, or Chlorosperms. By the time that you have examined carefully about a dozen specimens in this way, you will have gained a tolerably correct idea of the general classification of sea-weeds, and when a new sort falls in your way, you may try to discover its name, remembering, however, to reverse the above process. Suppose, for instance, you have found a specimen of the sea-weed numbered 6 on the 5th card; you will find on examination that it is a Rhodosperm, belonging to the group or order Delesseriaceæ; in that group to the genus *Nitophyllum*, and on turning on to the specific descriptions, you will not hesitate to call it *N. punctatum*.

C. A. J.

* "Manual of the British Marine Algæ."—(Van Voorst.)



Magnified portions of Figures 2—4.

CHLOROSPERMS, OR GRASS-GREEN SEA-WEEDS.

FOR the most part green, but varying to yellow, olive, purple, and other tints; fructification dispersed through all parts of the frond. The CHLOROSPERMS are more widely diffused than any other Alga. "A comparatively small number are found in the waters of the sea. A far larger proportion inhabit fresh-water rivers, lakes and ponds, ditches, the gutters of houses, and sewers. They are specially useful in purifying the air, by pouring forth during sunshine oxygen prepared in their delicate tissues from the carbonic acid on which they feed."—*Harvey*.

1. *Codium tomentosum*.—Frond green, sponge-like, nearly cylindrical, repeatedly forked, blunt; six inches to two feet long. On rocks near low-water mark; common on all the shores of Europe, and dispersed throughout all the temperate and torrid portions of the ocean. (Fig. 1.)

2. *Bryopsis plumosa*.—Frond glistening green, thread-like, tubular, cylindrical, unbranched below; divided above into feather-like branchlets; one to three inches long; rocks in the sea, frequent. Each branch consists of a single cell, which, when wounded, discharges the whole of its contents. When dried, it assumes a varnished appearance. (Fig. 2.)

3. *Cladophora late-virens*.—Frond green, jointed, much branched, bushy, forming tufts of a transparent yellow-green colour; faded, and without gloss when dry; six to eight inches long; common on all the shores of the Northern Atlantic Ocean. (Fig. 3.)

4. *C. arcta*.—Fronds forming broad starry tufts of a brilliant green colour, and more or less matted together; branches straight, crowded, erect. Both shores of the North Atlantic, frequent. There are in all twenty-five British species of *Cladophora*. The two figured are among the most frequent, but the species being difficult to discriminate, the collector will not be safe in naming his specimens without consulting *Harvey*, or some equally high authority. (Fig. 4.)

5. *Enteromorpha compressa*.—Frond green, tubular, cylindrical; or somewhat flattened, branched; the branches long, narrow at the base, and swelling upwards, blunt; six to twelve inches long. Most abundant on all parts of the coast, and often grown in the marine "aquarium." (Fig. 5.)

C. A. J.

F. REMNANT & SONS,
BINDERS.

