Algology.

ALGÆ

AND

Corallines,

OF THE

BAY & HARBOR OF NEW YORK,

Illustrated with Natural Types,

BY

C. F. Durant.

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To

The Illustrious son of Ops, the noble scion of Saturn, whose kingdom is the seas, and whose care is the plants and the creatures that live in and upon the waters, whose grisly beard requires due homage from the equatorial novitiate*, whose wrath has doomed the "Flying Dutchman"† to perpetual head winds at the icy Cape, and whose benevolence is always manifested in gentle breezes, to waft the honest hearted mariner to a haven of rest, this book on the Algæ and Corallines of the Bay and Harbor of New York.

Is most Respectfully Dedicated

By his grateful and obliged Servant

The Author.

Jersey City, December, 1850.

Note.(*) A very ancient and still prevalent custom in merchant ships, crossing the equator, is to keel haul, and then lather and shave all novices in that locality, out of profound respect for his majesty Neptune, who is always present on ship board with a flowing beard, to witness the ceremony.

Note.(†) The interesting legend of the 'Flying Dutchman', is familiar to most readers. It is a favorite story with marmers, who often see, or think they see the unfortunate crew and doomed ship beating about Cape Horn. This story, as well as that of the Patagonian giants, and sea serpent of Nahant, probably originated from the mirage, which prevails most in high latitudes, and which causes objects to 'loom', or to appear many times larger than their natural size. In our own Bay, in the Autumn, a small sloop will sometimes appear when a few miles distant, to be larger than a line of battle ship. The double mirage often witnessed in high latitudes, will show the image sometimes inverted high up in the clouds. I have seen the town of Lynn, Mass from Nahant, when it appeared in the clouds a quarter of a mile above its natural position. I was present on board a steamer, near Nahant when more than fifty persons exclaimed, "lo! the sea serpent, how very near, [300 feet off.] what a fine view!" The monster proved to be the effect of the mirage on the dorsal fins of shoals of small fishes swimming at the surface of the water. Thus, the 'Flying Dutchman' of the honest hearted sailor, may well be the reflected and often the inverted image of his own crew and his own ship.

GLOSSARY.

ACUMINATED: produced into a long slender point.
AIR-VESSEL: a hollow portion of a plant filled with air.
AMORPHOUS: indefinite shape.
ANASTOMOSE: to unite by growth into another body.
ANTHERIDIA: } organs described in the introduction.
ANTENNÆ: }
APEX, pl. *Apices:* the top or tips.
ARTICULATED: having the appearance of joints.
AXIL: the angle formed by branching or dividing.
AXIS: the central column of stem or branch.
BASE: the bottom.
BRANCHLET: the ultimate division or branch.
CALCAREOUS: formed of carbonate of lime.
CAPITATE: terminating in a knob.
CAPITULUM: a terminal knob.
CAPILLARY: very slender, like human hair.
CAPSULE: a spore case, or the capitulum of antheridia.
CARNOSE: fleshy, feeling like flesh.
CARTILAGINOUS: like gristle.
CELLULAR STRUCTURE: constructed of cells like a honeycomb.
CERAMIDIUM: a particular kind of fruit containing a tuft of spores rising from base.
CILIA: like very fine hairs.
CIRRHOUS: like the tendrils of a vine.
CLAVATE: shaped like a club, small at bottom and large at top.
COMPRESSED: as if a cylinder were partly flattened.
CONCEPTACLE: a hollow case containing a cluster of spores.
CONSTRICTED: drawn together as if tied by a string.
CONTINUOUS: without interruption or joints.
CORIACEOUS: the substance of, or like leather.
CORNEOUS: like horn.
CORYMBOSE: when ramuli form convex surfaces with each separate branch.
COSMOPOLITAN: growing in many parts of the world.
CRUCIATE: shaped like a cross.
CRUSTACEOUS: hard and expanded like a crust.
DECUMBENT: lying flat.
DEFLEXED: bent downwards.
DENTICULATED: having projections like teeth.
DICHOTOMOUS: repeated forkings, each dividing into two parts.
DISSEPIMENT: the membrane that connects two joints or articulations.
DISTICHOUS: in two opposite ranks.
ELLIPSOIDAL: resembling, though not an oval.
ELLIPTICAL: oval not ovate.
EMBRYO: the young plant, or germ in the seed.
ENDOCHROME: the colored matter in the cells.
EPIDERMIS: the outer skin.
FALCATE: shaped liked a sickle.
FAMILY: a collective group of genera.
FASICULATE: tufted.
FASTIGIATE: when the branches are nearly parallel, as in the Lombardy poplar, and level at top.
FAVELLA: a form of fruit like ceramedium.
FAVELLIDIUM: a favella immersed beneath the epidermis.
FIBRO-CELLULAR: firm and elongated cells strung together.
FILAMENT: a string of cells.
FILIFORM: slender and cylindrical like thread.
FLACCID: without stiffness, limp.
FLEXUOUS: bent from side to side.
FUSIFORM: like a rolling-pin, thick in the middle.
GELATINOUS: like jelly.
GENUS: a collective group of species.
HABIT: the general appearance of a plant.
HABITAT: the place of growth.
HOMOGENEOUS: having a uniform structure.
HYALINE: transparent like glass.
IMBRICATED: overlapping at the edges.
INARTICULATE: without apparent joints or interruptions.
INFLATED: swollen as if puffed out with air.
INTERNODE: the space between two joints.
INVOLUTE: rolled inwards.
IRIDESCENT: reflecting changeable colors.
LANCEOLATE: like the head of a lance.
LEVEL-TOPPED: same as fastigiate.
LINEAR: long and narrow.
LOBE: a part deeply cut or indentated.
MEMBRANACEOUS: thin, filmy, tender, but not gelatinous.
MONILIFORM: like a string of beads.
MUCUS: organic gelatine or slime.
NEMATHECIUM: a wart-like protuberance.
NODOSE: swollen joints.
OPAQUE: reverse of hyaline.
ORBICULAR: circular, round.
OVATE: like the outline of an egg.
PALMATE: divided into lobes, like a hand into fingers.
PAPILLATED: covered with wart-like prominences.
PARASITE: } growing on another plant, though not known to
PARASITIC: } derive any nourishment from it.
PECTINATED: arranged like the teeth of a comb, or the antennæ of a moth.
PEDICEL: the stalk of the fruit.
PERICARP: the walls or case of fruit, the seed vessel.
PINNA: one of a series of distichous branchlets.
PINNULE: a secondary pinna.
PINNATED: with distichous leaves or branchlets, ranged like the plumes of a feather.
PINNATIFID: deeply incised in a semipinnate manner.
PLACENTA: the part to which the spores are attached.
PLUMULE: a pinnated branchlet.
POLYGONAL: having many angles or sides.
POLYMORPHOUS: assuming many shapes.
PROLIFIC: yielding abundantly.
PROLIFEROUS: when a new leaf or branch springs out of an old one.
QUADRIFAROUS: spreading on all sides of a stem.
RADICLE: the fibrous part of a root.
RECEPTACLE: an internal fruit case.
RETICULATED: marked with lines like the meshes of a net.
RETIFORM: like net work.
REVOTULE: rolled back.
SECUND: arranged along one side only.
SERRATED: the edges toothed like a saw.
SESSILE: having no stalk on the outside.
SETACEOUS: equal to a hog's bristle.
SETIFORM: like a hog's bristle.
SILICULES: pod-like fruit.
SINUATED: numerous indentations in the margin.
SORUS, pl. *Sori:* a cluster of spores.
SPORACEOUS: convertible into spores.
SPORE: the seed or germ.
STICHIDIA: pod-like cases containing tetraspores.
STIPITATE: having a stem or stalk.
STRIA: a narrow line or mark.
SUBULATE: shaped like an awl.
TENTACULAR: long and slender like the tentacula of a snail.
TERNATE: in threes.
TETRASPORE: a spore dividing at maturity into four parts.
TRICHOTOMOUS: dividing continually into threes.
TRUNCATE: terminating abruptly, as if broken off.
WHORLED: surrounding a branch in a ring.
ZIGZAG: bent from side to side.
ZOOSPORES: spores which have a power of locomotion.

PREFACE.

THE evenings of one season, together with the hours that could be conveniently set apart from business, comprise all the time devoted to the collection of Algæ and Corallines: the evenings have been principally devoted to preparing the specimens collected during the day. A residence within ten minutes' walk of the rocky shore, where Algæ are always found in great profusion, has favored the inclinations in this pursuit. When the tide calendar is favorable, sufficient plants could be collected within half an hour of sunrise, to occupy two or three evenings in preparing and drying. Visits to distant shores of the Bay, have at times occupied several hours, or an entire day; in such visits, the most delicate specimens were prepared and dried on the shore, while the more hardy and tough kinds were loosely covered with Fucus or Ulva, to preserve moist for the evening. The aggregate perambulations on the tidal and sea shore, will somewhat exceed one thousand miles, which, including the evenings spent in preparing, will nearly or quite equal two thousand hours most agreeably devoted to the subject. The original design was to acquire at least one of each species indigenous to the harbor. With that object in view, I have with indefatigable perseverance continued to the present time. The frequent discovery of new plants, even at this period, admonish, however, that my labors, although favored with success, are neither perfect or complete. The business affairs of the day have necessarily confined the microscopic examinations to the light of the candle or lamp, which, although greatly inferior to solar light, must, nevertheless, convince the observer that his sight is directed to an unfathomable abyss, too wide, too deep, too vast for perfect exploration by human eye, or intellectual vision.

Some of the Corallines are easily prepared, and though technically separated from Algæ, they were deemed worthy of notice in the same book. It is indeed possible, that a more thorough knowledge of the two classes, may induce Naturalists to reduce them to one; they have many characteristics that are common to both, while neither seem to possess all the properties that are essential to constitute a perfect vegetable, or a perfect animal: the young spores and spawns of both classes have powers of locomotion, and swim about with great freedom in the water, while neither can mature and perfect its species, without permanent attachment to some matter or substance. The Corallines have carnose or fleshy organs of nourishment; these are flexible, and when highly magnified are seen actively reaching for food. Algæ have also flexible organs that move freely about for some purpose, and may, for all we know, be a carnose structure, specially adapted to catch and devour its food. I have described those organs under the name of antheridia, and have watched their motions with much care and solicitude; some plants are thickly studded with these organs,

while others have very few ; in some they are apparently absent, or more probably, present with instinct and power to contract internally, or withdraw from our sight ; the largest antheridia are very small when under the highest power of the microscope ; and we may reasonably suppose that the Ulva, Conferva, and a very few others, where I have not seen those organs, may be provided with antheridia that timidly withdraw from our sight, or, remaining distended, may be too small for observation under the highest microscopic power. The carnose organs of Corallines and Sponges, are contracted and withdrawn whenever they are at all disturbed, and no power of vision that we can direct would reveal their form or structure, unless we permit them in perfect quiet to pursue their natural labors.

The motions of external antheridia appear to have entirely escaped the observation of Naturalists, many of whom reside at a great distance from the sea: Linnæus resided at a very inconvenient distance from salt water. Algæ cannot long survive removal from their natural element. If those who may conveniently examine them while living, and within a few hours after removal from the water, would direct their attention to the motions of the antheridia, I think they would hesitate before severing the link with which nature binds both Algæ and Corallines to animal life.

The success of the past has encouraged bright hopes for the future ; and I shall continue to devote what little time may be conveniently spared from other pursuits, in perfecting or in approximation to a complete history of the Algæ and Corallines of our spacious Harbor and Bay. No Harbor in the world is more prolific than our own, whether we regard the number of species, or variety and beauty of color, and graceful outline of form and proportions. The plants are abundant, and profusely growing in every part of the Bay ; disposition and time are alone required for their collection and classification. The pursuit is easy ; a delightful recreation, and particularly and invitingly appropriate for ladies, whose delicate fingers and keen perceptions of the curious and beautiful in nature, could not fail to make Algology the most instructing and the most interesting branch of natural science. British writers make favorable mention of several ladies who have contributed largely towards adorning Algology ; whole genera and many species would probably have remained unknown, but for Mrs. Griffiths, Miss Hall, Miss Hutchins, Miss Turner, and others, whose discoveries of new and beautiful plants have conferred lasting obligations. A thorough exploration of our Bay, requires more and numerous co-laborers. The line of shore is very extensive ; no part should be neglected or slighted ; frequent visits to every part are essential, as plants found in one locality may not exist in another. Though some are perennial, others are of short periods, and quickly decay : a rock that is barren at the first visit, may be clothed in beautiful Algæ at the second, and have a new color with new species at the third. Plants found floating in great abundance at one time in a particular place, may have been sought for in vain on consecutive days, for a week or a month in the same locality. The frequent visits of numerous Algologists to all parts of the Harbor, and at all seasons, would probably reveal many species that are now unknown. If my feeble efforts shall inspire a love of the science, and induce others to join in perfecting the catalogue of Algæ and Corallines that flourish and decay in our waters, then I shall have accomplished a very desirable object.

INTRODUCTION.

Algology is the science that treats of the structure, habits, and classification of Algæ. Alga singular, and Algæ plural, meaning sea-weed, or sea-weeds, is the name applied to a large class of aquatic Cryptogamia, or flowerless plants. Algæ are formed of endochrome, gelatine, and membrane; the endochrome occupies the cavities of cells formed by the gelatinous and membraneous matter. They have no woody fibre, and no continuous vessels like the phænogamous plants. They inhabit all countries where water is found. All parts of the ocean, all rivers, lakes, pools, the spray from the billows, and drip from the fountain, form suitable habitations for Algæ. Many species are widely spread over the globe, while others have a very limited range. Many of the European species are identical with those found in America, while some species found in particular localities would be sought in vain elsewhere. Algæ existed in very remote times. The fossil remains bear witness to their antiquity and profusion. They are found on high mountains, and in quarries at great depths from the surface. I have several specimens and distinct species of fossil Algæ in carbonate of lime, a lithographic stone, quarried at Solenhofen, Germany, 350 feet below the surface. The marine origin is evident, from shrimp, crabs, and fishes of various species found in the same quarry, also a horse-shoe of the identical species that now inhabit our waters, and which annually in June deposit their eggs near high water mark, secure from the eels in the sand. Lamouroux, a French Algologist, has written largely on the geographical distribution of Algæ; his writings in the Annales des Sciences Naturelle, may be read with much profit by the curious in that department.

In the Linnæan system, Tremella, Fucus, Ulva, and Conferva, comprise the four grand divisions in aquatic plants. Since the time of Linnæus, important modifications and changes have been made in the classification of Algæ. Agardh of Sweden, who devoted much time and learning to the subject, separated the aquatic cryptogamia from the general system, and under the name of Algology, has aided largely to increase our knowledge, and adorn the science. Hudson, Greville, Harvey, and other writers on British Algæ, have introduced many new species; and by their accurate descriptions in organic structure, have enabled us to recognize many similar species in our own waters.

Much remains to be done in this country towards advancing the science of Algology. A few lovers of the natural sciences have devoted their leisure hours in collecting the Algæ convenient to them; and some by friendly exchanges have very large and interesting collections. One retarding cause is, probably, the difficulty experienced in ascertaining the exact position of each plant in the natural order, and in acquiring the specific name of each plant. The organic structure and organs of

fructification, are almost entirely microscopic, and yet these comprise the principal generic and specific characteristics for classification. To the unassisted eye, plants of different genera will appear identical, while varieties in the same species will seem entirely dissimilar. Language alone is inadequate to convey a correct idea of the minutia in specific difference. Familiarity with the plant in its native element, accurate descriptions, and a correct natural, (not painted) type, are all important to discern the specific gradations in Algæ. A science so replete with interest, where every step unfolds a new link in the chain that binds us to Omnipotence, must surely find votaries in this enlightened age, and in this highly favored country.

Algæ have been applied to many useful purposes. The Irish moss of the apothecary, is the chondrus crispus of Europe and America: large quantities of Algæ are used for manure: iodine is extracted from the Fucus; and from some recent experiments, I doubt not that bromine may be advantageously extracted from the Laurencia. Our cattle often wade in the water to devour the Fucus vesiculosus. Linnæus says, the people of Gothland boil and mix it with coarse flour to fatten swine. Fucus, Laminaria, and other kinds, are used as food and fuel by the people of some countries. The birds' nests which our merchants procure on their trading voyages, and sell at high prices to the Chinese, as delicate morsels to roll under the tongue, are supposed to be Algæ collected by the swallows. Large quantities have been used in manufacture of kelp, an article extensively used in making soap. Several species are converted into glue by boiling. The Chinese are said to use a transparent glue of this kind for windows and lanterns.

Algæ are from microscopic to gigantic growth: the Ulva linza in our Bay often attains ten feet in length: the Laminaria saccharina, thirty or forty feet in length, is often thrown on the shore at Staten Island and Fort Hamilton. Fucus nodusus and F. vesiculosus, often attain five feet in length in our waters, and one hundred tons may be collected within the distance of a mile. The Macrocystis luxurians is said to be of enormous length. Dr. Hooker observes that the beach at the Falkland Islands is lined with entangled cables of this plant, much thicker than the human body; he represents its horizontal growth at the surface of the ocean, from 200 to 700 feet long. It is mentioned by writers and travelers as being used for fish lines, and as attaining 1200 to 1500 feet on the Pacific, near San Francisco. Gentlemen from the north-west coast, via Cape Horn, represent it as being 500 or 1000 feet long on the surface, while the root is attached to the bottom "off soundings." The term "off soundings" has a definitive length among mariners; and if we call it 200 fathoms, then we have 1200 feet vertical from root to surface, which added to Dr. Hooker's 700 feet of horizontal growth, will give us 1900 feet, a very respectable growth surely, and if quietly reposing under the mirage, might "loom" into a sea serpent, whose graceful outline and proportions would vie with his snakeship of Nahant.

Olive, red, and green, are the three most prevalent colors in Algæ, and these are subject to innumerable varieties in shade and tint; the colors are liable to great changes from local causes and circumstances. Fresh water, the action of the sun, deep or shallow habitation, &c., all affect the color, and change or modify the tints. Nearly all the reds are instantly changed into green by hot water, or by caustic pot-

ash, or ammonia; many which, when recent, exhibit the most beautiful tints of olive, red, and green, bleach white, on exposure to the sun and moisture, or become a dull black when dried in the shade. The dull yellow color of Chondrus crispus, as sold by the druggists, is the effect of bleaching; the plant when recent is a dark olive.

Difficult as it may seem, and really is, to assign to each species the natural link in the Algological chain, we enter a yet more perplexing labyrinth in seeking for the position of the link that connects Algæ as a whole, in the great chain or system of nature; it lies somewhere between chaos and man; whether animal or vegetable, has been ably, and at great length, discussed by accomplished Naturalists, and by general consent they are assigned to the vegetable kingdom. The decision is not universally acquiesced in, or entirely satisfactory to myself, although I shall for the present treat of them as vegetable, in deference to abler pens. The germ, the seed, the spore, the young, all signifying the same thing by different authors, in most Algæ, have powers of locomotion; some observers have seen the little organs called ciliary, or hairs, with which the spore swims about, or attaches itself to a rock for permanent growth. I have not been able to see the organs of locomotion, though the rounded outline of the spore, and its brisk hurried motion, is very clear under a moderate power of my microscope; in a single drop of water I have counted more than 200, swimming with very lively motion. They are best observed on thin mica, or clear glass; one drop of water from a vessel where Algæ with mature fruit have been kept a few hours, or one drop of any clear water, with one grain of the yellow matter that exudes from the spore case of Fucus vesiculosus in autumn or winter, will rarely fail to show hundreds of the spores in brisk motion, while some remaining inactive, are collected in swarms, or sori. Some will occasionally leave the dormant swarm to join the apparently delighted swimmers; others tired of the sport, will return to the swarm, and after two or three attempts to acquire a comfortable berth, will remain quiet.

In the Annales des Sciences Naturelle for 1836, Mr. J. Agardh, son of the celebrated Swedish Algologist, has given the result of some very interesting observations on the birth, motion, and growth of the spore, or young plant. Decaisne and Thuret, in the Annales des Sciences Naturelle, mention little organs called antheridia, in the conceptacles of the Fucus; they are represented as transparent cases, borne on branching threads, fastened to the inner coating of the conceptacle; after a time the antheridia fall off from the threads, and at maturity escape from the conceptacle, and commence lively movements. From the description of the antheridia by Decaisne and Thuret, I am inclined to believe that the same organs are external and common to a very large number, if not to all the Algæ. Organs answering that description, I have discovered external, on nearly all the plants that I have submitted to the microscope; a low power is ample to detect them, and from their frequency, it seems singular that authors have not noticed them. In the beginning of October, for the first time, and since then, nearly every evening, I have observed motion in these organs. The reason why I had not previously noticed this movement, is, because the motion is not constant, and the organs were at rest when my sight has been directed to them.

The first discovery of this motion produced a sympathetic shock, that caused me to close the eye, and suddenly withdraw it from the microscope; the sensation was akin to that experienced when unexpectedly witnessing the accidental maiming or killing a fellow-creature. These organs consist of a fine pellucid stem attached to the branches and ramuli indiscriminately; at the end is a knob or capsule, generally pellucid, though sometimes tinted with red; the capsule sometimes has the form of a tulip just expanded, and sometimes that of an oblong spheroid; these are always single. In some the pellucid stalk is parted at a considerable distance from the plant, and thence branching into four, six, or eight pellucid branches, each capitate or surmounted with a knob; those branched or in clusters, are always round, and it is in those that I discovered the motion. In one instance only, I witnessed motion in the single tulip-shaped organ. Whether these organs represent the sexes, or perform the functions of antennæ in the insect tribe, it is not easy to discern; their motion so peculiar and extraordinary, shows that they have some important part assigned to them in the economy of life. The motions are of two kinds; when bent up against the plant, it commences slowly to expand or straighten out, the whole cluster moving on a joint close to the plant, until that part forms a right angle with the stem, and then the branches as slowly unrol from their crooked or twisted condition, until the whole are extended in a straight line; then suddenly, with electric quickness, the whole are again twisted and thrown up against the plant. In all the movements I have never observed one of the knobs or capsules to break or fall off from the stem. Some circumstances attending this phenomenon may favor the hypothesis that the motion is caused by pain, as in all cases the plants had been several hours out of their element, and may then have felt the agonies of death; when drawing in, the motion is spasmodic; and when slowly expanding or straightening, the motion is attended with trembling. In one instance, the antheridia of a Ceremium rubrum, (the single tulip form) exhibited the same motion when it had been 28 hours out of water, preserved in a moist state by a covering of Fucus nodosus.

It may never be possible to solve the problem of conception, though the mode of casting the seed, or bringing forth the young Algæ, is easily followed from the pericarp or womb, to the full developement of a plant; and here all the circumstances seem to favor the hypothesis of an animal nature. On the 28th of October I witnessed the spawning, or casting of spores from a Rytiphlæa thuyoides, in full and mature fruit. The pericarp or fruit case in this species is very large, and ovate or pear-shape, with a pore or mouth at the top. The plant was very recent, and the part submitted to the microscope was floated on mica with a few drops of rain water. Soon one of the pericarps discharged a very large spore, or swarm of spores; in the space of ten minutes, seven more spores or swarms, making eight in all, were discharged from the same pericarp; they were all round, apparently of granular structure, and very large; the whole eight when discharged occupied more space than two of the parent pericarps. The discharge seemed to be attended with much effort, slowly protruding until considerably beyond the centre, and then suddenly emerging with an accelerated motion. The discharge occured at seven o'clock in the evening, and the eight globular masses remained entire until observed again at seven o'clock in the morning,

when they had separated into shapeless masses, or sori of innumerable round spores; the outlines of the spores no doubt caused the granular appearance noticed in the eight rounded masses or swarms.

Algæ when growing, are attached by the root to stones, shells, wood, and to other Algæ, or matter, almost though not entirely indiscriminate. Yet we must not on that account suppose, that like the land plants, they feed from the root. The roots are of various forms, from a simple disc to complicated creeping fibres. Nothing, however, is known in regard to the mode or organs of nutrition; all opinions on that subject are founded on hypothesis or conjecture. My present opinion, from very limited experience is, that the external antheridia, in their several and distinct forms, are the organs which communicate nourishment, sensibility, or pleasure and pain, and in some way govern the fecundation or conception.

The Corallines are also permanently attached by roots of various forms, but in this class the organs of nourishment are so large, and their motion so palpable, that we cannot remain in doubt of the offices they were intended to perform. The polype, or fleshy part of the Coralline, is capable of great expansion and contraction; its organization shows a beautiful creature, armed with tentacula, which are thrown out on all sides to entice, entrap, and devour its prey. When disturbed, the tentacula, with the entire polype, is, in most cases, withdrawn nearly or entirely within the cell. The Corallines are numerous in our harbor, though very few of the species are suitable for a work of this kind; and indeed no dried specimen of a natural type, can convey a remote idea of the form and beauty of the polype; the polypidom, or horny part of the Coralline, is all that remains to the eye; the once beautiful polype has shrivelled and contracted to a very small rounded mass mostly within the cell, where the microscope alone will find it through the sub-opaque horny structure of the polypidom.

Sponges and Corals are too beautiful and too interesting to be entirely omitted in this work. They belong to the general group of Zoophytes, though in most classifications they are excluded from Algæ and Corallines. Several of the Corals not herein described, will be found on the dried Algæ; a very beautiful species that entombs the Gracilaria, and other plants, in his white silvery net, was found convenient for preservation. Two Sponges are inserted with the Corallines, not with any desire to have them considered as belonging to that order, but merely for convenience; they are not numerous in our waters. Linnæus classed them with marine vegetables; and some Naturalists of the present time are of opinion that they lean to the vegetable side of the finite line that separates the animal from the vegetable kingdom.

The pleasure experienced in the study of Algology, is ample remuneration for the patient industry required in its pursuit. The discovery of a new Alga, or of some new feature in its organization or habit, will furnish mental food and reflection for a week. The individual rocks so gracefully clothed in Algæ, become agreeably familiar in the frequent periodical visits. The gay irridescent plants seem tempting; the shore scenery is inviting; the exercise brings appetite, with a keen relish for food, while the heart flows in gratitude toHim who so graciously permits us to live in this last most perfect link of His beautiful creations.

ALGÆ

OF THE

BAY AND HARBOR OF NEW YORK.

However desirable and convenient it may be to have one common and universal classification, experience teaches that no author can frame a system entirely satisfactory, or one not subject to mutation and modification. Having no theory of my own, and no decided preference for any particular system, I will follow as near as may be convenient a general outline of all the modern classifications, and will place the whole under the following :—

Class, ALGÆ.

Natural character.—Aquatic cryptogamia, or flowerless plants. Their organs of nourishment are at present unknown.

I propose to treat only of those that are marine, or that inhabit the salt water, and such only as are indigenous to, or are occasionally found in the Bay and Harbor of New York. These we will divide into the following :—

Family I. FUCACEÆ. Har.

Natural character.—Olive green, occasionally approaching dull brown or yellow, becoming nearly black in drying ; of a tough, leathery substance ; spores contained in swollen portions of the plant, and communicating with the surface by a pore or opening, through which the spore at maturity escapes. It is divided into the following :

Genus, SARGASSUM. Ag.

Stalked nerved leaves, stalked air vessels, receptacles small ; linear, tuberculated ; mostly in clusters, pierced by numerous spores which communicate with spherical conceptacles.

No. 1. S. *bacciferum,* Turn. Stem cylindrical, slender, much branched ; leaves linear serrated, mostly without pores : air vessels spherical, on cylindrical stalks ; receptacles unknown.—*Grev.*

Very rare in our Bay, and probably does not grow here. I found it twice at Staten Island, on the shore at the mouth of the harbor.

No. 2. S. *Montagnei.* Bailey. Leaves linear, somewhat serrated, less branched than the preceding; air vessels spherical, stalked.

Found floating occasionally at Red Hook and Hurlgate; is abundant in the Sound near our harbor, whence it probably drifts with the tide into our waters.

Genus FUCUS. Linnæus.

Root scutate; plant linear, flat, or compressed, cylindrical at base, dichotomous; air vessels, when present, simple; receptacles generally at the apices, traversed by a net-work of jointed fibres, pierced by numerous pores.

No. 8. F. *vesiculosus,* L. Flat, thick, coriaceous, linear, dichotomous, midribbed; air vessels when present mostly in pairs; receptacles elliptical at the apices.—*Hook.*

Very abundant on most rocks in the harbor; in unfavorable localities ten inches; frequently two feet, and at Hurlgate and Yellow Hook four feet long.

No. 9. F. *vesiculosus,* id. Var. A.

A variety occasionally found floating in the harbor; air vessels entirely absent. It is very abundant on sandy shores in the Sound. The lens will show two rows of circular holes on either side of the midrib; these holes are inhabited by a Zoophyte, who, like the hermit crab, exhibit no scruples in occupying the house of a neighbor. Unlike the hermit crab, however, this insect allows his neighbor to live in a miserable, half-famished condition; the plant in this state is always dwarf, and we may account for the absence of air vessels, by supposing this insect, with his tentacula active, to be of less specific gravity than water.

No. 10. F. *vesiculosus,* id. Var. B.

This variety is common in all parts of the Bay; it inhabits the rocks at and above high water mark; it will serve as an apt lesson to those wearied of life. This plant, from the position of its habitat, is frequently for several consecutive days above the reach of the tide, and moistened only by the spray. It lives seemingly in hope of a spring tide, or a favorable change in domestic affairs; the long hoped for billows generally bring floating sticks, chips, and other matter, to fret and tear its sides, so that it is sometimes difficult to recognize it as belonging to the family Fucaceæ.

No. 11. F. *nodosus,* L. Coriaceous, without midrib, distichous, occasionally sub-dichotomous, linear, attenuated at base; air vessels oblong; single receptacles lateral.

Common on most rocks, and particularly abundant at Staten Island, Owls Head, Yellow Hook, and Hurlgate; perennial, fruiting in winter and spring; frequently five feet long; dark shining olive; not so abundant as F. vesiculosus, though the same rock is often the habitat of both species.

No. 12. F. *nodosus,* id. Var. A.

This dwarf variety is abundant in the Sound; occasionally found floating at Red Hook and at Hurlgate Sometimes the olive color natural to this plant, is changed to a dull yellow, probably the effect of bleaching.

No. 13. F. *Mackaii,* Turn. Cylindrical or sub-compressed, slender, much branched; branches dichotomous; air vessels elliptical, solitary; receptacles lateral, lanceolate, ovate or forked, pendulous, scattered near the base of the branches.—*Grev.*

Found by a friend at Hurlgate, on one occasion only. I have not had the good fortune to find it, though I have repeatedly visited every visible rock at Hurlgate.

Family II. LAMINARIEÆ. Grev.

Olive colored, inarticulate sea-weeds, whose spores are superficial, either forming indefinite cloud-like patches, or covering the whole surface.—*Harv.* This family is divided into the following :—

Genus, LAMINARIA. Lamour.

Stipitate, coriaceous or membranaceous, flat, cleft, or entire, ribless. Cloudy spots of spores imbedded in the surface.

No. 16. L. *digitata*, L. Stem cylindrical, gradually tapering and compressed upwards, expanding into many deeply cleft linear segments ; very tough ; root branched, perennial.

Very common in the Sound, though rarely floats into our waters. It grows six or eight feet high, while the cleft segments spread to three or four feet. This plant has the power of shedding its coat, which it annually pushes up literally over its head, and then appears in a new dress, greatly enlarged in dimensions.

No. 17. L. *saccharina*, L. Stem cylindrical, filiform, expanding into a cartilaginous linear leaf, undivided.

Very abundant off the mouth of the harbor; after a S. E. storm, the beach at Staten Island and Fort Hamilton is covered for miles with this plant; it is frequently 15 or 20 feet, and at times 30 or 40 feet long; it is not cleft, otherwise it resembles L. digitata, and like that plant, it also sheds its coat or skin.

Genus, CHORDA. Stack.

Simple, cylindrical, tubular, membraneous. Fructification, a stratum of obconical spores, much attenuated at the base ; among these spores are found elliptical antheridia.

No. 20. C. *filum*, L. Cartilaginous, lubricous, clothed with pellucid hairs, filiform, tapering to each extremity.—*Grev.*

Annual, summer, one to five feet; below tide mark in the Sound; rarely found floating in our waters.

Family III. SPOROCHNACEÆ. Har.

Olive colored, inarticulate ; spores attached to external jointed filaments.

Genus, DESMARESTIA. Lamour.

Filiform, compressed or flat, distichously branched, cellular, traversed by an internal single-tubed jointed filament. Fructification unknown.

No. 23. D. *veridis?* Müll. Cylindrical, filiform, repeatedly pinnate ; pinnæ and pinnulæ capillary, opposite.

On Fucus and other Algæ at Hurlgate, spring and summer; 6 to 15 inches long. This plant conforms to the published description of D. veridis of Müll, though it differs from a European specimen that I have seen by that name.

No. 24. D. *confervalis.* Filiform, cylindrical, capilary, dichotomous, and irregularly branched; branches and ramuli very long; pale green.

Winter, on Fucus vesiculosus at Yellow Hook, Red Hook, and other places; 2 to 12 inches long, very flaccid when young, adheres well to paper.

Family IV. DICTYOTEÆ. Grev.

Olive colored, inarticulate, whose spores are superficial, disposed in definite spots or lines, *(sori).* ***Har.***

Genus, PUNCTARIA. Grev.

Undivided, membranaceous, flat, ribless, with a naked scutate root. Fructification scattered over the whole plant in distinct round dots.

No. 25. P. *latifolia.* Grev. Pale olive green, gelatinous and tender, linear or oblong, suddenly tapering at base.

Annual, spring and summer, 6 to 12 or 20 inches long, and half to 1 or 2 inches broad; rare in most parts of the Bay; found at Fort Hamilton.

No. 26. P. *plataginea.* Roth. Dark brown, coriaceo-membranaceous; much attenuated at base.

Spring and summer, common on all our shores; 3 to 10 inches long; does not adhere well to paper, and therefore is difficult to preserve.

Genus, APIARIUM.

Flat, exhibiting primary cells of perfect hexagonal form.

No. 27. A. *apicula.* Dull olivaceous green, half to one and a half inches long, linear, dichotomously cleft; constricted at the axils, where small tufts give it the appearance of being tied with a ribbon in a bow-knot.

On Fucus vesiculosus, and at low water mark on a rock at Jersey City late in October; it may attain a larger growth; I found it on two occasions only, and each time only a single tuft. The walls of the cells are pellucid, and, when recent, those near the edges are hexagonal with mathematical precision; approaching the axils and middle, the cells become abnormal, elongated, irregular, and distorted, giving it the appearance of midrib; every step of the irregularity is, however, traceable from the perfect hexagon; the endochrome is green, granular; a few cells are partially or entirely vacant, as if the spores had matured, swarmed, and left the hive. This remarkable plant is the only instance of perfect hexagonal organization that I have observed in Algæ. The hexagon is well known to be the most economical structure, where the walls require labor, and the cell or space is desirable without waste in the interstices; hence the bee, whose object is space for a store-house, with the least possible expenditure of labor in the plastic walls, always make the comb of that figure. This analogy in structure, and also in the sori of viviparous and vivaceous young, forcibly urges a conviction, that like the bee, who can at will change one of the sleeping chrysalis into a fructifying and prolific queen, the Algæ may through the antheridia, or some other organ, fructify at will the endochrome in any cell, and thus create a queen that may send forth her swarms of vivaceous spores. In this hypothesis it is not necessary that we endow the Algæ with intellect, or the bee with sagacity, or even with instinct as generally understood, for when we place the bee's eye under a microscope, we find it reticulated, entirely covered with a net-work of perfect hexagonal meshes. Thus we learn that He who lists to the lone raven, and "who tempers the wind to the shorn lamb," has planned and directed every step; so that the bee has no discretion in the matter, and could not, if he would, construct his cells in any other form.

Family V. CHORDARIACEÆ. Har.

Olive colored, gelatinous or cartilaginous, composed of vertical and horizontal filaments interlaced together; spores attached to the filaments, concealed within the substance.

Genus, CHORDARIA. Ag.

Cartilagenous, filiform, much branched; the axis composed of densely packed, longitudinal, interlaced cylindrical filaments; the periphery of simple, club-shaped, horizontal, whorled filaments, and long capilary, gelatinous fibres. Fructification; obovate spores, seated among the filaments of the periphery.

No. 30. C. *flagelliformis.* Müll. Filiform equal throughout, branches alternate, mostly simple; filaments of the periphery club shape.—*Grev.*

From 3 to 12 inches long, found only at Hurlgate at low water mark, rare.

Genus, ELACHISTEA. Fries.

Parasitical, a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base; fructification, pear-shape spores attached to the bases of the filaments, concealed in the tubercle.—*Harv.*

No. 33. E. *fucicola.* Velley. Tufts pencilled, rusty brown, membranaceous, articulations once or twice as long as broad; fruit hemispherical.

Summer, parasitical on Fucus and other Algæ, rare in our harbor, occasionally found floating; is very abundant in the Sound, a few miles eastward; it is rather rigid, dichotomous, and irregularly branched; some of the ultimate ramuli are quadriferous, or spreading on all sides.

Note—We have in our waters several species and genera of this family, that are almost or entirely microscopic, and therefore not suited to this work, and which require more critical examinations than I can at present bestow.

Family VI. ECTOCARPEÆ. Ag.

Filiform, olive-colored, articulated, whose spores are generally external, attached to the ramuli.

Genus, SPHACELARIA. Lyng.

Filaments rigid, jointed, distichously branched, rarely subdichotomous; apices of branches distended, membraneous. Fructification, oval spores on the ramuli.

No. 35. S. *cirrhosa.* Roth. Filaments naked at base, branched, jointed, pinnæ opposite, alternate, or irregular.

At Hurlgate, on Fucus vesiculosus and F. nodosus; summer, half an inch to 1 or 2 inches, densely tufted.

No. 36. S. *plumosa.* Lyng. Filaments naked at base, elongated, irregularly branched, inarticulate, pinnæ opposite, simple, very close, elongated.

Autumn, on F. vesiculosus and other Algæ near low water mark, at Hurlgate, Castle Garden, and elsewhere; half inch to 2 inches long.

Genus, ECTOCARPUS. Lyng.

Filaments capillary, jointed, olivaceous or brown, flaccid, without longitudinal striæ; fruit spherical or elliptical; external or imbedded spores; or lanceolate, linear, or conical silicules.

No. 40. E. *crinatus.* Carm. Filaments decumbent, sparingly branched branches, sub-simple, distant, elongated; spores globose, scattered, sessile.—*Hook.*

On muddy shores in summer, very abundant for about two weeks only. The best specimens I found on Communipaw Flats, and at Kavon Point; it is very delicate, and must be carried in water; the spores are large, but very sparing; it forms patches of 2 to 12 inches.

No. 41. E. *litoralis.* L. Tufts dense, dirty brown, much and irregularly branched, frequently opposite; fructification, oblong swellings or stichidia, or sub-globose connections imbedded in the substance of the branches.

Very common in large tangled masses, 2 to 12 or 15 inches, growing in all parts of the harbor, on other Algæ, at all seasons; also on slime-covered rocks in autumn: tufts much entangled.

No. 41. E. *litoralis.* Var. A. Summer and autumn on Fucus in strong tidal currents; a beautiful green.

No. 42. E. *fenestratus.* Berk. Pale green, very slender, filaments not much branched, branches distant, alternate; densely striate.

Summer, on dock logs, very flaccid, 1 or 2 inches long; silicules very abundant.

No. 43. E. *tomentosus.* Huds. Filaments flexuous, very slender, interwoven into a dense spongy mass; silicules stalked, linear-oblong, obtuse.—*Hook.*

In summer on docks and stakes, 1 to 8 inches, imperfectly adhering to paper.

No. 44. E. *distortus.* Carm. Very much branched, greenish brown, angularly bent; branches spreading very wide; ramuli divaricate, obtuse, spine like; fruit large, round, sessile.

Summer and autumn, parasitical on Fucus and other Algæ, near low water mark; a delicate plant, flaccid, and adheres well to paper.

Note—I have not been able to devote the time which the genus Ectocarpus require; the varieties are very numerous in our waters, and many more would no doubt show a distinctive specific character.

Family VII. RHODOMELACEÆ. Har.

Red, or brown red, or dull brown; leafy or filiform; areolated or articulated; polygonal cells; fruit double, or of two kinds; conceptacles external, ovate or urn-shape, furnished with a terminal pore or opening, and containing a tuft of pear-shape spores; also tetraspores immersed.

Note—The double fruit is on the authority of European writers; experience may show that the whole is only one conception or form of fruit, in which the differently shaped organs perform the offices of antheridia or antennæ, tentaculæ, seed, and womb or pericarp.

Genus, RYTIPHLÆA. Ag.

Filiform or compressed, pinnate, reticulated; siphons surrounding a central cell; fructification; ceremedia, and tetraspores.

No. 50. R. *thuyoides.* Har. Stem erect, rising from creeping fibres.

Summer and autumn in all parts of the Bay, rather abundant, dull brown stem, twice as thick as hog's bristles; fruit very large, pear or apple shape, discharging the spores in large round masses or swarms that soon separate; antheridia frequently in motion.

Genus, POLYSIPHONIA. Grev.

Filamentous, generally articulate, joints longitudinally striate, siphons; fructification, pear-shape spores, and tetraspores imbedded.

No. 53. P. *stricta.* Dillw. Filaments densely tufted, setaceous, flaccid, bistriated, dichotomous, branches and ramuli straight, erect; axils acute; upper articulations four or five times longer than broad; capsules ovate, sessile.

Summer, floating at Yellow Hook and Fort Hamilton, color very dark red, approaching a brown, joints very irregular, from 1 or 2 times longer than broad in ramuli, and near root, to 8 or 10 times the diameter in principal branches; it seems nearly allied to P. urceolata, but a very much darker color.

No. 54. P. *Olneyi.* Harv. Filiform, dichotomously and much branched, brown, joints of stem shorter than broad, of branches longer, main stem thicker than hog's bristles, ramuli capillary; fruit large, pear shape, on short stem at dissepiments; pericarp open at top, containing large globular sori, or swarms.

Summer, at Castle Garden, at low water mark. I have not seen an official specimen, or a description of the plant, but learn from a friend that it has been described.

No. 55. P. *formosa.* Suhr. Threads exceedingly slender and flaccid, branches long, flexuous, bearing a second and third series; joints of main branches, many times longer than broad; fruit pitcher shape, with a produced contracted mouth.

Annual in May, at Hurlgate, Fort Hamilton, and Staten Island, at low water mark, on rocks; red, adheres well to paper.

No. 56. P. *urceolata.* Sm. Rigid, setaceous, much branded, loosely entangled, dichotomous, joints of ramuli short, of stem three to five times the diameter; fruit stalked, pitcher shape, with a produced contracted mouth.

Found on the shore at Staten Island and Fort Hamilton, summer, probably drifted from the sea; does not adhere well to paper; bright red.

No. 57. P. *elongella.* Har. Stem setaceous, sub-dichotomous, much spread, ramuli elongated and flaccid; joints of branches as long as broad, marked with three parallel veins, dissepiments pellucid.

At Owls Head and Yellow Hook in the summer, rare; 1 to 3 inches long.

No. 58. P. *variegata.* Ag. Filaments brownish purple, rigid below, attenuated upwards to a capillary fineness, dichotomous, articulations in the principal branches twice as long as broad, in the ramuli short, marked with three broad parallel oblong tubes; siphons 6 or 7; fruit ovate on short stalks.

Abundant on most rocks in the harbor, summer.

No. 59. P. *nigrescens.* Hud. Robust, rigid, bushy above, lower articulations short, upper longer than broad, siphons about 20; fruit ovate sessile.

Very abundant in summer, in all parts of the Bay, on rocks, stocks, shells, and stakes; from 3 to 12 inches long. We have many varieties of this plant that probably should be numbered as distinct species.

No. 59 A. P. *nigrescens.* Faded or bleached.

No. 60. P. *fastigiata.* Roth. Rigid, of equal diameter throughout, many times dichotomous, articulations shorter than broad, 16 to 18 siphons.

On Fucus nodosus and F. vesiculosus at Hurlgate, dense tufts, dull brown, 1 to 2 inches long.

Nos. 61, 62, are probably varieties of P. variegata, which they resemble; they were found floating on Zostera, in the sea, at the mouth of the harbor.

No. 63, Is no doubt a variety of P. variegata; found on rocks at Black Tom's Reef, near Kavon Point.

Genus, DASYA. Ag.

Filamentous, mostly opaque, irregularly cellular, composed of numerous parallel tubes surrounding a centre cavity, the ramuli jointed, single tubed; fructification, ceramidia containing a tuft of pear shaped spores, and pods or stichidia containing tetraspores ranged in transverse bands. The name signifies hairy.

No. 70. D. *elegans.* Har. Of very variable color and habit, red, from 2 inches to 3 feet long, distichous and dichotomous.

From half tide to low water mark, in all parts of the Bay, on rocks, stones, and shells; from July to November, very abundant.

Family VIII. LAURENCIACEÆ. Har.

Rose red or purple, polygonal cells, fructification; external conceptacles, ovate with terminal pore, and containing a tuft of pear shape spores, also immersed tetraspores.

Genus, LAURENCIA. Lamour.

Linear, pinnately branched, the apices obtuse, cellular, solid; fructification, ceramidia containing a tuft of pear shape spores and tri-parted tetraspores imbedded in the ramuli; name in honor of Laurencie, a Naturalist of France.

No. 73. L. *dasyphylla.* Woodw. Filiform, irregularly branched, ramuli short, club shape, obtuse, attenuated at base.

Summer, common between tide marks, on most rocks in the harbor; 6 to 12 inches long.

No. 74. L. *tenuissima.* Good and Woodw. Filiform, ramuli very slender, tapering to the base and apex.

Very common on rocks and other Algæ, summer, 3 to 8 inches. This plant in a moist state will destroy itself and other Algæ with it in a few hours; on a warm day in July, I gathered some of a beautiful red, on Black Tom, a well known rock in the Bay, and laid it on the warm seat of the boat; on turning to it in less than ten minutes, I was greatly astonished to see it turning green. I strongly suspect that the cause of rapid decay is bromine, held in a feeble organic state, and set free by a temperature a little above that of the water.

No. 75. Found at Red Hook between tides, is probably a variety of L. *tenuissima.*

Genus, CHRYSYMENIA. J. Ag.

Tubular, not constricted or jointed; fructification, ceramidia containing a very dense tuft of angular spores; also tri-parted tetraspores immersed in the ramuli.

No. 78. C. *divaricata.* Filiform, branches involute, secund, ranged on one side only, tapering at base and apices; pink to dark brown.

Found only once after the July storm, floating at Red Hook; very dense whorled tufts.

Genus, CHYLOCLADIA. Grev.

Constricted at regular intervals, and divided into chambers filled with a watery juice; fructification, conical ceramidia, containing a tuft of wedge shape spores; also tripartite tetraspores immersed in the branches.

No. 80. C. *parvula.* Ag. Sub-gelatinous, slender branched in a straggling sub-dichotomous manner, constrictions of equal length and breadth; capsules ovate.

In tide pools, Hurlgate, and Staten Island, summer, 2 to 8 inches long; somewhat anastomose, rare.

Family IX. CORALLINEÆ. Lamour.

Rigid, articulated or crustaceous, mostly calcareous, purple when recent, fading on exposure to milk white; tetraspores tufted, contained in ovate or spherical conceptacles.

Genus, CORALLINA. L.

Articulated, branched, coated with carbonate of lime, fructification, obovate ceramidia, pierced at the apex, mostly terminal, and containing a tuft of erect pyriform, or club shaped tetraspores.

No. 83. C. *officinalis.* L. Irregularly branched, lower articulations twice as long as broad.

Found at Hurlgate floating on other Algæ; rare; is very abundant in the Sound, a few miles from our harbor.

Corallina must not be confounded with Coralline. The former is an Alga, and is classed with the vegetables, while the latter is classed in the animal kingdom. Corallina officinalis, though coated with carbonate of lime, has beneath a structure resembling the Algæ. We may have strong reasons for supposing, that all the Algæ are animal, and might give facts to support such an opinion; but in the present treatise it is deemed best to leave them in the vegetable kingdom, where Linnæus and other able Naturalists have placed them. The Corallines are, however, universally conceded to be animals.

Family X. DELESSERIEÆ. J. Ag.

Rosy or purplish red, or blood red; leafy, rarely filiform, areolated, inarticulate, polygonal cells, membranaceous; fructification, conceptacles external or half immersed, containing a tuft of dichotomous filaments; also tetraspores in sori.

Genus, DELESSERIA. Lamour.

Rose red, flat, membranaceous, with a percurrent midrib; fructification, hemi-

spherical tubercles, containing a tuft of filaments, bearing the spores, also tetraspores in definite spots.

No. 85. D. *Americana.* Harv. A dull red, becoming brighter in fresh water, 2 to 15 inches long, from July to November, at Hurlgate, the Narrows, and other places; common but not abundant.

No. 86. D. *sinuosa.* Good and Woodw. Stem elongated, branched, with obovate, deeply sinuate toothed leaves, nerves opposite.

Very abundant a few miles east of us, and in Massachusetts Bay, occasionally floats into our harbor.

Genus, PLOCAMIUM. Lamour.

Pinky red, linear, compressed or flat, ribless or faintly nerved, distichous and much branched; fructification, spherical tubercles, sessile or stalked, also simple or branched pods, stichidia, containing a double or single row of tetraspores.

No. 88. P. *coccineum.* Huds. Narrow cartilaginous, compressed, branches spreading, alternate, irregular, ramuli often secund, pectinate on inner edges.

Floating in small quantities, rare; it is probably brought by tidal currents from Rhode Island and Massachusetts coast, where it is rather abundant.

Family XI. RHODYMENIACEÆ. Har.

Purplish or blood red; expanded or filiform, inarticulate, superficial cells minute, irregularly packed; fructification, globose or hemispherical conceptacles external or half immersed, spores in the pericarp on a central placenta; tetraspores in patches immersed through the whole plant.

Genus, RHODYMENIA. Grev.

Membranaceous or sub-coriaceous, ribless, veinless, cellular, fruit, convex tubercles.

No. 90. R. *palmata.* L. Sub-membranaceous, purplish red, broadly wedge shape, irregularly cleft, margin winged with proliferous leaflets; tetraspores distributed over the whole surface in cloud-like spots.

Rarely found in our Bay; grows rather abundant in the Sound near us; 6 to 15 inches long. I have only one plant.

Genus, GRACILARIA. Grev.

Filiform or rarely flat, carnoso-cartilagenous, the central cells large; fructification, convex tubercles.

No. 92. G. *multiparlata.* Clem. Cartilagineo-membranaceous, tender, brittle, dull purplish red, deeply cleft in an irregularly dichotomous manner; the apices acute, tubercles conical, prominent, scattered over the surface.

Summer and autumn, common on all our shores; abundant at Staten Island, Red Hook, Kavon Point, Jersey City, and Hurlgate, at and below low water mark. Turns black in drying, and does not adhere to paper; 2 to 10 inches long.

No. 93. G. *compressa.* Ag. Succulent, brittle, somewhat compressed, alternately or sub-dichotomously branched, branches long and mostly simple, tapering to a fine point, tubercles ovate-globose, sessile.

Abundant in summer and August, below low water mark, thrown up on Staten Island, Jersey City, and other places; dries black; does not adhere to paper; 6 to 20 inches long.

No. 94. G. *confervoides.* L. Cartilaginous, cylindrical filiform, irregularly and often slightly branched, branches long, sub-simple, ramuli scattered, attenuated at each end; tubercles roundish, sessile.

Summer and autumn, abundant, Jersey City, and all the rocky shore south to the Narrows; 6 inches to a foot long.

Family XII. CRYPTONEMIACEÆ. Har.

Purplish or rose red, filiform, rarely expanded, gelatinous or cartilaginous; conceptacles globose, masses of spores immersed or in swellings of the branches, with tetraspores variously dispersed.

Genus, GELIDIUM. Lamour.

Linear compressed, sinuated, corneous, solid; fructification, tubercles immersed in the swollen ramuli, containing a spherical mass of oblong spores, also tetraspores immersed in the ramuli, bipartite or tripartite.

G. *Corneum.* Huds. Between cartilaginous and horny, nearly flat, distichously branched, branches linear, attenuated at each end, pinnate and bi-pinnate, mostly opposite, spreading obtusely, and bearing within their apices elliptical tubercles.

Of which we have the following:—

No. 100. Variety *Crinale.* Huds. Setaceous, sub-cylindrical, somewhat dichotomously branched, sometimes three-forked at top, and bearing a few elliptical oblong ramuli, attenuated at the axils.

Summer and autumn, Hurlgate, Yellow Hook, and Staten Island; the latter place very abundant in autumn; three miles below Quarantine, at half-tide level, on rocks and stones; half an inch to one and a half inches long.

Genus, GIGARTINA. Lamour.

Cartilaginous, filiform, compressed or flat, irregularly divided, purple or dark red, the central substance of rather lax, branching and anastomosing filaments; the periphery of dichotomous filaments, distantly set in pellucid jelly, their apices moniliform and strongly united; fructification, external tubercles, also dense clusters of spores, held together by a net-work of threads.

No. 104. G. *pistillata.* Gmel. Compressed, branches repeatedly forked, axils obtuse; naked or pinnated with short subulate ramuli.

Autumn and winter, very abundant at Jersey City, Kavon Point, Red Hook, and elsewhere; very irre-

gularly branched; purplish red, and occasionally of a greenish hue; tetraspores round, imbedded; generally dries black.

No. 105. G. *acicularis.* Wulf. Cylindrical filiform irregularly branched, between pinnated and dichotomous, branches divaricating, curved, ramuli scattered, obtuse or spread, often secund, tubercles spherical on the branches.

Autumn and winter abundant on rocky shores at and below low water mark; Jersey City, Kavon Point, &c.

No. 106. G. *Teedii.* Turn. Membranaceous, flaccid, horny when dry, linear, acuminate, repeatedly pinnated with slender horizontal distichous, subulate ramuli, capsules globose on the ramuli.—*Grev.*

On rocks and stones from half tide to low water mark, Staten Island, Red Hook, Kavon Point, Jersey City, and other places; perennial, abundant in autumn, very irregularly branched, purple to pale and dull red; tetraspores round imbedded, branches frequently much flattened. This plant generally turns black in drying; when speedily dried in the sun it retains some red, and is occasionally bleached yellow with the sun and moisture.

No.107. G. *Baileyi.* Cylindrical, filiform, stout, cartilaginous, horny when dry, dark red, distichous, somewhat quadrifarious, branches long, erect, attenuated at each end; fructification, tetraspores round, attached to the epidermis internal, and also tubercles not prominent, only visible when a longitudinal slice is placed under the microscope.

At all seasons, abundant on rocky shores at low water mark; it dries black, and does not adhere to paper; it is occasionally found bleached nearly white, and is then more suitable for the herbarium, as it sticks to paper in incipient stages of decomposition. Professor Harvey, I learn, has proposed to place this plant under the generic name of Rhabdonia; but I see no necessity for separating it from Gigartina, where its fruit and structure naturally place it. The central substance is of extremely lax, horizontal, apparently jointed anastomosing filaments, and the interstices or cells are filled with watery gelatine, which causes it to flatten, very much in drying. The finest specimens of this plant are found at Kavon Point, three miles south of Jersey City.

Genus, CHONDRUS. L.

Cartilaginous, nerveless, compressed or flat, flabelliform, dichotomously cleft. Fructification, prominent tubercles, also tetraspores collected into sori, immersed.

No. 110. C. *crispus.* L. Thick cartilaginous, dichotomous, flat or curled, spread, sori concave on one side.—*Grev.*

Rarely found floating in our harbor, though it is extremely abundant a few miles to the eastward, in the Sound; dark olive, fading on exposure to dull yellow.

No. 111. C. *crispus.* L.

This variety of the same species is from the Irish coast. I obtained it at the druggists, who sell quantities of it under the name of "Irish Moss." This specimen is subjoined, to show the similarity in varieties of the two countries. This plant is incrusted near the base with carbonate of lime by a Zoophyte, who builds his house of that material; the circumstance should lead to some care in the use of Chondrus crispus. Though not familiar with the science of Allopathy, I suppose the gelatinous moss may cure some diseases that would be highly aggravated by carbonate of lime. There is very little imported at the present time, the trade being mostly in "Yankee Irish Moss," as it is called by druggists, from whom I learn that the Chondrus crispus of Massachusetts coast, is far superior to the imported article, and readily sells at more than double the

price of Irish Moss. I think the Chondrus crispus may be greatly improved, either as a medicine, or as the essential constituent of blancmange and jellies, by dipping in a weak sulphuric or nitric acid, to destroy the Zoophyte, or decompose his cells of carbonate of lime, and then thoroughly washing and drying the plant before it is offered for sale.

Genus, PHYLLOPHORA. Grev.

Rigid membranaceous, proliferous, nerveless, or with a vanishing nerve; fructification, warts composed of radiating moniliform filaments, whose lower articulations are converted into spores; also tetraspores collected into sori.

No. 115. P. *Brodiæi.* Turn. Root a small disk, stem cylindrical, filiform, branched, the branches expanding into simple or forked, flat, membranaceous leaves, which are proliferous from the extremity; fruit sessile, on the tips of the segments.

Perennial, fruiting in spring. At low water mark on the rocks at Hurlgate, abundant. Also found floating at Red Hook, Staten Island, and other places.

Genus, GYNOGONDRUS. Mart.

Cylindrical or compressed, horny, much branched, densely packed filaments, the innermost longitudinal, the middle curving outwards, and the periphery horizontal and moniliform; fructification (as far as known) naked warts, entirely composed of bead-like strings of cruciate tetraspores.

No. 120. G. *plicata.* Huds. Horny, cylindrical, filiform, very irregularly branched, entangled, wiry, sub-dichotomous, axils obtuse; fructification (as far as known) oblong warts, composed of obscurely jointed filaments, surrounding or attached to the stem.

At and below low water, on rocks at Hurlgate, and drifting abundantly on shore at Red Hook and Staten Island; from 2 to 9 inches long. One variety of this plant has the filaments somewhat compressed, and in both, portions of the branches become nearly white. The warts are always of a yellowish hue, and seem as independent of the plant as if they were attached Zoophytes. I think the difference in varieties will not justify the separation into two species. This plant shows all the characteristics given by European authors for *Polyides, rotundus*, of Gmel., and the *Furcellaria, fastigiata*, of Huds. I have not seen official specimens of those authors, and rely solely on their published descriptions.

Genus, DUMONTIA. Lamour.

Cylindrical, tubular, filiform, filled with watery gelatine, membranaceous; fructification, tetraspores attached to surface cells and inner surface.

No. 123. D. *filiformis.* Fl. Dan. Tender, membranaceous, cylindrical, simple or pinnated, with long simple branches, attenuated at each extremity.

Summer, at Hurlgate, on rocks at low-water mark; rare; 2 to 8 inches high; dull purple or greenish hue.

Genus, CATENELLA. Grev.

Dull purple, membranaceous, filiform, constricted at intervals, composed of a lax net-work of anastomosing filaments; fructification, spherical masses of spores in external capsules; also oblong transversely parted tetraspores immersed.

No. 128. C. *opuntia*. Good and Woodw. Very obscure purple, anastomose, and very irregularly branched.

Half an inch to 1½ inches long; in rock pools; very rare. I found it on one occasion only in a rock pool, at Hurlgate, on the rock, and on Ph. Brodiæi, at low-water mark. Its anastomosing properties render it necessary to tear it somewhat, in spreading it on paper; summer and autumn.

Family XIII. CERAMIEÆ. J. Ag.

Rose red, or purple, filiform; fructification, very like receptacles, containing angular spores; also tetraspores (antheridia?) attached to branches, or more or less immersed.

Genus, PTILOTA. Ag.

Inarticulate, linear, compressed or flat, distichous, the pinnules sometimes articulate; fructification, fruit roundish, clustered, surrounded by an involucre of short ramuli.

No. 140. P. *plumosa*. L. Cartilaginous, secondary branches bi-tripinnate, elongate, pinnules opposite; tetraspores on short pedicils; fruit pedunculate.

Very rare in our Bay, and found only floating in small fragments. It is very abundant a few miles eastward of New York.

Genus, FIRMATUS.

Dull purple, cartilaginous, solid; fruit round, solitary, not involucrated, sessile and immersed; periphery of closely packed filaments, the centre of lax, anastomosing filaments, forming small polygonal cells.

No. 142. F. *nanus*. Stout, rigid, cylindrical, or somewhat compressed, many times dichotomous, fastigiate, dull purple; fruit perfectly round, sessile, and also immersed.

Autumn, at Hurlgate, on Fucus nodosus; half an inch to one inch high.

No. 143. F. *pumilus*. Filiform, cylindrical, setaceous, many times dichotomous, axils obtuse, dull purple, approaching a brown; fructification, spores contained in round pericarp, sessile, also perfectly round tetraspores, immersed just beneath the surface.

Summer and autumn, at Hurlgate; 1 to 3 inches high; on Fucus nodosus and on F. vesiculosus. This plant resembles to the eye, some varieties of Gelidium corneum, while F. nanus resembles some dwarf varieties of C. rubrum, but the fruit is clear and decisive.

Genus, CERAMIUM. Roth.

Filiform, one tube, articulated; dissepiments opaque and colored, the same color and opacity sometimes extends over the whole plant; fruit roundish, subtended by short involucre ramuli.

No. 145. C. *rubrum*. Huds. Irregularly dichotomous, apices of ramuli hooked inwards, articulations coated, and often obscure, dissepiments constricted, tetra-

spores immersed in the articulations; fruit mostly on the lateral branchlets, subtended by 3 or 4 involucre ramuli.

Summer and autumn; very abundant in all parts of the Bay; very variable in size, form and color; 1 to 20 inches long, and from brown to dull red; on rocks, stones, sticks, Zostera, Fucus, and other Algæ, from half tide level to very deep water.

No. 146. C. *diaphanum*. Ag. Setaceous, attenuated upwards, rather flaccid, irregularly dichotomous, the lower forkings distant, the upper close, branches set with short lateral dichotomous ramuli, articulations pellucid, those of main stem 3 or 4 times the diameter, those of the ramuli short, dissepiments swollen, opaque; apices hooked inwards, fruit near the tips of the branches.

Summer and autumn, on rocks, Fucus, and other Algæ; abundant; 2 to 8 inches high. The colored dissepiments, with pellucid joints, give the appearance of beads strung on white glass. We have several kindred species, nearly related. Mr. Agardh has placed these in a genus distinct from ceramium, and has described a large number of species; the new genus is probably an improvement, but there is some danger of extending the number of species, as the plant is very varied in habit; and if we are to specify all the variations, then the number of species in our harbor alone, would amount to several hundred. For the present, I shall place the whole under this specific head, with the following varieties:

No. 148. C. *diaphanum*, var. *obtusa*. Setaceous, fastigiate, dissepiments opaque, joints pellucid, axils at very obtuse angles, filiform, dichotomous.

On Zostera and on Algæ, from half tide to low-water mark; very abundant in autumn, in all parts of the Bay; 1 to 6 inches long.

No. 149. C. *diaphanum*, var. *obscura*. Setaceous, filiform, dichotomous, joints pellucid, except near the root, where they are entirely coated, dissepiments opaque.

On Fucus nodosus, and other Algæ, at Hurlgate, between tide marks; abundant in summer and autumn; half an inch to 2 inches long.

No. 150. C. *diaphanum*, var. *rectangularis*. Axils all at right angles, joints at apices very short, midway between extremities 1 to 1½ times longer than broad.

Autumn, on rocks and Algæ at low water mark, all parts of the harbor, ½ inch to 1 inch high, abundant, though difficult to find on account of its diminutive size. I seldom know that I have it in the morning's work, until preparing the plants with a lens in the evening; the plant is much obscured by very minute parasites.

Genus, SPYRIDIA. Har.

Filiform, cylindrical, much branched, traversed by a wide articulated tube, whose walls are composed of small angular cells, ramuli setiform, simple jointed; fruit stalked, gelatinous, involucred by short ramuli.

No. 160. S. *Americana*. Filiform, stout at base, and diminishing gradually to the apices, which are obtuse; sub-distichous and somewhat divaricate, sub-opaque cartilaginous, dull brown to pinky red, 2 to 8 inches long, anastomose in a slight degree, all the branches and ramuli pectinated with fine hair-like ramellus a tenth of an inch long; fruit round, stalked on the ramuli, and also imbedded in the branches.

July to September, on Zostera and rocks, at and below low-water mark; found floating in most parts

of the Bay; abundant at Red Hook, after the July storm. A very beautiful plant, and is supposed to have escaped notice until the present season.

No. 161. S. *setacea.* Robust below, capillary at apices; sub-dichotomous, branches thickly set, attenuated; stem and branches thickly set with short bristle-like ramuli; joints very short, half to two-thirds the diameter.

Summer, floating at the Battery, Red Hook, &c., sometimes attached to Zostera. Very rare.

Genus, CALLITHAMNION. Lyngb.

Rosy or brownish red, filiform, branches jointed, one tubed, mostly pinnate, dissepiments hyaline; fructification, round or lobed receptacles on the main branches; also external tetraspores (antheridia?) scattered along the ultimate branches, or borne on little stalks. The name is from two Greek words, and signifies a beautiful little shrub.

No. 170. C. *cruciatum.* Ag. Linear, irregularly divided, articulated, each joint having 2 or 4 opposite or quarternate, slender, erect, pinnated ramuli.

A rare plant. I found it floating at Red Hook in July, and subsequently I found it growing on a rock at Hurlgate, at low-water mark.

No. 171. C. *lignator.* Dull brown, distichous, fruit large, round, antheridia single and in clusters, the single are tulip shape, those in clusters have round knobs or capsules, joints 3 to 5 times longer than broad, pellucid dissepiments in branches sometimes very wide; filiform, capillary, 1 to 3 inches high.

Summer, between tide marks, on dock logs and other submerged wood; first found by Mr. Walters, at Jackson ferry slip. I found it in great abundance on the plank facings at Castle Garden, and subsequently very small plants, of microscopic growth, on many piers in the East River, and in Hudson River: for a short period I supposed this plant could not grow on any thing other than wood; later in the season, however, I found it on two dock stones at Castle Garden; the stones were covered with slime, and within three feet of the decaying wood facings to the outer wall. Though haunting the city docks, it requires clear water; when it locates near the terminus of a sewer, the growth is dwarf, from the fourth of an inch to microscopic length. The color of this little wood seeker, would seem to preclude its introduction into the society of Callithamnion, of Lyngb., but its general habits show strong claims to that rank.

No. 173. C. *roseum.* Sm. Stems much branched, secondary branches long, flexuous, sub-distichously plumulate, with a roundish outline, and crowded towards the tips, pinnules long, spread, main articulations 4 to 5 times longer than broad; those of the pinnæ shorter, tetraspores (antheridia?) elliptical, scattered near the base of the pinnæ.

Summer and autumn, abundant on oyster shells and Algæ, at half tide mark, in all parts of the Bay; 1 to 2 inches high.

No. 174. C. *byssoidcum.* Arnott. Stems extremely slender, flaccid, and byssoid or a little stouter than cobweb, much divided, branches linear, lanceolate with pinnate plumules, joints of branches 8 times, of the ramuli four times longer than broad.

Summer, at half tide, on shells, Zostera, and Algæ—rather plenty—very delicate; must be lifted from the water with care, and carried carefully in salt water: antheridia single.

No. 175. C. *spongiosum.* Harv. Stems robust, cartilaginous, more or less opaque and veiny, branched in every direction, branches thickly set with dense quadrifarous, repeatedly dichotomous, round topped branchlets much spread; articulations of the branches swollen at the joints, thrice as long as broad, apices short, bifid.

Summer and autumn, on Fucus and other Algæ, at Hurlgate, between tide marks—rather abundant—holds water like a sponge; antheridia mostly single, tulip shape; a few in clusters, 4 to 6 on a stem: these, on two occasions, exhibited violent paroxysms, when seven hours out of water: fruit round and pear shape, sparingly distributed—1 to 3 inches long.

No. 176. C. *Baileyi.* Harv. Main stem robust, cartilaginous, branches much attenuated and crowded near the tips, very irregular, many times dichotomous and quadrifarious, the crowded ramuli giving it the appearance of being capitate, fruit apple shape, 2 to 6 inches long. Spring and summer.

Found floating at Red Hook and Staten Island, and elsewhere; lodges abundantly in the high water drift at Port Richmond, S. I. This plant is extremely variable, and has many of the characteristics of C. spongiosum; in both, the borders, like the dissepiments, are hyaline, and the ramuli repeatedly dichotomous; the axils, when dichotomous always commence at the dissepiments, and when distichous, the axil is just below the dissepiment. The name is in compliment to Professor Bailey, of West Point, who discovered it at Fort Hamilton, and who has devoted much attention to Algæ. I have not seen that gentleman's description of this beautiful plant, but have examined varieties enough to show its variable character. The graceful swelling at the joints is common to several in this genus, and a singular ovate horizontally striate organ, probably a young pericarp, is also common to several genera; in some of the fruit the outline of the pericarp is lobed, and those exhibit the rounded outline of the internal spores, or globular swarms of spores.

No. 177. C. *pinnata.* Stem robust, branches alternate, pinnated, apices capillary, obtuse, joints at base generally obscure, joints near base 1 time, and increasing towards apices to 2 times the diameter, joints of branches 3 to 4 times longer than broad, dissepiments and sides of branches and ramuli hyaline, and somewhat constricted at the dissepiments; fruit apple shape, and organs resembling a tripartite fan, (the tetraspore of some authors,) opaque, much branched.

Autumn, at Hurlgate, parasitic, on Fucus nodosus at low water mark, half inch to one and a half inches long, not abundant, dull red; by keeping a day in fresh water the tips turn green, and it is then very beautiful.

Family XIV. SIPHONEÆ. Grev.

Green, composed of continuous, tubular, simple or branched filaments.

Genus, BRYOPSIS. Lamour.

Membranaceous, tubular, cylindrical, filiform, branched, shining green, filled with a green minutely granuliferous fluid.

No. 185. B. *plumosa.* Huds. The branches scattered, naked below, spread, twice or thrice pinnated, the pinnæ pectinated.

Summer, on rocks and timber, between tide-marks, common at Hurlgate, the Battery, Yellow Hook, Bergen Point, and other parts of the Bay; this plant appears first on floating timber that is warmed by the sun; it appears on the floating fenders of the Floating Chapel in the East River, two weeks earlier than on any rock in the harbor.

No. 186. B. *hypnoides*. Lamour. Much branched, the branches long, slender, ramuli capillary irregular, somewhat erect.

Summer and autumn, at Castle Garden, Staten Island, and other places, on rocks at low water mark; plenty, but not so abundant as the preceding.

Family XV. CONFERVEÆ. J. Ag.

Green, with few exceptions, composed of articulated threads or filaments, cells polygonal, cylindrical; fructification as far as known, zoospores from the articulations cells, or filiform branched or flat, expanded, or cleft.

Genus, CLADOPHORA. Kütz.

Filaments composed of a single series of cells or articulations, much branched and tufted; fruit, zoospores contained in the articulations.

No. 196. C. *pellucida*. Huds. Cartilaginous, rigid, erect, bright green, di-trichotomous, axils much spread, branches erect, articulations many times longer than broad.

On mud-covered rocks at Jersey City, Hurlgate, the Battery, and other parts of the harbor, 2 to 5 inches high, wiry, not abundant, summer.

No. 197. C. *rupestris*. L. Slender, rigid, dark green, straight, bushy, branches erect and crowded; articulations 3 or 4 times longer than broad.

Summer, on floats, Captain Rabineau's bath, Floating Chapel, at Hurlgate, Yellow Hook, Staten Island, and other places, on rocks and Algæ at half tide mark.

No. 198. C. *Rudolphiana*. Ag. Filaments very long, slender, flexuous, much branched, inextricable, yellow green; branches di-trichotomous or irregular, ultimate ramuli pectinate, articulations of main stem many times longer than broad.

Summer, on rocks, floats, and parasitical, near low water mark; soft, silky, and bright green, when recent; rather abundant at Fort Hamilton, Yellow Hook, and Hurlgate.

No. 199. C. *refracta*. Ag. Filaments capillary, tufted, bright green, much branched, branches spreading on all sides, repeatedly divided and spread or reflexed.

Summer, on the mud flats at Gowanus, Communipaw, and other places; rather plenty for a month; spread in patches from 2 inches to a foot; inextricably entangled.

No. 200. C. *falcata*. Duby. Filaments intricate at the base, dark green, ultra capillary, rigid, much and irregularly branched and curved, inner faces of branches furnished with short blunt falcate ramuli, articulations 3 or 4 times longer than broad.

Summer and autumn, on F. nodosus and other Algæ at Hurlgate; rather plenty, occasionally on rocks at Hurlgate and Yellow Hook, not abundant.

No. 201. C. *arcta*. Dillw. Full green, much branched, erect, dense tufts, articulations either uniformly twice as long as broad, or with the lower joints short, the upper very long.

Spring, on rocks at low water mark, not plenty, generally on the north side of the rock, at Jersey City, Hurlgate, Castle Garden, Fort Hamilton, and other places. When young it is very flaccid, of a shining green, the branches free and adhering well to paper; old plants are of dull color, rigid, wooly, matted, and entangled, 2 to 5 inches high. The transition from flaccid, shining green, to dull wooly matlocks, requires only a short period; and indeed the whole period of existence is brief. Four beautiful, flaccid, shining green plants, were left on a rock at Castle Garden, intending to visit them frequently in order to watch their growth, and gather them at maturity; on revisiting the rock after a lapse of only five days, the color had changed to dull green, and the entire plants were matted like tag-locks of wool.

Our harbor is rich in Cladophora, and if I have not enumerated as many species as are described by British Algologists, it is not for want of materials. The plants of this genus are very variable; if language would enable us to critically distinguish more of the varieties, it would remain questionable how far the multiplying of species is ornamental to the science, or useful to the student in Algology.

Genus, CONFERVA. Plin.

Green, unbranched, composed of a single series of cells or articulations; fructification as far as known, zoospores formed from the endochrome in the articulations.

No. 210. C. *melagonium*. Web. and Mohr. Elongate, scattered, straight, thick, erect, stiff and wiry, articulations twice as long as broad.

In deep water, between Governor's Island and the Narrows, articulations varying from 1 to 5 or 6 times longer than broad, and color from dark green to yellowish white, very tough, often thrown on the shore loose or entangled in other Algæ, from 1 to 10 inches long. European authors make several species that are here comprised in one; a little difference in color or in length of joints, is not deemed ample for distinct specification.

Family XVI. ULVACEÆ. Har.

Green or purple, expanded or cylindrical membranes of polygonal cells.

Genus, ENTEROMORPHA. Link.

Membranaceous, hollow and reticulated, green; fructification as far as known, spores directly formed from the endochrome in the cells, and thence issuing through pores.

No. 220. E. *intestinalis*. L. Elongated, simple, wholly or partially inflated, often floating, and then wholly inflated.

Summer, on rocks, and parasitical on F. nodosus and vesiculosus, near high water mark, 1 inch to 15 inches long.

No. 221. E. *compressa*. L. Elongated, branched, sub-compressed, branches generally simple, attenuated at base, and gradually enlarged to very obtuse apices.

Summer, at and below low-water mark—mostly parasitical—not frequent.

No. 222. E. *ramulosa*. Sm. Very much branched, and interwoven, twisted, covered with spine-like branchlets.

Summer, on docks, rocks and Algæ, beginning near high-water mark, where it forms a beautiful green zone or belt, that girts the entire harbor; as the heat increases with the season, the growth extends down to near low-water mark; extremely variable in form and size; 1 inch to 15 inches long.

No. 223. E. *constricta.* Branched and much constricted at irregular intervals.

Summer, parasitical, on other Algæ, and on pebbles and shells, on mud flats. The finest specimens grow on the flats at Communipaw, attached to clam, mussel and razor shells; this variety adheres well to paper, while that growing on Fucus, shrinks, cracks, and darkens, in drying. The plants of this genus are much varied in form: our waters seem congenial to its growth, and teem with innumerable varieties that correspond with all the numerous species described by European algologists. I think, however, that a further enumeration of species would not improve the science, and indeed, I am not sure, that to suppress compressa and ramulosa, leaving the whole under the species *intestinalis* and *constricta*, or under *intestinalis*, variety *constricta*, would not be an improvement.

Genus, ULVA. L.

Green, flat, sometimes inflated in the young state; fructification as far as known, zoospores direct from the endochrome in the cells.

No. 230. U. *latissima.* L. Broadly ovate, flat.

May to February, very abundant, on rocks, stones, shells, and parasitical; 3 inches to 5 feet long; the largest specimens grow on flats at Gowanus and Communipaw: this plant bleaches in decay to a cream color or white, and some specimens are exceedingly beautiful in that state.

No. 231. U. *lactuca.* L. At first obovate, inflated, at length cleft down to the base, the segments unequal and laciniated.

Summer, on Fucus and other Algæ, between tides, and on rocks and shells in all parts of the Harbor.

No. 232. U. *linza.* L. Linear-lanceolate, acute, composed of two membranes closely applied.

Summer, parasitical, on Fucus, at half tide, when it is from 3 to 15 inches long, and undulate at the margin. A variety, from 3 inches to 10 feet in length, perfectly plane and linear, grows on the flats at Gowanus and Communipaw, attached to pebbles and shells. It is very abundant for a short season.

Genus, PORPHYRA. Ag.

Purple, plane, thin; fructification, circular sori from aggregated cells.

No. 235. P. *vulgaris.* Ag. Ovate or linear, simple or cleft, or waved in the margin.

Spring, on rocks and pebbles from half tide to low water mark, very abundant. We have several varieties in form; beautiful clusters, linear, 15 inches long, are found at Kavon Point; broadly ovate, plane or with waved margins from 2 to 12 inches long, at Jersey City and elsewhere; with deeply cleft segments, (the *laciniata* of Lightf.,) are abundant at Castle Garden. The purple color is instantly changed to green by caustic, potash, or by ammonia; the color appears to emanate from the endochrome or contents of the cells; the walls of the cells are broad and rather pellucid, giving the shriveled endochrome the appearance of "roundish granules, mostly arranged in a quartate manner, and covering the whole plant," described by Greville as a second form of fruit. The fruit is evidently from the sori, or circular aggregation of cells; the conglomeration begins at the periphery, which is densely opaque, while the centre continues to show the distinct outline of the cells; the whole circle, however, finally becomes fructified, and is then entirely opaque. This plant, under the names of *Lavor*, *Sloke*, or *Slokum*, is used as food in many parts of Great Britain; it is reduced to a pulp by stewing for several hours, and when served with lemon juice, is said to be a favorite dish with many persons.

No. 236. P. *miniata*. Ag. Plane, solitary, oblong, lanceolate, rose red.

Autumn, on F. nodosus at Hurlgate, half an inch long, pink or rose red, inclining to purple, near low water mark. I have only two plants of this species; though not abundant, one or two dozen may be gathered in a day. When first discovered I supposed it very young, and preferred waiting for a more mature growth; on a subsequent visit, though only ten days had elapsed, the plant had entirely disappeared. The proverbs, "Make hay while the sun shines," "A bird in the hand, &c.," may be followed with advantage by the student in Algology; the birth, the seed time, and harvest of many plants, occur before the waning moon has once filled her horns.

Family XVII. NOSTOCHINÆ. Ag.

Green, composed of moniliform filaments, lying in a gelatinous matrix.

Genus, SPERMOSEIRA. Ag.

Cylindrical, free, simple, in a very delicate membraneous tube, cells compressed, connecting cells large; fructification, spores or zoospores in the articulations.

No. 245. S. *litorea*. Kütz. Robust, nearly straight, composed of very short compressed cells.

Abundant in autumn on decaying Algæ, from deep green when young, to dull brown when old, entangled and rigid, filaments from a quarter inch to two inches long, very brittle when dry, does not adhere to paper; can be preserved only by covering with gum, and is then difficult to recognise with the unassisted eye. We have several plants belonging to this genus that are of microscopic size, and not suited to this work.

CORALLINES

OF THE

BAY AND HARBOR OF NEW YORK.

Some of the Corallines, to the unassisted eye, resemble the Algæ so closely, as to be often mistaken the one for the other; their structure is, however, widely dissimilar, and with the aid of a microscope there is no possibility of confounding the two classes. The Genus Sertularia of Linnæus, now divided into several genera, are particularly liable to be confounded with Algæ, on account of their general habit; they are filiform, branched, and articulated, or have that appearance from the insertion of the polype cell, as well as from rings and contractions above and below the cells: they are also rooted, and greatly resemble miniature trees or shrubs; they are described by that accomplished Naturalist, in the tenth edition of his Systema Naturæ, as "Sertularia, *Stirps*, fibrosa, nuda, articulata; articulis unifloris." This class is numerously represented in our harbor; and on account of the polypidom retaining its natural form when dried, is more than any other adapted to illustration with natural types.

Corallines are often attached to old shells, to clams, oysters, and to wood; the latter seems a favorite habitat, especially when the wood is permanently fixed, and well soaked with water. The broken gil-net poles that are abandoned by the fishermen, and the brush fike-hedges, that give a landscape appearance to the Bay between Jersey City and Bedlow's Island, are at all seasons covered with myriads of Corallines. The brush and twigs of the fike-hedges become so loaded as to break off, and are then carried by the tide to the southern shore of Jersey City, where the beach is often lined with them. These stakes, poles, and brush, as I have elsewhere remarked, are used in the shad fishery, which for the past half century has been extensively pursued in Jersey City. The latter part of March is the beginning of the shad season, and then the busy note of preparation is heard along Hudson-street. The newly-painted nets are hung up to dry; the boats are repairing, or already launched, and occupy every safe nook and corner about the slips. Hickory trees of from 75 to 100 feet in length, that were cut during the winter in the densely wooded part of our State, are arriving, or have already been deposited from the teams; men in stockinet shirts, thick homespun trowsers, and true thick water-proof boots, with brown complexions, strong arms, and warm, cheerful hearts, throng the shore, and dot the river in their twin-boat contrivance for sticking the fish-poles into the bed of the river. The fishermen are from Monmouth county mostly; they reside near the sea-coast, and like the stormy Petrel, they walk and subsist on the ocean; their launch and return through the surf in the season of bass and codfish, requires a steady nerve and daring

intrepidity, that none but the long trained surfmen possess. The shad fishing is the first active pursuit of the year; the winter is spent in preparing nets, gathering fuel, discussing the affairs of government, national and domestic; the house receives a coat of whitewash, both internal and external; stores are distant; the matron is provided with abundance of substantial food; news arrives that shad have struck the Delaware, and quick as if an enemy had struck the Hudson, the fishermen from Squan to the Neversink, are in motion for Jersey City.

A few of our own citizens have a pecuniary interest, as proprietors of nets, poles, and other materials required for shad fishing; but the toil and danger consequent on the fishing business are all borne by the surf fishermen who annually visit us. The business in general is profitable, affording a good interest on the money invested. Some of the men have a share of the receipts for their services; such often receive one hundred or more dollars each for the season of about six weeks in duration. The 25th of March is generally the beginning, and the 6th of May is the end of the season for gil-nets.

The farmers of Bergen for one hundred years past have pursued the shad fishery in the shallow waters of our Bay with circular nets, called "fikes;" this mode of fishing is generally continued till the 1st of June. The fike is a trap, with a funnel-shaped mouth, aud resembles a rat-trap, the old-fashioned round one, turned up on its side. The fish are led into the fikes by long fences of net-work, and, at intervals, of birch brush, to allow boats to pass through without injury. The principle of the fike fence is the same as the Indian's deer or buffalo fence; the victims carelessly follow the trail nearest to the bent of their inclinations, until, like a Wall-street broker, they get cornered, then turn a cold eye on the world, and resign themselves to their fate.

The gil-net is a more refined operation: it requires no "decoy-ducks," or "false lights." Each net is about 20 feet square, and is set at a right angle to the current of the river. The shad with a daring, deserving of a better fate, pursues the even tenor of its way, head on, until the mesh of the net is strained and tightened just back of the gill; the increased dimension at the neck prevents further ingress, and the opening gill receiving the mesh, prevents backing out. The mesh usually measures 12 inches in circumference, so that fish of less than one foot in circumference can very easily pass through. The gil-nets are raised every turn of the tide, which occurs four times in about 25 hours. The fikes are raised once in each day when the weather is favorable. In stormy or boisterous weather, the Bergen farmer will sometimes allow his fikes to remain two or three days without lifting; in such cases the shad are dead, and not unfrequently the eels, like sneaking foxes, have commenced preying upon them.

If Spurzheim had lived to visit the Connecticut and the Hudson, as the writer hoped, and as the Boston papers kindly promised, he might have discovered in the shad a very prominent bump of "philoprogenitiveness." Else how can we account for their aunual pertinacity in running the gauntlet in our rivers, to deposit their spawn in fresh and congenial water? The seines are thrown around them at the Narrows and at Coney Island; the fikes entrap them in the shoal water, and from

Bedlow's Island to far above Tappan, the gil-nets obstruct their passage in the channel. The porpoise, the fish-hawk, and man, pursue them from their first advent on the coast, until the act of spawning in the fresh water has reduced them to skeletons. Yet periodically and annually they revisit the troubled waters to perpetuate their species.

The winter abode of the shad is as uncertain and as little known as the aphelion of an unscanned comet. They strike the coast north of Florida, and enter the principal fresh water rivers between Florida and Massachusetts. Their progress is always northerly. They enter the Savannah, the Potomac, the Delaware, the Hudson, and the Connecticut Rivers consecutively,—the collateral or smaller streams, like the Hackensack or Passaic, receiving a due portion of visitors. They strike the Hudson in shoals of greatest force about the 21st day of April—seldom more than three days later or in advance of that time. They soon lose a portion of their scales in the river; but the fact of their entering in compact shoals with perfect scales, has induced a belief that they could not have been many hours subject to agitation from porpoises or hawks. They probably live and grow during the winter in deep cavities near the coast. We may suppose that previous to the time for spawning, the shad has a very small sound or air bladder, which would enable them to sink to a great depth, say one thousand feet, which would give a pressure or density of thirty atmospheres, equivalent to four hundred and fifty pounds for every square inch—a pressure which the porpoise could not sustain. The maturing of the spawn may increase the amount of air in the sound, and enable the fish to rise at the proper time for ascending the fresh water streams.

The shad that enter the rivers, are found returning to the sea in midsummer in a very poor condition. The young shad descend the streams in the fall. A small fish about one or two inches long, and resembling smelt, enter the rivers in great abundance at the same time as the shad, which feed and fatten on them.

It is probable that the shad which enter different rivers are different varieties. A difference is discernable as well between the shad of different rivers, as between the different shoals which enter the same river. The shad which enter the Hudson, may, for example, be those only that were spawned in that river, and each variety or tribe may have its separate winter cavity in the ocean, near the mouth of the river in which it was spawned.

Flexible Corallines, under the general division *Zoophytes*, were little known until about the middle of the eighteenth century, 100 years ago, when Linnæus, Spallanzani, Pallas, Müller, Ellis, and others, published the results of their valuable researches in Natural History. Cuvier, Lamarck, Lamouroux, Latreille, Fleming, Johnston, and many others of equal merit in the present century, have made large contributions to our knowledge of Zoophytes. Unimportant differences occur in the classifications of those authors, and differences in opinions of some importance, on the animal or vegetable nature of the several orders, is discussed with more or less ability by all of them.

Naturalists generally agree in the characteristics of each genus and species; the great perplexity lies in not having some standard types as monuments to designate the line where vegetable life shall end, and animal life begin. Johnston quotes Deshayes' "L'irritabilité manifestée par le mouvement," as the true definition of animals, and then very strangely argues that the definition will exclude Sponges and Corallines from amongst them. Why? The retreat of the polype to his polypidom cell, is a movement that manifests irritability as clearly as the retreat of the tortoise's head within the shell manifests sensibility. If Johnston will visit the shore of our unrivalled Bay, where all life partakes of the freedom of the political constitution, we will show him the irritability of the Algæ manifested by the most violent paroxysms in their external antheridia.

The propagation of the Corallines is by ovaries, buds, and ciliated ovules, that originate mostly in the pulp of the parent, or in ovarian vesicles both external and internal, and which, though of a different substance, are similar to pericarp or spore case in Algæ. The ova, or young, move freely about in the water until a suitable habitation is found, when they become permanently attached, throw out their tentacula in quest of food, and rapidly assume the form and size of the parent. The polype, or contractile part, is carnose or fleshy; the polypidom, or flexible root, stem, and branches, is rigid and somewhat horny. Different opinions prevail among authors as to the vascular, or "extravascular" nature of the polypidom; that is, whether it is permeated by nutritious or absorbent vessels, and whether it can thereby undergo intestinal changes in growth when once formed. The advocates of the "extravascular" system cannot be very close observers of nature. Analogies in all organic life show a vascular system; finger nails, hair, horn, and polypidoms, are all vascular, and grow from nourishment distributed throughout the structure. I have ocular demonstration of the enlargement of the polypidom, from having marked the locality of several individual Tubularia larynx on Rabineau's bath at Castle Garden; and in daily visits noticed the enlargement, until the polypidom had attained double the original diameter.

The circulation or current through the polype has been frequently noticed, and is not, so far as I know, questioned by any Naturalist of the present time. Cavolini, Spallanzani, Müller, and others, describe the circulation as not only into the stomach of the polype, but also through the tube of stem and branches of the polypidom. Very little is known of the sexes; some Naturalists have supposed that a difference noticed in the polypes of the same or distinct polypidoms, may characterize the sexes; it is generally conceded that the same polypidom, with its numerous polypes, is capable of reproducing its species.

The Zoophytes that form the subject of these remarks, may be conveniently understood by the following:—

Class, FLEXIBLE CORALLINES.

Aquatic, tubed, simple or branched, flexible, rooted, substance corneous, surmounted with carnose tentacula that supply the structure with food.

Genus, EUDENDRIUM. Ehrenberg.

Erect, rooted by creeping fibres, much and irregularly branched, polypes from the apices, non-retractile, roundish, the body encircled with a zone of 15 tentacula, the mouth central.

No. 264. E. *ramosum.* Ellis. Slender, pinnately branched, single tube, branches ringed at their origins.

On fike hedges, very abundant, 5 to 8 inches high, of a dull horn color; dense clusters of this Coralline attached to twigs are thrown on the beach at Jersey City.

Genus, TUBULARIA. L.

Root a creeping fibre, unbranched, polypes at the extremities of the tube, non-retractile, furnished with two rows of smooth filiform tentacula, one row around the middle of the head, and one row around the mouth.

No. 265. T. *indivisa.* Lin. sys. Tubes clustered, smooth throughout.

Summer and autumn, on stakes and shells, below low water mark, thrown on shore at Jersey City, Red Hook, Staten Island, and other parts of the Bay.

No. 266. T. *larynx.* Ellis. Clustered filiform, ringed at distant and regular intervals.

Summer, on floating wood near the surface, at Rabineau's bath, Floating Chapel, East River, and on fike-hedges, near Ellis' Island.

Genus, HALCEIUM. Oken.

Stem of aggregated capillary tubes, much branched, branches alternate, spread at wide angles, cells tubular, jointed at the base, alternate from opposite sides, ovarian vesicles irregular, scattered, polypes scarcely retractile within the cells.

No. 267. H. *halecinum.* Johnston. Vesicles oval or oblong, the aperture shortly tubulous, subterminal.

On shells and stones in deep water, thrown on shore at Staten Island, Jersey City, and other places in the harbor. I found it pendulous on stones at low water mark at Castle Garden; all the specimens that I found have the appearance of having laid in the mud a long time.

No. 268. H. *muricatum.* Vesicles ovate, echinated.

Autumn, in deep water, on the fike-hedges, on oysters at Robbin's Reef, Kavon Point, &c. It is the Laomedea muricata of Lamouroux.

This Coralline is very variable in habit; some varieties I found on oysters in the East River, has all the characteristics of H. Beanii of Johnston; but I shall include all such varieties under H. muricatum.

Genus, SERTULARIA. L.

Variously branched, the branches single tubed, denticulated or serrated with the

cells, and jointed at regular intervals, cells alternate or paired, biserial, sessile, urceolate, short with averted apertures, ovarian vesicles scattered, polypes hydraform.

S. *polyzonias.* Lin. syst. Loosely branched, cells alternate, with a wide averted four-toothed aperture; vesicles egg shape, and wrinkled across.

No. 269. S. *polyzonias*, var. A. Vesicles round.

On shells and fike-hedges below low water mark, thrown on shore at Jersey City, and other parts of the Bay.

No. 270. S. *pumila.* S. Doody. Cells opposite, approximate, shortly tubular; the top everted with an oblique mucronated aperture, vesicles ovate.

On rocks and on Fucus vesiculosus, above and near low water mark, at Hurlgate, Castle Garden, Staten Island, and other places, abundant, about 1 inch long.

No. 271. S. *pumila.* The same in clusters as it grows on Fucus.

No. 272. S. *argentea.* Merret. Cells nearly opposite, or sub-alternate, urceolate, acutely pointed, the upper half spread out, vesicles oval, polypidom cauliferous.

On shells and rocks in deep water, in the Channel, at the Narrows, off Staten Island, and Kill Van Kull; thrown on shore in great abundance at all parts of the Bay; large clusters attached to twigs and bark from fike-hedges, are thrown on shore at Jersey City.

No. 272 A. S. *cupressina*, of Ellis and other authors; but I regard it as a variety of S. *argentea*, in one of its very sportive forms.

Genus, LAOMEDEA. Lamour.

Root of creeping fibres; jointed at regular intervals, the joints ringed, incrassated, giving origin alternately from opposite sides, to the shortly pedicled cells; vesicles axillary, polypes hydraform.

No. 273. L. *dichotoma.* Ellis. Filiform, incrassated below the joints and ringed above them, branches alternate, cells on ringed tapered pedicles, ovarian capsules axillary, ovate, smooth.

At and below low water mark on shells, rocks, and sticks; drifts on shore at Red Hook, Fort Hamilton, and other places; rare.

No. 274. L. *dichotoma*, var. B.

More slender and elongate, drifted on shore at Jersey City, and other places.

No. 275. L. *geniculata.* Doody. Stems zigzag, not much branched, cells on annular stalks from the joints, with an even rim; vesicles axillary, ovate.

At low water mark on fike hedges, and on rocks and shells, very abundant in autumn.

No. 276. L. *gelatinosa.* Dillenius. Filiform, elongate, branched, branches spreading at wide angles; cells on long pedicles, with an even rim.

On stones and wood near low water mark, at Kavon Point, Fort Hamilton, and elsewhere.

Genus, CRISIA. Lamour.

Cells in two rows, subalternate, the aperture entire and terminal.

No. 277. C. *eburnea.* Ellis. Cells loosely aggregated cylindrical, bent, tubular, orifices free.

Rare in our harbor; I found it on one rock only at Hurlgate; it is often found parasitical on Sargassum Montagnei, drifting into our harbor from the Sound, where it is very abundant.

Genus, BEANIA. Johnston.

Confervoid, the shoots creeping, tubular, irregularly divided, the cells very large, sessile, erect, ovate; single and in pairs.

No. 278. B. *mirabilis.* W. Bean. Confervoid, ½ inch high.

I have only one specimen of this Coralline, and that was accidentally discovered when preparing some Algæ; it is probably abundant, though escapes notice on account of its diminutive size. It is very beautiful under the microscope.

Genus, VALKERIA. Fleming.

Confervoid, fistular, variously branched, cells clustered, ovate with a narrow base, polypes with eight regularly ciliated tentacula.

No. 279. V. *pustulosa.* Ellis. Dichotomous, or alternately branched, the cells clustered, unilateral.

This Coralline drifts on shore at Jersey City, Fort Hamilton, and other places from the deep water. It is rather abundant, though I have not found it attached to anything, and don't know the precise habitat, or locality of growth; the polypidom is of a clear horn color, and branched at very wide angles.

The stubborn, horny nature of Corallines, make it inconvenient to fasten them on paper; and for that cause I have omitted to preserve many that lay in my path in the early search for Algæ. A careful reconnoitre of our harbour, would no doubt, reveal many more species, or entire genera.

MISCELLANEOUS ZOOPHYTES.

Our waters are very prolific in Zoophytes; and under the head of Miscellaneous, a very large number of species, genera, and families, might be introduced to the reader with descriptive engravings. Their peculiar structure, however, renders it impossible to convey even a tolerable idea of their habits by dried specimens, and they are therefore omitted in this work. The following were deemed of sufficient importance to justify their insertion in this place:

No. 290. Spongia, *damicornis,* of Esper.

Variously divided and compressed, often proliferous, the polypes have sixteen tentacula, eggs oval and heart shape, compressed. Johnston who adopts the genus Alcyonidium of Lamouroux, and species Hirsutum of Fleming, says the egg is clothed with cilia, and all inclined in one direction, moving with great uniformity and quickness; and the velocity of the cilia is not generally diminished when the egg is at rest; the egg swims freely about, often turning on its axis.

At Hurlgate, on the stem of Phyllophora Brodiæi, at low water mark, not very abundant.

No. 291. Spongia, *ahenobarbus.*

The "red beard" of our fishermen, who use it instead of a cloth for washing dishes. It is very abundant at Kavon Point, Bergen Point, and Staten Island, on old shells and oysters, below low water mark; it grows in large clusters from 6 to 12 inches high, and spreading on all sides to 5 or 6 inches broad; the polype and ova are deep red, which give a beautiful appearance to recent specimens; the dried polype for a long time communicates a fœtid odor; when exposed to the sun and water, it soon bleaches to a dull ash color.

No. 292. Spongia, *arboreus.* Aborescent, dichotomously branched.

This beautiful sponge I found on two occasions at the mouth of the harbor, near the telegraph, Staten Island; it is cylindrical, much branched, ¼ inch thick, and nearly equal throughout, except at axils, where the branches are woven together for some distance. I think its habitat is in the deep water of the lower Bay, between the Narrows and Sandy Hook.

Genus, FLUSTRA. L.

Crustaceous, cells more or less quadrangular, flat, the aperture transverse, valvular.

No. 293. F. *membranacea.* Lin. syst. Cells oblong, with a short blunt spine at each corner.—*Ellis.*

On gracilaria and other Algæ; commencing at the base, surrounding the stem, and thence creeping upwards to the apices, weaving a beautiful net-work, that appears to the unassisted eye like silver gauze or lace. Some fine specimens of this Coral are thrown on the shore at Jersey City; in one instance, a gracilaria, with many branches and ramuli, was entirely entombed in its meshes. There are several species of this genus, and the entire genus is nearly allied to the Membranipora of Ellis; the Flustra of Linnæus, as characterized by Cuvier, will include the whole, though Cuvier mentions a difference that would certainly amount to a generic separation:—"D'après les observations de Spallanzani, de MM. Audouin, Edwards, et de Blainville, certaines flustres seraient habités par de animaux du group des acidies; mais il y en a aussi, qui bien certainement, d'après MM. Quoy et Gaimard, le sont par des vrais polypes."—*Règne Animal*, iii., 303. Grant says, "The aperture of the cells is formed by a lid which folds down when the polype is about to advance from the cell, and in F. truncata where the lid is very long; it appears through the microscope like the opening of a snake's jaws."

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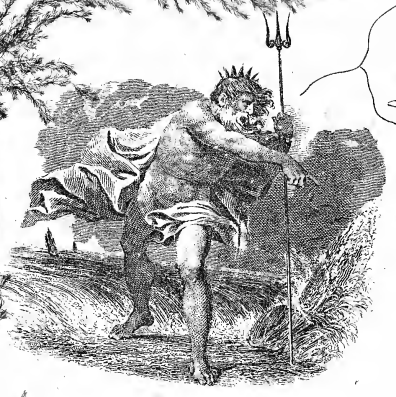

Don't touch the plants.
Look through a lens.

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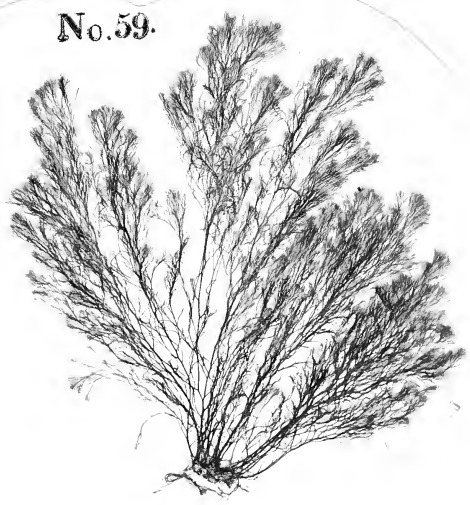

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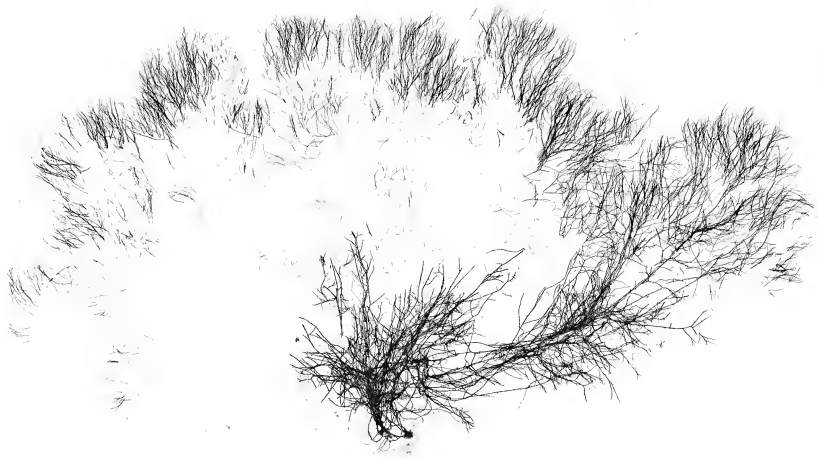

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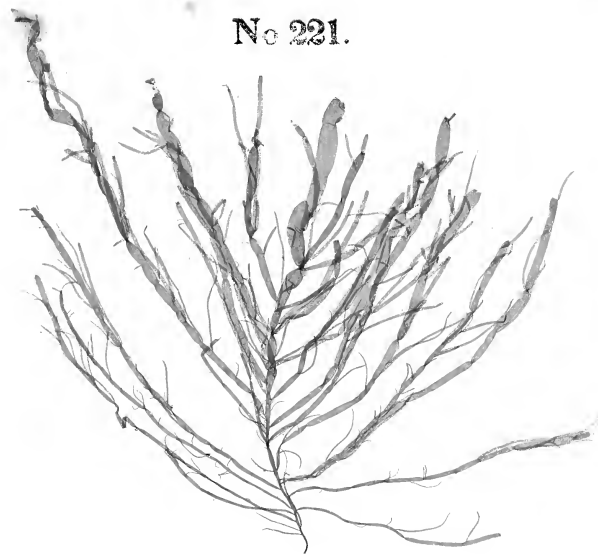

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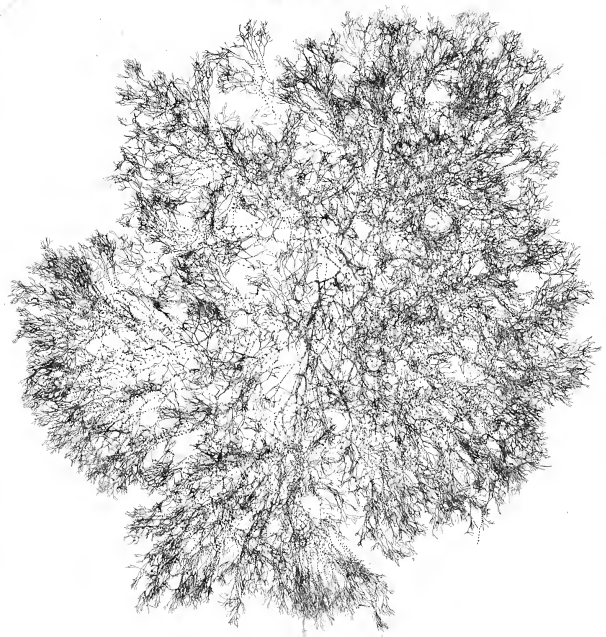

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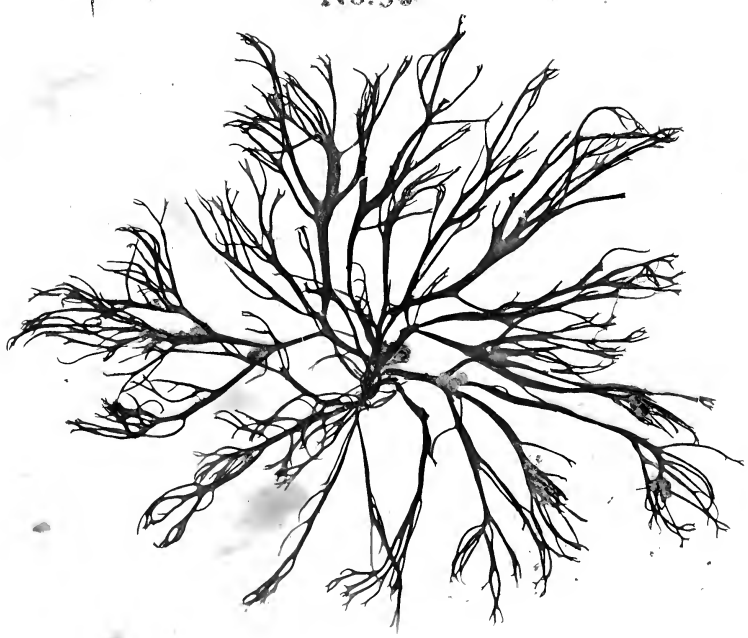

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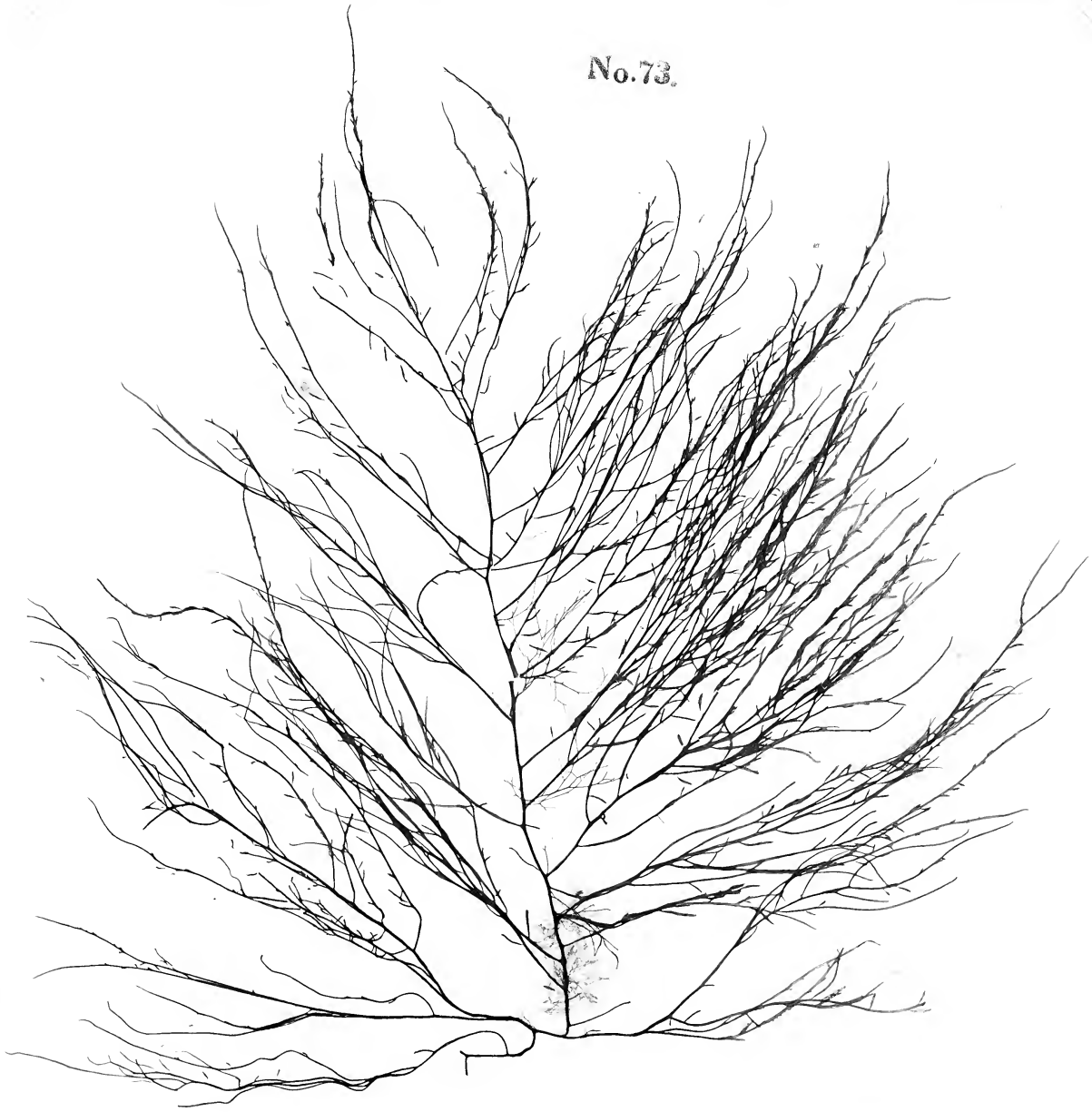

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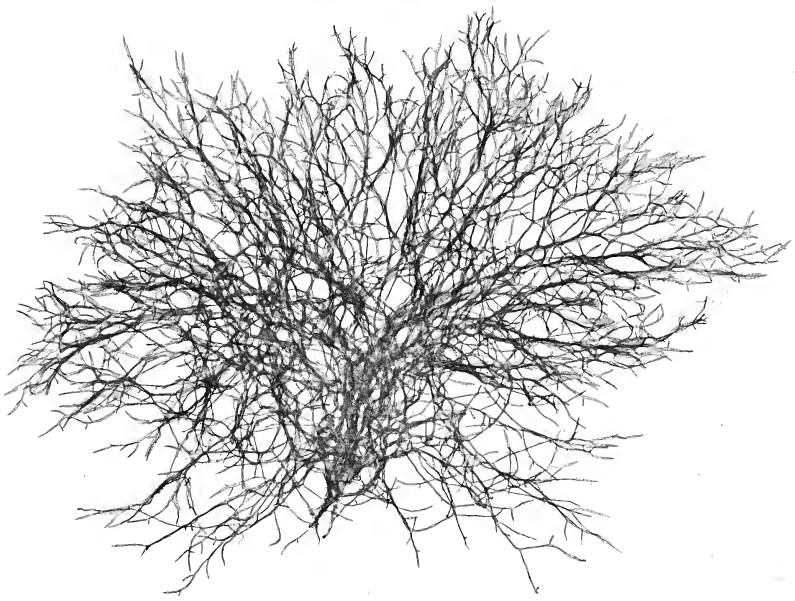

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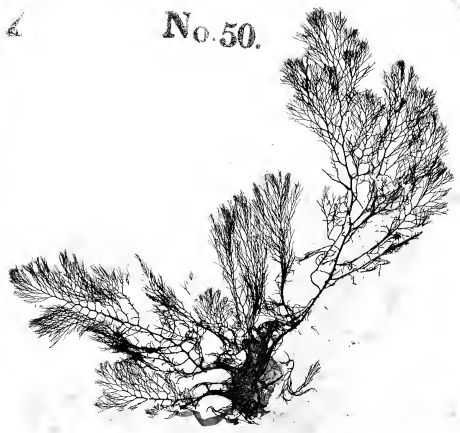

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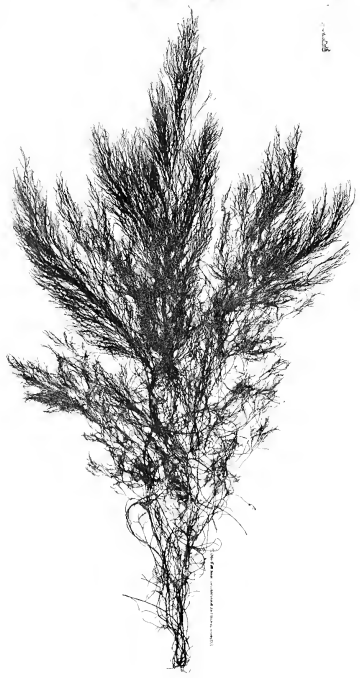

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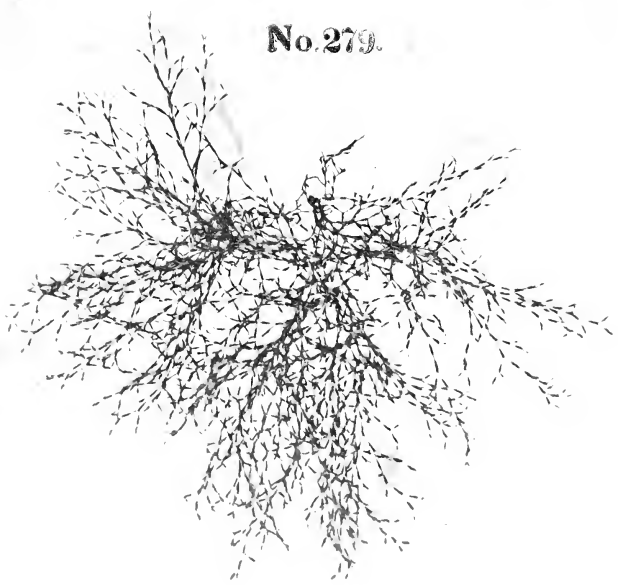

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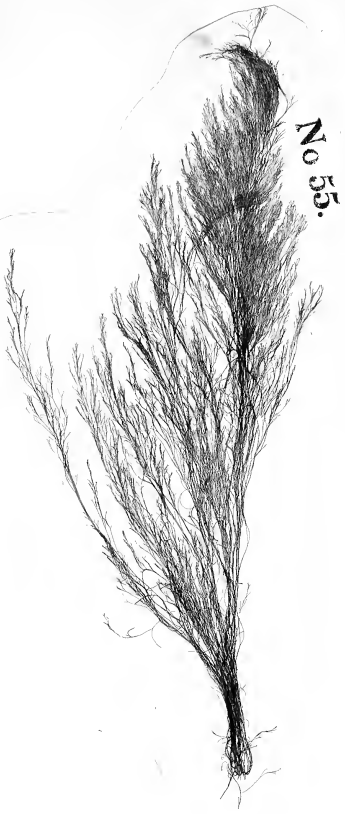

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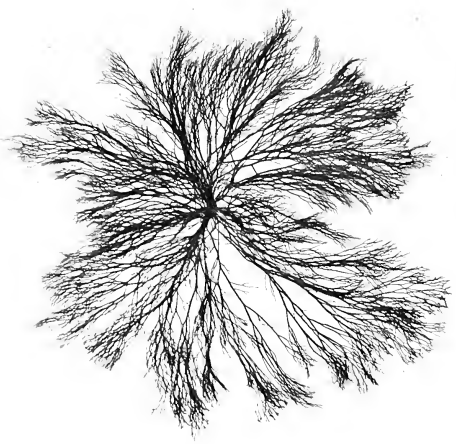

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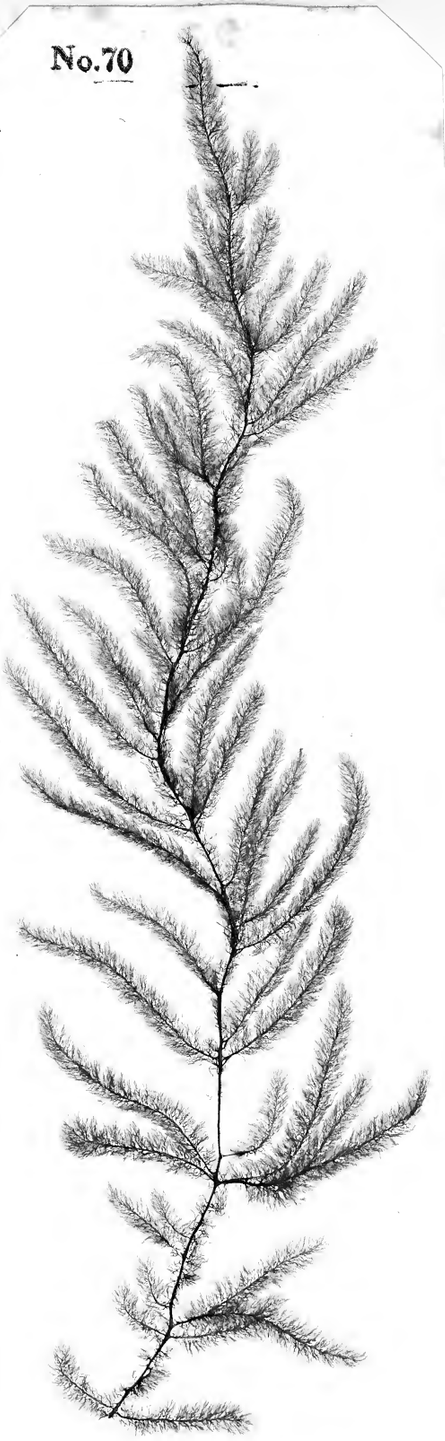

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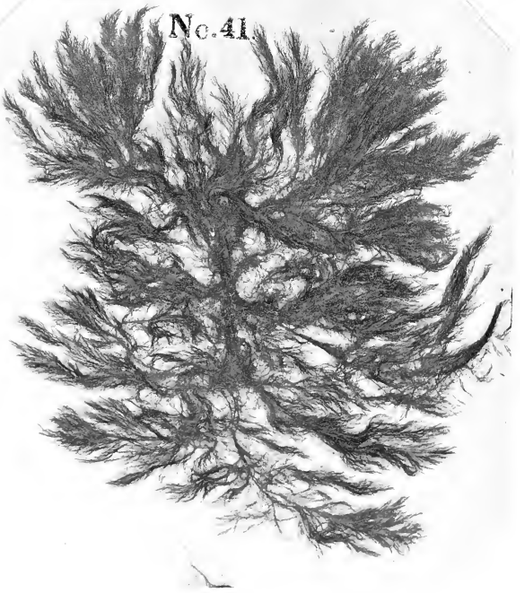

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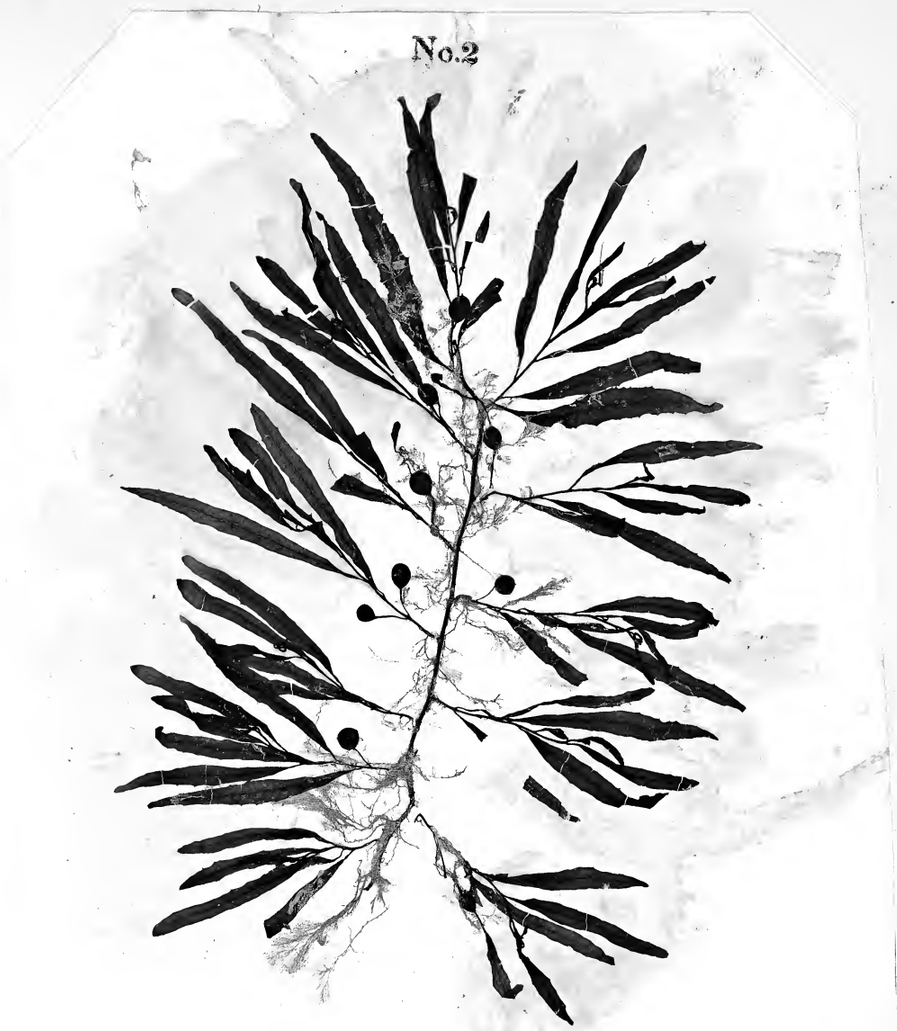
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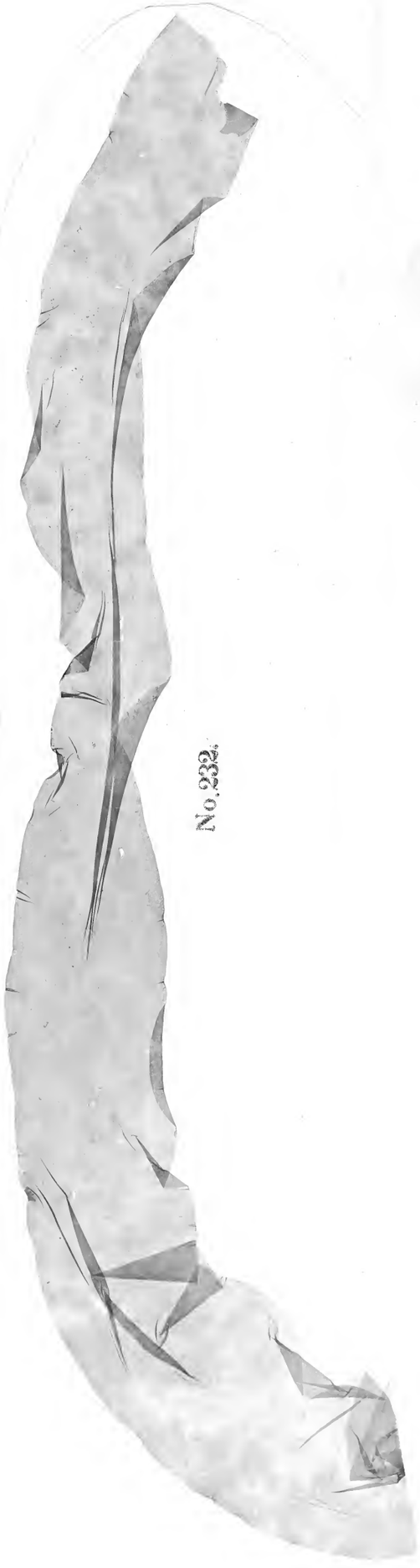
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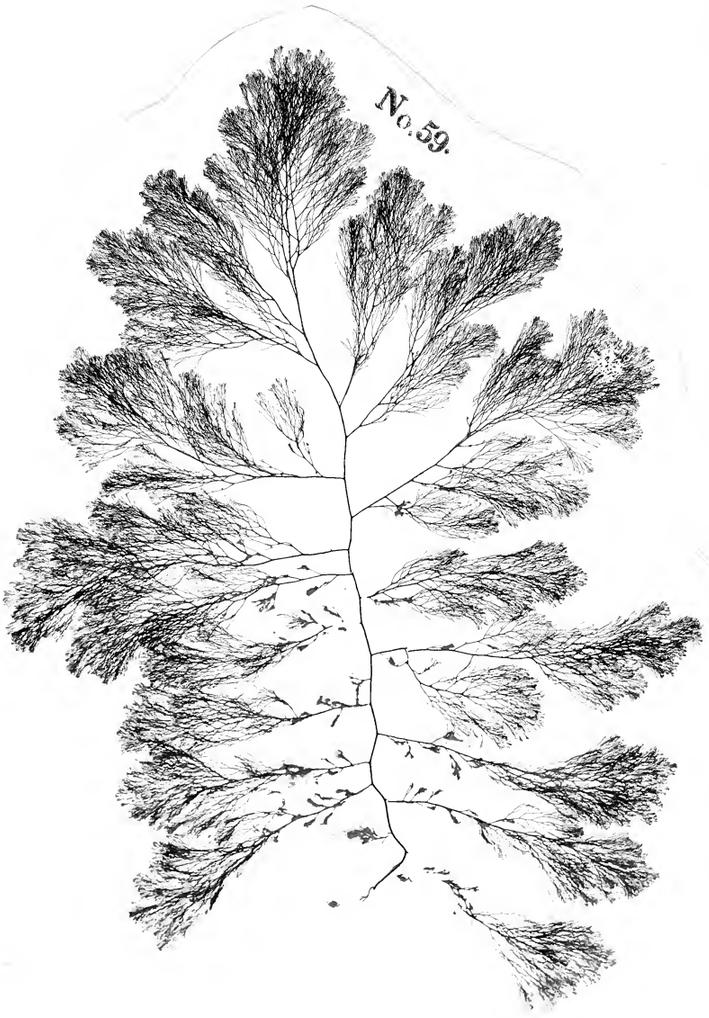
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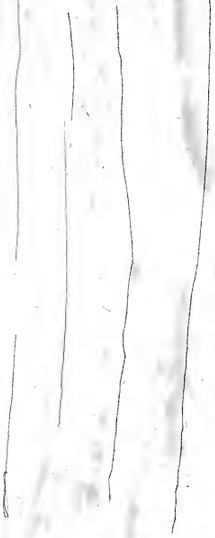

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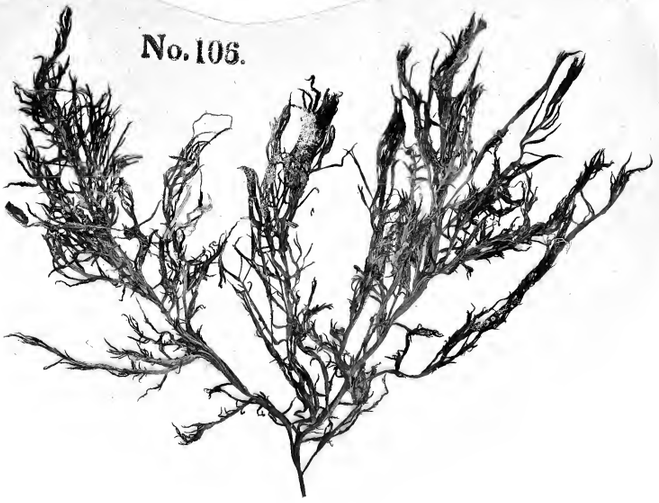

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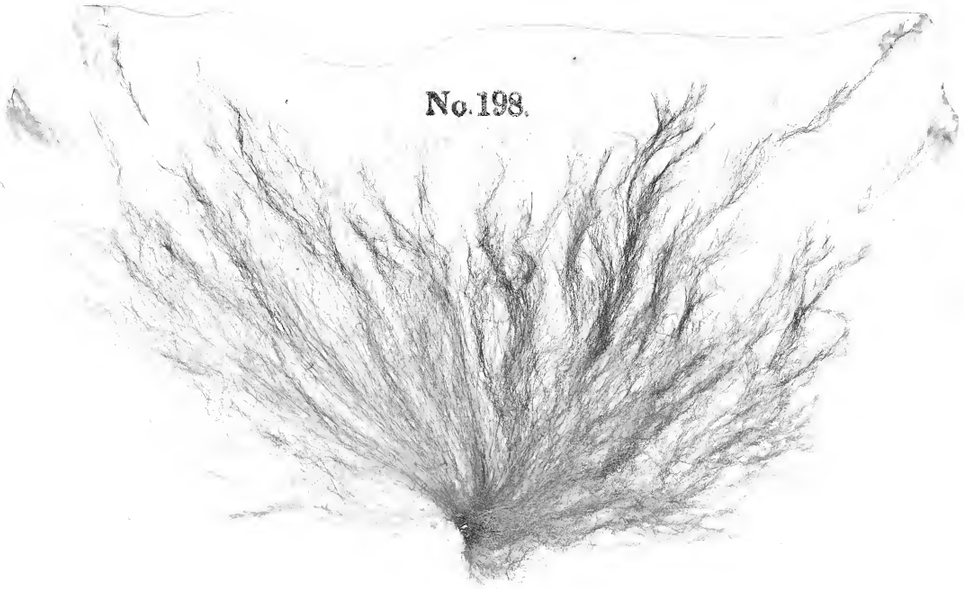

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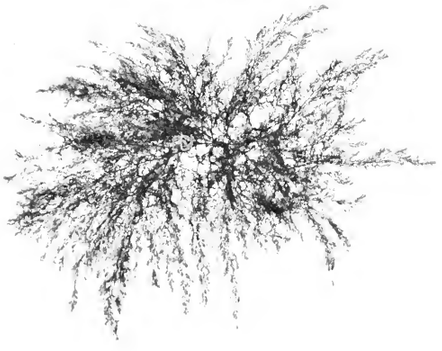

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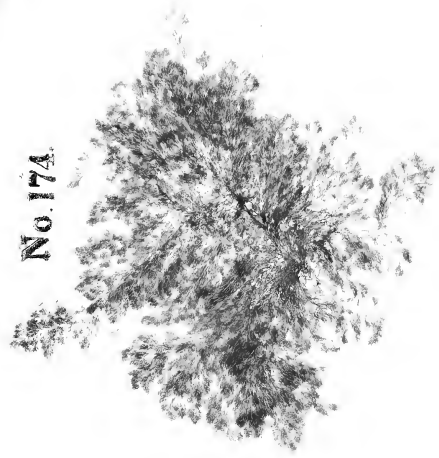

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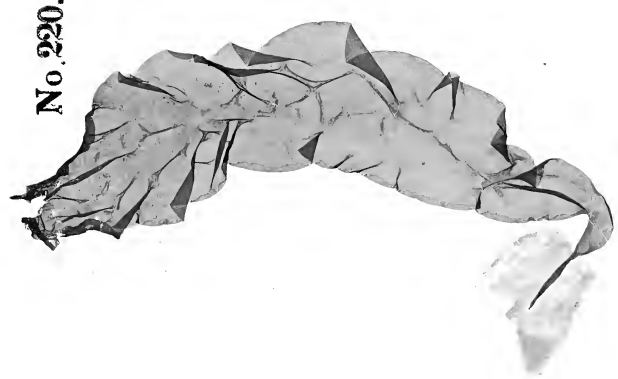

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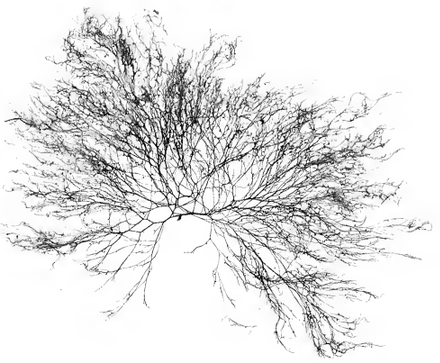
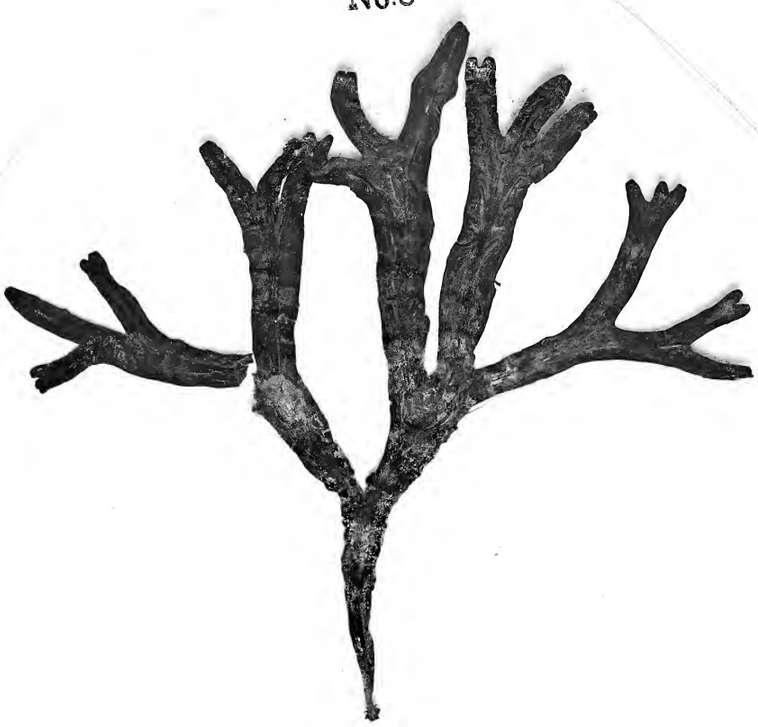
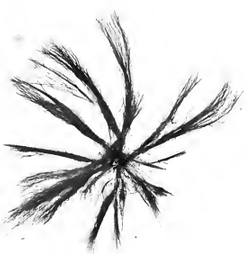


No 35.

No.8



No 33

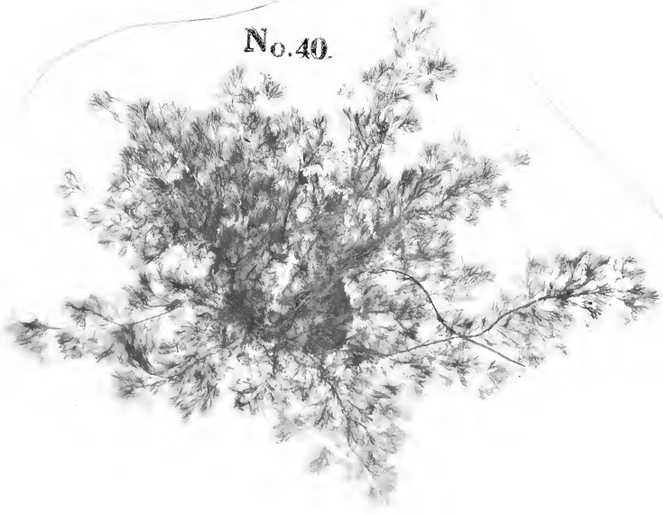


No 60.

No.70

No.291.

No.40.



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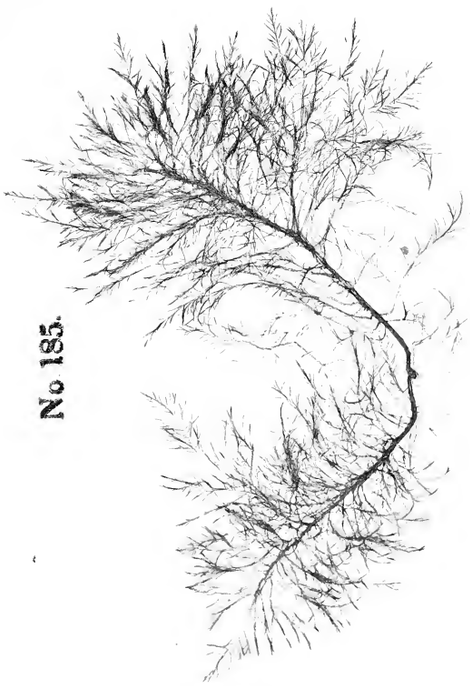
No.59.

No 17.

No.146

No 185.



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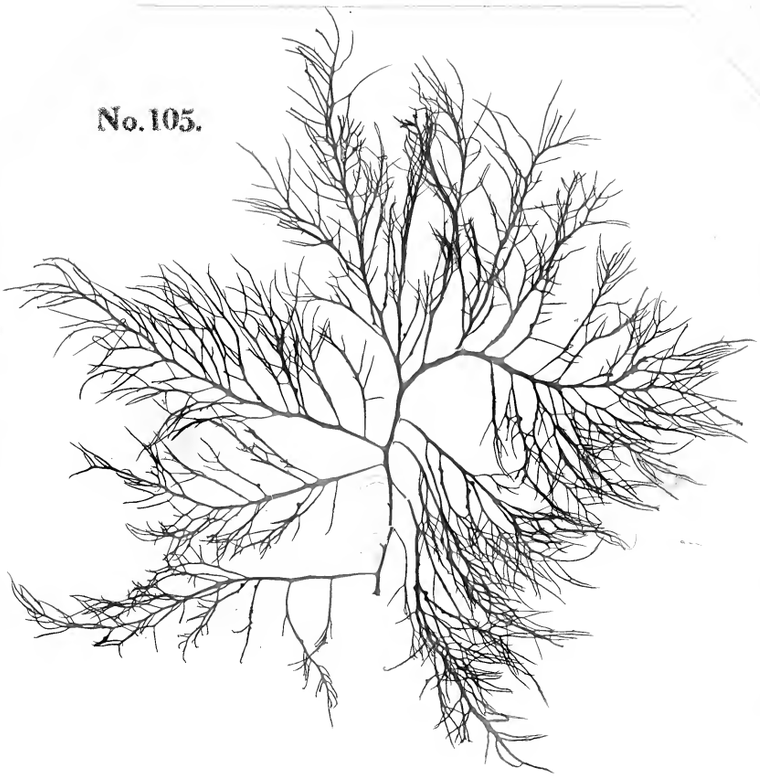
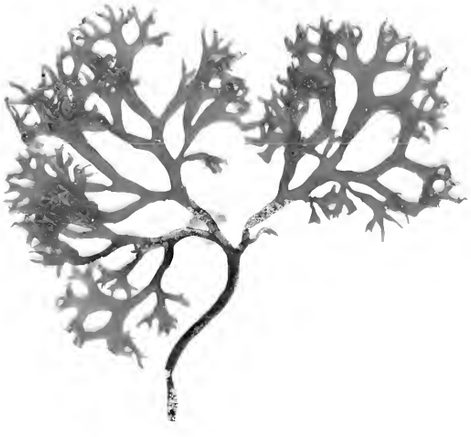
No. 105.



FAM. VII. BOSTRYCHIA.
No. 48. B. ANCEPS.

No. 85

No 111.



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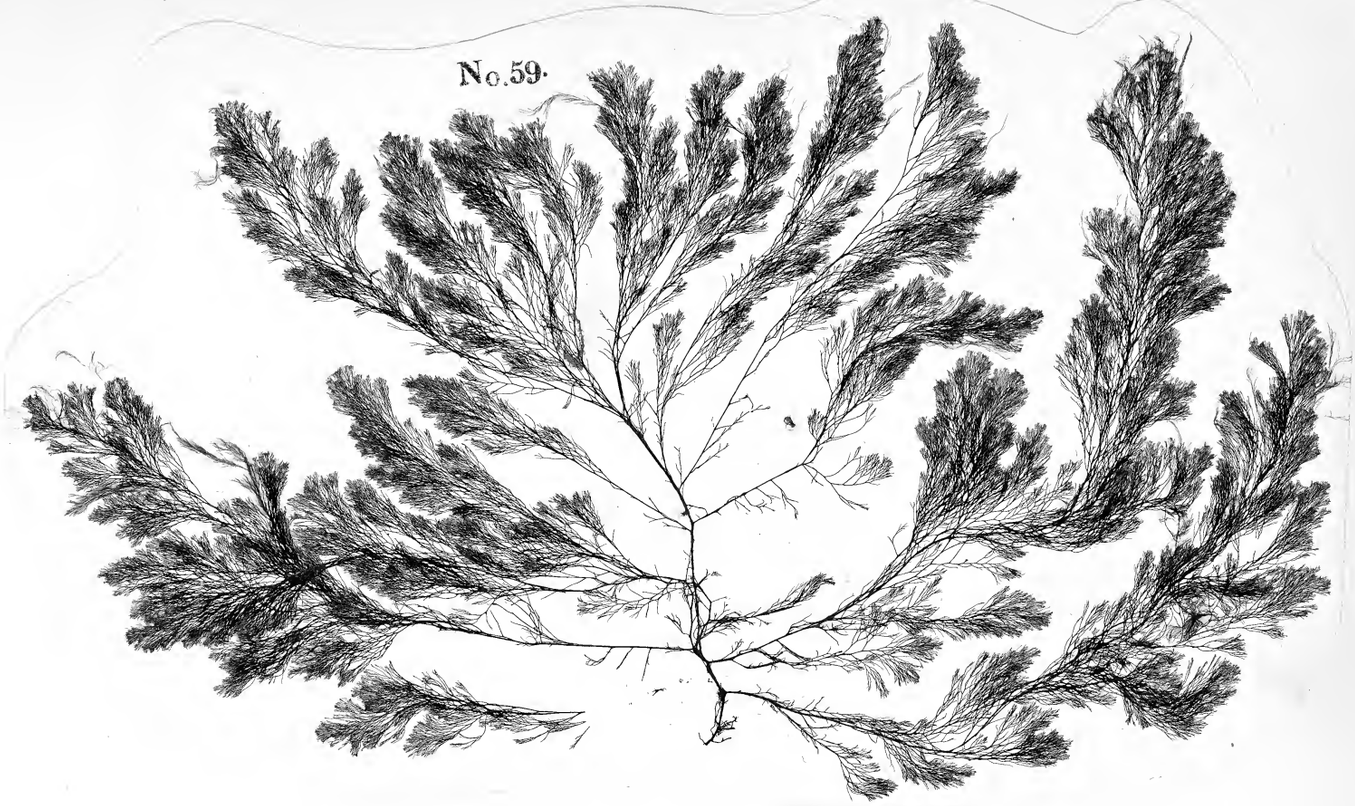

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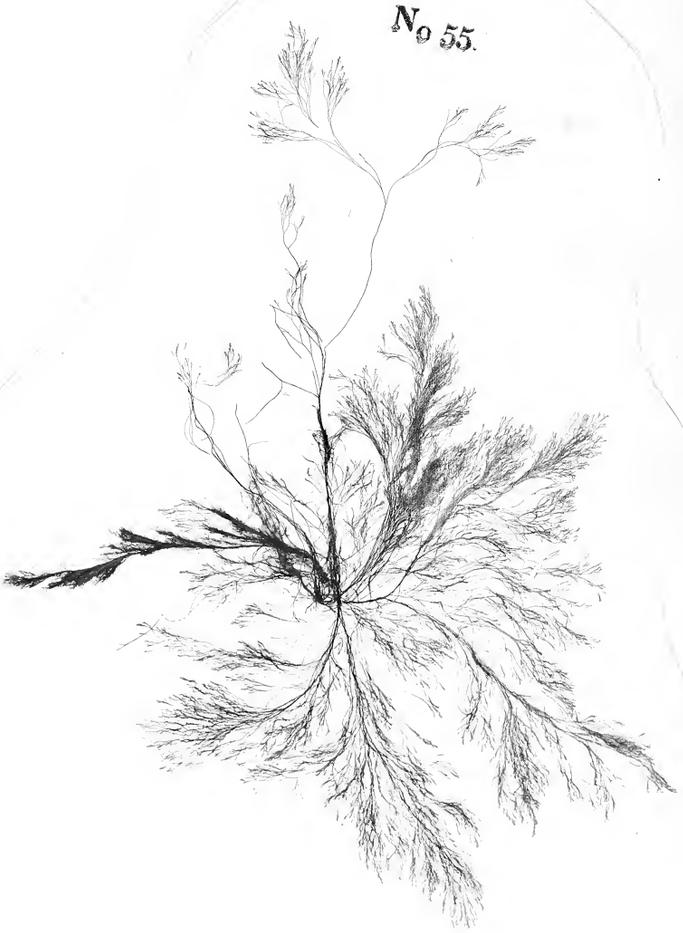
No 55.



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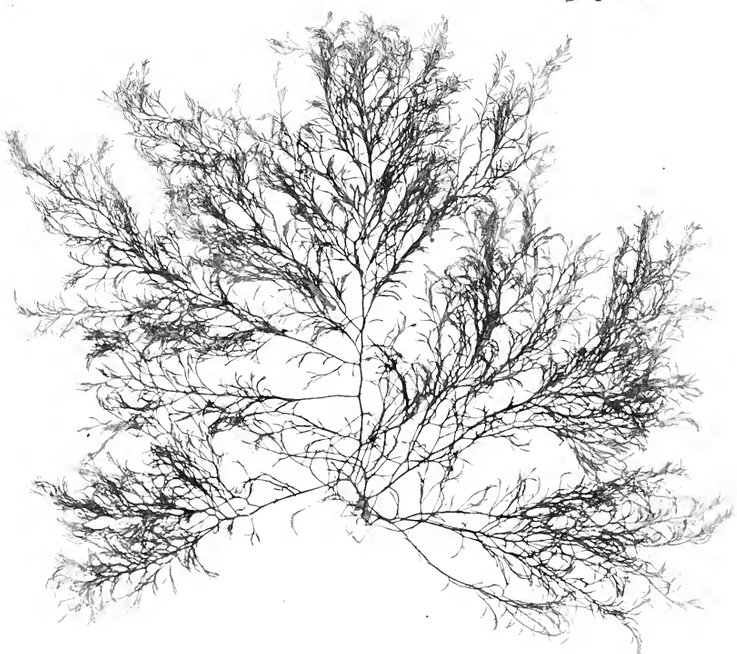
No.174.

No.16

No.75.



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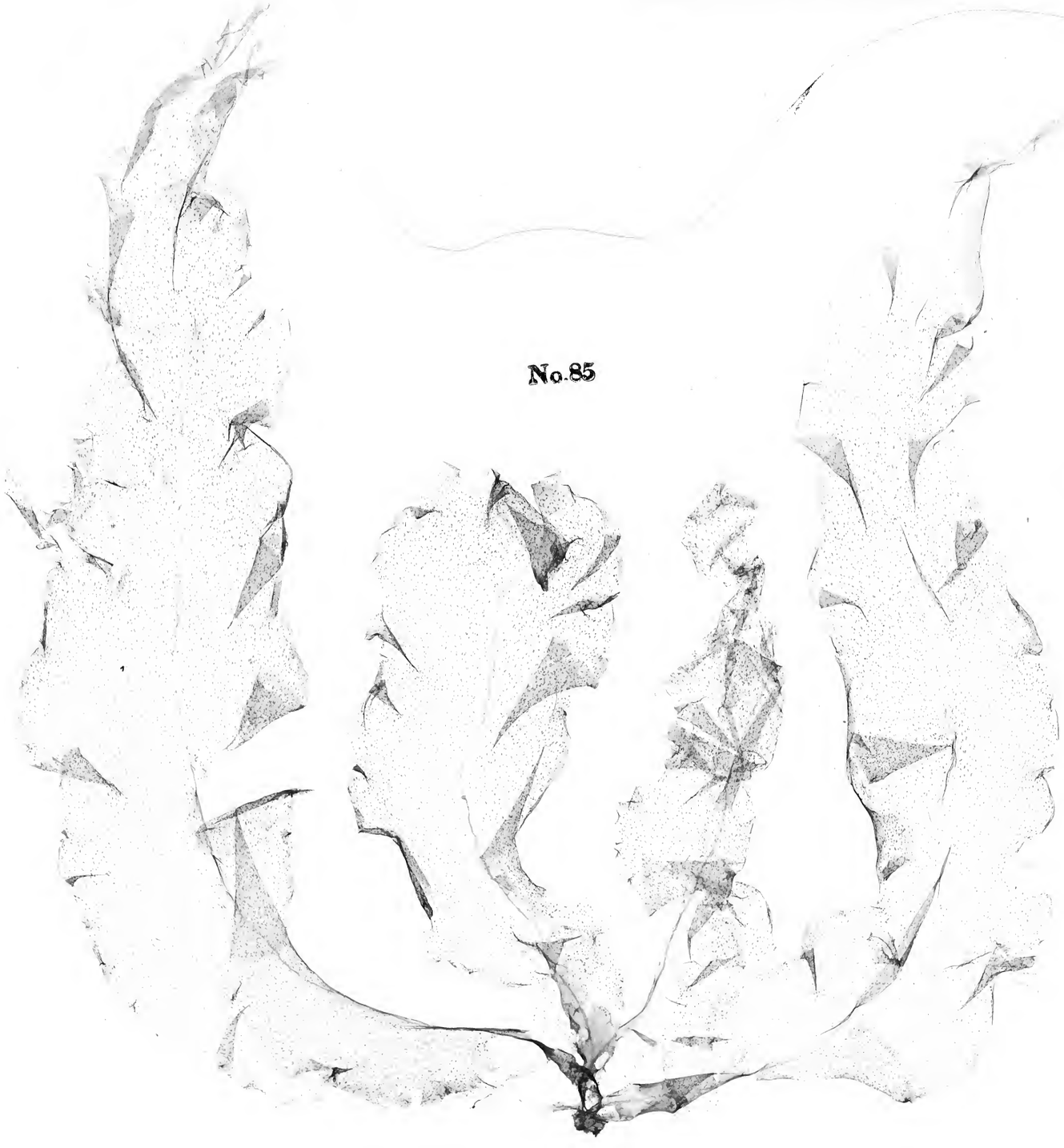
No.41.A.

No.85



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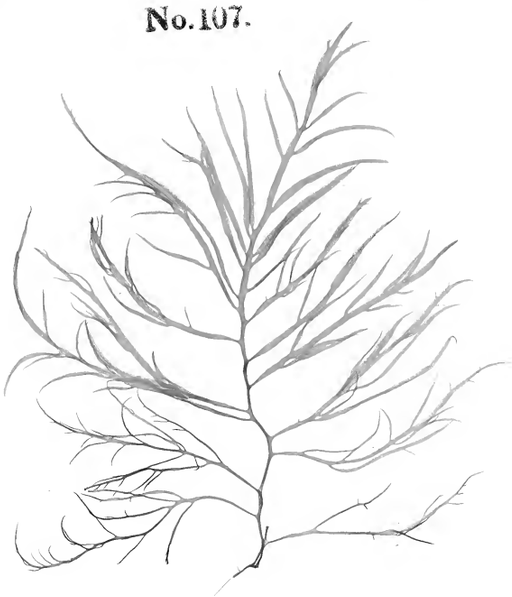

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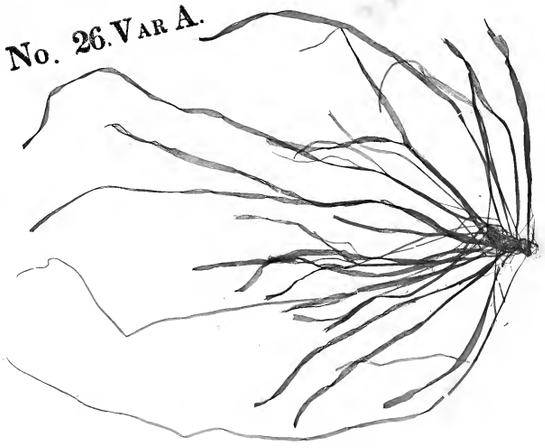
No. 26. Var A.



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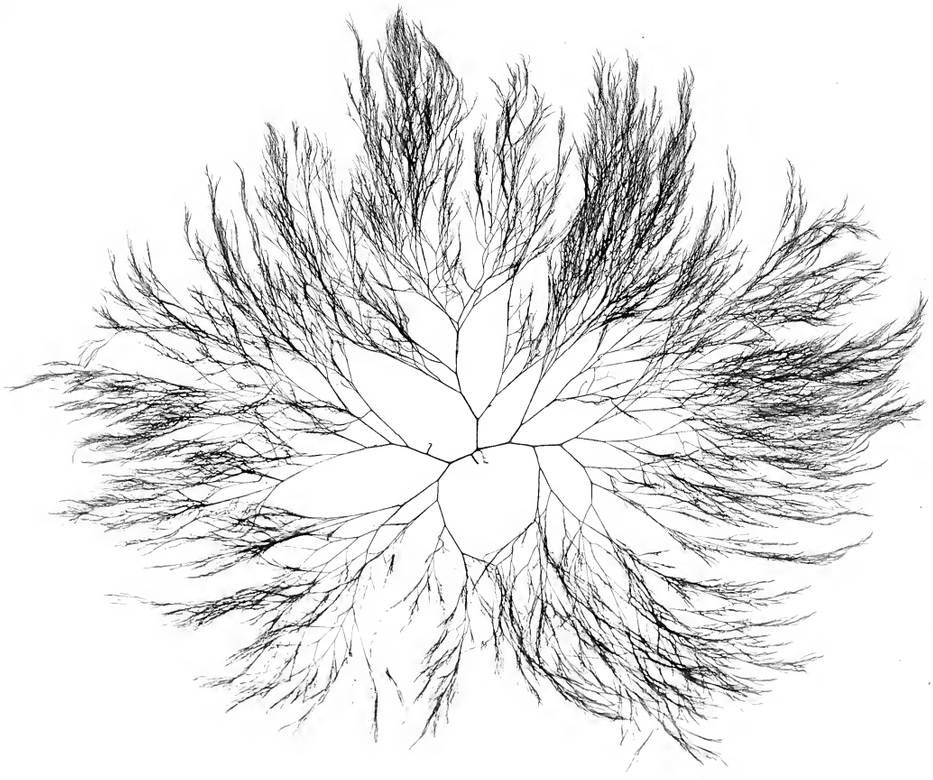

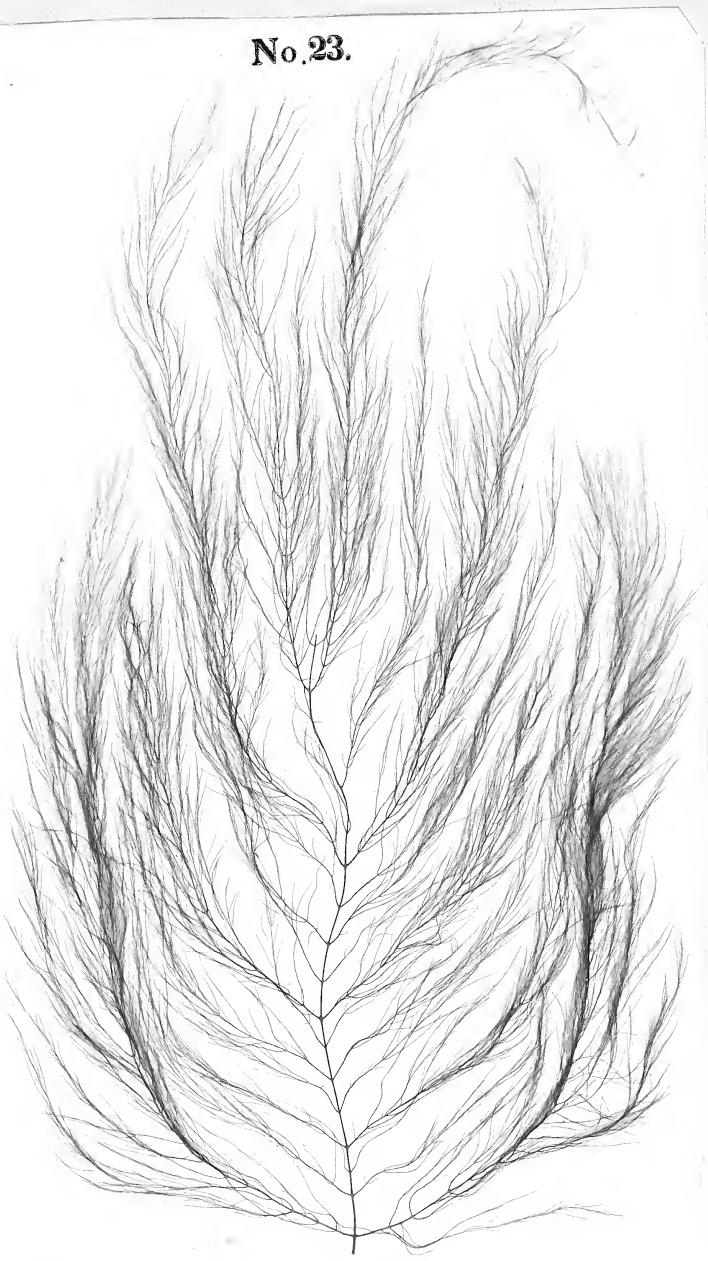

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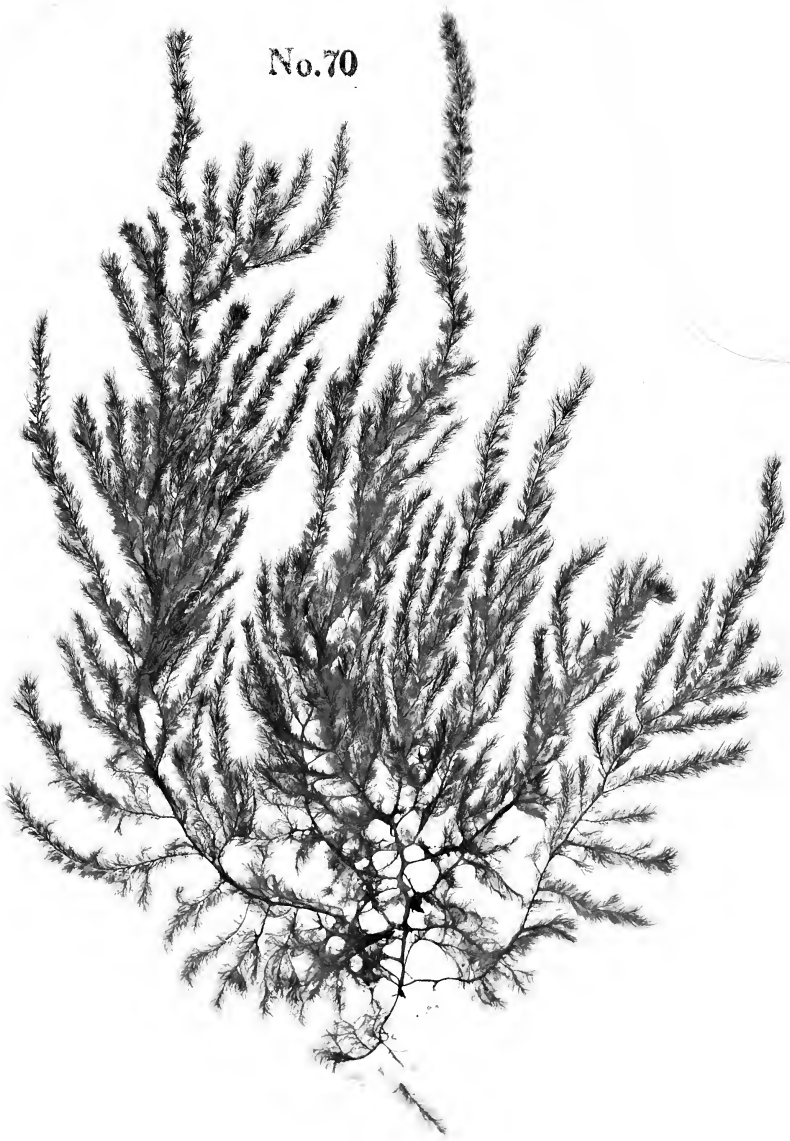

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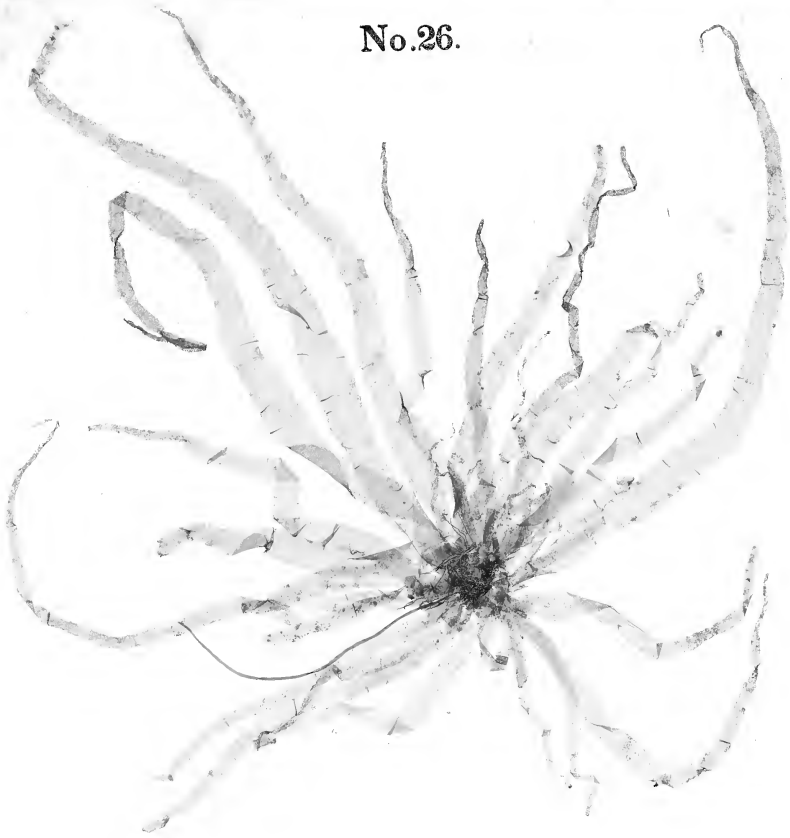

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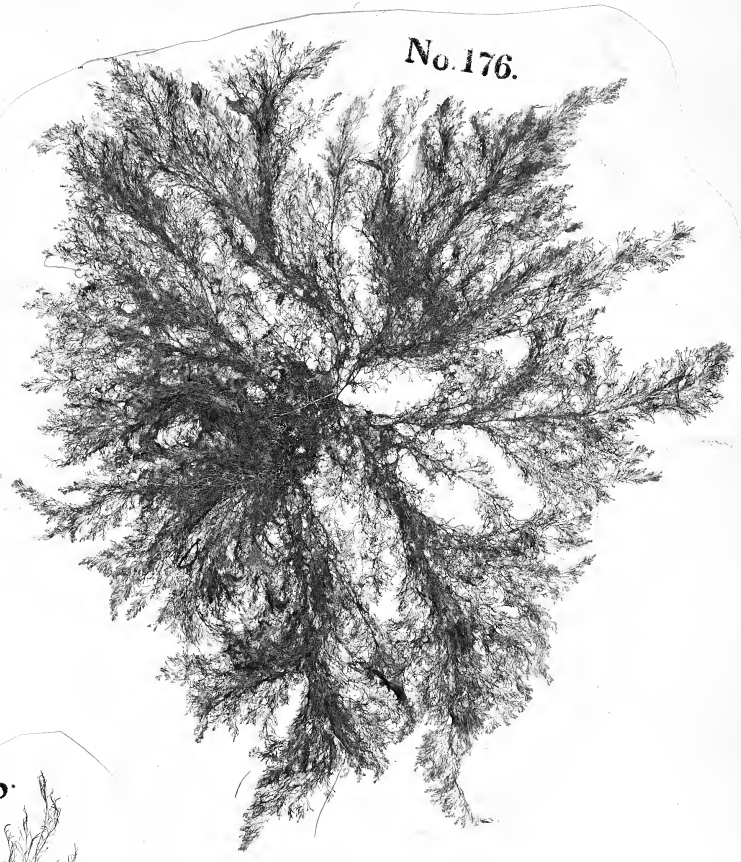

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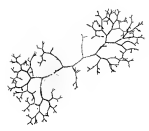

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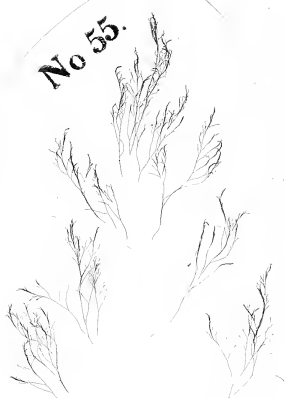

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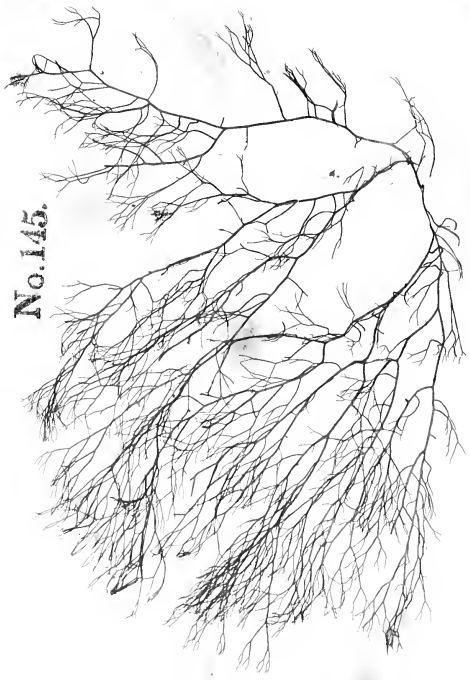
No.145.



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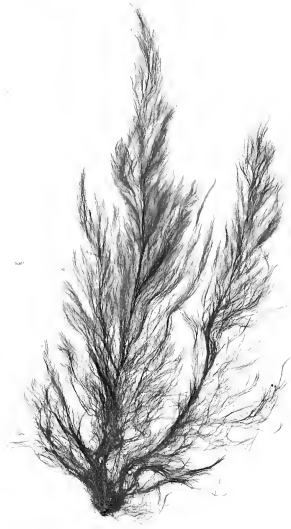

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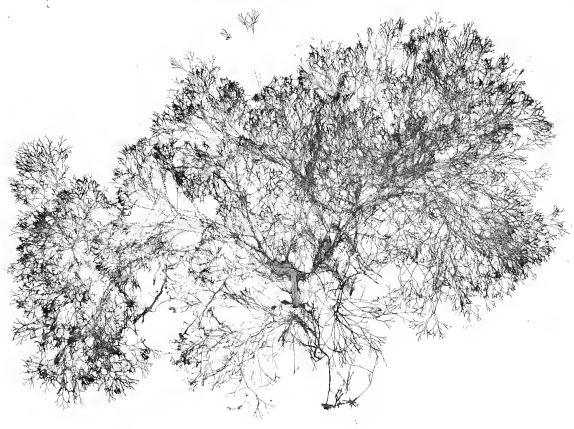
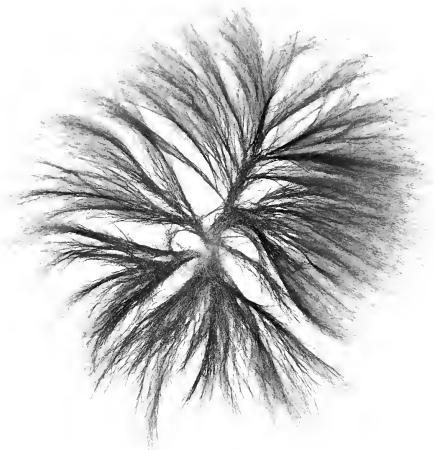


No.273.

No 173.

Fam. XIII. Callithamnion.
No. 178. C. Floccosum.

No. 201.



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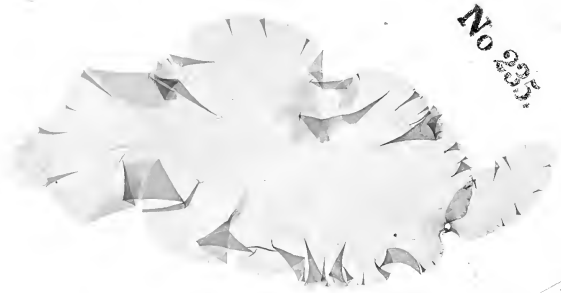

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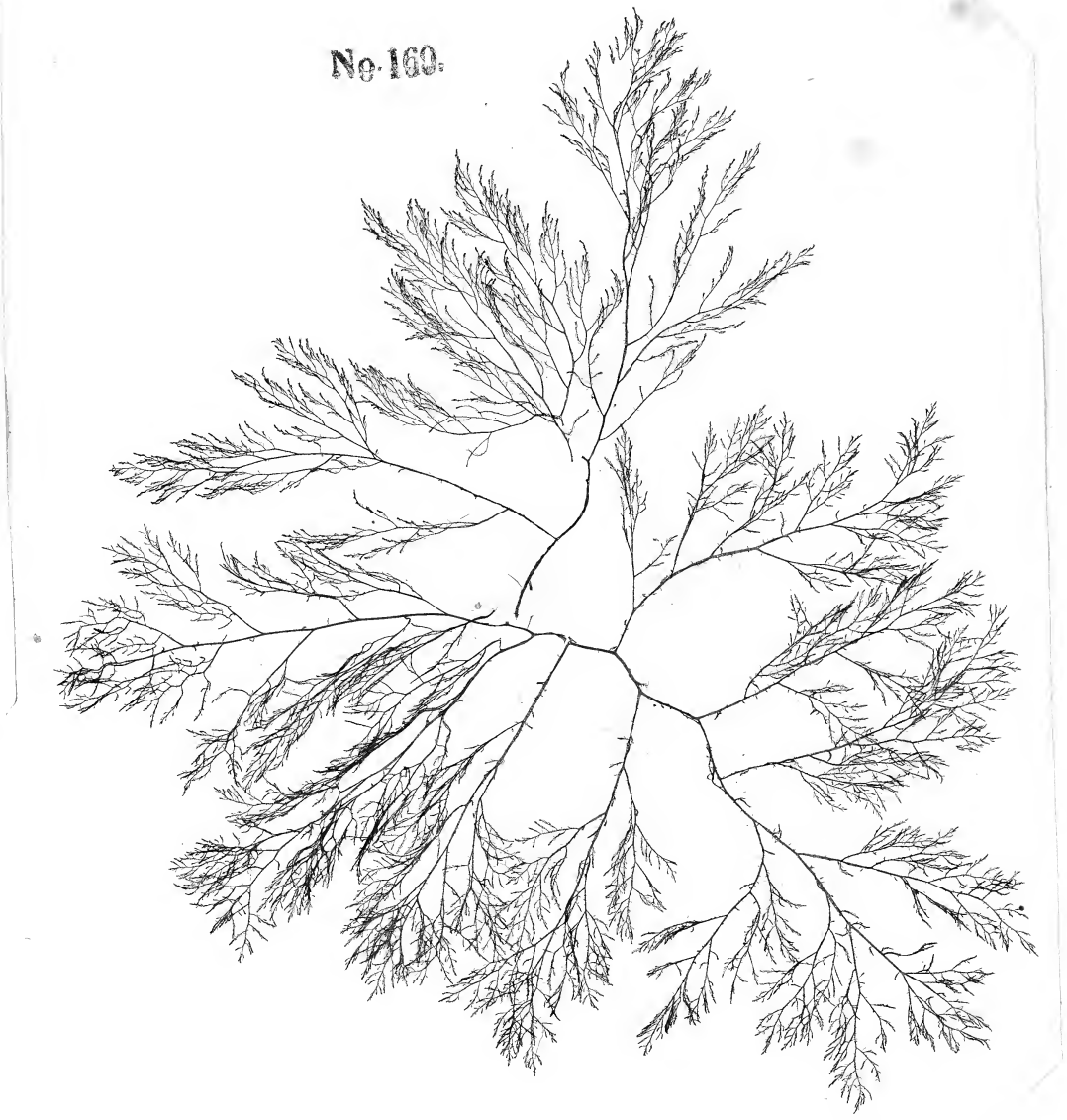

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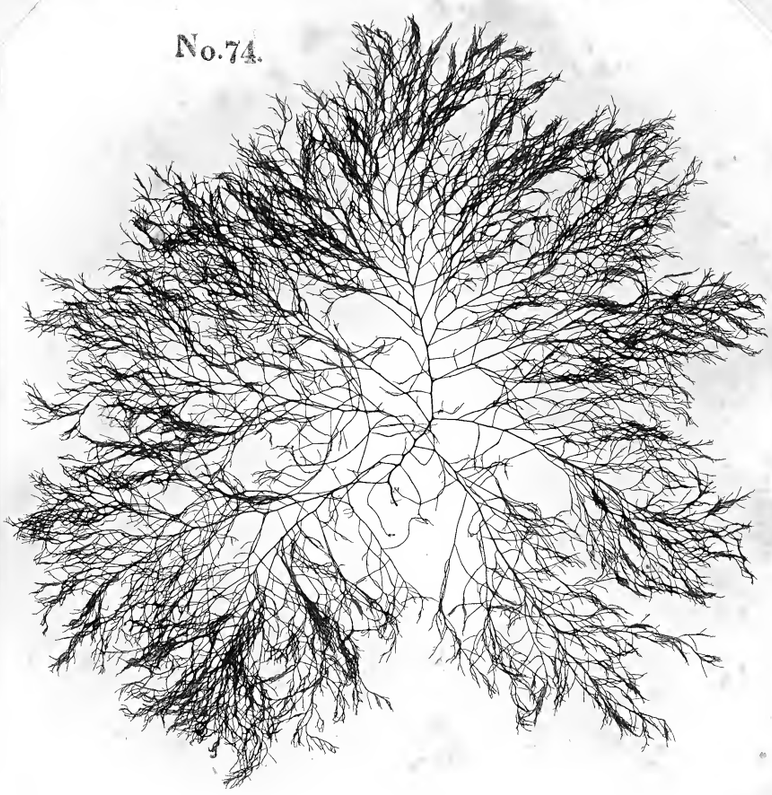
No.74.



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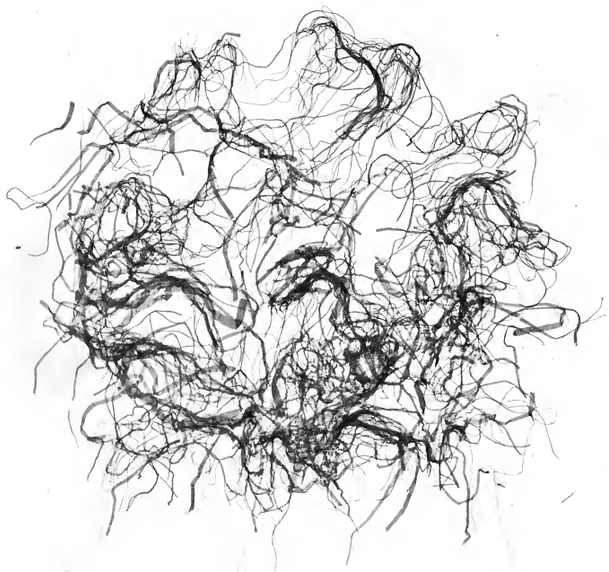
No.220.

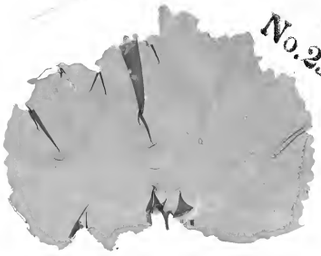


No. 85

No 88.

No. 292

No. 231.



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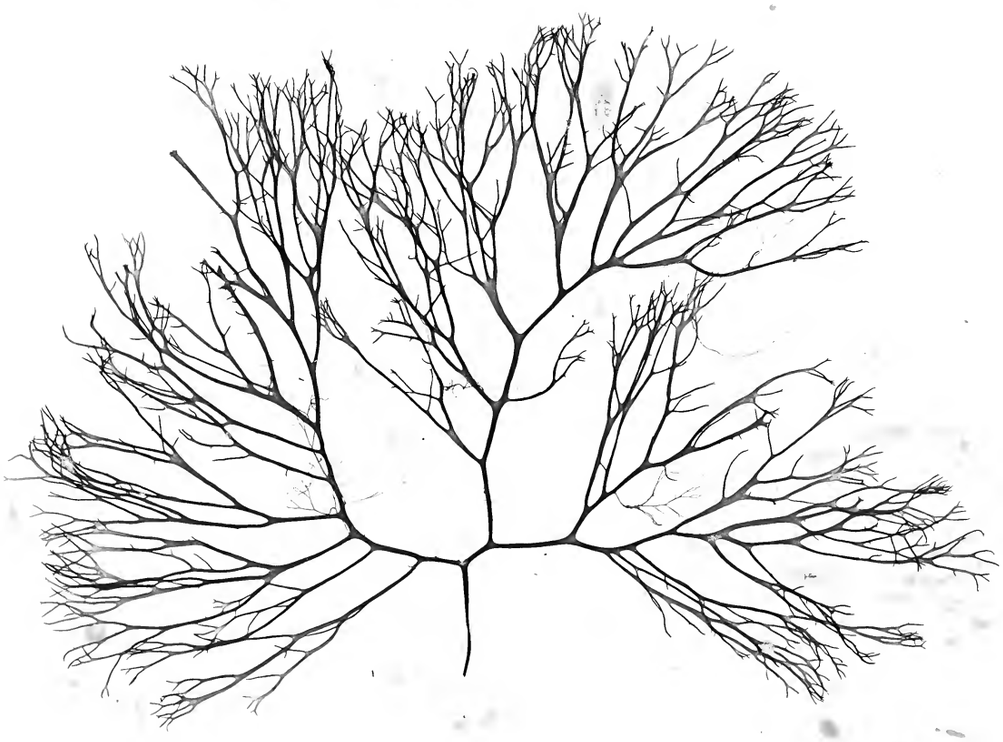

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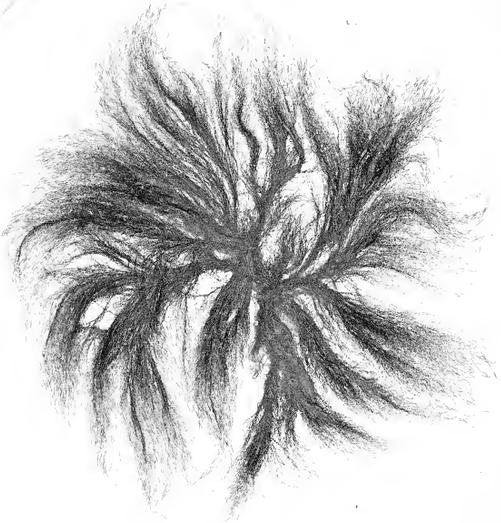

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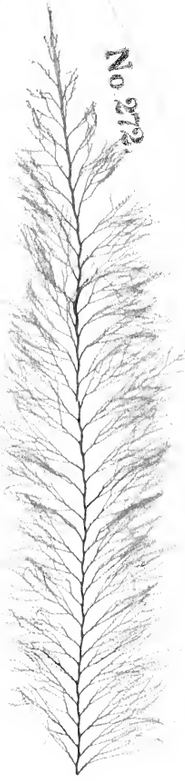

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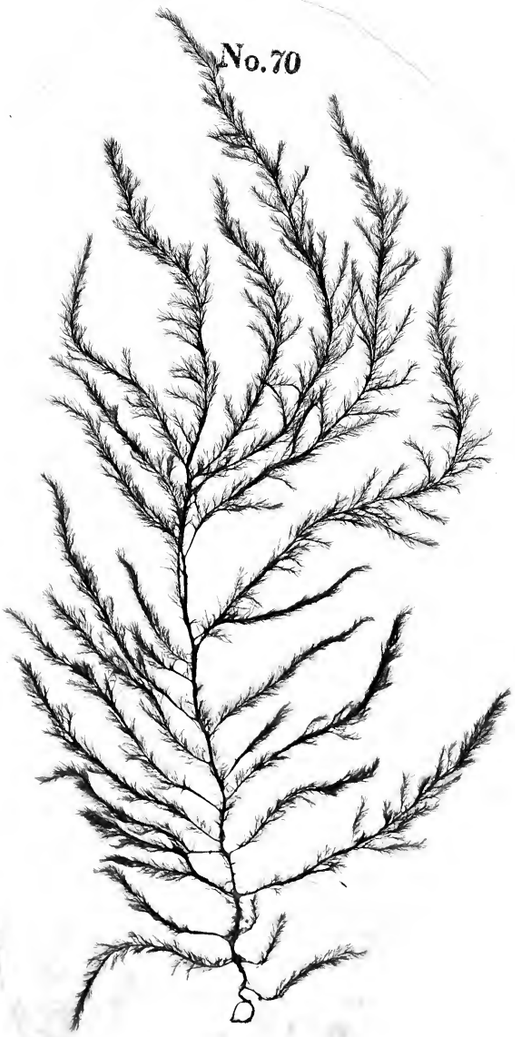

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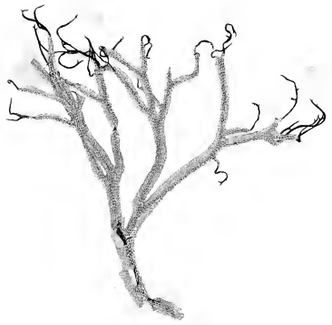
No.20

No.293.



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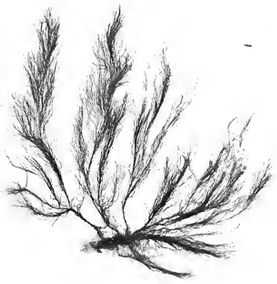
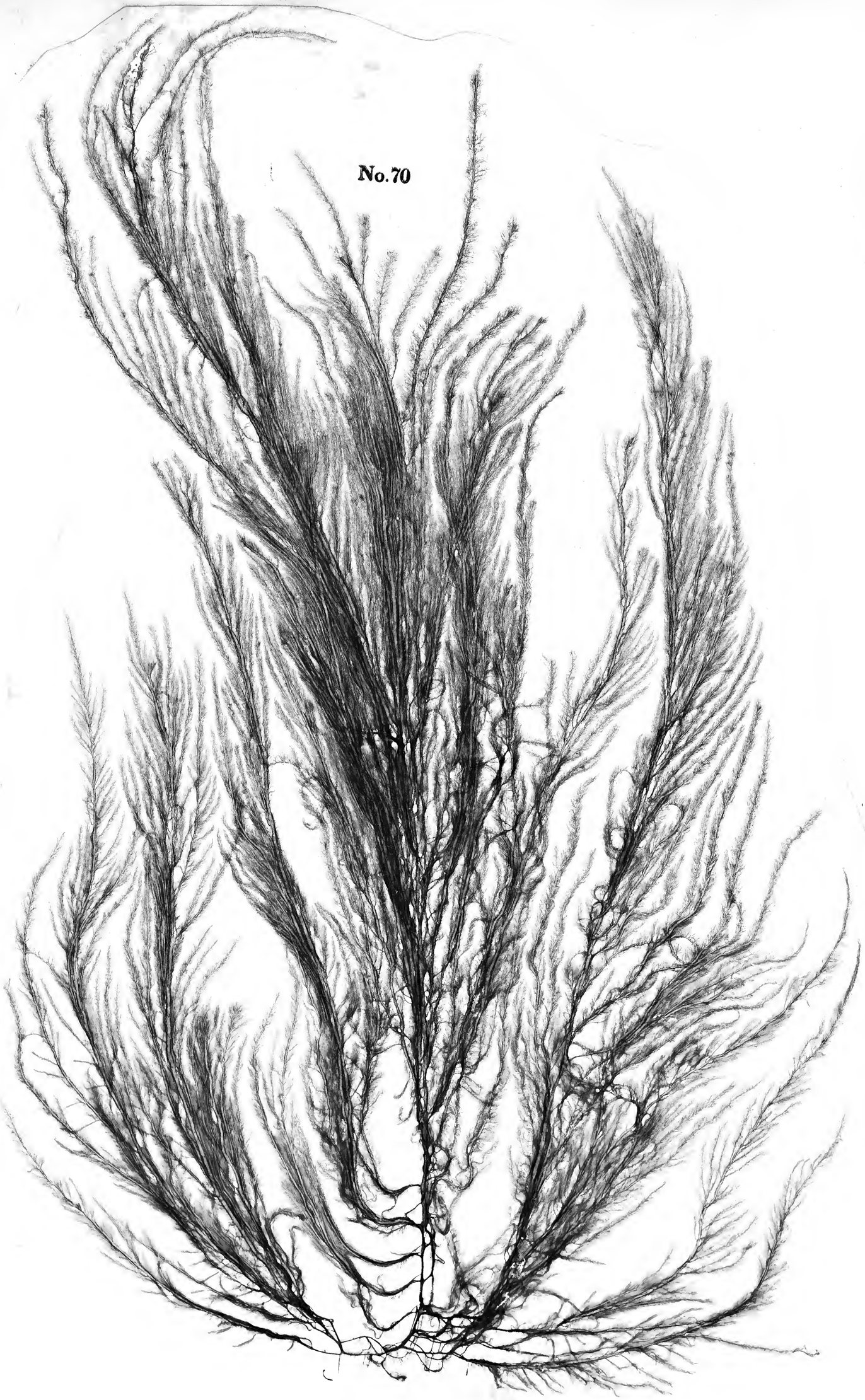
No.43.

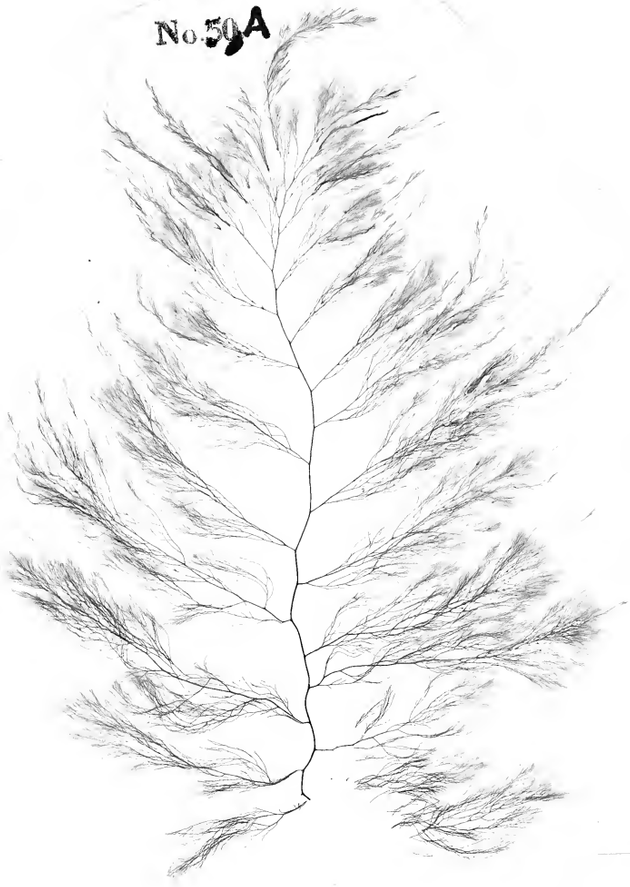


No.146.

No. 70



No. 50 A



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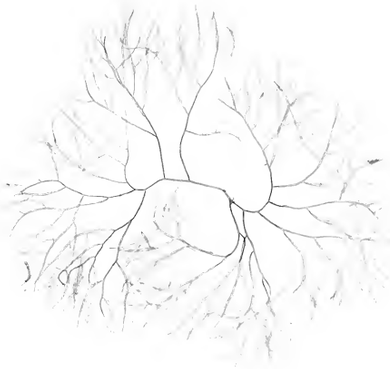
No. 223.

No 90.

No. 78.



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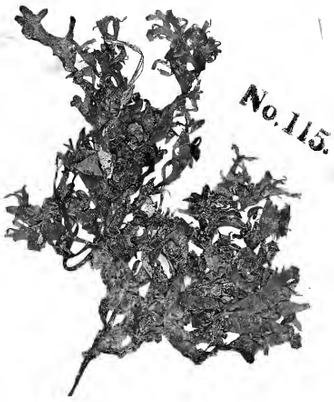

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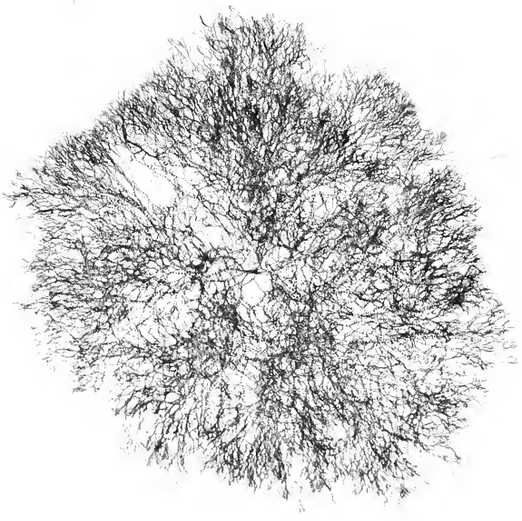

No. 266

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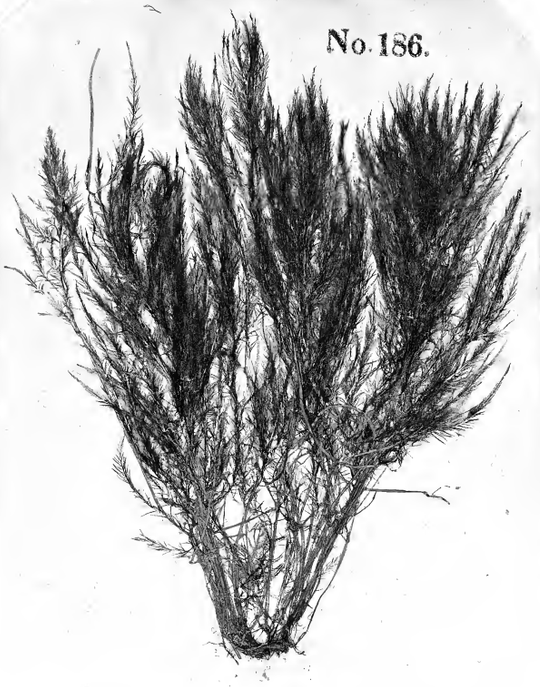

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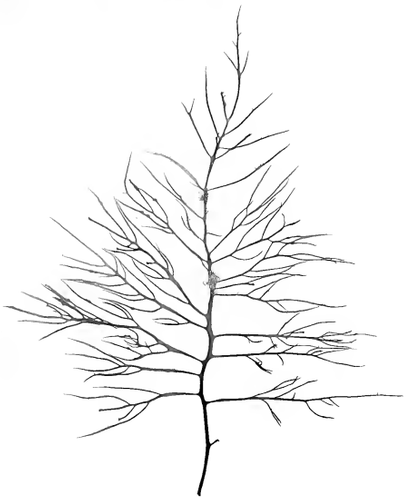

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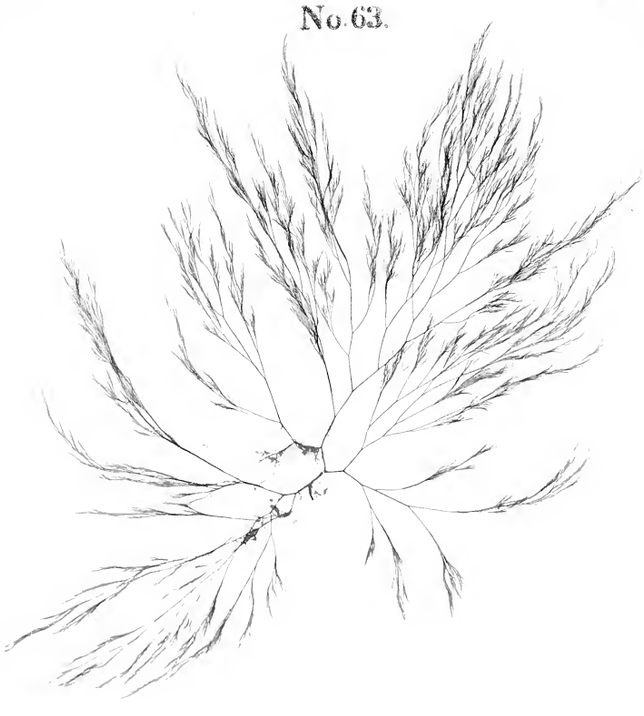

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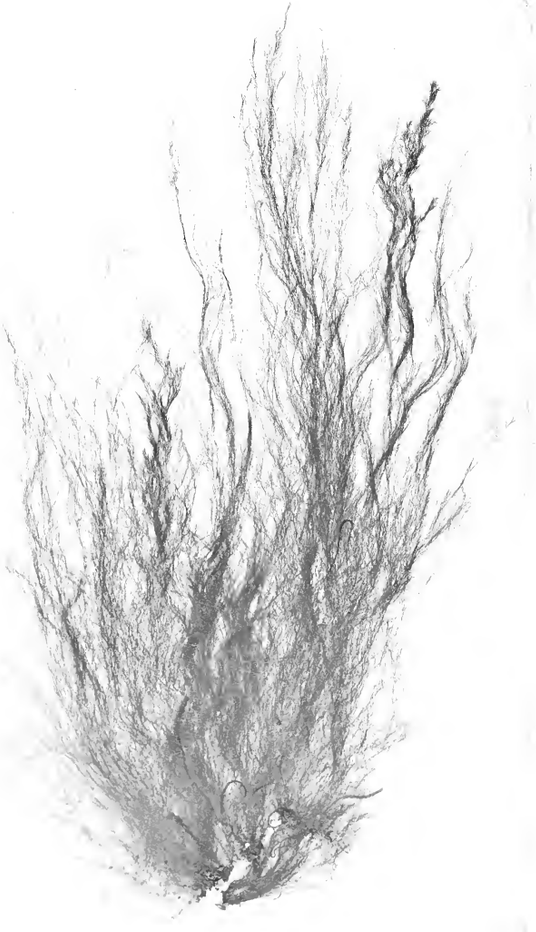

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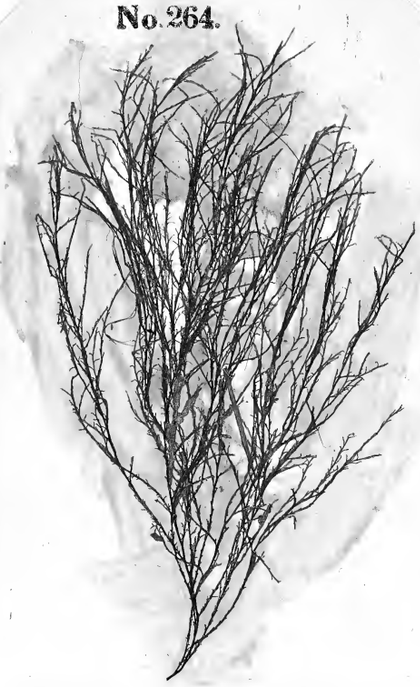
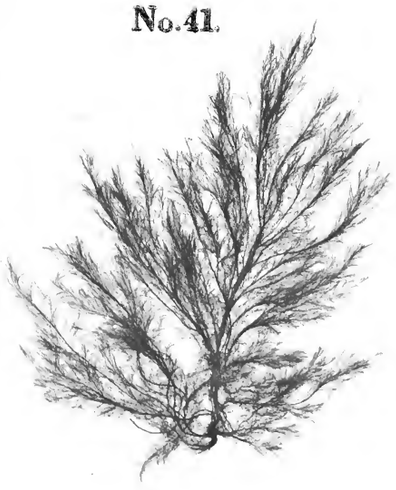


No. 8

No. 245. Var A.

No. 41.



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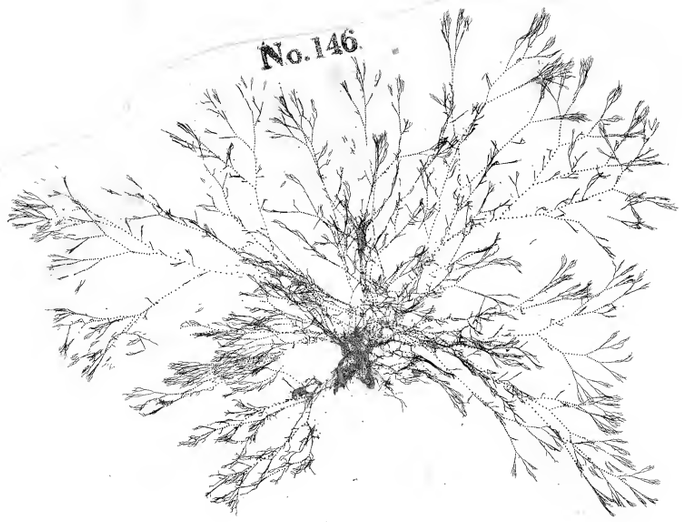

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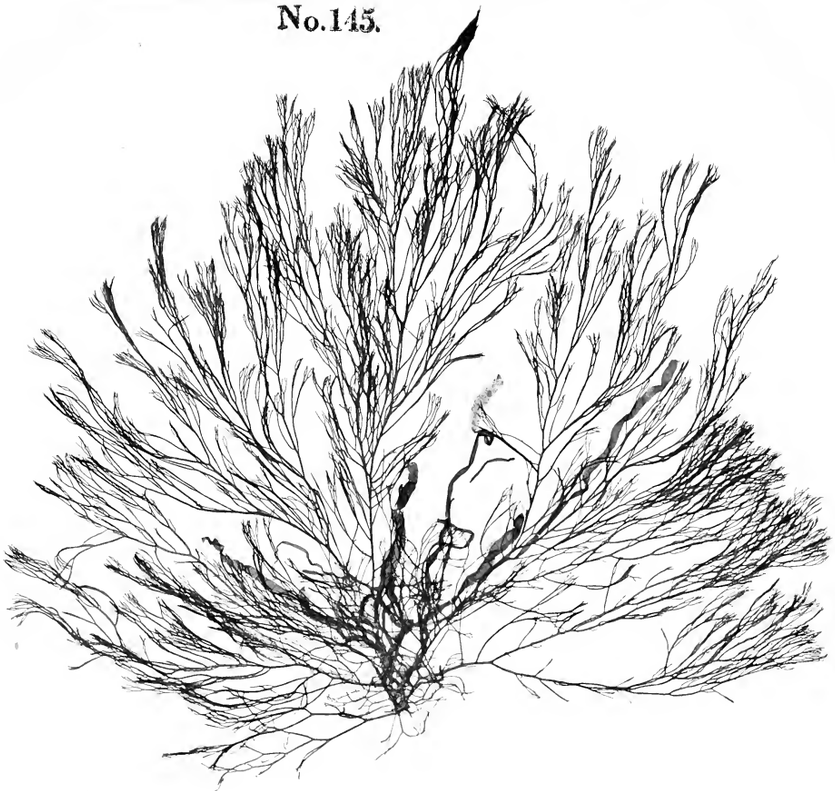

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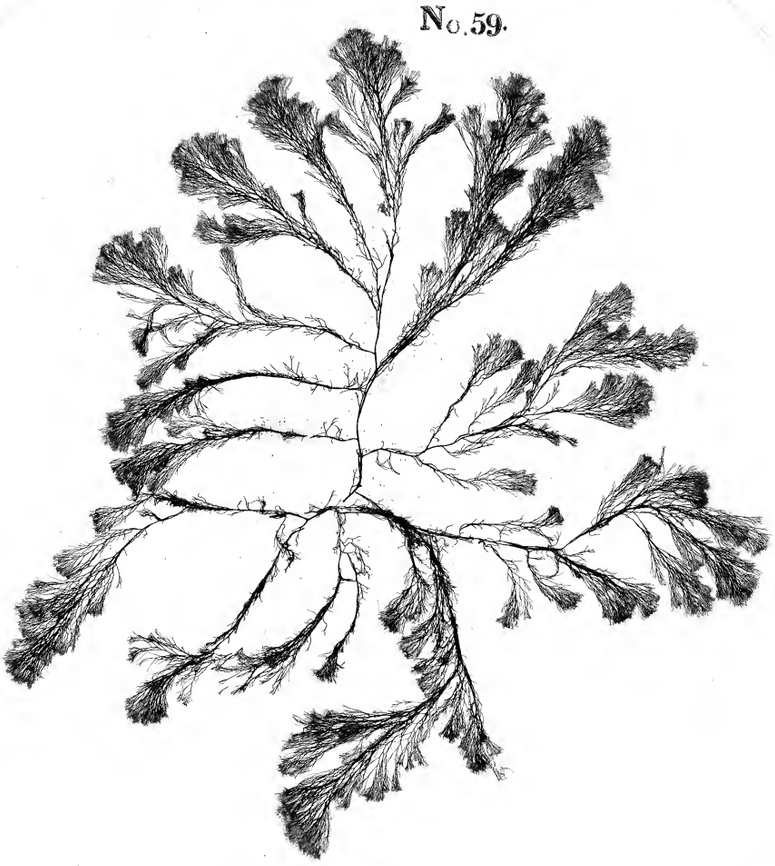

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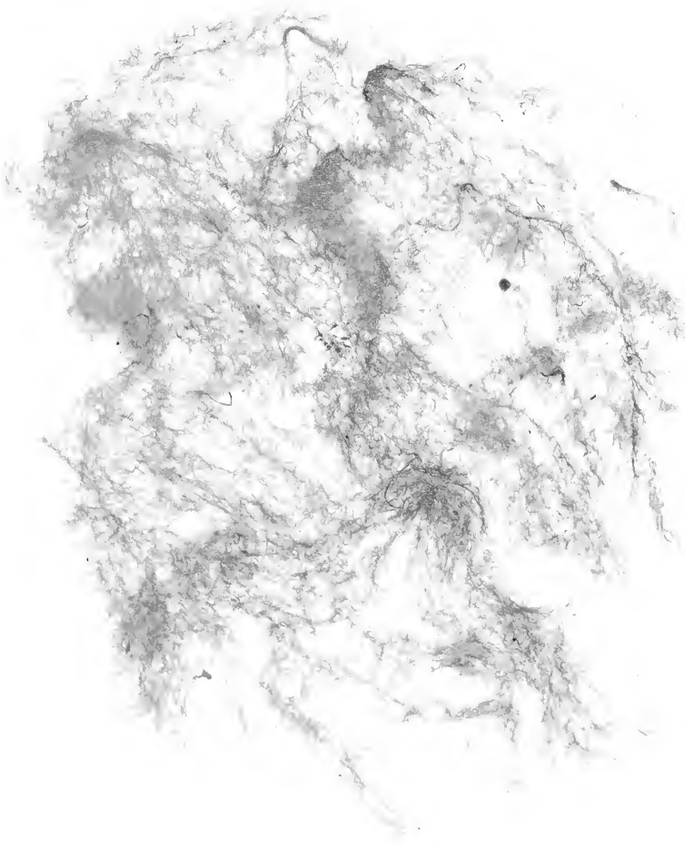

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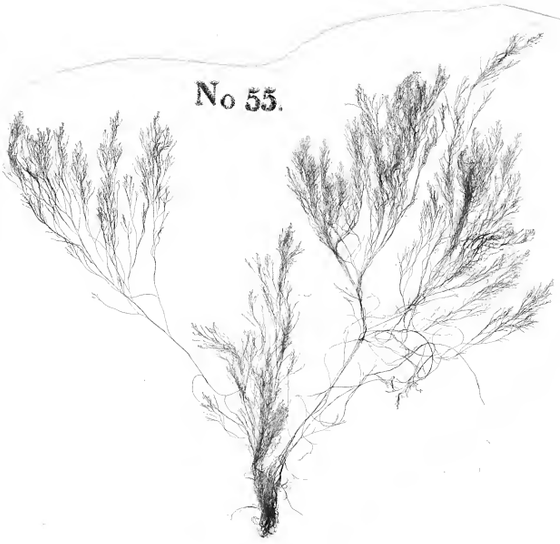

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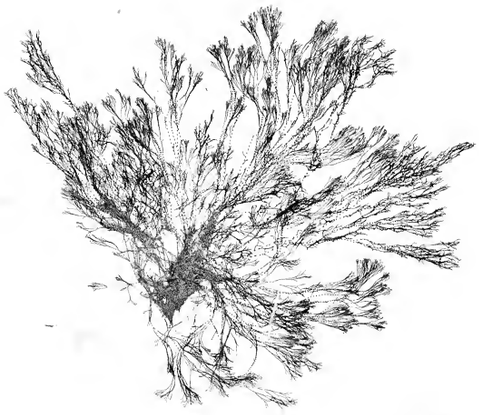

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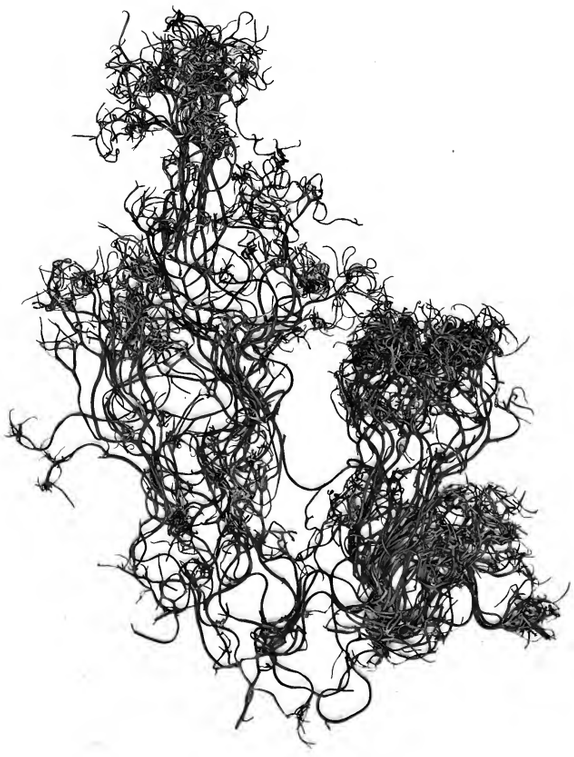

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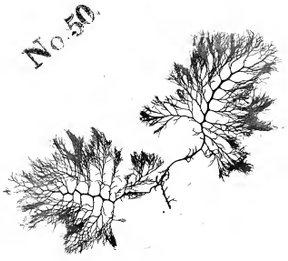
No. 86.



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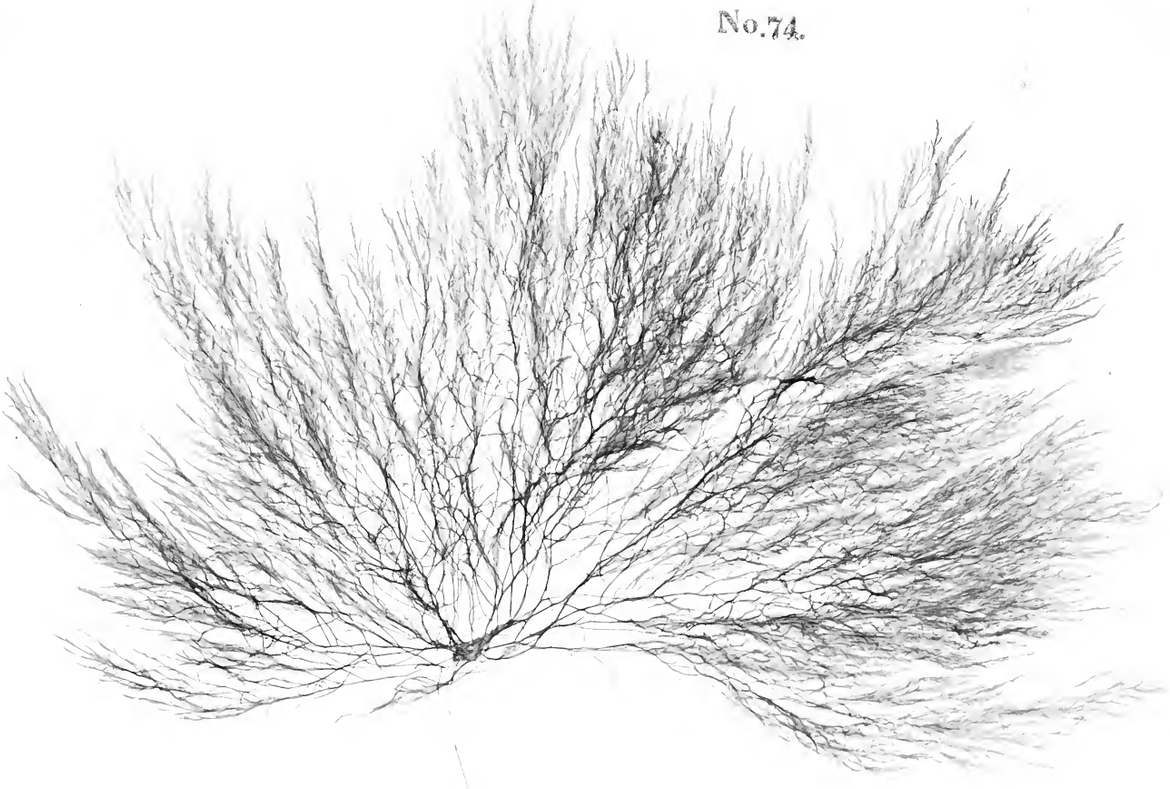

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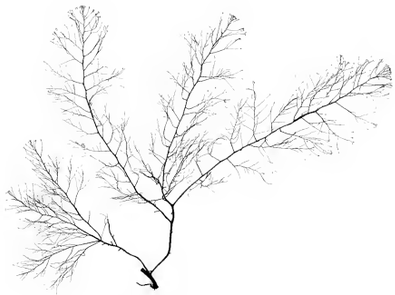
No 177.



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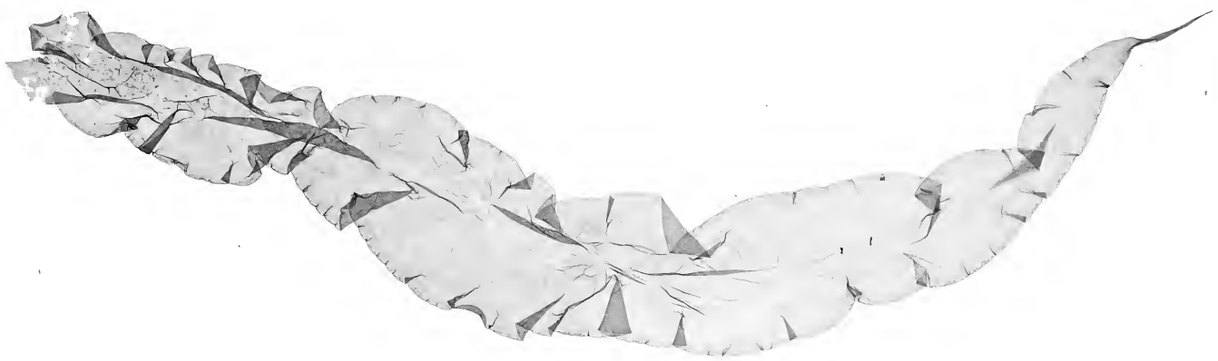

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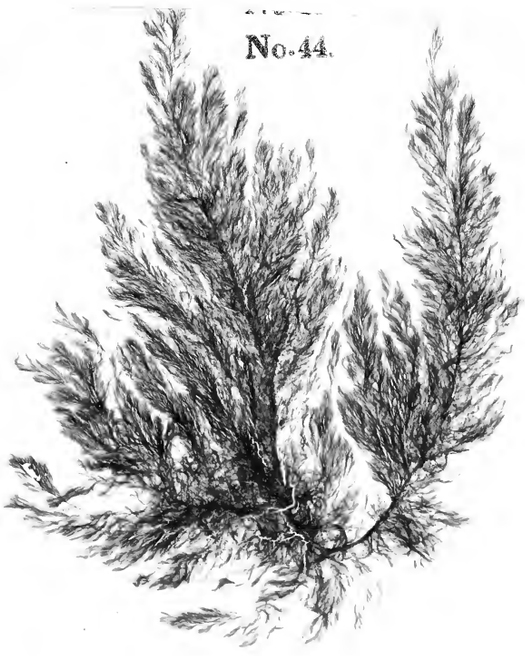
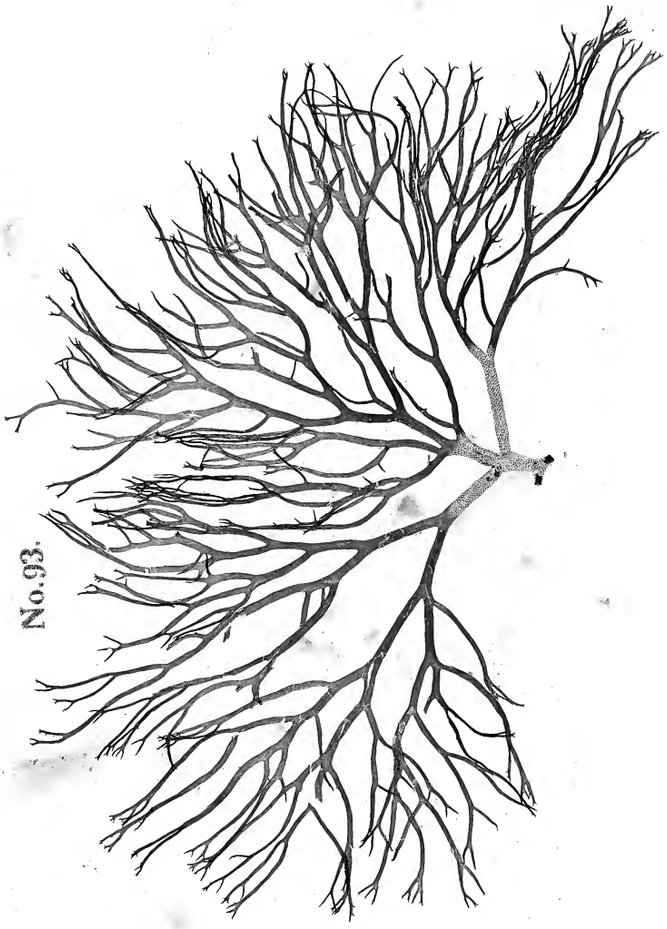


No.10

No.33.A.



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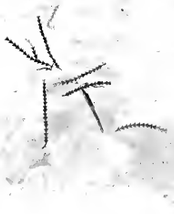

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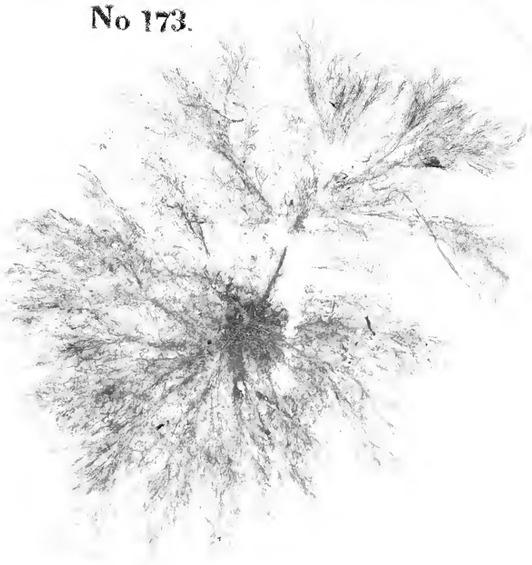

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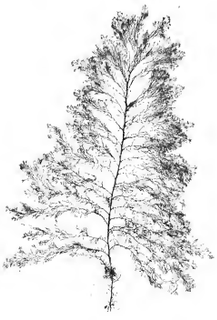

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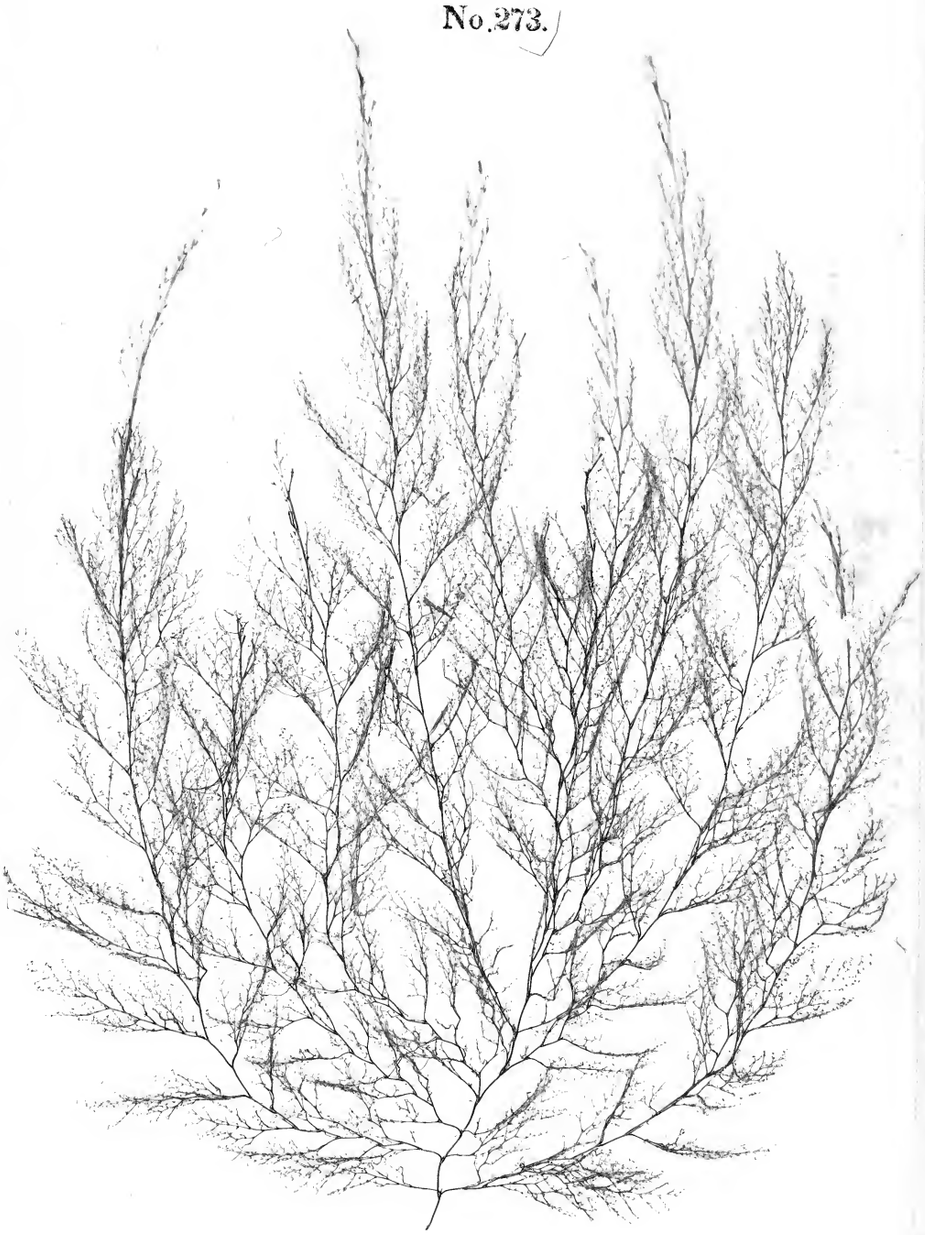

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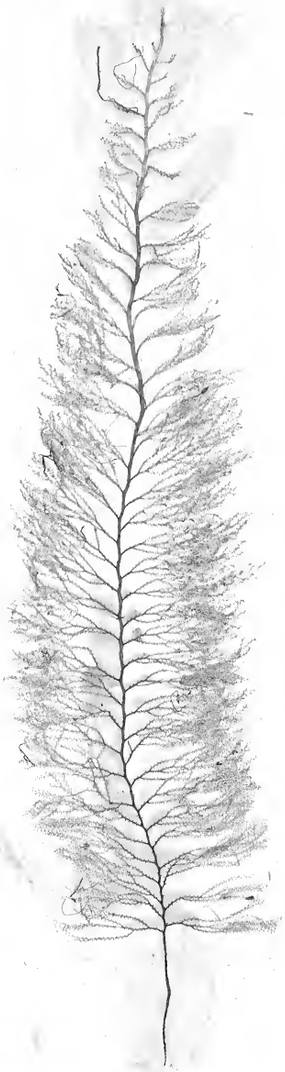

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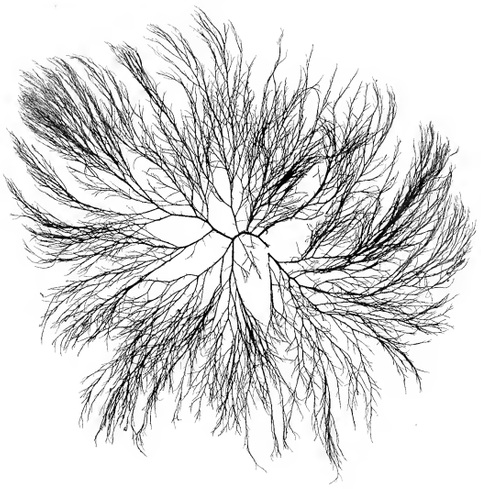

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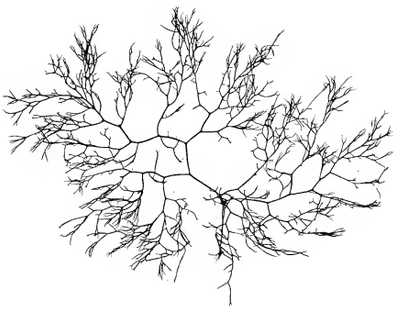

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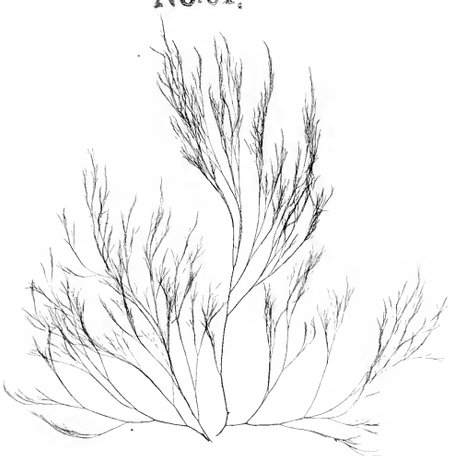

No. 196.

NOTICES BY THE PRESS.

[*From the New York Journal of Commerce, Dec.* 27, 1850.]

DURANT'S ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK. Geo. P. Putnam, 155 Broadway.

No collection of the submersed plants that vegetate in our waters, has ever been made at all approaching to the perfection of one just exhibited to us by Mr. Charles F. Durant, of Jersey City. It is contained in a large quarto volume, which comprises a thorough treatise on Algology, illustrated with specimens of more than two hundred species of algæ and corallines, collected and prepared by Mr. Durant himself. The illustrations are not pictorial, but natural specimens, exhibited in relief on the blank page. This is the first work on Algology ever published in this country, and, it is believed, the only one in the world wherein the science is illustrated by natural specimens. As yet only one copy of this is completed, and that is intended as a present to the New York Typographical Society. A few volumes will, however, be deposited at the bookstore of Mr. Putnam, for the examination of the curious, and for sale. The whole edition will consist of fifty copies only, and the great labor of collecting and expense of preparation, render it improbable that a second will be printed. We learn from the introduction to his work, that Mr. Durant has waded at least a thousand miles in the waters of New York Bay to procure these specimens, and has expended upwards of two thousand hours in their preparation. They are remarkably beautiful, and the extreme delicacy of some of them requires a magnifying glass for the development of their formation.

[*From the New York Evening Post, Dec.* 28, 1850.]

SEA-FLAGS, &c., OF NEW YORK BAY.—It has often been the practice of those who hunt the sea coast in summer to make collection of sea-mosses and sea-flags, which being pasted on the pages of an herbarium, make a very striking figure, both as respects beauty of form and color. A New Yorker, C. F. DURANT, has lately occupied himself in making a regular collection of all the plants of this class found in New York Bay—reducing them to a scientific classification, and accompanying them with letter press descriptions.

Fifty copies of the work have been struck off with the title of—"ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK: Illustrated with Natural Types." The work is on sale at Putnam's. The specimens given, number about two hundred, and some of them are new to naturalists. For the last two years Mr. Durant, during his leisure hours, has led a sort of amphibious life, paddling and wading, like a pelican, among the shallows, in search of the beautiful plants described in this book, which root themselves on the rocks, or on sea-weeds of the larger kind.

Mr. Durant, in his preface, questions the vegetable origin of these supposed plants, and seems inclined to rank them with the zoophytes, or that class of objects in natural history in which communities of insects, living in connected habitations, assume a near resemblance to the growths of the vegetable world. This, however, is a point for naturalists to settle.

[*From the New York Tribune, Dec.* 28, 1850.]

CURIOSITIES OF NEW YORK BAY AND HARBOR.—We have examined a curious and beautiful work by Mr. C. F. DURANT, a few copies of which are issued by G. P. Putnam, consisting of a rich collection of Marine Plants, Algæ and Corallines, made by Mr. Durant, on personal explorations of the waters in this vicinity. The specimens are accompanied with letter press descriptions, giving a complete account of their localities and habits, and furnishing all requisite information for the use of students. It would form an invaluable addition to the cabinets of the curious, or an exquisite ornament for the drawing-room.

[*From the New York Herald, Dec.* 29, 1850.]

ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK: Illustrated with Natural Types—by C. F. DURANT: New York, George P. Putnam.

Mr. Durant has entered upon a new field of science, and has brought his labors to such excellent results, that we are gratified to call attention to his admirable work. The title of it indicates that it is of an unique character, as the illustrations are dried specimens of sea plants, beautifully preserved, in explanation of the letter press of the book. In this country we have only two or three persons who have contributed anything valuable to this department of science, in which the microscope is of such essential service in determining the characteristics of a very minute, but most interesting, part of creation.

We are happy to find that Mr. Durant has done so essential a service to science. Prof. Bailey, of West Point, has done much for the credit of the country in examining and adding to the nomenclature of Ehrenberg, with respect to the vast field of minute zoology; and we think that Mr. Durant is in a fair way of giving us, eventually, something more satisfactory than science yet enjoys, with regard to that point of creation that lies between animal and vegetable life. We have little doubt that the organization of many of the plants in this collection is only perfected by the presence of animal life; and the instances we have seen of budding animalculæ convince us that further researches will lead to some valuable additions to human knowledge. Such a collection as this of Mr. Durant's is well calculated to lead investigation to some settled point, beyond the region of controversy, and eventually to give a higher sense of the omnipotence and omnipresence of the Creator, than yet affect the sensations of mankind. We believe that the stellar worlds will never afford humanity grounds so satisfactory for investigation, as the minute and almost unseen regions of animal and vegetable existence.

The mind is filled with wonder at the newness of the phenomena detected by means of the microscope. The ciliary organs of what are now called sea plants, and of many species of animalcules, in themselves furnish a theme for speculation, and a mystery yet to be solved. If vegetable life is only the type and symbol of animal existence, science will probably be able to detect the fact; but our belief is, that it will soon be found that there are plants with animal organizations, and that these are existing among the algæ.

Our purpose, however, is to thank Mr. Durant for his labors. He has set an example to lovers of nature, in so practical a way that we shall expect to find ladies and gentlemen of leisure following in his steps, and making collections on our sea coast. The trade price of his work is such that he cannot be repaid for his labor; but he will have the credit of having made the first book on the subject, in which nature herself has furnished the illustrations.

We are also happy to add, that the book which we have noticed, is the only copy which has been completed, and that it has been presented by the author to the New York Typographical Society, at whose rooms the lovers of science may be able to examine it. We do not know when we have seen a more admirable specimen of ingenuity and scientific industry.

[*From the New York Herald, Dec.* 31, 1850.]

ALGÆ AND CORALLINES OF NEW YORK.

To the Editor of the New York Herald:

In your notice in yesterday's paper, of C. F. Durant's "Algæ and Corallines of the Bay and Harbor of New York," you say that he "will have the credit of having made the first book on this subject, in which nature herself has furnished the illustrations." Knowing your desire to be corrected when in error, in regard to any subject in which the public are interested, I have taken the liberty to set you right on this subject. Mr. Henry M. Whitney, now editor of the *Polynesian*, (Sandwich Islands newspaper) is the one, in my opinion, who produced the first work on this subject, about three years since. His edition (only 75 copies) met with a ready sale.

My design in sending this communication, has not been to lessen the merits of Mr. Durant's book, for the production of which, he is worthy the highest praise—but simply to do justice to one who is far away, and who has many friends in our midst.

AN OLD SUBSCRIBER.

[*From the New York Herald, Jan.* 1, 1851.]

To the Editor of the New York Herald:

Your correspondent, in Tuesday's paper, is mistaken in regard to the character and purport of the two works referred to. Mr. Whitney's book was merely a collection of sea plants, comprising about a dozen species—not exceeding that number—entirely without classification or name to a single plant. The specimens were very beautiful, and gave much pleasure to the undersigned, and to others who were so fortunate as to procure a copy. Similar books, containing collections of sea plants, and some of them having the plants labelled or named—not classed—have been compiled by several persons, both in this country and in Europe. Mr. Durant's work is entirely different: it is a thorough treatise on the science of Algology, in which the natural specimens are illustrative of the text. An examination of the work will show your correspondent that the work is explained by the title "Algæ and Corallines of the Bay and Harbor of New York, illustrated with natural types" Your able notice of Mr. Durant's book, in the *Herald* of the 29th ultimo. evinces a familiarity with that department of natural history, so scientifically treated by that author; and you were correct in saying that Mr. Durant is the first author in any country to publish a treatise and classification on the subject, in which nature herself has furnished the illustrations.

B.

NOTICES BY THE PRESS.

[*From Hunt's Merchants' Magazine, January*, 1851.]

ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK: Illustrated with Natural Types. By C. F. DURANT. New York: George P. Putnam.

A super-royal quarto on one of the most interesting branches of natural history. The sea-weeds and corallines of our Bay have been too long neglected; a subject so replete with interest and instruction, should long ago have engaged the attention of naturalists. Mr. Durant is the first in this country to issue a book on the science of Algology, and it is believed to be the first book in any country wherein Algology is illustrated with natural types. Some nineteen families, comprising near two hundred species, are generically and critically described in the text, and then further illustrated by natural specimens of the most beautiful productions of nature. The work has required much industry, patience, and learning. Few men possess the courage to grapple with such a Herculean task, and we know of no other man so competent to do full and complete justice to the subject.

[*From the Independent, January 2d*, 1851.]

ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK; Illustrated with Natural Types. By C. F. DURANT.

A curious and valuable work under the above title, has just been issued from the press of Mr. Putnam. The copy shown us has been presented by the author to the New York Typographical Society. It contains two hundred species of sea-plants, preserved and arranged in the most delicate and beautiful manner. The work will be a valuable contribution to science, and an honor to the author and to the country. Price, one hundred dollars per copy. It should be in every public library.

[*From the New York Evening Express, Jan.* 4, 1851.]

ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK. By C. F. DURANT.

By dint of hard labor and zealous devotedness to the task, Mr. Durant has collected together specimens of all the marine plants which grow in and around our harbor, and has pressed them in an elegant folio volume, splendidly bound and lettered, with indices, and a clear and instructive preface. The work is highly creditable to his scientific character, to his perseverance, and his taste. It may be seen at the bookstore of Mr. Putnam.

[*From Noah's Times and Messenger, Jan.* 5, 1851.]

A GREAT WORK.—Amidst the numerous productions of the American press, we are sometimes startled by a great and unexpected work, which developes new evidences of American skill, science, and enterprise. Audubon's great work on the ornithology of our country, surprised all Europe. Wilson's work on the same subject—a most graceful, agreeable, and authentic research—ranks among the first of our standard books. We have now another splendid issue, in quarto form, published by Putnam, entitled "*Algæ and Corallines of the Bay and Harbor of New York, illustrated with Natural Types: by C. F. Durant.*" We have seen frequent specimens of corallines from rocks, bays, and harbors, beautifully *drawn;* but never before have we met with the *orginals*, in all their natural beauty and delicacy, in a work scientifically illustated. We have long known Mr. Durant as an enterprising and intelligent citizen, of indomitable perseverance. If he desires to ascertain the currents of air above, and the temperature of the atmosphere, he ascends in a balloon to discover what he wishes to know practically. If he is smitten with the vegetable and delicate productions of the sea, the rocks, the inlets, and the estuaries of our bay, he wades a thousand miles on our shores, makes his collections, illustrates and publishes his work, to the great pleasure and delight of the scientific. How he is to be repaid for the cost of the enterprise, we know not. One hundred dollars a volume must be the price, and two hundred copies must be sold, before the contingent expenses are paid. But what is that sum to our numerous wealthy patrons of art and genius?

[*From the New York Commercial Advertiser, Jan.* 10, 1851.]

A BEAUTIFUL VOLUME.—We have had an opportunity of examining during the past week a very beautiful volume which has been presented to the library of the New York Typographical Society by its author and compiler. Its title is—

ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK: Illustrated with Natural Types. By C. F. DURANT. New York: G. P. Putnam.

As the title indicates, the book is devoted to a science which, for a year or two, has attracted considerable attention in this vicinity—Algology, or the structure, habits and classification of algæ, or sea-weeds. We have heretofore had occasion to notice some fine preparations illustrative of the study; but we believe that this is the first attempt to collect and properly classify all the different species that are to be found in the waters of our harbor. Of the scientific department of Mr. Durant's labors, we must leave those who are better versed in this department of natural history to speak. We can bear testimony to the industry and perseverance which he has displayed in this compilation. In his preface he says that the evenings of one season, with the hours that could be conveniently set apart from business, comprised all the time devoted to the work. Yet this time, in the aggregate, amounted to nearly two thousand hours, or two hundred working days of ten hours each, and the perambulations in the tidal waters and upon the sea shore, in search of the specimens, exceeded one thousand miles.

The book is a large quarto, finely printed, containing about fifty pages of letter-press, devoted to an introductory treatise of the science, and a regular classification and description of the specimens, designating them by numbers, by families and genera. The illustrations are the plants themselves, skilfully preserved in all their natural colors. We say plants, but with due deference, for we see that the author himself, though adopting that designation, is at least half inclined to consider them as belonging rather to the animal than vegetable kingdom. The number of specimens of the algæ is 245. To these are added corallines of the harbor enough to make the whole number nearly three hundred.

We understand that Mr. Durant has collected specimens sufficient to illustrate fifty copies of the work, though that now under consideration is the only one entirely finished. When completed, a portion of them will be for sale at the publisher's. In the meantime the book may be examined at the Typographical Society, No. 300 Broadway, which is open every evening, Sundays excepted.

[*From the New York Evening Mirror, Feb.* 6, 1851.]

DURANT'S ALGÆ AND CORALLINES OF THE BAY AND HARBOR OF NEW YORK.

The following Report and Resolution were submitted at a regular meeting of the New York Typographical Society, on the 1st inst., and ordered to be published.

TO THE NEW YORK TYPOGRAPHICAL SOCIETY:

Your Committee, having carefully discharged the duty assigned to them, respectfully report,—

That they have very closely examined the magnificent work placed in their hands, entitled "Algology," presented to this Society, by CHARLES F. DURANT, Esq., the author, and they are highly pleased to bear witness to the deserved praise which has been bestowed upon the book by the public press. As a specimen of the mechanical arts, the execution of the work is almost perfect; while as a monument of persevering devotion to a neglected branch of science, it is such as will do the author a lasting honor.

The obtaining and classifying of the almost numberless subaqueous plants of our noble bay, was a subject worthy of the genius of the accomplished and distinguished citizen who began it; and we may rejoice that the public have cause of congratulation that the severe studies of Art have never alienated him from that spontaneous worship of Nature which is ever quick in the soul of true genius.

Without attempting a description of a work so unique and withal so difficult of pen-portrayal, we would respectfully return the book to the Library, and at the same time recommend for adoption the following resolution.

Respectfully submitted.

F. J. OTTARSON,
DANIEL NORTHUP,
CHARLES MCDEVITT, } *Committee.*

Resolved, That the thanks of this Society be extended to C. F. Durant, Esq., for his very valuable work—Algology—so generously presented to our Library.

Published by order of the Society.

R. H. JOHNSTON, Sec'y. A. CUNNINGHAM, Pres't.

Also published in the *Commercial Advertiser*, February 7th; the *Evening Post*, Feb. 7th, and the *Courier and Enquirer*, Feb. 8th.

Algology.