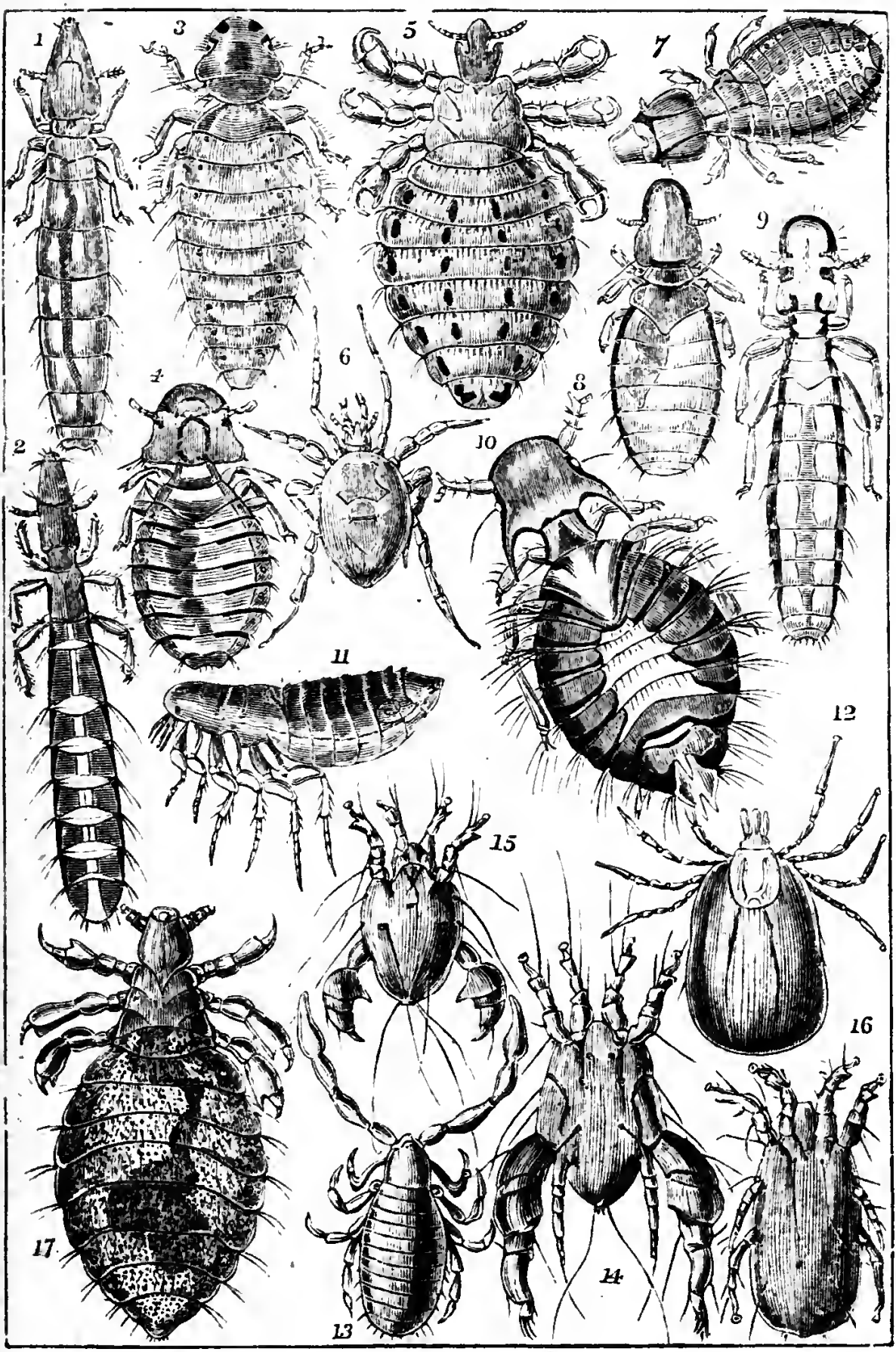
ONE THOUSAND OBJECTS FOR THE MICROSCOPE

BY

M. C. COOKE

WITH ILLUSTRATIONS

S. H. Rook.



PARASITES.

ONE THOUSAND OBJECTS

FOR THE

MICROSCOPE.

By M. C. COOKE,

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WITH FIVE HUNDRED FIGURES.

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FOR EVERYBODY.

By M. C. COOKE.

Containing all the British Ferns, with the Foreign Species, suitable for a Fernery.

With Page Illustrations, in Colours.

TO THE

PRESIDENT AND MEMBERS

OF

The Quekett Microscopical Club

I WOULD dedicate this little book, if dedications were not considered "out of fashion" or vulgar. It is of very little consequence to me, or the public, what this prefatory page may be called; and so long as it associates the Quekett Club therewith, I am content. I have endeavoured to produce "a guide to the cabinet," which will be of service to the microscopist of smallest pretensions; and I claim to associate it with a Club eminently "popular" in its constitution—to the establishment of which I had the honour of being chiefly instrumental—in the hope that it may aid in rendering the use of the Microscope still more popular. If, as a father, I offer a gift to my children, it is accompanied by the hope that it may be bread, and not a stone.

The number of objects enumerated is so great, that only a brief space could be assigned to each, except by increasing the size and price of the volume. It has been my desire not to come into competition with any other book for the Microscope, and I hope that I have succeeded. In selecting objects for enumeration, I have endeavoured to confine myself to those that are common and easily examined, excluding all sections, injections, or preparations requiring an experienced hand.

To all who have aided me with drawings, suggestions, or assistance in any form my thanks are due; and, if these pages should induce but a few readers to appeal to works of greater pretensions, our labour will not have been altogether in vain.

M. C. COOKE.

One Thousand Objects

FOR

THE MICROSCOPE.

THE classification of objects adopted in this work is the primary division into two nearly equal sections, of which the first contains objects derived from the Vegetable kingdom, or Plant world, and the second of objects obtained from the Animal kingdom. Naturally enough, the first section subdivides itself into two groups, the one including derivatives from Phanerogamic or Flowering plants, and the other Cryptogamic or Flowerless plants, such as ferns, mosses, fungi, and water-weeds or *algæ*. The first group, or those objects which are derived from flowering plants, such as trees, shrubs, garden and wild flowers or weeds, contain the elementary tissues and the organs of plants. A general and popular arrangement, under a few groups, has been adopted in preference to a rigid scientific sequence, which would have assumed the reader to be in possession of considerable technical knowledge, an assumption by no means consistent with the design of the present work.

In examining the objects enumerated, we may be permitted to recommend the novice always to commence the examination with the lowest power of his microscope, and then, where necessary, to proceed with the higher powers. It is well never to commence the examination of an object

with a power higher than one inch, and after that to employ a half-inch, a two-thirds, or a quarter, if desirable; but the greatest satisfaction will always be derived from a good practical use of low powers.

The objects selected for this work are common, easily obtained, readily mounted, and are all within the compass of an instrument not costing more than five guineas.

SECTION I. VEGETABLE.

1. Cuticle of Leek (*Allium porrum*).—The cuticles of the leaves of plants furnish a very interesting series of objects, and may be easily removed and mounted. Two modes are recommended: one by maceration, which occupies three weeks or more; the other by boiling in dilute nitric acid. Cuticles may be mounted dry, in balsam, or in glycerine jelly. In the Leek the cuticular cells are quadrangular and much elongated, with numerous stomata of about the same breadth as the cells. (Pl. I., fig. 34.)

2. Cuticle of Yucca (*Yucca gloriosa*).—This is a favourite cuticle. The plant is commonly cultivated, and the cuticle easily removed. The cells are much less regular than in the leek, not so long, obscurely hexagonal, and not arranged in such symmetrical lines. The stomata have also a different form.

3. Cuticle of Straw (*Hordeum vulgare*).—The flinty cuticle of barley-straw may be obtained by incineration. The rectangular elongated cells are similar in form and order to those of the leek, but the sides are bluntly toothed throughout their length. The stomata are smaller and more numerous.

4. Cuticle of Duckweed (*Lemna minor*).—It is not difficult to obtain the cuticle of this very small plant. The cells are not arranged so much in lines as the yucca, but

the elongated serrated cells lie in almost all directions. The form and arrangement of cells and the disposition of the stomata in the cuticle of different plants furnish an almost unlimited variety in objects of this class. (Pl. I., fig. 33.)

5. CUTICLE OF MISTELTOE (*Viscum album*).—One of the characteristics of this cuticle is the large number of elongated stomata it contains. The cells are about twice as long as broad, and lie irregularly in all directions. It is a thick, tough cuticle, and requires prolonged maceration in water for its separation, and is a good subject for experiment by boiling in diluted nitric acid. (Pl. I., fig. 47.)

6. CUTICLE OF IRIS (*Iris Germanica*).—Large pieces of the cuticle of the garden Iris may often be stripped off, by exercising a little care, between the thumb and finger, without any previous maceration. The cells are very long, hexagonal, but much flattened at the sides, so that two of the angles are so obtuse that they scarcely appear like angles. (Pl. I., fig. 37.)

7. CUTICLE OF WATER-CROWFOOT (*Ranunculus aquatilis*).—The cells are regular hexagons with equal sides, and offer a marked contrast to the last-named and many others. (Pl. I., fig. 36.)

8. CUTICLE OF HELLEBORE (*Helleborus fœtidus*).—The Stinking Hellebore yields a very characteristic cuticle, the cells being many-angled, and the stomata large. (Pl. I., fig. 35.)

9. CUTICLE OF PLANTAIN (*Plantago major*).—This cuticle, when removed from either the leaves or their footstalks, retains the form of the hairs over which the cuticle also extends. Along the midrib the cells are much elongated, otherwise it is difficult to make out the delicate outline of the cells.

10. CUTICLE OF DEUTZIA (*Deutzia scabra*).—One of the most beautiful of cuticles, on account of the stellate hairs with which it is studded. Though not a native, both this and *Deutzia gracilis* are common greenhouse plants.

11. CUTICLE OF ELDER (*Sambucus nigra*).—Cells large, and elongated hexagons, with broad divisions. The tapering simple hairs sprinkled over the surface give additional

interest to this cuticle, which, however, requires careful manipulation.

12. CUTICLE OF IVY (*Hedera helix*).—Cells of irregular form, with waved or toothed margins. The stomata are also very numerous. Cuticle easily removed from this, as from all hard and leathery leaves.

13. CUTICLE OF FERN (*Scolopendrium vulgare*).—This is easily separated either by maceration or boiling in dilute nitric acid. The cells are irregular hexagons of rather large size.

14. CELLS OF BOG-MOSS (*Sphagnum cymbifolium*).—The cells of Bog-Moss, when fully matured, are well known to microscopists for the spiral character of the internal deposits upon their cell walls, but when very young the cell-form is rhomboidal without markings, and contrast strongly with those of the older leaves. (Pl. I., fig. 42.)

15. CELLS OF CRENULATE SCALE-MOSS (*Gymnomitrium crenulatum*).—The form of the majority of cells is hexagonal, but those at the margins of the leaves are elongated, pointed, and more transparent. The cell structure of all the species of Scale-Mosses are well worthy of examination, and I am assured by a friend that he has mounted them successfully in water-glass (silicate of soda), but hitherto I have seen none of his specimens. (Pl. I., fig. 49.)

16. CELLS OF THREE-TOOTHED SCALE-MOSS (*Plagiochila tridentata*).—The hexagonal cells of this species are larger than usual, and, as the figure indicates, have a very attractive appearance. (Pl. I., fig. 50.)

17. CELLS OF LADDER SCALE-MOSS (*Alicularia scalaris*). —The hexagonal cells contain minute granules, which are arranged from two to four in a line in their interior.

18. CELLS OF CURLY-LEAVED SCALE-MOSS (*Jungermannia curvifolia*).—The cells of this Scale-Moss are rectangular or squarish, with an almost transparent border, containing usually a pair of granules in their interior. (Pl. I., fig. 43.)

19. PETAL OF GERANIUM.—The petals of Geranium, Pelargonium, Heartsease or Pansy, and indeed of innu-

merable other flowers, afford a great variety in cell form and colouring, but their beauty is greatest when examined in the fresh state.

20. Simple Hairs of Plantain (*Plantago major*).—The simple hairs of the common broad-leaved Plantain may be taken as an example of a very usual form of vegetable hair, which is simple, cylindrical, and slightly attenuated upwards.

21. Forked Hair of Shepherd's Purse (*Capsella bursa-pastoris*).—The majority of cruciferous plants have more or less branched hairs. In the present instance they divide about half-way of their length into two parts, which spread from each other in a forked manner. (Pl. I., fig. 22.)

22. Forked Hair of Hawkbit (*Leontodon hispidus*).—Many of these hairs are only forked as in the last example, but some of them are divided into three branches, all springing from the same point, and divergent. (Pl. I., fig. 19.)

23. Peltate Hair of Chrysanthemum.—Peltate hairs are not uncommon, usually with a short stem, bearing, as in this instance, at right angles, a slender straight hair, attached at the centre like the needle in the mariner's compass. Some disc-like scales in other plants are also attached in a similar manner. (Pl. I., fig. 4.)

24. Tufted Hair of Guelder Rose (*Viburnum opulus*).—These large hairs are almost visible to the naked eye, studding the under surface of the leaf like silver stars. Seen from above they have a stellate appearance, but are really tufts of simple hairs, which may be united at the base, but are not so truly stellate as in the following instances. (Pl. I., fig. 3.)

25. Stellate Hair of Virginia Stock (*Malcolmia maritima*).—The stellate hairs of this common garden plant have usually four rays, but the number of rays in stellate hairs constantly vary on the same leaf. (Pl. I., fig. 1.)

26. Silicious Hair of Deutzia (*Deutzia gracilis*).—These hairs are silicious or flinty, and by care the organic

portion may be burnt away, leaving the flinty star-shaped hairs on the slide. Similar hairs are afforded by *Deutzia scaber*, both greenhouse plants. (Pl. I., fig. 2.)

27. Stellate Hair of Hollyhock (*Althea rosea*).—The star-shaped hairs of the Hollyhock differ much in the number of branches or rays. (Pl. I., fig. 16.)

28. Stellate Hair of Ivy (*Hedera helix*).—Somewhat like the last, but with broader rays, and of a more scale-like character. It is probably (from analogy in other species) a stellate scale rather than a hair. (Pl. I., fig. 24.)

29. Cotton (*Gossypium herbaceum*).—It must not be forgotten that Cotton consists of the hairs which surround the seed of the Cotton plant. These are long cylindrical hairs, which when dried become flattened and twisted, so that they have been erroneously described as 'flattened twisted bands.' Cotton and fine cotton fabrics are good objects for the polariscope.

30. Branched Hair of Mullein (*Verbascum thapsus*).—This may be taken as an example of a branched or dendritic hair, of by no means uncommon occurrence. (Pl. I., fig. 28.)

31. Stalked Cruciate Hair (*Arabis sinensis*).—Of all plants the Crossworts (*Cruciferæ*) afford the greatest number and variety of branched hairs. The figure is typical of the *Arabis* hairs, which vary in the direction and mode of branching. This is a common garden plant. (Pl. I., fig. 6.)

32. Stalked Stellate Hair of Fern (*Niphobolus sp.*)—The hairs and scales of ferns are usually attractive objects, and those of an exotic fern belonging to this genus are figured as an example of a stalked star-like scale. (Pl. I., fig. 9.)

33. Glandular Hair of Hellebore (*Helleborus fœtidus*).—The glandular hairs of the Stinking Hellebore are surmounted by a club-like head or gland. Similar hairs occur on some species of Goosefoot or *Chenopodium*. (Pl. I., fig. 5.)

34. Clubbed Hair of Mullein (*Verbascum nigrum*).—The anthers of this species of Mullein are hairy through-

out the greater part of their length. The hairs are club-shaped, and of a bright purple colour when fresh. (Pl. I., fig. 7.)

35. Jointed Clubbed Hair (*Geum urbanum*).—The common Avens affords an example of a club-shaped hair, divided into cells. (Pl. I., fig. 13.)

36. Capitate Hair of Figwort (*Scrophularia nodosa*).—The hairs of the Figwort have a broad head like a button. (Pl. I., fig. 8.)

37. Capitate Hair of Gourd (*Cucurbita maxima*).—A similar hair to the last, but with a proportionately smaller head, is found on the leaves of the great Gourd or Pumpkin. (Pl. I., fig. 21.)

38. Hair of Southernwood (*Artemisia abrotanum*).—This hair is divided into two limbs or filaments, each of which is usually twisted or contorted.

39. Beaded Hair (*Mirabilis jalapa*).—The hairs of the Marvel of Peru have a series of swellings throughout their length, which give them a beaded appearance.

40. Glands of Loosestrife (*Lysimachia vulgaris*).—The short hairs of the Loosestrife are surmounted by a twin gland, so as to appear to be double-headed.

41. Coltsfoot Pappus (*Tussilago farfar*).—The white downy substance which is attached to the seed of the Coltsfoot, and several other plants of the same order, have pairs of spiny projectors placed at regular distances throughout the length of these hairs. (Pl. I., fig. 10.)

42. Scale of Rusty-back Fern (*Ceterach officinarum*).—The under surface of the fronds of this fern is so covered with rusty scales that it is sometimes called the rusty-backed fern. These scales are good objects for the lowest powers. (Pl. I., fig. 14.)

43. Scale of Fern (*Nothochlæna lævis.*)—Still more beautiful are the scales of this cultivated fern. Although in size and general form resembling the preceding, the margin and base are set with long pointed spines. (Pl. I., fig. 15.)

44. Scale of Sea-Buckthorn (*Hippophæ rhamnoides*).—A portion of the leaf of this plant, with the stellate

scales *in situ*, may be mounted as a permanent object. The scales are flat, with a radiating structure, and irregularly toothed at the margin. (Pl. I., fig. 11.)

45. Scale of Mayweed (*Anthemis cotula*).—This is a smaller and less attractive scale, with an obtusely pentagonal outline, and the margin very slightly toothed. (Pl. I., fig. 20.)

46. Scale of Oleaster (*Elæagnus hortensis*).—Though not a British plant, it is commonly cultivated. The scales are somewhat of the character of those of No. 44, but more irregular in form.

47. Lupuline Gland (*Humulus lupulus*).—The glands of the catkins of the Hop are curiously cup-shaped, varying in form with age. (Pl. I., fig. 23.)

48. Spiral Cells of Quillwort (*Isoetes lacustris*).—This kind of cell is not uncommon in the internal structure of plants, and is well seen in the Quillwort, which grows plentifully at the bottom of clear rocky lakes. (Pl. I., fig. 41.)

49. Spiral of Horsetail (*Equisetum*).—The spiral fibres of flowering plants are generally more decided than in Cryptogams, but the 'Horsetails' furnish a loose kind of spiral tissue which is of interest. (Pl. I., fig. 48.)

50. Simple Spiral of Hogweed (*Heracleum spondylium*).—The spiral of the common Hogweed is simple, or of one thread, and may be obtained from the leaf-stalks by boiling. (Pl. I., fig. 12.)

51. Spiral of Plantain (*Plantago major*).—Similar to the foregoing is the simple spiral in the leaf-stalks of the common Plantain. These stalks cannot be broken across without drawing out the threads of spiral fibres.

52. Spiral of Rhubarb (*Rheum sp.*)—The leaf-stalks of the garden Rhubarb, especially when old and 'stringy,' furnish plentifully similar spirals. When thoroughly cleaned and mounted in balsam they are good objects for the polariscope.

53. Spiral of Gourd (*Cucurbita maxima*).—In the Pumpkin or Gourd the spiral is loose, and unwinds in a kind of band. (Pl. I., fig. 39.)

54. Compound Spiral of Lily (*Lilium candidum*).—The spiral consists of several threads, which remain slightly attached to each other, and unroll in a band or ribbon. (Pl. I., fig. 18.)

55. Compound Spiral of Water-Lily.—The flower-stalks and leaf-stalks of all the species of Water-Lily furnish a compound spiral. This is a favourite stock object, especially when derived from *Nymphæa edulis*, an Indian species of Water-Lily.

56. Spiral of Mezereon (*Daphne mezereum*).—The spiral in this instance often divides or branches, and, as will be seen in the next, is accompanied by discs. (Pl. I., fig. 38.)

57. Discs of Mezereon (*Daphne mezereum*).—The discs appear to belong to a secondary deposit, and occur in the same vessels as the last, over which the third or spiral layer is deposited. (Pl. I., fig. 45.)

58. Punctate Vessel of Poppy (*Papaver somniferum*).—The vessels from the stem of the Opium Poppy, and probably other species, are punctured in bands around the vessel. (Pl. I., fig. 44.)

59. Punctate Vessel of Balsam (*Impatiens balsamina*).—The vessels of the stem in the common Balsam are punctate in a different manner. In both instances the punctures are caused by deficiencies in the secondary deposit. (Pl. I., fig. 46.)

60. Pine-wood Discs.—The cells of Pine-wood are characterized by circular pits or depressions, which are concave, with a small orifice in the centre. The arrangement differs in different coniferous trees. A thin pine shaving will exhibit them. (Pl. I., fig. 40.)

61. Double Discs (*Araucaria imbricata*).—In this wood the discs are usually in double rows in the cells. Occasionally they may be seen in treble rows.

62. Discs of Mammoth Tree (*Wellingtonia gigantea*).—These discs are large and distinct, generally in single rows, sometimes double, in the wood-cells. Smaller discs are distinct upon the transverse bands of the medullary rays.

63. Flax Fibre (*Linum usitatissimum*).—The fibre of the inner bark of the Flax plant, Flax of commerce, has certain characteristic cross markings at variable distances apart. All vegetable fibres mounted in balsam are suitable for the polariscope. (Pl. I., fig. 29.)

64. Jute Fibre (*Corchorus capsularis*).—This fibre has a rougher outline and a more opaque appearance than flax, without definite cross markings.

65. Hemp Fibre (*Cannabis sativa*) resembles flax in many points, but seldom with cross markings, and when present these are faint and undecided.

66. China Grass Fibre (*Bœhmeria nivea*).—There is a peculiar roughness in the appearance of nettle fibres, of which this is one. Viewed as opaque objects, the frosted, glistening character is of interest.

67. Anther of Blushwort (*Erythræa centaurium*).—The stamens of this common wild flower are peculiar, the twisted anthers being pendulous. The stigma of this flower is also peculiar and worthy of examination. (Pl. I., fig. 28*.)

68. Anther of Heath (*Erica tetralix*).—This Heath has curious shaped anthers, with a pair of horns at the base. Each cell resembles a bag or watch-pocket. (Pl. I., fig. 25.)

69. Anther of Whortleberry (*Vaccinium uliginosum*).—The anthers of this plant have a pair of horns near the apex, and the openings to the cells are prolonged into a pair of horn-like tubes. (Pl. I., fig. 26.)

70. Anther of Ling (*Calluna vulgaris*).—The elongated anthers of the common Ling have also a pair of horns or spurs at the base, but in form, size, and colour differing from No. 68.

71. Anther of Strawberry Tree (*Arbutus unedo*).—Still more singular are the stamens of this shrub. The stalk or filament is swollen at the base, and the anther is surmounted by a pair of erect horns. (Pl. I., fig. 27.)

72. Anther of Mullein (*Verbascum nigrum*).—The lower portion of the anther is clothed with beautiful purple club-shaped hairs. (See also No. 34, Pl. I., fig. 7.)

73. Stigma of Corn Chamomile (*Anthemis arvensis*).—The stigmas of the florets of composite plants are very variable and often curious. That of the present plant is twice forked and erect. (Pl. I., fig. 30.)

74. Stigma of Goat's-beard (*Tragopogon pratense*).—The stigmas of the florets are forked once, and each division is gracefully recurved. (Pl. I., fig. 31.)

75. Stigma of Mayweed (*Anthemis cotula*).—The stigmas resemble the last, except that each division of the fork is again subdivided near the tip, and the ultimate subdivisions are also recurved. (Pl. I., fig. 32.)

76. Stigma of Willow (*Salix repens, &c.*)—This stigma is bifurcate, with spreading segments nearly in the form of a cross.

77. Mallow Stamens (*Malva sylvestris*).—These stamens are united round the stigma, and, when mounted entire, with the pollen just escaping, there is scarcely a more beautiful object for a low power to be found in the vegetable world.

78. Floret of Coltsfoot (*Tussilago farfar*).—The entire floret of Coltsfoot, with the pappus attached, is a very good object, as are also the florets of the daisy and many other composite flowers.

79. Pappus of Goat's-beard (*Tragopogon pratense*).—The star-like parachute which surmounts the seed of the Goat's-beard is a pretty object.

Starch may be readily obtained from the tubers and roots of some plants, the fruit or seed of some, and the stems or rhizomes of others. If the portion containing starch is rasped down or grated into water, the granules of starch will be liberated from the cells, and in a little time subside at the bottom of the water. After washing two or three times in distilled water, the deposit may be mounted dry or in silicate of soda.

80. Wheat Starch consists chiefly of large and small grains, with a few of intermediate size. The smaller are nearly globose, the larger rounded and flattened. In some granules concentric lines are faintly traced.

81. Rice Starch.—The granules are angular and very

small, indeed almost the smallest of common starches; but, unlike most irregular starches, the granules do not adhere together in groups.

82. Starch of Oats.—The granules are compressed and often angular, with a distinct hilum, but without external markings. (Pl. I., fig. 51.)

83. Maize Starch.—More or less angular and polyhedral, adhering together in clusters so as to present a hexagonal face. Each granule has a distinct hilum or cross.

84. Tous les Mois.—The largest of known starches, a common article of commerce. The granules are egg-shaped, with a hilum towards one end, and fine, regular, concentric lines.

85. Potato Starch.—A thin section of potato will show these granules in position. They are large and shell-shaped, with a hilum towards one end, and coarse concentric lines. (Pl. I., fig. 52.)

86. Bean Starch.—The granules have an undulating surface, and are larger than those of the pea. There is usually a long central groove. (Pl. I., fig. 53.)

87. Pea Starch.—The undulating appearance of these granules, and the last, seem to be caused by the permanent fusion of three or four smaller and nearly globose granules into one large and irregular one.

88. Orchid Starch (*Orchis bifolia*).—This singular starch consists of somewhat ovoid granules, each of which has usually two conical projections at opposite extremities of the axis. (Pl. I., fig. 54.)

89. Iris Starch.—A singular starch is obtained from the rhizomes of the Florentine Iris; the granules are long and narrow, with clubbed ends like dumb-bells.

90. Lily Starch.—The granules are almost pear-shaped, somewhat elongated, often with a double hilum and faint concentric lines. (Pl. I., fig. 55.)

91. Hyacinth Starch.—The granules of starch obtained from the bulbs of the common wild Hyacinth resemble those of the lily, but are smaller, more regular, often depressed in the centre, and a hilum at each end. (Pl. I., fig. 56.)

92. WAKE-ROBIN STARCH (*Arum maculatum*).—The starch of the common Arum consists of very small granules, which are either circular, muller-shaped, or polyhedral. The circular hilum lies in a small depression.

93. HORSE-CHESTNUT STARCH (*Æsculus hippocastanum*).—Granules oval or elliptical, very variable in size, but much more regular in outline than the next. (Pl. I., fig. 57.)

94. ACORN STARCH (*Quercus pedunculata*).—Granules irregular, and variable in form and size, sometimes pear-shaped, egg-shaped, or oval, but usually with no definite typical form. Markings very faint. (Pl. I., fig. 58.)

95. GINGER STARCH.—Granules rather large, egg-shaped, with the smaller end abrupt and irregular, as if bitten off. Concentric rings very faint, scarcely visible. (Pl. I., fig. 59.)

96. WEST INDIA ARROWROOT.—The granules are smaller than in *Tous les mois*, narrow and tapering, frequently terminating in an obtuse point, sometimes with warts or knobs scattered over the surface. The concentric rings are few and faint.

97. TAPIOCA STARCH.—The granules in this starch are muller-shaped; when seen endways they appear circular. There is a circular hilum or slit, and a few faint concentric rings.

98. SAGO STARCH.—The granules are irregularly elliptical, generally more or less broken, with a circular hilum, and a few faint concentric rings.

99. EAST INDIAN ARROWROOT.—The granules in this starch are long, narrow, and shell-shaped. The hilum is an indistinct ring at the narrow end of the granule. The lines on the surface only form broken segments.

100. CROCUS STARCH.—Starch granules from the bulbs of the Crocus are of a very compound character, from three or four to six or seven, or more, being united together in an irregular mass, so that when separated into their individual granules they are, as the result of compression, very variable in form.

101. SHERARDIA POLLEN (*Sherardia arvensis*).—The

pollen of this common plant is very characteristic, having a rounded outline, with the margin plicated or folded, so as to appear ribbed in a side view, and radiating in an end view. (Pl. II., fig. 1.)

102. NASTURTIUM POLLEN (*Tropæolum majus*).—The outline of the pollen of the common Nasturtium is triangular. It is rather large, and may be seen as an opaque object with a one-inch power. (Pl. II., fig. 2.)

103. YELLOW FUMITORY POLLEN (*Corydalis lutea*).—The pollen of this plant is very diverse in its forms, sometimes nearly spherical, at others deeply constricted and lobed. (Pl. II., fig. 3.)

104. ST. JOHN'S WORT POLLEN (*Hypericum perforatum*).—The granules in this species have the appearance of a sphere divided by three bands. (Pl. II., fig. 4.)

105. MALLOW POLLEN (*Malva sylvestris*).—No enumeration of pollen would be complete were the pollen of the Mallow omitted. It is such a common object that no description or figure is necessary. It should be mounted dry, attached to the anther. (See No. 77.)

106. MUSK PLANT POLLEN (*Mimulus moschatus*).—These curious granules resemble a band or cord rolled or folded in a spherical mass, somewhat like the pollen grains of *Thunbergia*, an exotic plant. (Pl. II., fig. 5.)

107. SOWTHISTLE POLLEN (*Sonchus pulustris*).—The Marsh Sowthistle has a very interesting pollen, somewhat spherical, but divided by a raised reticulation into angular cells, but less distinctly than in the *Scorzonera*. (Pl. II., fig. 6.)

108. RUSH POLLEN (*Juncus sp.*)—The pollen grains in most species of rush are spherical, in clusters of four. When the granules emit their pollen-tubes, these clusters exhibit a very interesting appearance, as delineated in the figure. (Pl. II., fig. 7.)

109. LINSEED POLLEN (*Linum usitatissimum*).—In the common Flax plant the pollen has a square form, and when the pollen-tubes are emitted, one issues from each corner, and one from the centre above and below. (Pl. II., fig. 8.)

110. Willow Herb Pollen (*Epilobium angustifolium*).—The pollen granules in some species of Willow Herb are in groups of three or four. In the present species, which is common in cottage gardens, the granules are triangular. (Pl. II., fig. 9.)

111. Buttercup Pollen (*Ranunculus acris*).—All the Buttercups have pollen of a specific character, differing either in size or appearance one from another. In the majority they are more or less elongated, and in the present instance four-lobed or nearly square in the end view. (Pl. II., fig. 10.)

112. Scorzonera Pollen (*Scorzonera Hispanica*).—This is a large and beautiful pollen, and although the plant is but little in cultivation, it is worth growing for the sake of its pollen. The form is polyhedral, with projecting hexagonal reticulations. (Pl. II., fig. 11.)

113. Salsify Pollen (*Tragopogon porrifolius*).—The granules of Salsify are also polyhedral, but differing from those of the *Scorzonera*. This is another plant which is worth cultivating a plant or two for the sake of its pollen.

114. Lanceolate Plantain Pollen (*Plantago lanceolata*).—This very common plant has spherical pollen, the surface of which contains numerous depressions or pores. The cellular structure of the anthers is worthy of examination. (Pl. II., fig 12.)

115. Phlox Pollen (*Phlox Drummondi*).—This garden plant yields a spherical pollen, with the surface reticulated in a regular hexagonal manner. The most beautiful pollen of this kind is yielded by a species of *Cobæa*.

116. Zamia Pollen (*Zamia Mexicana*).—This plant is cultivated in stoves, and is not at all uncommon. The pollen is produced plentifully. It is very transparent, and may be viewed as such. In form it resembles a miniature 'pig cowry.' (Pl. II., fig. 13.)

117. Cedar Pollen (*Cedrus Libanus*).—This is a very good type of coniferous pollen, consisting of two lobes of nearly hemispherical shape, connected by a kind of isthmus. There is a great similarity in the character of

the pollen of the majority of coniferous trees. (Pl. II., fig. 14.)

118. Dock Pollen (*Rumex sp.*)—Most species of Dock yield a spherical, rough, granulated pollen, of rather small size, and is useful in helping to a variety in the collection of pollen grains, rather than from any peculiar beauty of its own which it may possess as a recommendation. (Pl. II., fig. 15.)

119. Primrose Pollen (*Primula vulgaris*).—The granules are very small and of a nearly ellipsoidal outline, with six longitudinal furrows, which leave an equal number of prominent ridges, which give the pollen a stellate appearance in an end view, which is represented in the figure. (Pl. II., fig. 16.)

120. Cucumber Pollen (*Cucumis sativa*).—A spherical pollen, with three little warts or projections on the surface. Several others of the Cucumber family possess similar pollen.

121. Fuchsia Pollen (*Fuchsia coccinea*).—Of a triangular form, somewhat flattened, with papillæ at the angles.

122. Coltsfoot Pollen (*Tussilago farfar*).—The granules are nearly spherical, with three obscure bands. The whole surface covered with long spines.

123. Bluebell Pollen (*Campanula trachelium*).—Of a spherical form, the surface partly covered with little spines, and apparently also punctate.

124. Pollen of Orchid (*Orchis mascula*).—This may be taken as a type of Orchid pollen. The pollen adheres together in a mass by means of elastic threads, which unite at the base into a caudicle, terminating in a viscid disc.

The small Seeds of plants are very interesting objects for low powers, and the following will be found a good representative collection. Those which are not native are in common cultivation, and may be purchased from a respectable florist.

125. Opium Poppy Seed (*Papaver somniferum*).—The seeds of either the white or grey variety are good opaque

objects. They are kidney-shaped, and the surface is reticulated with raised veins of a more or less hexagonal form. Within the pits caused by this reticulation is a secondary, fainter, and more minute reticulation. (Pl. II., fig. 20.)

126. Corn Spurrey Seed (*Spergula arvensis*).—Broadly ovate seeds, of a deep brown colour, with a pale, sharp margin. The surface is sprinkled with club-shaped, white, glandular hairs. The seeds are rather large for microscopical objects, but too characteristic to be omitted. (Pl. II., fig. 26.)

127. Climber Seed (*Eccremocarpus scaber*).—This common hardy climber is extensively cultivated. The dark-coloured ovate seeds are surrounded by a transparent wing, traversed by numerous branching veins. They are sometimes viewed as opaque objects, and at others mounted in balsam. By the latter means a beautiful object is secured. (Pl. II., fig. 19.)

128. Lychnis Seed (*Lychnis diurna*).—Several species of Lychnis furnish very similar seeds, of a reniform or kidney shape, the surface regularly studded with warts or short blunt spines. The garden Lychnis and wild *Lychnis dioica* possess this character. (Pl. II., fig. 25.)

129. Sweet William Seed (*Dianthus barbatus*).—The seeds of this garden flower are heart-shaped, and gently curved in the plane of their length. On the inside curve an obtuse ridge runs in the direction of the length, rising into a prominence near the middle of the seed. The colour is nearly black, and minutely stippled with small depressions. The figure gives an oblique view of the object. (Pl. II., fig. 39.)

130. Satin Flower Seeds (*Stellaria holostea*).—Oval, almost kidney-shaped seeds, possessing much of the character of lychnis seeds, the surface studded with warts. Colour, pale brown.

131. Chickweed Seed (*Stellaria media*).—The seeds of this common wayside weed are brown, ovate, with one side produced to a bluntly pointed apex. Waved ridges are disposed in several rows on the outer edge, gradually

forming into star-shaped prominences in the centre. A well-marked line divides the apex obliquely. (Pl. II., fig. 29.)

132. Coreopsis Seed (*Calliopsis bicolor*).—This favourite composite annual has elongated, nearly spindle-shaped seeds, blunt at each end, glossy black, and minutely and regularly punctured. Each end is of a pale ochrey tint, and obtuse. (Pl. II., fig. 22.)

133. Ivy Bellflower Seed (*Wahlenbergia hederacea*).—The seeds are of a light brown colour, smooth and glossy, shaped like the back of a 'cowry' shell, and minute. They are chiefly of interest for the variety which they furnish in a collection, than for any special attraction. (Pl. II., fig. 17.)

134. Eschscholtzia (*Eschscholtzia tenuifolia*).—This favourite flower has seeds of a form generally spherical, with large triangular bluntly-pointed projections radiating from the surface, giving the appearance of a rosette to the entire seed. These prominences are obscurely dotted. The general colour is light brown. (Pl. II., fig. 27.)

135. Purslane (*Portulaca oleracea*).—These seeds bear some resemblance to the shells of the fossil Ammonites. Rounded prominences with dark tips are arranged in spiral rows upon the surface, each of which is surrounded by an indented line on the surface of the seed. A peculiar nacreous lustre gives this object a very beautiful appearance. (Pl. II., fig. 38.)

136. Bladder Campion Seed (*Silene inflata*).—The general shape is reniform, with a slightly flattened projection at the concave part; the colour yellowish drab. On the greater part of the surface rounded protuberances with indented margins are deposited in alternate rows, following the convex outline. From the centre and over the rest of the seed the indented line forms elongated irregular cells. (Pl. II., fig. 31.)

137. Sandwort Seed (*Lepigonum marinum*).—These seeds have something the character of those of *Eccremocarpus*, being ovate and surrounded by a transparent wing, the venation of which differs from that of the seed named. (Pl. II., fig. 24.)

138. PLANTAIN SEED (*Plantago psyllium*). — These shining brown seeds are oblong, with a broad deep furrow on one side, and convex on the other. Though not a native of Britain, the plant is sometimes met with. (Pl. II., fig. 18.)

139. TOBACCO SEED (*Nicotiana tabacum*).—The seeds of this popular plant are kidney-shaped, of light brown colour, with strongly marked waved ridges meandering over the surface. Towards the concave portion of the seed these become somewhat less decided. On some specimens a curious iridescence may be noticed in parts. (Pl. II., fig. 35.)

140. SPHŒNOGYNE SEED (*Sphœnogyne speciosa*).—These beautiful seeds have the appearance of a complete plant, stem, leaves, and root being all represented. The stem is stout, slightly curved, with longitudinal ridges, terminating at one end in silky, glistening filaments, and at the other in four obovate leaves, with broad central veins. The general colour is pure white. (Pl. II., fig. 32.)

141. CHINA NETTLE (*Bœhmeria nivea*). — The plant furnishes the beautiful China grass fibre, and has been grown experimentally in this country. The dull brown seeds are attenuated towards each extremity, and covered with short transparent hairs. (Pl. II., fig. 23.)

142. COMMON SNAPDRAGON (*Antirrhinum majus*).—The seeds of this widely diffused and favourite flower are of very irregular form, of a dull snuffy-brown colour, with the surface honeycombed with deep hexagonal pits. The partitions of these pits are striate, and their margins irregular. (Pl. II., fig. 21.)

143. CHILI NETTLE SEED (*Loasa aurantiaca*).—This half-hardy annual affords seeds of a delicate yellowish-brown colour, somewhat oval in outline, with very deep and bold reticulations, mostly hexagonal, over the entire surface. The edges of the dividing walls are somewhat darker. Through some of the cells a smaller dividing ridge runs longitudinally. (Pl. II., fig. 28.)

144. SPURGE SEED (*Euphorbia græca*). — The outline of these seeds is pear-shaped, irregularly divided by a

raised, slightly projecting ridge of white, minutely pitted. The interspaces are also dotted, of considerably darker colour, and shelve gradually to the centre.

145. Small Toadflax Seed (*Linaria minor*).—The seeds are of a rich brown colour, of rounded oblong form, with several bold ribs or ridges of the same colour running longitudinally, and towards the apex of the seed separating into nodules which maintain the same direction. (Pl. II., fig. 33.)

146. Lophospermum Seed (*Lophospermum scandens*).—Splendid seeds of the winged kind, with an irregular angular outline, and the central opaque portion rough with large ribbed warts or short spines. These should be mounted direct from the plant, as they are soon injured.

147. Heather Seed (*Erica cinerea*).—These seeds, which are of a light brown colour, afford an interesting object in their division into cells more or less hexagonal in form, with deep interspaces. Some specimens have an iridescent appearance, as noted in other cases. (Pl. II., fig. 36.)

148. Eyebright Seed (*Euphrasia officinalis*).—This pretty little wild flower has whitish, spindle-shaped seeds, with longitudinal ridges meeting at each end. The interspaces are barred at right angles to the ribs, which are marked in a similar manner. The spaces are darker in colour, owing, perhaps, to the presence of some darker body underneath. (Pl. II., fig. 30.)

149. Ling Seed (*Calluna vulgaris*).—The seeds of this plant are oval in shape, covered with a decided reticulation, sometimes plainly and at others obscurely hexagonal. At the smaller end, the testa forms a sort of hood, partially covering the body of the seed. In some lights a brilliant play of colours is visible on this object. (Pl. II., fig. 37.)

150. Nightflower Seed (*Nycterinia capensis*).—The extraordinary form of these seeds defies verbal description. Their colour is a delicate primrose, and their texture resembles the scaly covering of a snake. (Pl. II., fig. 34.)

151. Cornflower (*Cyanus minor*).—The seeds of this

plant are remarkable for the barbed tuft of hair which they bear. At the opposite end a well-marked notch is seen. As they are very large, only an inconsiderable magnifying power is required. (Pl. II., fig. 40.)

152. Eucharidium Seed (*Eucharidium concinnum*).—Singular elongated and brown seeds, convex on one side, and on the other concave or spoon-like at one end, with a cleft extending nearly to the other. The entire surface reticulated and sculptured. (Pl. II., fig. 41.)

153. Indian Pimpernel Seed (*Anagallis Indica*).—Broadly ovate or irregular, presenting a triangular face. At first covered with membranaceous warts, which in drying shrivel into conical projections. (Pl. II., fig. 42.)

154. Isotoma Seed (*Isotoma longiflora*).—Neat little seeds of an oblong shape and amber colour. Regularly reticulated so as to leave shallow hexagonal pits over the whole surface, which is clear and shining.

155. Foxglove Seed (*Digitalis purpurea*).—Cylindrical with blunt ends, and a shallow longitudinal groove. Surface minutely honeycombed. *Digitalis lutea* has similar seeds, but not so attractive or regular. (Pl. II., fig. 43.)

156. Lousewort Seed (*Pedicularis palustris*).—Pear-shaped, with a curved cleft or groove on one side. The surface finely reticulated. Of a shining, chocolate-brown colour. (Pl. II., fig. 44.)

157. Verbena Seed (*Verbena pulchella*).—Long, narrow seeds, traversed on one side with a broad shallow groove, terminating in a point at one end and a spatula at the other; the groove with a central ridge covered with granular papillæ. (Pl. II., fig. 45.)

158. Eutoca Seed (*Eutoca multiflora*).—These seeds are long, elliptical, with pointed ends, of a dull brown colour, and the surface deeply punctured with pentagonal pits. A similar structure is found in *Whitlavia grandiflora.*

159. Small Snapdragon Seed (*Artirrhinum orontium*).—With an oblong outline, flattened on one side, and on the other deeply hollowed, with five or six large papillæ around the depression. The whole surface mi-

nutely granular. Some seeds are white, others brown, with intermediate shades, very singular. (Pl. II., fig. 46.)

160. Red-wood Sorrel Seed (*Oxalis rosea*).—Ovoid, with pointed ends, and five or six angular longitudinal ribs, jointed by numerous transverse bars. Dull, pale ochraceous yellow. (Pl. II., fig. 47.)

161. Venus' Looking-glass Seed (*Campanula speculum*).—Small almond-shaped seeds, of a pale brown or amber colour, and smooth glossy surface. Interesting for comparison and contrast with the others named.

162. Celery Seed (*Apium graveolens*).—This is an excellent type of the order to which it belongs. The five longitudinal ribs are very clear and distinct, and its small size renders it a good representative of the carraway, cumin, and anise kind of seed.

163. Blumenbachia Seed (*Blumenbachia insignis*).—This is rather a large seed for the microscope, but one which cannot be omitted from a collection. Its irregular form and gnarled and distorted testa defy description within any reasonable limits.

164. Fruit of Elm (*Ulmus montana*).—These are large and well-known winged seeds. If well soaked in turpentine and mounted in balsam, the encircling membrane becomes transparent, and almost equal to the winged seeds of some Bignonias.

DESMIDS.

These minute fresh-water *algæ*, or water-weeds, are of a beautiful green colour and elegant form. Every boggy pool or swamp may be expected to contain them, and they often flourish on the surface of damp rocks. Often in company with fresh-water diatoms, they will be found in similar stations; but, unlike them, they have no flinty

skeleton, and are not so easily or successfully mounted and preserved.

165. Round-thread Desmid (*Hyalotheca dissiliens*).—This species consists of an elongated jointed filament with a transparent gelatinous envelope. Each joint is constricted at its point of union with the next joint, and the contents are divided transversely into two portions. Common, and often plentiful. (Pl. III., fig. 1.)

166. Triangular-thread Desmid (*Desmidium Swartzii*).—Also united in filaments, which are triangular, the twisting of which causes a zigzag line down the filament. Each joint is constricted at its junction with the next, and notched in the middle, with two teeth to each segment above and below the notch. The contents also divided into two portions. Common both in England and America. (Pl. III., fig. 2.)

167. Large Star Desmid (*Micrasterias denticulata*).—Single, not connected in filaments. Circular, and divided into two segments, each of which is five-lobed, with the middle lobe the smallest; each of the larger lobes is again notched. Common. (Pl. III., fig. 3.)

168. Wheel Desmid (*Micrasterias rotata*).—So much like the last that it is easily confounded with it; the chief differences being that the margins of the divisions are toothed, and the middle lobes of each segment have each three notches instead of one. (Pl. III., fig. 4.)

169. Small Star Desmid (*Micrasterias truncata*).—This is very much smaller than either of the preceding, is also circular, and divided into two segments, of which each is five-lobed; but the end or middle lobe is much the broadest, the other lobes being sharply toothed. Common. (Pl. III., fig. 5.)

170. Oblong Desmid (*Euastrum oblongum*).—This desmid is of an oblong form, and smooth, divided at the centre into two equal segments, which are five-lobed. The notches between the lobes are broad, and the lobes have the corners rounded. (Pl. III., fig. 6.)

171. Thick Euastrum (*Euastrum crassum*).—About the same size as the last, but more four-sided, with the

ends rounded. Each segment is somewhat square at the base, with concave sides, from which the end lobe is separated by a deep notch on each side. (Pl. III., fig. 7.)

172. Warty Euastrum (*Euastrum verrucosum*).—This is a very characteristic species, though not so common as some others. The surface is rough with warty granules; each segment is broader than long, being broadly wedge-shaped and three-lobed, each lobe with a concave depression in the centre.

173. Triangle Euastrum (*Euastrum didelta*).—In this species each segment is pyramidal, the basal corners rounded, the sides with a convex projection, the ends flattened and squared, with a narrow terminal notch. (Pl. III., fig. 8.)

174. Eared Euastrum (*Euastrum ansatum*).—Smaller than the last, each segment triangular, with a blunt apex, the sides concave and the apex notched. (Pl. III., fig. 9.)

175. Pectinate Euastrum (*Euastrum pectinatum*).—Each segment in this species is three-lobed, the end lobe being broad, almost flat; the side lobes with a concave depression or blunt notch in the centre. The whole plant is twice, or more, longer than broad. It is not so common as many other species.

176. Elegant Euastrum (*Euastrum elegans*).—This is a very minute species, of an oblong form, with a broad shallow notch on each side, and a broad end notched in the centre. (Pl. III., fig. 10.)

177. Crenate Cosmarium (*Cosmarium crenatum*).—About twice as long as broad, divided at the centre into two equal lobes, which are flattened at the sides and end, and the margin crenate, or serrated with blunt rounded teeth. Smaller than the next. (Pl. III., fig. 11.)

178. Pearly Cosmarium (*Cosmarium margaritiferum*).—The commonest species of its genus. The surface rough with little granules; divided into two kidney-shaped segments, which sometimes are almost circular. (Pl. III., fig. 12.)

179. Pyramid Cosmarium (*Cosmarium pyramidatum*).

—This is rather an elongated form, being twice as long as broad, deeply constricted into two equal segments, each of which is somewhat triangular, with rounded angles. Not uncommon.

180. Minute Cosmarium (*Cosmarium bioculatum*).—This very small species is divided on each side by a gaping notch into two elliptical segments, having the broadest sides united by a distinct neck. Its minute size occasions it to be often overlooked.

181. Angular Cosmarium (*Cosmarium botrytis*).—This species differs from *C. margaritiferum* in its more elongated form and flattened ends, so that each lobe is more triangular than kidney-shaped. The beaded margin will serve to distinguish it from the "pyramid cosmarium."

182. Beautiful Cosmarium (*Cosmarium ornatum*).—Smaller than the last, from which it is distinguished by its less regular outline, and its end view, instead of being elliptical, has a convex projection on each side, so as to be cross-shaped. (Pl. III., fig. 13.)

183. Gourd Cosmarium (*Cosmarium cucurbita*).—The surface is not granular, as in the preceding. It is a small species, with nearly straight sides and rounded ends. The end view is circular. This is by no means an uncommon species. (Pl. III., fig. 14.)

184. Fork-spined Xanthidium (*Xanthidium armatum*).—This is like a species of Cosmarium, having a spiny margin. The segments are almost kidney-shaped, and fringed with short spines, each of which is divided at the apex into three or four points.

185. Sharp-spined Xanthidium (*Xanthidium fasciculatum*).—The segments are usually kidney-shaped, as in the last species, but the spines are slender and pointed, in pairs at the margin; each segment has commonly four pairs of spines.

186. Horned Staurastrum (*Staurastrum dejectum*).—In the side view this little species consists of two elliptic or half-moon-shaped segments, with each horn or extremity ending in a sharp spur. The end view shows three

or four equidistant rays, each terminated by a spur or spine. A common species. (Pl. III., fig. 15.)

187. Alternate Staurastrum (*Staurastrum alternans*).—The two segments are oblong, and rough on the surface, but, not lying in the same plane, have the appearance of being unequal. End view three-lobed, the lobes of the one segment alternating with the lobes of the other. Not so common as the last. (Pl. III., fig. 16.)

188. Finger-like Penium (*Penium digitus*).—Of a long elliptic form, with nearly straight sides and rounded ends. The division into two segments is indistinct, but there is a paler band across the centre. End view circular. A very common species. (Pl. III., fig. 18.)

189. Brebisson's Penium (*Penium Brebissonii*).—This is scarcely so large as the last, and the sides are straighter, so that it has the form of a cylinder with rounded ends. It is often so plentiful in places where water lodges in wet weather as to form a stratum. (Pl. III., fig. 19.)

190. Capped Tetmemorus (*Tetmemorus granulatus*).—This genus at first sight resembles the last in its cylindrical form and elongated fronds, but it differs in being constricted at the middle and in having notches at the ends. The present is the most common species, which is spindle-shaped, with colourless ends.

191. Slender Docidium (*Docidium baculum*) consists of long, straight, slender, thread-like fronds, divided across the centre into two segments, each of which is a little swollen near the joint. There are several species belonging to the same genus, but this is the most common. (Pl. III., fig. 20.)

192. Crescent Closterium (*Closterium lunula*).—This species and the four following belong to a genus in which the fronds are narrowed towards each end, and curved like a bow or a crescent. In this, one side is nearly straight, and the other tapers rapidly from the centre towards each end. (Pl. III., fig. 21.)

193. Ehrenberg's Closterium (*Closterium Ehrenbergii*) differs from the last in being more curved, the lower side concave instead of straight, and a little swollen

at the centre. A number of vesicles are scattered over the frond, and not arranged in a single line as in the next. (Pl. III., fig. 22.)

194. Beaded Closterium (*Closterium moniliferum*). —Smaller than the last, similarly swollen at the centre, but it has a single row of vesicles down the middle. (Pl. III., fig. 23.)

195. Lined Closterium (*Closterium striolatum*).—When the green contents are discharged, the membrane is distinctly striated. It is a slender species, crescent-shaped, with a single row of vesicles, and the ends are very blunt. (Pl. III., fig. 24.)

196. Beaked Closterium (*Closterium rostratum*).—This differs from all the other species we have enumerated in tapering at each end into a kind of beak. The green endochrome is confined to the central swollen portion, which is about the length of one of the uncoloured ends.

197. Spiral Desmid (*Spirotœnia condensata*).—This may be known from all the others which are here enumerated by the green contents forming a broad spiral band. The sides are straight, and the ends rounded. It is a very attractive species, and is common. (Pl. III., fig. 25.)

FRESH-WATER DIATOMS.

Of all microscopic objects Diatoms have engrossed the most attention, and maintained the greatest popularity. These organisms are plants, low in the scale it is true, but still plants, belonging to the water-weeds or *algæ*. One great peculiarity in these minute plants is the possession of a flinty or siliceous skeleton or framework, which is in reality the portion sought after by microscopists. This framework in most instances consists of two corresponding *valves*, or more or less flattened plates, which are applied together and form a *frustule*, of which the *front view* and the *side view* differ. These terms are employed in the

following descriptions in such a sense. Fresh, brackish, and salt water are alike inhabited by various species, and their flinty skeletons are found buried in the earth in a kind of fossil condition, in deposits sometimes of miles in extent, which often indicate the bed of some ancient lake. When collected in a living state, floating on the surface of ditches or adhering to larger plants, they are, besides their own endochrome, usually mixed with organic matter, from which they must first be cleansed. This is usually accomplished by boiling in nitric acid, which destroys all but the flinty skeletons; and when thoroughly cleansed, by washing in distilled water, from all trace of acid, these skeletons are mounted dry or in balsam. The surface of the valves are marked in various ways with channels, striæ, ribs, or dots; and the form of the valves is almost as variable as their markings. For the following enumeration of the species most commonly found in fresh and also in salt water, we are indebted to Mr. Frederic Kitton, of Norwich, a gentleman well known as an authority, and of great experience in this subject.

198. Robust Epithemia (*Epithemia turgida*).—The group or genus to which this belongs contains species which are parasitic, adhering by the concave surface to the stems of small aquatic plants and *algæ*. The valves are arched or bent (arcuate), and crossed by transverse ribs. This species is the most robust of those common in fresh water, and the ribs are very distinct. Common in ditches. (Pl. III., fig. 26.)

199. Marsh Epithemia (*Epithemia rupestris*).—The present is a small form, with almost spindle-shaped valves, which are slightly curved, with the ribs distant from each other, and the striæ between them faint. Marshes and boggy pools.

200. Swollen Epithemia (*Epithemia gibba*).—This species differs conspicuously from the preceding, the front view being straight, or line-like, swollen at the middle and at each end. The side view is narrow, with straight parallel sides and obtuse ends. Marshes and boggy pools.

201. Four-ribbed Eunotia (*Eunotia tetraodon*).—In this genus the valves are also bent, as in the last, but there are little nodules at the extremities, there are no ribs, and the delicate striæ are convergent. The present species has four dorsal ridges, which in a side view resemble large blunt teeth, on the outer margin. Boggy pools. (Pl. III., fig. 27.)

202. Broad Himantidium (*Himantidium bidens*).—The curved valves in this genus bear great resemblance to those of the last, but in the present the frustules are at first united together into a filament, and the striæ on the valves are parallel. In this species the valves are proportionately broader than in the next, and there is a depression in the centre of the convex side, and one near each extremity. In marshes. (Pl. III., fig. 28.)

203. Narrow Himantidium (*Himantidium pectinale*).—Valves narrower than the last, tapering, but not constricted, towards the extremities. More usually united into a filament.

204. Common Meridion (*Meridion circulare*).—The frustules in this genus are wedge-shaped, and united together into a spiral filament. The valves in the present species are long, wedge-shaped, rounded at the larger end, and the striæ are indistinct. Attached to the stems of water-plants in clear streams. (Pl. III., fig. 29.)

205. Blunt Odontidium (*Odontidium mutabile*).—In this genus the frustules are quadrangular, and united in a filament. The valves are either elliptical or cross-shaped, with conspicuous ribs. This species has oval or elliptical valves, with ribs at the margin. Common in ditches. (Pl. III., fig. 30.)

206. Pointed Odontidium (*Odontidium Tabellaria*).—The frustules do not adhere together so tenaciously as in the last species, and the valves are usually oval, with pointed ends. Common in ditches.

207. Broad Odontidium (*Odontidium mesodon*).—Distinguished from the other two species by the broader frustules, and more oval form of the valves, with only from two to four ribs. Common in ditches.

208. Acute Fragilaria (*Fragilaria capucina*).—The frustules are also quadrangular, narrow, almost line-like, and united into a filament; whilst the valves are also linear, or narrowly elliptical, and striated. In this species the valves are narrow, with parallel sides and wedge-shaped ends. Common in ditches. (Pl. III., fig. 31.)

209. Obtuse Fragilaria (*Fragilaria striatula*).—The valves are broader and their extremities more obtuse than in the previous species, and the striæ are much closer together. Common in ditches.

210. Common Chain Diatom (*Diatoma vulgare*).—The frustules are oblong, adhering together by their angles in a zigzag chain. The valves in this species are elliptical, suddenly diminishing at their extremities, and ending bluntly. Attached to confervæ growing in gentle streams. (Pl. III., fig. 32.)

211. Long Chain Diatom (*Diatoma elongatum*).—Longer and narrower than the last, and the valves with straight sides, slightly swollen at the rounded ends; growing as above, and frequently found living in the water supply of various towns, mixed with the following species.

212. Stellate Diatom (*Asterionella formosa*).—Frustules line-like, end swollen, adhering at similar ends, giving a star-like arrangement to the filaments. The filament in this species consists of from four to nine frustules; the adhering end of the frustule is generally rather more enlarged than the free portion.

213. Sigmoid Nitzschia (*Nitzschia sigmoidea*).—In this large group the frustules are not united at any period, and are therefore called *free*. They are long, narrow, and keeled; the valves are linear, with punctate margins and transverse lines or striæ. In the present species the valves are long and narrow, with parallel sides and short pointed ends. The keel has a single row of dots. Common in every fresh-water gathering. (Pl. III., fig. 34.)

214. Arched Nitzschia (*Nitzschia amphioxys*).—The valves are short, and bent like a bow, with sharp and prominent extremities. The striæ are distinct. Common in moss growing in damp situations. (Pl. IV., fig. 31.)

215. Common Amphipleura (*Amphipleura pellucida*). —The frustules are free and elongated, narrowly spear-shaped, with longitudinal ridges. More or less common in every wayside pool and rivulet. (Pl. III., fig. 33.)

216. Long Synedra (*Synedra ulna*).—The frustules in Synedra are elongated, and at first attached by the lower end. In this species the sides of the valves are nearly parallel, with the extremities suddenly pointed. Very common. (Pl. IV., fig. 33.)

217. Headed Synedra (*Synedra capitata*). — The valves are long and narrow, with parallel sides, expanding at each end into a triangular head. Very common. (Pl. III., fig. 35.)

218. Slipper Cymatopleura (*Cymatopleura solea*).— The frustules in this genus are oblong, the undulations of the valves have a boss-like appearance on the margin, and the surface of the valves undulated. The valves in this species are narrow, gradually constricted towards the centre, and the ends pointed, with six undulations, and the surface striated.

219. Elliptic Cymatopleura (*Cymatopleura elliptica*). —The valves are broadly elliptical, a little pointed at the extremities, with four or five undulations; the striæ on the surface not so distinct. Both species common in ditches. (Pl. IV., fig. 1.)

220. Two-rowed Surirella (*Surirella biseriata*). — In this genus the frustules are usually somewhat wedge-shaped, the margins produced into a kind of wing, with distinct, usually parallel, channels. The valves in this species are broadly spear-shaped (elliptical lanceolate), with conspicuous wings and large channels.

221. Narrow Surirella (*Surirella linearis*).—Valves narrower than in the last, occasionally constricted, with either blunt or pointed extremities. Both species common on marshes and ditches. (Pl. III., fig. 36.)

222. Ovate Surirella (*Surirella ovata*).—A minute species. The valves ovate, wings small, and channels only at the margins. The three preceding species will generally be found in boggy pools. (Pl. IV., fig. 34.)

223. Ribbed Campylodiscus (*Campylodiscus costatus*). —The frustules are saddle-shaped and contorted; the valves circular, with radiating channels; the centre minutely dotted. Frequently associated with the species above described.

224. Little Cyclotella (*Cyclotella minutula*).—The frustules are either free or united, and of a flattened, circular, or discoid shape. The valves with radiating striæ. In this species the valves are not undulate. Common in fresh water.

225. Kutzing's Cyclotella (*Cyclotella Kutzingiana*). —The valves are undulated, and the delicate radiating striæ form a broad marginal band; centre of disc smooth. Common in fresh and brackish water. (Pl. IV., figs. 11, 11*a*.)

226. Common Orthosira (*Orthosira orichalcea*).—In this genus a cylindrical filament is formed by the union of numerous frustules, usually spiny or toothed at the line of junction. The filaments in this species are straight, and the face of the junction surfaces smooth. Common everywhere. (Pl. III., fig. 37.)

227. Sand Orthosira (*Orthosira arenaria*).—Filament curved, very rigid; valves with a line of dots; junction surfaces with radiating striæ. Not so common as the preceding. (Pl. IV., fig. 3.)

228. Variable Melosira (*Melosira varians*).—The frustules are cylindrical, attached end to end in a filament. The valves are cylindrical, with flattened or truncated ends. Found in every clear spring or river, from the lowest to the most elevated situations. When living, of a rich golden yellow or chestnut hue.

229. Parasite Cocconeis (*Cocconeis pediculus*).—In this genus the valves are elliptical, with a line down the middle and a nodule in the centre. In the present species the frustule is arched, the valves elliptical, somewhat angular, and delicately striated. Parasitic on small water-plants and confervæ.

230. Flat Cocconeis (*Cocconeis placentula*).—The frustules are flat, and the elliptical valves striated. Of frequent occurrence with the above. (Pl. IV., fig. 35.)

231. ACHNANTHIDIUM (*Achnanthidium lanceolatum*).—The frustules resemble those of *Achnanthes*, but have no stipes: they are united into a filament. The valves are elliptical; the upper one with a median line and central nodule, the lower with the nodule dilated only on one side. (Pl. IV., fig. 4.)

232. BOAT-SHAPED CYMBELLA (*Cymbella cuspidata*).—The frustules are boat-shaped, and unattached, or free. The valves are striated, with indistinctly beaded or moniliform striæ. (Pl. IV., fig. 5.)

233. SPEAR-SHAPED COCCONEMA (*Cocconema lanceolatum*).—The frustules in this genus have a similar form to those of *Cymbella*, but are borne upon a stipes or stalk. The valves have a longitudinal line near the middle, with nodules at the centre and extremities. (Pl. IV., fig. 6.)

234. CLUSTERED ENCYONEMA (*Encyonema cæspitosum*).—The frustules in this genus resemble those of *Cymbella*, but they grow enclosed in a threadlike tubular frond, often much divided. The ends of the valves in this species are attenuated. In ditches, attached to Conferva. (Pl. IV., fig. 10.)

235. MINUTE AMPHORA (*Amphora minutissima*).—In the front view elliptic or oval; valves marked with a transverse band. Found parasitic on other diatoms, as *Nitzschia sigmoidea* and *Nitzschia linearis*.

236. CAPITATE GOMPHONEMA (*Gomphonema capitatum*).—The frustules are stalked and wedge-shaped in this genus. The valves in the present species are much narrowed towards the lower extremity. (Pl. IV., fig. 7.)

237. CONSTRICTED GOMPHONEMA (*Gomphonema constrictum*).—The valves differ from those of the last species in being more or less constricted towards the upper extremity.

238. CURVED GOMPHONEMA (*Gomphonema curvatum*).—A small species with curved frustules, as seen in a front view. The valves are narrowed gradually throughout their length, with the upper extremity rounded and the lower acute.

239. LOZENGE-SHAPED NAVICULA (*Navicula rhomboides*).—In this very large genus the form of the frustules is

simple; more or less rectangular in the side view, with a longitudiual clear space or line down the middle, and a nodule at the centre and at each extremity. The valves in this species are nearly quadrangular, and the striæ very delicate. (Pl. IV., fig. 8.)

240. Convex Navicula (*Navicula serians*).—Valves similar in size and form to the last, except that the sides are rounded, and not at all angular. The longitudinal striæ distinct, generally associated with the last species, forming a film on the surface of boggy pools.

241. Nippled Navicula (*Navicula crassinervia*).—Valve between elliptical and spear-shaped, with the extremities lengthened or produced into a kind of seed-like termination. Striæ delicate. Similar habitats to the preceding.

242. Horned Navicula (*Navicula cuspidata*).—Valve spear-shaped, with somewhat acute extremities. The striæ parallel and distinct. There is a great similarity in the outline of these four species, especially to the unpractised eye. Of frequent occurrence in ditches.

243. Swollen Navicula (*Navicula gibberula*).—The valves in this species have rounded ends, and the sides have a convex inflation at the centre. Common in ditches.

244. Bordered Navicula (*Navicula firma*).—Valve narrow, gradually tapering to the rounded ends; a longitudinal line near each margin. Central nodule conspicuous. Striæ fine. Common in ditches.

245. Constricted Navicula (*Navicula amphisbæna*).—Valve elliptical, with constrictions near the extremities, and rounded ends. Common in fresh and brackish water. (Pl. IV., fig. 32.)

246. Great Pinnularia (*Pinnularia major*).—From *Navicula*, this genus differs chiefly in the valves being ribbed instead of striated. This is a large and fine species, with the sides parallel and straight, except a slight marginal inflation at the centre, and blunt rounded ends. The central nodule large. Marshes and sluggish streams.

247. Narrow Pinnularia (*Pinnularia viridis*).—Valve narrowly elliptical, with the ends scarcely so rounded as

the last, and without a central inflation. Ribs closer than in preceding species. Common everywhere. (Pl. IV., fig. 9.)

248. Oblong Pinnularia (*Pinnularia oblonga*). — Valve spear-shaped (lanceolate) with rounded ends; the ribs distant from each other, and reaching to the line down the middle of the valve. Not so common as the above, but frequently mixed with it.

249. Radiate Pinnularia (*Pinnularia radiosa*). — Smaller than the last, of similar form, but more pointed extremities, and the radiate ribs closer together. Common in fresh water.

250. Variable Pinnularia (*Pinnularia varians*). — Variable in form and size, with oblique ribs nearly reaching the median line, more conspicuous opposite the central nodule.

251. Broad-banded Stauroneis (*Stauroneis phœnicenteron*).—This genus differs from *Pinnularia* in the central nodule being widened into a clear central band. This species is of a spear-shape (lanceolate). The central band reaches the margin. Striæ fine. Very common in all fresh-water gatherings.

252. Delicate Stauroneis (*Stauroneis gracilis*). — Valve of a similar form to the last, but with the central band scarcely reaching to the margin. Striæ much closer than in the last species.

253. Nippled Stauroneis (*Stauroneis anceps*).—Form of the valve elliptical, with teat-like extremities. The central band not reaching to the margin, and the striæ delicate.

254. Common Pleurosigma (*Pleurosigma lacustre*).— The valves in this genus are more or less spear-shaped, with a sigmoid line (like an elongated S) down the middle. This species is of a pale brown colour, and the middle line considerably bent.

255. Narrow Pleurosigma (*Pleurosigma attenuatum*). —The colour of this species is purplish brown, the ends of the valves blunt, and the median line less waved than in the last.

256. Spencer's Pleurosigma (*Pleurosigma Spencerii*).

—The colour of this species is a pale brown. The ends of the valves are obtuse, and its size is less than either of the foregoing. It requires care to distinguish many of the species in this genus from each other. The above species of Pleurosigma are more or less common in all fresh-water gatherings. (Pl. IV., fig. 30.)

MARINE DIATOMS, familiar to every microscopist, are found all along the coast, parasitic on seaweeds, attached to zoophytes, and often in great abundance in the stomachs of marine animals, especially molluscs, and growing freely in every tide pool. Collecting them is no very difficult task; and, when unmixed with sand, boiling in nitric acid, and afterwards free washings in distilled water, are sufficient to procure the siliceous shields in a fit condition for mounting as microscopical objects. The following species are those most commonly met with in stale or brackish water.

257. VENTRICOSE EPITHEMIA (*Epithemia ventricosa*).—The valves in this genus are arcuate, or bent like a bow, with transverse ribs. The form of the present species will be better understood from the figure (Pl. IV., fig. 36) than any technical description. It occurs in brackish water.

258. SIGMOID NITZSCHIA (*Nitzschia sigma*).—This is a large genus of elongated form, with the valves linear or line-like, and keeled with a punctate margin and tranverse striæ. In the front view the present species has the waved form of a long S (*ſ*). Brackish water.

259. BEAKED NITZSCHIA (*Nitzschia vivax*).—The front view in this species is straight, the valves bent like a bow (arcuate), and beaked at the extremities, with distinct striæ terminating in marginal dots. Found in sand ripples.

260. POINTED NITZSCHIA (*Nitzschia dubia*).—In this the valve is straight, with the ends tapering to a point. The tranverse striæ are faint. Common in all marine and brackish-water gatherings, and resembles *Tryblionella acuminata*, with which it is frequently associated.

261. Blunt Nitzschia (*Nitzschia virgata*).—This is also straight in the front view, with the valves slightly curved, and obtuse at the extremities. The distinct striæ become dilated into bands towards the margin. Common in gatherings from sand ripples.

262. Inflated Synedra (*Synedra fulgens*).—In this genus the frustules are long and attached by the lower end. In the present species they grow at the extremities of a thick branched stem, and the valves are inflated at the middle and ends. Found attached to seaweeds.

263. Acute Synedra (*Synedra affinis*).—Grows in fan-like tufts at the extremity of a stem. The valves are acute and spear-shaped. Also parasitic on seaweeds.

264. Slender Tryblionella (*Tryblionella gracilis*).—This genus is allied to *Surirella*, from which it is distinguished by its more regular and symmetrical form, and parallel, scarcely conspicuous, canaliculi or channels. Found in brackish water. (Pl. IV., fig. 24.)

265. Common Tryblionella (*Tryblionella acuminata*).—The valves in this species are linear, with pointed ends and interrupted striæ. Very common in brackish water.

266. Winged Surirella (*Surirella striatula*).—In this genus the frustules are usually somewhat wedge-shaped, the margins produced into a kind of wing, with distinct and usually parallel channels. The valves of the present species are ovate and striate, and somewhat resemble the next species. Found in brackish water.

267. Fine-ribbed Surirella (*Surirella gemma*) has much finer ribs than the last, with a less conspicuous wing, and is finely striate between the ribs (costæ). Occurs also in brackish water.

268. Oval Surirella (*Surirella ovalis*). — A small form, attenuated towards one extremity, and the margin with short teeth-like ribs. The centre of the valve is striate.

269. Dotted Campylodiscus (*Campylodiscus cribrosus*).—As Smith has observed, the "species included under this genus may all be recognized by the characteristic bend or contortion of their surfaces." This species has an ob-

scurely radiant series of irregular-shaped granules on the valves. Occurs in the mud of estuaries and in dredgings.

270. Little Campylodiscus (*Campylodiscus parvulus*).—The disc is nearly circular and small, with about twelve ribs. It is usually considerably contorted, and is the smallest species know. Found under similar conditions to the foregoing. (Pl. IV., fig. 2.)

271. Arched Rhabdonema (*Rhabdonema arcuatum*).—In this genus, the frustules united form a compressed filament with a short stem. The valves are joined to the connecting zone by a series of rings, which are furnished on the circumference with a row of cells. Marine, generally growing on the smaller Algæ. (Pl. IV., fig. 25.)

272. Marine Grammatophora (*Grammatophora marina*).—The frustules in this genus are also united into a filament, which partly separate and form a zigzag chain. Common on small Algæ, growing just below low water. (Pl. IV., fig. 27.)

273. Beaded Melosira (*Melosira nummuloides*).—The frustules in this genus are usually cylindrical or disc-shaped, cohering in a filament; but in the present species they are spherical and united in pairs, strung together like a string of beads. Common on Algæ. (Pl. IV., fig. 26.)

274. Radiate Coscinodiscus (*Coscinodiscus radiatus*).—The valves in the genus *Coscinodiscus* are circular, and more or less convex. The hexagonal cells in the present species are in radiating lines, and largest in the middle. The margin of the valves is smooth. Found in the stomachs of molluscs and in dredgings. (Pl. IV., fig. 12.)

275. Excentric Coscinodiscus (*Coscinodiscus excentricus*).—The cells in this species are small, and arranged in excentric lines. The margin of the valve is spinous. Found also within small molluscs and in dredgings.

276. Delicate Coscinodiscus (*Coscinodiscus subtilis*).—The cellules are small, and arranged in radiating lines from the centre to the circumference. Found in brackish water, frequently attached to the stems of rushes, &c.

277. Ralfs's Actinocyclus (*Actinocyclus Ralfsii*).—

In this genus the shape is also circular or discoid, and the markings of the valves consist of radiating dots (granules) nearly reaching a small central blank space. Near the margin, a small circular clear portion has the appearance of a nodule. This species is easily distinguished by its beautiful blue colour when mounted in balsam and viewed under a low power. Found in the stomachs of molluscs and in dredgings. (Pl. IV., fig., 29.)

278. Transparent Actinocyclus (*Actinocyclus subtilis*) is very transparent, with numerous radiating dotted lines. Found in the same localities as the foregoing.

279. Waved Actinoptychus (*Actinoptychus undulatus*). —The species which compose this genus are distinguished by the division of the disc into triangular portions by radiating lines. In the present species the segments are alternately elevated and depressed. Found in the stomachs of molluscs and in dredgings. (Pl. IV., fig. 14.)

280. Many-eyed Eupodiscus (*Eupodiscus argus*).—The present genus differs from *Coscinodiscus*, in the structure being apparently less cellular, and in the raised processes or horns which occur on the margin of the disc, of which this species has three or more. Found at the mouths of rivers and in dredgings. (Pl. IV., fig. 13.)

281. Twin-spot Auliscus (*Auliscus sculptus*).—In this genus also the forms are discoid or oval, with two circular flattened processes at some distance from the margin in each valve. The present is the only British species, and occurs in the mud at the mouths of rivers and in dredgings. (Pl. IV., fig. 15.)

282. Eared Biddulphia (*Biddulphia aurita*).—The large, angular, four-sided frustules in this genus adhere to each other in a chain by their alternate angles. The valve in this species is elliptical, with two or three spines in the central elevation. Common on Algæ. (Pl. IV., fig. 23.)

283. Honeycombed Triceratium (*Triceratium favus*). —The side view in the species of this genus is either three, four, or five angled. In the present the cells are long and hexagonal, the sides nearly straight, or a little conve-

with obtuse angles. Found in mud at the mouths of rivers and in dredgings. (Pl. IV., fig. 16.)

284. Angle-barred Triceratium (*Triceratium alternans*).—The sides are straight, with obtuse angles, which latter are granulated, and separated by transverse lines from the hexagonal centre. Found under similar conditions to the foregoing.

285. Shield Cocconeis (*Cocconeis scutellum*). — The valves in this genus are elliptical, with a line down the middle, and a nodule in the centre. In this species the valves are broadly elliptical, and the transverse lines are concentric. It is said to occur in every quarter of the globe, parasitic on the larger Algæ. (Pl. IV., fig. 18.)

286. Long-stemmed Achnanthes (*Achnanthes longipes*).—In this genus the frustules grow attached to a stem or stipes. The frustules are bent downwards, so that the upper side is convex. It this species the stem is long, and the valves ribbed. Parasitic on seaweeds. (Pl. IV., fig. 22.)

287. Short-stemmed Achnanthes (*Achnanthes brevipes*).—The stem is short, and the valves, though striate, are not ribbed. It also grows attached to seaweeds.

288. Sand Amphora (*Amphora arenaria*). — In this genus the valves are bent, with a nodule at the centre of the inner edge. The frustules of the present species are broadly linear, with rounded angles, and the valves are very transparent. It occurs in sand ripples.

289. Oval Amphora (*Amphora ovalis*).—The frustules are oval, with broadly rounded ends, and the valves have distinct beaded or moniliform striæ. It is found in salt or brackish water. (Pl. IV., fig. 17.)

290. Elliptic Navicula (*Navicula elliptica*).—This is the largest genus of British diatoms. The form is simple, more or less rectangular in the side view, with a longitudinal clear space or line down the centre, a central and terminal nodules. The present species is elliptical, with rounded ends and distinct, beaded or moniliform striæ.

291. Jenner's Navicula (*Navicula Jenneri*). — This species has a waved central line, and the frustules are

twisted. It differs from the next in being larger, and the extremities obtuse. This occurs in brackish water.

292. West's Navicula (*Navicula Westii*).—In this species the middle line is slightly waved or flexuose, and the extremities somewhat acutely pointed. It is also found in brackish water. (Pl. IV., fig. 37.)

293. Elegant Navicula (*Navicula elegans*).—The valves are broadly spear-shaped, with slightly pointed ends. The striæ are curved and radiant towards the smooth space around the central nodule. It occurs in brackish water and tide-pools.

294. Lyrate Navicula (*Navicula lyra*).—The valves in this species are elliptic, marked by two narrow longitudinal blank spaces, connected by the central nodule into the form of a lyre: hence its name. Is found in sand ripples.

295. Granulated Navicula (*Navicula granulata*).—In this species the valves are broadly linear, with straight sides, and the ends suddenly constricted to a point. It resembles the next in outline, but differs in the coarseness of the markings, which are large and brilliant. Nearly opaque when dry. Also in sand ripples.

296. Crystal Navicula (*Navicula humerosa*).—As already observed, the outline of this species is the same as the last; but the striæ are closer and less distinct, clear and glassy when dry. Both species are common in sand ripples.

297. Narrow Pinnularia (*Pinnularia peregrina*).—This genus differs from *Navicula* chiefly in the valves being ribbed instead of striated. Under a high power the ribs are found to be transversely striate. The present species has narrowly spear-shaped (lanceolate) valves, which gradually taper towards each extremity. Found in brackish water.

298. Distant-ribbed Pinnularia (*Pinnularia distans*).—The valves in this species are spear-shaped (lanceolate), with distant radiating ribs, not reaching the central line. It is a very common form in deep-sea dredgings.

299. Salt Marsh Stauroneis (*Stauroneis salina*).—

This genus differs from the last in the central nodule being widened into a clear central band. The present is a small species, with somewhat spear-shaped valves and obtuse extremities. It occurs in salt-water marshes. (Pl. IV., fig. 20.)

300. Beautiful Stauroneis (*Stauroneis pulchella*) has also spear-shaped valves; but the central band is dilated outwards, and the striæ are much more distinct than in the last. It is common in sand ripples, as well as in dredgings.

301. Lozenge-shaped Pleurosigma (*Pleurosigma quadratum*).—In this genus the valves are more or less spear-shaped (lanceolate), with a sigmoid line (shaped like a long *s* down the middle. The form of the present species is rhomboid, and easily distinguished by its angular shape. The striæ are oblique and delicate. It is common in salt-water ditches and small creeks.

302. Angular Pleurosigma (*Pleurosigma angulatum*) is not of so angular a form as the last; but the striæ are similar, and it is found in kindred localities.

303. Long Pleurosigma (*Pleurosigma elongatum*) is long and narrowly spear-shaped, with the median line almost straight. The striæ are oblique. The long narrow form of this species is sufficient to distinguish it from its allies.

304. Baltic Pleurosigma (*Pleurosigma Balticum*).—The valves are long and straight, except near the extremities, which are curved in opposite directions. The striæ are both longitudinal and transverse. Occurs in salt marshes.

305. Cross-lined Pleurisigma (*Pleurosigma strigilis*).—This form is spear-shaped (lanceolate), with transverse and longitudinal striæ, which are very distinct. The difference in the shape of the valves must be observed in distinguishing this from the last. It is also found in salt marshes.

306. Acuminate Pleurosigma (*Pleurosigma acuminatum*) is spear-shaped or lanceolate, but with more obtuse extremities than the last. The striæ are both

longitudinal and transverse. Found in salt marshes. (Pl. IV., fig. 21.)

307. Winged Amphiprora (*Amphiprora alata*).—This genus is distinguished by its side wings, which are constricted in the middle; so that when viewed in front the form is more or less fiddle-shaped, with broadly rounded ends, and the present species is often twisted. It occurs on the surface of the mud in salt-water ditches. (Pl. IV., fig. 19.)

308. Smith's Mastogloia (*Mastogloia Smithii*).—This last genus has the frustules imbedded in a gelatinous frond, and the frustules are oblong or boat-shaped. In this species they are somewhat spear-shaped, with obtuse extremities. Brackish water. (Pl. IV., fig. 28.)

FUNGI afford numerous interesting objects for the microscope. Many of them are exceedingly common, and most are easy of manipulation. Our present limits will only enable us to enumerate a few of those which recommend themselves either by their beauty or the facility with which they may be obtained.

309. Wheat Mildew (*Puccinia graminis*).—Common on grasses and straw in the autumn, forming long blackish lines. The spores are two-celled, borne on a slender colourless stalk, and accumulated in tufts, bursting through the cuticle. (Pl. V., fig. 1.)

310. Crowned Mildew (*Puccinia coronata*).—A very distinct species from the last, and occurs on the leaves of the more delicate grasses. The apex of the spore bears three or four tooth-like processes. (Pl. IV., fig. 2.)

311. Mint Brand (*Puccinia Menthæ*).—The leaves of mint in gardens are often attacked by a species of brand or mildew, with shorter and broader spores than either of the above, though otherwise similar.

312. Celery Brand (*Puccinia Apii*).—A similar brand, with two-celled spores, is found on the wild and also on

cultivated celery leaves. The entire leaf is generally closely sprinkled with the patches of coffee-coloured spores.

313. Anemone Brand (*Puccinia Anemones*).—Very common, in the spring, on leaves of the wood anemone, or wind-flower. The surface of the spores is rough, with little points or projections. (Pl. IV., fig. 3.) A similar but rougher-spored species is found, but rarely, on the Alexanders (*Smyrnium*). Other brands, with two-celled spores, occur on willow-herb, thistles, ground-ivy, violets, bedstraw, primroses, knotgrass, asparagus, &c., but all are similar in character.

314. Meadow-sweet Brand (*Triphragmium Ulmariæ.*)—This brand has a similar habit to the foregoing, but the spores are divided into three cells. The Meadow-sweet is common beside streams and ditches everywhere, and the brand is nearly as common in autumn on the under surface of the leaves. (Pl. V., fig. 4.)

315. Bramble Brand (*Phragmidium bulbosum*).—Common on bramble-leaves in the autumn. The black patches are good objects, *in situ*, viewed opaque with one-inch objective. The spores are borne on a transparent pedicel in tufts. Each spore has three or four divisions, and the surface is rough with projections. (Pl. V., fig. 5.)

316. Strawberry Brand (*Phragmidium obtusum*).—Common on the leaves of the wild strawberry, is similar, as also the raspberry brand (*gracile*) on raspberry leaves, and the rose brand (*mucronatum*) on leaves of wild or cultivated roses. The principal differences are the number of divisions in the spores.

317. Great Burnet Brand (*Xenodochus carbonarius*). The finest of all the brands, and occurs on the leaves of the great burnet, but not very commonly. The spores have a number of articulations, often as many as fifteen, of a chocolate-brown colour, in tufts, which form black patches, visible to the naked eye. (Pl. V., fig. 6.)

318. Nettle Cluster Cups (*Æcidium Urticæ*).—Clusters of bright golden cups, found in spring and early

summer on the leaves and stems of the nettle. The mouth of the cup is white and toothed; the interior is filled with yellow globose spores. (Pl. V., fig. 7.)

319. Buttercup Cluster Cups (*Æcidium Ranunculacearum.*—Similar cluster cups to the above are found on the pilewort and other species of Ranunculus, and are introduced here on account of no superior attractions, but because this is the most common species, and the first to make its appearance in early spring.

320. White-spored Cluster Cups (*Æcidium leucospermum*).—Are found on the leaves of the wood anemone, generally in company with plants bearing the anemone brand. The most important feature in this species is the white spores.

321. Cluster Cups.—Other cluster cups are found on the leaves of the gooseberry, sanicle, coltsfoot, bedstraw, violet, berberry, goatsbeard, buckthorn, daisy, primrose, dock, and other plants, all similar in their general character.

322. Wheat Bunt (*Tilletia caries*).—Fills the whole interior of the grain of wheat with a fetid olive powder, which, viewed with a quarter-inch objective, is found to consist of globose, reticulated spores, mixed with branched threads.

323. Rye Smut (*Polycystis parallela*).— Forms long dark-coloured lines on the leaves and sheaths of rye, consisting of many-celled spores. Interesting as the type of the so-called 'cholera fungus.' (Pl. V., fig. 20.) Allied species are found on leaves of buttercup and anemone, violets, and the meadow saffron.

324. Wheat Rust (*Trichobasis rubigo-vera*).—This is the 'red rust' of farmers, and is but too common on the green leaves of growing corn, covering them with a rusty powder, which consists of the globose spores, which burst through the cuticle.

325. Cow-wheat Rust (*Coleosporium Rhinanthacearum*).—Common in summer and autumn in bright orange patches on leaves of the cow-wheat. The spores are at first chained together, but ultimately disconnect

themselves, and are nearly globose: orange, with a rough surface.

326. Star-spored Fungus (*Asterosporium Hoffmanni*).—The beautiful stellate spores of this fungus ooze out in a black mass from orifices in the bark of the beech, forming sooty patches. They have three or four separate rays, and may be mounted in glycerine or balsam. (Pl. V., fig. 47.)

327. Grape-spored Fungus (*Cheirospora botryospora*).—Found, in damp weather, oozing from the bark of the beech in a black gelatinous mass, something like printers' ink. It consists of branched threads, terminated by clusters of spores arranged after the manner of bunches of grapes.

328. Orange Tendrils (*Nemaspora crocea*).—On the same beech tree as the preceding, provided it has been felled for some time, orange tendrils may be found issuing from orifices in the bark. These are gelatinous when moist, but horny when dry, and consist of myriads of clear, transparent, curved spores, pointed at each end.

329. Birch Cushion-spore (*Coryneum disciforme*).—Black circular orifices in the bark of birch twigs are often the indications of this fungus. It consists of a number of brown septate spores, packed closely side by side, and springing from a cellular cushion or disc. To the naked eye the masses are like the heads of as many large black pins.

330. Large-spored Coryneum (*Coryneum macrosporum*).—In external appearances similar to the last; but the spores are different, being long and with clear colourless tips at either end. (Pl. V., fig. 8.)

331. Crested-spored Fungus (*Pestalozzia*).—One species is found on dead camellia leaves; but another has recently been met with on twigs of a cypress. The black mass, seen beneath the orifices of the bark, is composed of spores, with a long slender stem, and a crest of about three slender threads. (Pl. V., fig. 40.)

332. Two-coloured Melanconium (*Melanconium*

bicolor).—The most common of all the black masses of spores which issue from the bark of fallen twigs is one with simple ovate spores, each containing a large nucleus. It is most common on birch.

333. Cornel Stilbospore (*Stilbospora angustata*).—This is another of the species in which the spores issue in a black mass. It is found on twigs of cornel, and has fine brown spores, divided by three septa, which resemble the spores of some of the Spheriæ. (Pl. V., fig. 22.)

334. Birch Prosthemium (*Prosthemium betulinum*).—Dead birch twigs foster another parasite, with large septate spores; but in this instance two or three are clustered together in a bundle, and attached to colourless threads, which have the appearance of rootlets. The majority of this kind of fungi, on dead sticks, are to be sought in early spring. (Pl. V., fig. 38.)

335. Alder Prosthemium (*Prosthemium stellare*).—On dead alder sticks, but not common. The spores are septate, and clustered in a radiating star-like manner at the apex of a common stem. In both instances the spores are produced within a special receptacle (perithecium), more or less imbedded in the bark. (Pl. V., fig. 21.)

336. Nettle Flasks (*Apospharia acuta*).—Old nettle stems will in the spring exhibit a number of black flask-shaped bodies clustered about the lower portion of the stem. These flasks are 'perithecia,' and in their interior are very minute free sporidia, or larger and true spores contained in long membranous asci. In the latter case the fungus is a true Sphæria, in the former only a condition or phase of the Sphæria, which continues to bear a separate name, as here applied to it.

337. Common Diplodia (*Diplodia vulgaris*).—This represents a large number of species growing on dead twigs or dead leaves. The perithecia contain a number of free spores, which are at first colourless and undivided, but at length are divided across the centre, and in many instances acquire a brown colour. When mature, they escape through an orifice at the apex of the perithecium. (Pl. V., fig. 34.)

338. Elegant Hendersonia (*Hendersonia elegans*).—Found on dead reeds in the spring. The pores are large, and have many divisions. At first enclosed in a perithecium, whence they escape as in *Diplodia;* but the spores are more attractive.

339. Birch Hendersonia (*Hendersonia polycystis*).—On dead birch twigs. The perithecia are concealed beneath the bark, which they elevate and ultimately perforate. The spores are many-celled, often divided longitudinally. (Pl. V., fig. 36.)

340. Cornel Hendersonia (*Hendersonia Corni*).—With smaller spores divided by three septa. It is common on dead twigs of cornel in spring, and the spores are profuse. (Pl. V., fig. 49.) Other species occur on plane twigs, bramble, and various plants, differing chiefly in the size of the spores and the number of their septa.

341. Elm Septoria (*Septoria Ulmi*).—Fading leaves in autumn are subject to parasites, which appear as very minute black points or dots, often scattered over a pale or discoloured spot. These are the delicate perithecia of some species of Septoria, few of which possess any attractive features: the Septoria of the elm is one of the best. The spores, when mature ooze out in dirty white spots on the underside of the leaves. They are colourless, elongated, curved, and divided by three septa.

342. Grass Bristle-cups (*Dinemasporium graminum*). The leaves and culms of dead grass have often bristly little black cups breaking through the cuticle, which are in themselves interesting objects. These contain spores, slightly curved, with an awn or bristle at each extremity. (Pl. V., fig. 41.) An allied species, with cups double the size, is found on rotten nettle stems.

343. Common Torula (*Torula herbarum*).—Old nettle stems have often large black sooty patches upon them, an inch or two in length. They consist of a number of roundish or oval dark-coloured spores, attached end to end.

344. Compact Torula (*Torula hysterioides*).—A less common species, with the spores closely compressed so as to appear like jointed threads, which also adhere to-

gether laterally, so as to differ considerably in appearance from most other species. Found on poles and bare sticks, in smaller patches than the last. (Pl. V., fig. 16.)

345. Red Cheese Mould (*Torula sporendonema*).—Found in reddish patches on old cheese, and is very different to the common Blue Cheese Mould, having the simple spores attached together in chains. The same species occurs on rats' dung, and we have seen it growing upon glue.

346. Beaded Twin-spore (*Bispora monilioides*).—The black sooty patches on old stumps are sometimes a species of *Torula*, but are more commonly this fungus. The spores are chained together as in *Torula*, but the spores are larger, and each spore is divided by a transverse septum. It is exceedingly common. (Pl. V., fig. 28.)

347. Coil-spored Fungus (*Helicosporium vegetum.*)—A curious fungus which has been found on rotten oak sticks, but is evidently uncommon. The spores are long and narrow, curled round in a spiral manner, or like the involutions of a coil shell. (Pl. V., fig. 9.)

348. Red Tubercularia (*Tubercularia vulgaris*).—Common on dead twigs, especially on currant. Forms bright pink or reddish, rounded, and prominent tubercles, breaking through the bark. (Only a spermatiferous condition of *Nectria.*) The surface consists of a dense stratum of minute sporidia (?).

349. Nettle Fusarium (*Fusarium tremelloides*).—Little reddish patches, of a rather gelatinous nature, sprinkled over dead stems of nettles. Only a condition of a species of Peziza. If one of the little patches be removed, and placed in a drop of water on a glass slide, the structure can be well examined with a quarter-inch objective. One of the commonest of fungi.

350. Nettle Black Mould (*Arthrobotryum atrum*).—Found on nettle stems, just visible to the naked eye. The jointed threads are united so as to form a stem, bearing large, dark, septate spores at the apex, in a kind of dense head.

351. Velvety Black Mould (*Helminthosporium velu-*

tinum). — In blackish velvety patches on fallen sticks. There are jointed threads, dark-coloured at the base, and spores divided transversely by three septa, scattered amongst them. (Pl. V., fig. 31.)

352. Holly Black Mould (*Helminthosporium Smithii*). —Rotten twigs of holly are often sooty with a mould of this species, which is of a similar character to the foregoing, but the spores are not so much divided. Other species are found on herbaceous plants, lime twigs, oak branches, rotten sticks, and dead wood.

353. Cabbage Mould (*Macrosporium cheiranthi*). — The decaying leaves of the field beet, and those of some other plants, often bear the blackish patches of a kind of mould, the spores of which resemble those figured in Pl. IV., fig. 36, except that they are almost colourless. Another species is common on decaying cabbage leaves.

354. Common Plant Mould (*Cladosporium herbarum*). —One of the commonest of fungi, and found on almost all damp decaying vegetable matter, in olivaceous patches consisting of floccose threads, which are more or less branched, and bear uniseptate spores.

355. Common Chain Mould (*Aspergillus glaucus*).— This is one of the common Moulds which appear on various kinds of decaying substances. The slender stem bears a globose head, from which spring necklaces of minute spores. The colour is very variable. (Pl. V., fig. 23.)

356. Potato Mould (*Peronospora infestans*).—This is the mould too well known as connected with the potato disease. It appears on the stem and leaves in the form of delicate branched threads. The upper portion of the branches with swollen nodules, and terminated by solitary spores. (Pl. V., fig. 25.)

357. Lettuce Mould (*Peronospora gangliformis*).— Frequent on lettuces and allied plants belonging to the natural order Compositæ. The branches terminate in a swollen, subglobose head, bearing several spicules, each spicule surmounted by a spore. (Pl. V., fig. 27.)

358. Sandwort Mould (*Peronospora Arenaria*).—This is found upon *Arenaria trinervis* and some other species.

This is a handsome form of mould, with slender stem much and equally branched, and bearing at the tips small elliptical acrospores. (Pl. V., fig. 26.)

359. Parsnip Mould (*Peronospora nivea*).—Occurs on parsnip, wood angelica, and other umbelliferous plants. The patches on the leaves are white, and very conspicuous. The threads are produced in bundles, each thread being short and once or twice forked, bearing subglobose acrospores which have a blunt projection at the apex.

360. Dock Mould (*Peronospora obliqua*).—A curious little dwarf species is very common on dock-leaves in whitish patches. The threads are often simple, sometimes forked, and bear at the apex large elliptical acrospores, which are usually attached obliquely.

361. Spinach Mould (*Peronospora effusa*).—This mould occurs in dirty-looking patches on the leaves of spinach, goosefoot, and other similar plants. The threads are in bundles, short, thick, and from two to six times forked.

362. Nettle Mould (*Peronospora Urticæ*).—Common on the leaves of nettles, in white patches, often of a circular form. The threads of the mould are small and loosely, from four to six times, forked, with large acrospores.

363. Fasciculate Mould (*Polyactis fasciculata*).—Not uncommon on old horse-chestnut husks and other decaying vegetable substances. The threads are collected in bundles, branched in the upper portion; the branches terminated by clusters of spores. (Pl. V., fig. 30.)

364. Grey Mould (*Polyactis cinerea*).—Common on old herbaceous stems, generally proceeding from a black sclerotium. The threads are not collected in bundles, but scattered, branched above, and bearing the clusters of spores in a similar manner to the foregoing.

365. Grass Oidium (*Oidium monilioides*).—Forming dirty-white patches on grass leaves. These patches are shown by one-inch power to consist of fascicles of delicate threads, which the quarter inch demonstrates to consist of rounded vesicles attached end to end in a beaded manner. (Pl. V., fig. 11.)

366. Fruit Oidium (*Oidium fructigenum*).—Rotten

apples and pears lying on the ground in autumn are seen to be covered with the dirty-grey mouldy patches of this fungus, of a more dense and compact substance than moulds generally, and, as an object, one of the best in the genus to which it belongs.

367. Rosy Mould (*Dactylium roseum*).—This appears in pinkish or roseate patches, on various decaying vegetable substances, and is not at all an uncommon mould. It consists of slender delicate threads bearing the spores at the apex; these are of an ovate form, divided by a central septum. (Pl. V., fig. 32.)

368. Grey Fusidium (*Fusidium griseum*).—Very common on dead leaves lying on the ground in damp situations, often covering the whole surface with a dirty-white incrustation, which consists of a mass of narrow spores, pointed towards either extremity.

369. Yellow Mould (*Sporotrichum sulphureum*).—Not uncommon in sulphur-coloured patches on corks, rotten wood, and other substances in cellars. The threads of the mould are simple and septate, with the spores scattered.

370. Clustered Spored White Mould (*Gonatobotrys simplex*).—This handsome mould is by no means common on decaying vegetable substances. It consists of erect jointed threads, swollen at the joints, around which the roundish spores form globose clusters. This and similar moulds lose their spores in fluid. (Pl. V., fig. 33.)

371. Beautiful Botryosporium (*Botryosporium pulchrum*).—The threads are erect and sparingly branched. Shorter branches at regular intervals bear clusters of small spores, of which five globose clusters are united into a compound head. (Pl. V., fig. 29.)

372. Diffused Botryosporium (*Botryosporium diffusum*).—This is somewhat similar in structure to the foregoing, and like it is found sparingly on decaying herbaceous plants in the autumn. The globose heads consist of a great number of small spores, *not* collected in clusters.

373. Whorled Mould (*Verticillium distans*).—This mould has erect septate threads bearing branches in whorls, with spores at their tips. The branches are at-

tenuated towards their extremities, and about six in a whorl. On the decaying stems of herbaceous plants, in white mouldy patches. (Pl. V., fig. 10.)

374. Fruit Mould (*Mucor mucedo*).—Common on decaying fruit. The structure is similar to the next, except that the threads are not branched. Ultimately the mould turns blackish.

375. Branched Mould (*Mucor ramosus*). — The threads in this mould bear at their tips sporangia, or spore-cells, which contain numerous sporidia; the cells at length burst, and the spores are set free. It is common on decaying fungi, and the threads are very much branched at their extremities.

376. Dog's Mould (*Mucor caninus*) is common in damp weather on the dung of cats and dogs. The threads are unbranched, and the heads are at first white, becoming yellowish or rusty brown.

377. Golden Mould (*Sepedonium chrysospermum*).—The interior of rotting Boleti, when broken, are often seen to have become of a bright yellow colour, from the globose rough spores which occupy the whole substance of the pileus of the Boletus. It is very common in winter. (Pl. V., fig. 44.)

378. Maple Blight (*Uncinula bicornis*).—This singular fungus covers the leaves so that they appear as if white-washed. On the entangled threads, globose dark-coloured conceptacles are produced, each surrounded by numerous appendages or processes which are forked and recurved. (Pl. V., fig. 39.)

379. Hazel Blight (*Phyllactinia guttata*).—This has something of the character of the preceding; but the mycelium is less profuse, so that it is sometimes scarcely to be distinguished by the naked eye. The appendages of the conceptacles are few, straight, and awl-shaped.

380. Berberry Blight (*Microsphæria Berberidis*).—On leaves of the berberry. The conceptacles are small, and surrounded by from five to ten appendages, which are divided and subdivided at their apices in a forked manner. (Pl. V., fig. 42.)

381. Alder Blight (*Microsphæria penicellata*).—One form of this species is found on the leaves of the Guelder rose, another on those of the alder. The appendages are about equal in length to the diameter of the conceptacles, and are much and beautifully branched at the tips. (Pl. V., fig. 43; one of the tips more highly magnified.)

382. Spindle Blight (*Microsphæria comata*).—This is found on the leaves of the common spindle tree, and all of them in the autumn. The appendages in this instance are several times longer than the diameter of the conceptacles, and much divided at their tips. Several other species are found in Britain.

383. Straw Bristle Mould (*Chætomium elatum*).—This is plentiful on damp rotting straw, and consists of bristly conceptacles, with scarcely any distinguishable mycelium.

384. Discoid Sphæria (*Microthyrium microscopicum*).—This interesting little parasite is found, like minute black points, on fallen leaves of box and evergreen oak. It consists of a number of little asci containing spores, and arranged in a radiating manner; the whole being covered with a membranaceous discoid perithecium. The perithecium only is figured. (Pl. V., fig. 14.)

385. Hispid Sphæria (*Venturia myrtilli*).—Of the large group of Sphæriæ, containing the spores (usually eight) in transparent elongated asci, mixed with barren threads, and enclosed in a more or less globose perithecium; some are smooth, and others rough or spiny. The species found on dead leaves of the whortleberry is a good example of a Hispid Sphæria, and, if seen with a binocular under an inch power, is a very pretty object. (Pl. V., fig. 12.)

386. Gunpowder Sphæria (*Sphæria pulvis-pyrius*).—This is a gregarious species. The black perithecia form large patches on old stumps and naked wood, resembling, to the naked eye, large grains of gunpowder. If one or two of the perithecia are placed in a drop of water and broken by pressure, the interior will be found to be filled with asci, containing brown triseptate spores.

387. Cinnabar Sphæria (*Nectria cinnabarina*).—The rough tuberculated perithecia of this Sphæria occur in tufts breaking through the bark of twigs. Their bright vermillion colours make them conspicuous objects to the naked eye. (Pl. V., fig. 13.) If one of the perithecia is crushed in a drop of water, the spores will be seen enclosed in a long membranaceous asci.

388. Berberry Sphæria (*Sphæria Berberidis*).—Clusters of black perithecia of this species occur on fallen twigs of the berberry, bursting through the bark. The sporidia, which are contained in asci, are amber-coloured, and divided, both transversely and longitudinally, by septa in a muriform manner. (Pl. V., fig. 46.)

389. Common Herbaceous Sphæria (*Pleospora herbarum*) has scattered, not aggregated, perithecia, more or less immersed in the old stems of herbaceous plants, on grasses, and the fallen leaves of trees and shrubs. Very common, especially on old bean and pea stalks, and the sporidia bear considerable resemblance to the last.

390. Birch Massaria (*Massaria siparia*).—The perithecia are imbedded beneath the bark of twigs of the birch, and cause little elevations which are sometimes scarcely perceptible to the naked eye. The sporidia are large, dark-coloured, and multiseptate, surrounded by a transparent hyaline membrane. (Pl. V., fig. 37.)

391. Maple Massaria (*Massaria gigaspora*) has also large and fine septate, coloured sporidia, surrounded by a similar hyaline membrane, and is found in spring on dead twigs of the hedge maple. (Pl. V., fig. 48.) A variety is found on the cornel.

392. Elm Massaria (*Massaria amblyospora*).—Occurs on elm twigs. The spores issue from the mouth of the scarcely perceptible perithecia, and form a black stain on the bark. The spores are egg-shaped and biseptate, differing considerably from either of the foregoing.

393. Oak Valsa (*Valsa taleola*).—Compound Sphæriæ have the perithecia in definite clumps or masses, with the necks often converging, sometimes united, or ending in a

disc. The Oak Valsa is common in March on almost every fallen twig of oak. The sporidia are oval, and divided by a septum, with slender transparent hair-like appendages at each extremity, and one at each side at the septum. (Pl. V., fig. 45.)

394. Common Valsa (*Valsa leiphemia*).—Even more common on oak twigs than the last, with a more distinct corky disc, and the sporidia of nearly the same size and form, but without appendages.

395. Hairy White Peziza (*Peziza villosa*).—Of equal interest with Sphæriæ are the little fleshy cups so commonly to be found on decaying plants. These are sometimes several inches in expanse, when growing on the ground; but on herbaceous plants, twigs, and dead leaves, are usually not much larger than a good-sized pin's head. The present is a hairy species, and is found on nettles, &c. The disc consists of a number of asci and barren threads, packed closely side by side. If a portion is crushed in a drop of water on a glass slide, the clear oval spores will be seen in the asci.

396. Wine-glass Peziza (*Peziza cyathoidea*).—This is a smooth dirty-white species, with the cup on a long stalk, so as to resemble a miniature wine-glass. Common on the dead stems of plants. (Pl. V., fig. 35.)

397. Truffle (*Tuber æstivum*) is a large, subterraneous, rough-coated fungus, the size of a small potato. It is noticed here on account of its singular spores, which are contained in cavities of the substance. There are several British species, which have spores differing in appearance. (Pl. V., fig. 17.)

398. Latticed Fungus (*Stemonitis fusca*).—This curious little fungus grows in tufts on rotten wood. The long stem is in its upper portion branched and interlaced, bearing a great number of minute spores, enclosed in a brown membrane, and forming a sausage-shaped head.

399. Red Trichia (*Trichia rubiformis*).—Growing also on rotten wood, in clusters of claret-coloured, small, pear-shaped heads, which burst and expose the powder-like spores, mixed with spiral threads spiny throughout

their length. These threads are most interesting as microscopic objects.

400. YELLOW TRICHIA (*Trichia chrysosperma*).—Like the last, growing on rotten stumps in globose, golden-yellow heads. The threads are very different from those of the Red Trichia, being without spines.

This list by no means exhausts even the genera of Fungi which are of interest to the microscopist. The two thousand British species contain many other exceedingly beautiful forms, for which we must refer the student to some special work devoted solely thereto.

401. FERN CAPSULES, or thecæ, as more properly called, are found clustered together in brown tufts on the under side of the fronds. They usually approximate to the form delineated, of a pear-shaped body on a short stalk, surrounded by an elastic ring which is either oblique or vertical. (Pl. VI., fig. 7.)

402. OSMUND CAPSULES (*Osmunda regalis*).—The thecæ or spore capsules of this and some other ferns divide laterally and liberate their spores. They are not provided with an elastic ring, as in the majority of ferns.

403. HOODED INDUSIUM (*Cystopteris fragilis*). — The thecæ of ferns are often covered or surrounded by a membraneous indusium, which in this species has the form of a hood. In certain ferns the indusium is altogether wanting, and in most genera the form varies. These objects should be sought and examined before the spores are fully matured. (Pl. VI., fig. 8.)

404. PELTATE INDUSIUM (*Polystichum angulare*).—The covering of the spore-cases in this species, and its allies, is rounded and attached at the centre. In some species the margin is furnished with glands.

405. SPERMATOZOIDS (*Pteris aquilina*).—These active little bodies are produced in cells, which are developed upon the prothallus, or filmy green membrane which results from the germination of the spores of the common bracken. Of course the spores must be caused to germinate to obtain them. (Pl. VI., fig. 6.)

406. BRISTLE FERN CAPSULE (*Trichomanes radi-*

cans).—The receptacle containing the spores are urn-shaped.

407. Filmy Fern Capsules (*Hymenophyllum*).—The two-valved receptacle in either British species may be mounted in a cell with a portion of the frond, as also all other ferns, and viewed as an opaque object.

408. Woodsia Fruit (*Woodsia hyperborea*).—A portion of the fertile frond, showing the fringed clusters of spore-cases, is an interesting object.

409. Jersey Fern (*Gymnogramma leptophylla*).—The clusters of spore-cases are long, and arranged in a line; may be viewed *in situ* on a small fragment of a frond.

410. Gold Fern (*Gymnogramma Mertensii*).—This is one of the commonest gold ferns, of which a small portion of the frond should be mounted, so as to examine the spore-cases and scales of the under surface.

411. Lady Fern (*Athyrium filix-fœmina*).—One of the commonest ferns, of which the fertile frond should be examined.

412. Scaly Ferns (*Goniophlebium sp.*)—Many of the species of this genus are scaly, and consequently interesting objects. Some are cultivated in this country.

413. Cionidium Fern (*Cionidium Moorei*).—The singular way in which the spores are arranged at the edge of the fronds renders this a desirable object.

MOSSES.—The cell-structure of the leaves and fruit of mosses are favourite objects with many microscopists. The cells of the leaves vary much in form, and as they are easily procured, and as easily preserved, will probably become more popular than they are.

414. Leaf Cells (*Bryum cæspiticium*).—These cells are rhombic and about twice as long as broad, and are found at the base of the leaves, which often differ in character from the other portion. (Pl. VI., fig. 1.)

415. Moss Leaf (*Bryum capillare*).—The cells in the leaf of this species are beautifully distinct; the granules

of chlorophyl, or green colouring-matter, making them very attractive objects. Of course they are brightest and best when examined in a fresh state.

416. Hypnum Cells (*Hypnum rutabulum*).—The cells in these leaves are rhombic, with the ends pointed, and are in length several times their diameter. This kind of areolation is of the same type as in fig. 1, but differ in their length. The moss is a common one. (Pl. VI., fig. 2.)

417. Pottia Cells (*Pottia truncata*).—The areolæ of this pretty little moss are hexagonal and dotted. Their length scarcely exceeds the diameter. (Pl. VI., fig. 3.)

418. Cushion Moss Cells (*Grimmia apocarpa*).—Somewhat similar but smaller cells than the foregoing. Many species of Cushion Moss are common on old walls, roofs, &c., and in the majority of them the cell-structure possesses this character.

419. Double Peristome (*Mnium hornum*). — The peristome surrounds the capsule like a fringe, and in this, as in many other species, it is double. The teeth are variable in different species, and the outer series is often richly coloured. They are best mounted dry. (Pl. VI., fig. 4.)

420. Twisted Peristome (*Tortula ruralis*). — This moss is common on walls and thatched roofs. The Twisted Peristome affords a good example of this kind of object. (Pl. VI., fig. 15.)

421. Spiral Capsule (*Eucalypta streptocarpa*).—Unfortunately, this moss is more often found barren than with capsules; these are cylindrical and spirally striated. The moss occurs in the fissures of rocks and on old walls. (Pl. VI., fig. 33.)

422. Bristle Moss Peristome (*Orthotrichum affine*). —The species of *Orthotrichum* are difficult mosses for a learner to name; but this is common enough on trunks of trees, and almost any species furnishes a good peristome.

423. Bottle Moss (*Splachnum sphæricum*).—This is the most common species of the genus, and is found in moist places and Alpine stations on the dung of animals. The capsules are very characteristic. (Pl. VI., fig. 30.)

424. Hygrometric Moss (*Funaria hygrometrica*).—

One of the commonest mosses on the ground, walls, or rocks. The fruit stalks twist like a cord in dry weather. The peristomes open and close alternately when breathed upon; hence they should be mounted with a movable cover.

425. HAIRY HOOD (*Orthotrichum crispum*). — The hairy hood, or calyptra, of this moss, in its early stage, may be found raised on the top of the capsule; with the little cup or sheath, from which it has separated, at the base of the fruit stalk. (Pl. VI., fig. 36; magnified.)

426. INFLATED HOOD (*Funaria hygrometrica*).—The inflated oblique hood, or calyptra, of this very common moss is an interesting object. (Pl. VI., fig. 32.)

427. SCHISTOCARPOUS CAPSULE (*Andreæa sp.*).—The capsules of all the species of *Andreæa* are of this type; at first nearly globose, then splitting into four valves which remain united at the apex. (Pl. VI., fig. 35.)

428. SPIRAL CELLS (*Sphagnum cuspidatum*). — The spiral cells of bog moss are known to most microscopists. This is one of the commonest species in boggy places.

429. FRUIT OF LIVERWORT (*Jungermannia bicuspidata*). —The capsule of almost any species of Liverwort, which may be found in moist shady places, will exhibit the four-valved capsule. This is common on banks, and fruits in spring. (Pl. VI., fig. 14.)

430. ELATERS OF LIVERWORT.—The spiral elaters, or threads, are found mixed with the spores in the capsules of many kinds of Liverwort, and should be sought in the spring. (Pl. VI., fig. 13.)

431. SPORE AND ELATERS OF HORSETAIL (*Equisetum*). —The spores from the cone-like heads of Horsetails have hygrometric threads that uncurl when breathed upon, and should be mounted with loose covers. (Pl. VI., fig. 31.)

432. FRINGED SCALE-MOSS (*Ptilidium ciliare*).—This common Scale-Moss grows in heathy places. A branch, or two or three leaves, may be mounted in glycerine jelly.

433. CURVE-LEAVED SCALE-MOSS (*Jungermannia curvifolia*).—Also common on dead wood in small purple patches. The form of the leaves, and their cellular structure, commend this plant.

434. Mealy Scale-Moss (*Trichocolea tomentella*).—In very pale-green patches in moist places. Leaves divided and subdivided in a compound manner into thread-like branching segments.

435. Whitish Scale-Moss (*Jungermannia albicans*).—Very common on moist banks in a loamy soil. Leaves with a pellucid mark in the centre of each lobe.

436. Maidenhair Scale-Moss (*Calypogeia trichomanes*).—Common in moist woods, on moors, &c. Leaves rounded, with smooth edges. Fruit capsule twisted.

437. Spores of Lycopod (*Lycopodium clavatum*).—This is the largest species of British Lycopod, and bears the spores like a yellowish-white dust within the scales of club-shaped heads. The spores are somewhat angular.

438. Spores of Mountain Lycopod (*Lycopodium alpinum*).—A common Lycopod in Alpine regions. Smaller than the last, often growing with it. Spores obtusely triangular.

439. Lichen Spore (*Urceolaria scruposa*).—The fruit of lichens is usually borne in little cups (apothecia). A section exhibits the asci, or long transparent membranes containing eight spores. The asci are side by side, mixed with barren threads. The spores in this species are very fine. (Pl. VI., fig. 11; spore.)

440. Lichen Spore (*Leptogium lacerum*).—In this instance the spores differ considerably from the last, being elliptic with pointed ends and many transverse divisions. (Pl. VI., fig. 12.)

441. Saccate Lichen Spore (*Solorina saccata*).—The spores of this not very common lichen are uniseptate, or divided by one partition, and the surface is rough. (Pl. VI., fig. 37.)

442. Lichen Ascus (*Calicium turbinatum*).—Our figure exhibits one of the asci, or spore-sacs, of a lichen, with its eight spherical brown spores and a single barren thread. Found on old bark. (Pl. VI., fig. 38.)

443. Ascus and Paraphyses (*Collema pulposum*).—This is a gelatinous kind of lichen when moist, and the

barren threads (paraphyses) are clubbed at the tips. (Pl. VI., fig. 9.)

The following sea-weeds (Nos. 444 to 463) are marine:

444. TETRASPORES (*Chrysomena rosea*).—Four spores united together into a globose body is the usual form of fruit in the red sea-weeds. Three spores only are visible in any position. (Pl. VI., fig. 10.)

445. WRACK SPORES (*Fucus vesiculosus*).—In the common sea-wrack the egg-shaped spores are mixed with barren threads or paraphyses in receptacles at the tips of the fronds. (Pl. VI., fig. 42.)

446. COMMON CORALLINE (*Corallina officinalis*).—Every little pool amongst rocks on the sea-shore has tufts of this coralline, which is also known upon the beach in rough weather, and soon becomes bleached to a chalky whiteness. (Pl. VI., fig. 40.)

447. TETRASPORES IN SITU (*Ceramium strictum*).—The tetraspores in this genus are usually imbedded in the branches at regular distances, and in bands around the branch. In this position they alternate with the spines in the spinulose species. (Pl. VI., fig. 41.)

448. BLADDER WRACK (*Fucus vesiculosus*).—The spores are borne in receptacles at the tips of the fronds in this very common species, and are mixed with the jointed and branched barren threads, or paraphyses. (Pl. VI., fig. 42.)

449. STEM OF SEA WEED (*Polysiphonia affinis*).—Although this is not one of the commonest species, it affords a very good example of the kind of structure to be met with in sections of the stem of some of our sea-weeds. There is, however, a great variety in the cell arrangement in different species. (Pl. VI., fig. 43.)

450. WHORLED WRANGELIA (*Wrangelia multifida*).—The branches of this elegant sea-weed are very elegant, with its whorls of slender branched filaments. Not uncommon in tide-pools on the South Coast.

451. SHORE CONFERVA (*Ectocarpus litoralis*).—One of the commonest parasites on larger Fuci all around the

coast. When in fruit, the smaller branches are swollen at intervals into darker striate receptacles.

452. Granulose Conferva (*Ectocarpus granulosus*).—Not an uncommon marine Conferva, growing on other sea-weeds. Differing considerably in appearance from the last and the mode of producing its fruit.

453. Red Dasya (*Dasya coccinea*).—A section of the lower portion of the stem of this sea-weed is recommended.

454. Thready Polysiphonia (*Polysiphonia byssoides*). One of the handsomest of British sea-weeds, especially when young, and of a beautiful pink colour, with delicate slender branches.

455. Latticed Conferva (*Enteromorpha clathrata*).—Grass-green, much branched, with latticed cells. Common in rock pools.

456. Elongated Polysiphonia (*Polysiphonia elongata*). —A section of the stem of this rather common species is also deserving of notice.

457. Ditch Conferva (*Conferva litorea*).—A common Conferva, found in salt-water ditches, of a dull green colour. Cells one and a half times as long as broad, with here and there a pair of swollen cells.

458. Involucre of Sea Weed (*Griffithsia sp.*).—In some species the tetraspores are attached to short branches arranged in a circle, so as to form a kind of involucre. (Pl. VI., fig. 44.)

459. Fruit of Coralline (*Corallina officinalis*).—The receptacles in this common coralline contain tufts of tetraspores of an elongated form, with the four spores placed end to end. (Pl. VI., fig. 45.)

460. Favellæ (*Callithamnion tetragonum*). — This beautiful red alga is a parasite on larger species. The tetraspores are very small, but the favellæ are large and easily detected, seated on plumules less than half a line in length. (Pl. VI., fig. 46.)

461. Binate Spores (*Ectocarpus Mertensii*).—This is a common species on mud-covered rocks near low-water mark. The binate spores are immersed in the smaller

branchlets. The entire plant is about four or five inches in length, sometimes more. (Pl. VI., fig. 47.)

462. Bristly Sea Weed (*Ceramium ciliatum*).—Several closely allied species are found on our coasts, the bristly filaments of which form beautiful microscopic objects. The present species is found attached to stones in tide-pools, and the filaments are about the thickness of a hair. (Pl. VI., fig. 48.)

463. Capsule of Sea Weed (*Polysiphonia fibrillosa*).—This is a common species of sea-weed on our coasts, and will afford good examples of capsules, as well as tetraspores. The capsules are ovate, and closely seated upon the smaller branches. Any species of *Polysiphonia* will afford capsules. (Pl. VI., fig. 49.)

The following are chiefly confined to fresh water:

464. The Phyllactidium (*Phyllactidium pulchellum*).—This is by no means a common species. It is found adhering to the sides of aquaria, like little green discs, visible to the naked eye. The structure, as seen under a low power, is given in the figure. (Pl. VI., fig. 17.)

465. Beaded Water-weed (*Batrachospermum moniliforme.*—Met with in standing pools or running streams. Stems one inch or more long, branched, covered with whorls of beaded threads, which are themselves branched, and bear amongst them the granular fruit.

466. Slender Drapernaldia (*Drapernaldia tenuis*).—Filaments convervoid and free, but gelatinous, slender, and branched; four inches long; cells two or three times as long as broad, sometimes less. In sluggish streams.

467. Beautiful Trentepohlia (*Trentepohlia pulchella*).—Found growing on stones in streams, in blue-green or rosy tufts, a quarter of an inch in length. Filaments branched several times in a forked manner

468. Common Nostoc (*Nostoc commune*).—Like lumps of dark green jelly on gravel walks, &c., after rain. It consists of a mass of beaded threads, with here and there an enlarged cell, involved in gelatine. Common in autumn and winter. (Pl. VI., fig. 18.)

469. JENNER'S SPIRILLUM (*Spirillum Jenneri*).—This is a rare species, and is given as an illustration of the group to which it belongs. The filaments are green, and found mixed with *Oscillatoria*. They form a loose spiral, and are apparently beaded, from the numerous divisions. (Pl. VI., fig. 19.)

470. HEATH CONFERVA (*Zygogonium ericetorum*).—In appearance confervoid; the filaments forming a stratum on swampy heaths, and sometimes in water, of a dull purplish colour. The cells about twice as long as broad. (Pl. VI., fig. 20.)

471. BANDED CONFERVA (*Ulothrix zonata*).—Filamentous, bright green, delighting in clear water and the neighbourhood of waterfalls. Cells rather longer than broad, or not half as long as broad, almost cylindrical, with a clear margin around them. Common. (Pl. VI., fig. 21.)

472. WALL CONFERVA (*Lyngbya muralis*).—Common on damp walls, and conspicuous after a shower of rain. Filaments entangled, contorted, dark green; cells short.

473. SPORE OF CONFERVA (*Spirogyra sp.*).—The spore (analogous to seed) of a species of *Spirogyra*, with its spiral fibre in the interior, just before germination, is shown in the figure. (Pl. VI., fig. 23.)

474. MUCOUS CONFERVA (*Ulothrix mucosa*).—Found in stagnant water. The filaments are surrounded by a mucous envelope. Similar to No. 471, but not so common. (Pl. VI., fig. 24.)

475. SPERMATOZOIDS.—These curious bodies are more or less common amongst algæ, varying a little in shape. Often ovate, with two or more active cilia at the narrow end. They issue from special receptacles, and are the agents of fertilization. (Pl. VI., fig. 25.)

476. SPIRAL CONFERVA (*Spirogyra commune*).—The spiral arrangement of the green contents of the cells is common to several species of Conferva, of which this is an example not uncommon in ponds. (Pl. VI., fig. 26.)

477. ELLIPTIC SPHÆROZYGA (*Sphærozyga leptosperma*).—The filaments are slender and jointed, collected into a

gelatinous stratum. Elliptical cells scattered in the threads. Found in ditches and pools.

478. Carmichael's Sphærozyga (*Sphærozyga Carmichaelii*).—The filaments beaded, tapering at the ends, collected into a gelatinous stratum. Vesicular cells, spherical and ciliated, and the sporangia elliptical. Found on damp soil in salt marshes or in brackish ditches. (Pl. VI., fig. 27.)

479. Little Mesocarp (*Mesocarpus parvulus*) is a small species of Conferva of rather uncommon occurrence, which conjugates by cross threads so as to form a kind of network.

480. Water-flower Conferva (*Aphanizomenon flos-aquæ*).—The filaments cohere in bundles, and indistinctly septate; joints longer than broad; the sporangia many times longer than broad. Probably not uncommon. (Pl. VI., fig. 28.)

481. Curved Trichormus (*Trichormus flos-aquæ*) is found in stagnant ditches, and rises to the surface in large bluish-green gelatinous masses. The filaments are curved and beaded, with larger cells interspersed.

482. Straight Trichormus (*Trichormus rectus*).—The filaments are beaded and slender, but straight and of a bright green. Vesicular cells reddish. Found in still pools, but not common. (Pl. VI., fig. 29.)

483. Ditch Rivularia (*Rivularia angulosa*).—Roundish, gelatinous, and hollow, attached to plants in still waters. The filaments radiate in all directions, inflated at the base, and tapering upwards. (Pl. VI., fig. 34.)

484. Black Rivularia (*Rivularia atra*).—This is a common parasite on Corallina, and on stones, forming little hard balls like shot. The plant consists of dark green, awl-shaped filaments, with a colourless spherical cell at the base. (Pl. VI., fig. 39.)

485. Orange Wall Conferva (*Chroolepus aureus*) is found in orange, velvety patches on rocks, trees, and walls. Very common. The irregular filaments are much branched.

486. Ralfs's Zygnema (*Zygnema Ralfsii*).—The filaments jointed; cells three or four times as long as broad; contents green, collected in the form of dumb-bells. Standing water on commons. (Pl. VI, fig. 22.)

487. The Volvox (*Volvox globator*) is common enough in most pools, and consists of a ciliated reticulated sphere, generally enclosing miniature spheres of a like character, of a deep green colour, themselves young stages of the same plant. The rolling movement of these spheres, when living, and the bright colour cannot, of course, be preserved in mounting; hence the Volvox should be examined alive.

488. The Pandorina (*Pandorina morum*) is a less beautiful object, but not less interesting. A number of little green bodies, with long cilia, are associated together in a cluster, and thus they move about in the water. They occur in pools amongst duckweed and Conferva, and are not uncommon.

489. The Breastplate (*Gonium pectorale*).—Near the surface in clear water. Square, with about sixteen green cells, each with a pair of cilia.

490. Green Protococcus (*Protococcus viridis*).—The plant consists of a single cell, first developed on moist earth, and then moving about in standing water, as zoospores. At some periods of rest, the colour is reddish.

SECTION II. ANIMAL.

491. Plumules of Small White Butterfly (*Pieris Rapæ*).—Plumules are characteristic scales found on the upper surface of the fore wings of male butterflies. These are expanded below, with a broad deep notch, and tufted at the apex. (Pl. VII., fig. 7.)

492. Plumules of Orange Tip (*Pieris cardamines*).—Fan-shaped, with the sides nearly parallel, and the ends slightly convex and fringed.

493. Plumules of Common Blue (*Polyommatus Alexis*).—Known as 'Battledore scales,' from their shape, which is elliptical, produced below into a shaft or handle. (Pl. VII., fig. 11.)

494. Plumules of Azure Blue (*Polyommatus argiolus*).—The sides are nearly parallel, and the ends straight; so that, with the markings, they appear to resemble miniature 'gridirons,' rather that battledores.

495. Plumules of Large Heath (*Hipparchia tithonus*).—Very long and narrow, tapering upwards, and terminated by a small tuft or tassel.

496. Plumules of Wall (*Hipparchia megæra*).—Very similar to the last, but with the lower extremity a little lobed by the depression of the shaft. (Pl. VII., fig. 12.)

497. Plumules of Grayling (*Hipparchia semele*).—Much shorter in proportion than either of the two last named, rounded at the base, and the sides almost parallel.

498. Fringe Scale of Clearwing (*Trochilium tipuliforme*).—The marginal hair-like scales have a long shaft, expanded into a triangular five-pronged head. (Pl. VII., fig. 4.)

499. Scale of Clearwing (*Trochilium tipuliforme*).—The scales on the nervures of the wings have nearly parallel sides, rounded base, and irregularly notched apex. (Pl. VII., fig. 5.)

500. Transparent Scale (*Trochilium tipuliforme*).—The small rounded scales scattered over the clear membrane of the wing are very delicate and transparent; slightly iridescent. (Pl. VII., fig. 6.)

501. Long Scale of Cabbage (*Pieris Rapæ*).—A common form of scale on the small white Cabbage Butterfly, is lobed at the base, and expanded upwards, with a rounded apex. (Pl. VII., fig. 14.)

502. Fan Scale of Silver Lines (*Pyralis prasiniana*).—This pretty little green moth has fan-shaped scales, mixed with other forms, with an expanding deeply toothed apex. (Pl. VII. fig. 17.)

503. Scale of Silver Lines (*Pyralis prasiniana*).—Another form of scale common on this moth is acutely

pointed at the base, with the sides convex, and irregularly toothed at the apex. (Pl. VII., fig. 13.)

504. Scales of Tortoiseshell (*Vanessa Urticæ*).—If the scales of the upper surface of the fore wing are transferred carefully, they will represent the form and arrangement of the scales of the wing, and make a most instructive mounting.

505. Scales of Hunting-Spider (*Salticus scenicus*).—This common little spider is clad with beautiful scales, for which it should be mounted whole.

506. Scale of Lepisma (*Lepisma saccharina*).—This insect inhabits old woodwork. The scales are nearly ovate, with an acutely serrated apex, and longitudinally striated. (Pl. VII., fig. 8.)

507. Podura Scale (*Degeeria nigro-maculata*).—Many species of Podura yield scales; this, which Mr. McIntyre calls the 'Speckled Podura,' he refers with some doubt to the above named species. The insect appears to inhabit cellars. (Pl. VII., fig. 9.)

508. Podura Scale (*Macrotoma plumbea*).—This pentagonal scale, with fine striæ, is very distinct from the usual form of Podura scales. (Pl. VII., fig. 19.)

509. Scales of Death-Watch (*Amobium tesselatum*).—The larva of this beetle furnishes two or three forms of minute scales—one hair-like, one with parallel, and one with convex sides.

510. Scale of Gnat (*Culex pipiens*).—Minute scales, nearly triangular, with longitudinal ribs. (Pl. VII., fig. 15.)

511. Scale of Weevil (*Curculio sp.*).—Many of the little 'weevil' beetles have scales distributed over the elytra. One of these is found on beech-trees. (Pl. VII., fig. 16.)

512. Scales of Rose Weevil (*Otiorhynchus picipes*).—The scales on this weevil are arranged in circles, with a scale in the centre. The circles in parallel lines along the elytra. Attacks rose-bushes in the spring, and is common also in hedges. (Pl. VII., fig. 22.)

513. Little Phyllobius (*Phyllobius uniformis*).—The

elytra are covered with beautiful green and iridescent scales. Another species (*P. argentatus*) is equally beautiful. Found on nettles and other herbaceous plants in spring.

514. Bronze Hypera (*Hypera nigrirostris*). — This little beetle is covered with minute, bronze-like, narrow scales, and is commonly found in hedges and gardens.

515. Asparagus Beetle (*Crioceris asparagi*).—This is often mounted as an object; but it is by no means so attractive as either of the above. It is smooth, and without scales.

516. Green Phyllobius (*Phyllobius viridicollis*) is a similar and equally beautifully scaled beetle with No. 513, but is not so common, and of maritime proclivities.

517. Tiger Beetle (*Cicendela campestris*).— The rough green wing-case of this beetle is worthy of regard. The beetle may be found in hot sandy places, and is remarkably active.

518. Wing-case of Nepa (*Nepa cinerea*).—The wing-cases (elytra) of this common insect are covered with minute scale-like hairs, or hair-like scales, and discoid plates.

519. Wing-hooks of Ophion Fly (*Ophion obscurus*). —The hind wings of many Hymenopterous insects are furnished at the upper edge with a row of hooks, which vary much in form in different insects. In this instance the tips are slightly recurved. (Pl. VII., fig. 26.)

520. Wing-hooks of Saw-Fly (*Uroceros gigas*).—The hooks of the large Saw-fly are flat, a little expanded at the tip, and gradually curved. (Pl. VII., fig. 24.)

521. Wing-hooks of Bee (*Andrena fulvicrus*).—These hooks are abruptly bent, and curved back at the tips. The bee is abundant around London, and generally distributed throughout the country. (Pl. VII., fig. 23.)

522. Wing-hooks of Golden Wasp (*Chrysis ignita*). — This common, brightly coloured insect has nearly straight hooks. (Pl. VII., fig. 27.)

523. Wing-hooks of Astata (*Astata boops*). — The hooks are gently curved, with straight tips. The insect is not uncommon. (Pl. VII., fig. 28.)

524. Wing-hooks of Hive-Bee (*Apis mellifica*).—These hooks have been long known, as well as those of the Humble Bee, and are arranged in a long series.

525. Wing-hooks of Plant-Lice (*Aphis*).—The wings of most species of plant-lice have small hooks of a similar character to the above.

526. Antenna of Encyrtus (*Encyrtus punctipes*).—This insect is a small parasite, which attacks a species of *Coccus*, and may be hatched oftentimes from female scale-insects (*Cocci*) attached to living twigs of hornbeam. The antennæ are clavate, jointed, and hairy. (Pl. VII., fig. 34.)

527. Antenna of Euplectus (*Euplectus*).—These are little beetles, found sometimes in cucumber-frames, but not common. In all the same type of antennæ prevails. (Pl. VII., fig. 35.)

528. Antenna of Cockchafer (*Melolontha vulgaris*).—The antennæ of this common insect bear overlapping ovate plates at the tip, which separate like a fan. Those of the female are smaller than the male, and less known to microscopists.

529. Antenna of Wasp-Beetle (*Rhipiphorus paradoxus*).—A black beetle found in wasps' nests and on flowers. Each joint of the antennæ has a branch or spur on the inner side. (Pl. VII., fig. 36.)

530. Antenna of Prionus (*Prionus coriarius*).—One of the long-horned beetles. The antennæ consist of funnel-shaped joints, inserted one into the other. (Pl. VII., fig. 37.)

531. Antenna of Water-Beetle (*Hydrus piceus*).—This is a large water-beetle. The singular antennæ are slender below, but broad and clubbed above, with lunate joints. (Pl. VII., fig. 38.)

532. Antenna of Mole-Flea (*Pulex Talpæ*).—The pair of jointed antennæ which surmount the head of this lively little flea are curious and interesting. (Pl. VII., fig. 41.)

533. Antenna of Vapourer-Moth (*Orgyia antiqua*).—This very common moth has plumose antennæ, each

branch again plumed with rigid hairs, and terminating in a pair of bristles. In all these instances, males should be selected.

534. ANTENNA OF SCALLOP-BAR (*Scodiona belgiaria*).—This has also plumose antennæ, as well as the Bordered Grey (*Selidosema plumaria*), the Oak Beauty (*Amphidasis prodromaria*), and the males of many others of the Geometers. (Pl. VII., fig. 39.)

535. ANTENNA OF GNAT (*Culex pipiens*).—The plumose antenna of the male gnat, and the still finer antenna of another species, called the Plume Gnat, may be mounted *in sitû*.

536. END OF ANTENNA.—The end of the antennæ of the larva of the Cockchafer is furnished with a number of erect spines. (Pl. VII., fig. 25.)

537. CLAW OF SPIDER (*Epeira diadema*).—In many species of spider, the concave side of the claw of the foot is serrated, or toothed like a comb, more distinct in some than in others. (Pl. VII., fig. 20.)

538. EYES OF WATER-SPIDER (*Argyroneuta aquatica*).—The eight eyes are arranged according to a different plan in nearly all the genera of spiders—a useful guide in determining the genus to which a spider belongs. (Pl. VII., fig. 18.)

539. THREAD OF SPIDER'S WEB (*Epeira diadema*).—These glutinous threads have spherical beads at regular distances, with intermediate smaller ones. (Pl. VII., fig. 50.)

540. LANCET OF WASP (*Vespa vulgaris*).—The lancet of wasp-sting, extruded, with its toothed barbs, is a common but very instructive object. (Pl. VII., fig. 10.)

541. TONGUE OF BLOW-FLY (*Musca vomitoria*).—This very common and beautiful object is often figured and described as flattened and contorted by mounting. It is, however, a beautiful object when seen in its natural condition.

542. FOOT OF FLY (*Musca domestica*).—The foot is hardly less interesting than the tongue. The claws and

the pads, with their trumpet-shaped tenant hairs, should be examined.

543. COMPOUND EYE.—Many insects are at hand to furnish compound eyes, that is, eyes composed of innumerable hexagonal segments, each of which is believed to perform the office of a simple eye

544. PROBOSCIS OF BUTTERFLY (*Vanessa Urticæ*).—It is better to mount the entire head of such a butterfly as the Small Tortoiseshell, so as to show the compound eyes, the antennæ, and the coiled proboscis at one view.

545. WING OF HOUSE-FLY (*Musca domestica*) is beautifully iridescent under the microscope, especially if the light be well managed. It is best to use a Lieberkuhn (*E. Marks*).

546. PLUME MOTH WING (*Pterophorus pentadactylus*).—One of the plumes or an entire wing of the White Plume Moth. Each plume is fringed along each side with delicate white hairs.

547. HEAD OF CORETHRA (*Corethra plumicornis*).—The head of this common gnat-like insect, with its plumed antennæ, is a very pretty object.

548. SKELETON LARVA (*Corethra plumicornis*).—A common aquatic larva, remarkably transparent, fully described in several natural-history journals. Should have a place in every cabinet.

549. LARVA OF GNAT (*Culex pipiens*, &c.).—May be found in every water-butt, and, if carefully mounted, is 'a thing of beauty.'

550. FOOT OF CUCKOO-SPIT (*Aphrophora spumaria*).—This common hopper, with its frothy home, is well known; and both the foot and under wing are recommended as microscopical objects.

551. CLAW OF BRITTLE STAR (*Ophiocoma rosula*).—The arms of the common Brittle Star have attached on the under side numerous two-toothed hooks, which, with the ray spines, are good objects. (Pl. X., fig. 25.)

552. ROSY FEATHER STAR (*Comatula rosacea*).—Either the young animal, or the arms of a larger one, of this

pretty star-fish makes an attractive object. It, unfortunately, cannot be considered common.

553. Grey Brittle Star (*Ophiocoma neglecta*).—May be found in tide-pools at the base of small seaweeds, or amongst the filaments (byssus) of mussels. Often less than an inch in expanse, it may be mounted whole.

554. Common Brittle Star (*Ophiocoma rosula*).—Even more common than the last, congregating on the edges of scollop banks, from whence they may be dredged, and mounted entire.

555. Common Sun-Star (*Solaster papposa*). — With twelve to fifteen rays, frequenting oyster-beds. Small specimens, three-quarters of an inch in diameter, are desirable objects.

556. Pedicellaria of Star-Fish (*Uraster rubens*).—These curious beak-like processes from the upper surface of the common 'Five-fingers' should have a place in every cabinet.

557. Spines of Egg Urchin (*Echinus sphæra*).—The small spines of this urchin, and also the pedicellariæ, may be commended to notice.

558. Spines of Heart Urchin (*Amphidotus cordatus*). —The commonest of all Heart Urchins, with hair-like spines. The enclosed animal sometimes contains a good collection of diatoms.

559. Sole Skin (*Solea vulgaris*). — Fish-scales are favourite objects. Those of the Sole have a very spiny free margin, and should be seen attached to a portion of the skin as an opaque object.

560. Perch Scale (*Perca fluviatilis*).—More or less square, with rounded angles; lobed at one extremity, and spiny at the other; the spines diminishing towards the centre. Closely traversed with concentric lines, except at the spiny end.

561. Roach Scale (*Leuciscus rutilus*).—Nearly circular, with a wavy margin and one flattened side. Concentric lines more distant as they approach the centre, where they are obliterated.

562. Pike Scale (*Esox lucius*).—Oblong, with a raised,

wedge-shaped segment proceeding from one extremity towards the centre. Concentric lines very close and numerous over the entire surface.

563. Trout Scale (*Salmo fario*).—Small, irregular, ovate or elliptic, with coarse concentric lines nearly to the centre.

564. Grey Mullet Scale (*Mugil capito*).—Shortly pear-shaped, depressed at the smallest, and convex at the broadest end; the former with about eight longitudinal ribs and numerous transverse concentric striæ. The broadest end apparently reticulated with the lines of short obtuse spines.

565. Dog-Fish Skin (*Acanthias vulgaris?*).—Whole surface covered with small, short, arrow-headed spines. The species is uncertain from whence this skin was obtained.

566. Eel Skin (*Anguilla acutirostris*).—A piece of eel skin may be cleaned and mounted in balsam to show the arrangement of scales.

567. Thornback Skin (*Raia clavata*).—Covered with curious horny hooks, variable in size. A portion, where the hooks are small, should be selected as furnishing the neatest object.

568. Feather Hooks.—The barbs of the feathers of a goose will afford an example of the hooks on the barbs, so often alluded to by authors.

569. Feather.—The upper portion of a small feather, such as that of a Gold Crest or, perhaps better, of a Humming-Bird, affords a good example of the usual form of feather structure.

570. Feather of Fowl (*Gallus Bankiva*, var.)—The shining neck-feathers of the male of some varieties of the Barn-door Fowl have the horny shaft and its branches expanded in a blade-like manner, which occasions the glossiness.

571. Feather of Peacock (*Pavo cristatus*). — The green-bronzed feathers of the Peacock should have a small portion mounted with a disc of pink or crimson sheet-gelatine as a background.

572. Down of Tawny Owl (*Syrnium aluco*).—The separate fibrils of the lower (downy) extremity of a feather vary in different birds. In the Owl they are of two kinds, modifications the one of the other, as represented in the plate. (Pl. VII., figs. 29, 30.)

573. Down of Goshawk (*Astur palumbarius*).—The upper ends of the joints scarcely expanded, so that the filaments are almost like jointed transparent hairs. (Pl. VII., fig. 31.)

574. Down of Eider Duck (*Somateria mollissima*).—The joints are long and broadly expanded at the upper end into a trumpet-shape, with a slightly notched or waved margin. (Pl. VII., fig. 33.)

575. Down of Cuckoo (*Cuculus canorus*).—The joints about the same length as in the Owl, but expanding more suddenly at the end of each. The filaments slender and delicate.

576. Down of Turkey (*Meleagris gallopavo*).—The fibrils are coarse, and the joints numerous; but with the ends only slightly expanded, and toothed at the margin.

577. Down of Little Egret (*Herodias garzetta*).—Fibrils short and delicate. Joints numerous, but little swollen—a good contrast to the down of the other birds enumerated.

578. Down of Gold-Crest (*Regulus cristatus*).—The joints are short, and their upper extremities expanded, with the margins serrated. (Pl. VII., fig. 32.)

579. Hair of Anthrenus larva (*Anthrenus varius*).—The larvæ of two or three small beetles, destructive in cabinets, of which this is one, are furnished with delicate hairs of two kinds, the most interesting of which is figured. It has long been known to microscopists as 'Hair of *Dermestes*.' (Pl. VII., fig. 1.)

580. Hair of Tiresias larva (*Tiresias serra*).—A much larger beetle-larva than the last; found under the bark of elms. The hairs are larger, but very similar to those of *Anthrenus*.

581. Hair of Pencil-tail (*Polyxenus lagurus*).—This insect is found under the old bark of elms, and also

furnishes two kinds of hairs, both of which are figured. The entire insect is a good object for a low power. (Pl. VII., figs. 2, 3.)

582. HAIR OF SPIDER (*Epeira diadema*).—These hairs from the legs are fringed with delicate branches, which are spreading in the lower portion and approximate above. (Pl. VII., fig. 40.)

583. HAIR OF OX-FLY (*Tabanus bovinus*).—The upper portion of the hairs from the thorax are beset with short fibrils. (Pl. VII., fig. 49.)

584. HAIR OF CATERPILLAR (*Orgyia antiqua*).—The tufts of dark hairs at the extremity of this common caterpillar are brush-like at the tips, as shown in the figure. (Pl. VII., fig. 21.)

585. HAIR OF TIGER-CATERPILLAR (*Arctia caja*).—The hairs of the caterpillar of the common tiger-moth are beset with bristly fibrils throughout their length..

586. HAIR OF WATER-RAT (*Arvicola amphibius*).—The cellular centre of the larger hairs is occupied by three parallel longitudinal lines of nearly equilateral cells. (Pl. VII., fig. 42.)

587. HAIR OF POLECAT (*Mustela putorius*).—Margin of the large hairs serrated. Central portion more distinctly cellular than in the stoat, which the smaller much resemble. (Pl. VII., fig. 44.)

588. HAIR OF OTTER (*Lutra vulgaris*).—Centre of the larger hairs dark and indistinctly cellular. The cells passing across the centre. Margin of small hairs serrated. (Pl. VII., fig. 45.)

589. HAIR OF FOX (*Vulpes vulgaris*).—Transparent, except the centre, which is occupied by a row of distinct cells, shorter than broad in the larger hairs, and nearly equal in the smaller. (Pl. VII., fig. 46.)

590. HAIR OF STOAT (*Mustela erminea*).—Largest hairs with a dark centre, the cells of which can scarcely be distinguished, the smaller serrated at the margin and the centre with a single series of equilateral cells. (Pl. VII., fig. 47.)

591. HAIR OF FALLOW-DEER (*Dama vulgaris*).—Larger

hairs with the centre darker coloured and cellular. The cells not arranged in regular longitudinal series. (Pl. VII., fig. 48.)

592. Hair of Mole (*Talpa Europæa*).—These hairs are evidently flattened, the margins indented on one side. The centre occupied by transverse irregular cells, which are opaque from the enclosed air.

593. Hair of Rabbit (*Lepus cuniculus*).—Larger hairs, with three or more longitudinal rows of cells, almost to the margin of the hair. Small hairs with one row of cells, similar but distinct from Mouse hair.

594. Hair of Weasel (*Mustela vulgaris*).—Two-thirds of the diameter of the larger hairs cellular; a single line of short cells running down the centre. In the smaller hairs the cells are longer, and the clear space between them greater.

595. Hair of Mouse (*Mus musculus*).—The larger hairs exhibit three longitudinal series of cells, which occupy three-fourths of the diameter of the hair. Indistinct markings, representing the margins of the external scales, are just visible.

596. Hair of Brown Rat (*Mus decumanus*).—Translucent; central cells shallow, passing across more than three-fourths of the diameter of the larger hairs, with short connecting branches to the cells above and below.

597. Hair of Lesser Horseshoe Bat (*Rhinolophus hipposideros*).—Transparent; scales cylindrical, expanding upwards, with nearly straight or slightly waved edges. No cellular portion visible in any of the Bat hairs included here.

598. Hair of Barbastelle (*Barbastellus communis*).—The margin finely serrated; scales wholly or partly cylindrical, conspicuously short and close.

599. Hair of Long-eared Bat (*Plecotus auritus*).—Flattened, with a deeply notched outline; serratures opposite or alternate; scales half embracing the shaft, darkened at the margin, faintly striate. (Pl. VII., fig. 43.)

600. Hair of Whiskered Bat (*Vespertilio mystacinus*).—Dark coloured and opaque; margins distinctly serrated.

Somewhat resembling the last, but distinct by the greater opacity, which is not lost in balsam.

601. Cabbage Butterfly Eggs (*Pieris Brassicæ*).—These eggs are very much elongated, with the apex contracted, and then lengthened into a nipple-like projection. Prominent ribs longitudinally, at regular distances, connected by short transverse bars. When fresh, of a pale primrose-colour. (Pl. VIII., fig. 26.)

602. Small Tortoiseshell Eggs (*Vanessa Urticæ*).—Truncated ovoid, or resembling a hen's egg with flattened ends; with distant and prominent longitudinal ribs, and indistinct transverse lines between them. (Pl. VIII., fig. 31.)

603. Red Admiral Eggs (*Vanessa Atalanta*).—Nearly ovoid, with flattened ends. Very prominent parallel ribs from base to apex, rather distant from each other. (Pl. VIII., fig. 39.)

604. Meadow Brown Eggs (*Hipparchia janira*).—Almost conical, with an abrupt apex; parallel ribs from base to apex. (Pl. VIII., fig. 36.)

605. Gatekeeper's Eggs (*Hipparchia tithonus*). — Resembling a truncated cone, with prominent longitudinal ribs, connected by transverse bars. (Pl. VIII., fig. 38.)

606. Speckled-wood Eggs (*Lasiommata Ægeria*).—Of a regular, rather elongated-ovoid form; the surface beautifully reticulated into hexagonal cells. (Pl. VIII., fig. 25.)

607. Common Blue Eggs (*Polyommatus Alexis*).—Spherical, a little depressed, of a chalky whiteness. The surface rough, with small obtuse papillæ. (Pl. VIII., fig. 21.)

608. Ringlet Eggs (*Hipparchia hyperanthus*).—Almost globular, a little flattened at the base, and beaded in longitudinal lines with little points. (Pl. VIII., fig. 24.)

609. Brown Hair-Streak Eggs (*Thecla Betulæ*). — Somewhat conical, of an ivory whiteness, covered with deep depressions and corresponding projecting spines.

610. Puss Moth Eggs (*Cerura vinula*).—The eggs of the 'Puss Moth' are almost round, of an orange tint, and the surface is finely reticulated, with a raised network of delicate and regular veining.

611. Lunar Thorn Eggs (*Selenia lunaria*).—Elliptical, with one end flattened. Translucent, with a pearly lustre. Surface minutely and delicately reticulated. (Pl. VIII., fig. 27.)

612. Buff Tiger Eggs (*Euthemonia russula*).—These eggs are rather small, globular, and externally covered with a network of hexagonal elevations. The texture is very delicate and iridescent.

613. Dotted Clay Eggs (*Noctua baja*). — Flattened at the base and rounded above, so as to be almost hemispherical. Parallel ribs from base to apex numerous, united by transverse bars. (Pl. VIII., fig. 23.)

614. Dingy Shears Eggs (*Orthosia upsilon*).—These are somewhat conical eggs, rather small, and with the surface traversed by longitudinal ribs, which are connected together by small transverse veins, so as to cover the surface with quadrangular depressions.

615. Grey Arches Eggs (*Aplecta nebulosa*). — Orbicular, flattened at the poles. The surface covered with minute lenticular bases. (Pl. VIII., fig. 22.)

616. Swallow-tail Moth Eggs (*Ourapteryx Sambucaria*).—Of an oval form, with truncated ends. The sides with raised parallel ribs, connected with smaller transverse bars. (Pl. VIII., fig. 33.)

617. Small Emerald Eggs (*Jodis vernaria*).—Of a flattened-oval form, the surface minutely reticulated; almost transparent, and of a delicate silvery whiteness.

618. Willow Beauty Eggs (*Boarmia rhomboidaria*). —Cylindrical, with obtuse, rounded ends. Surface reticulated with hexagonal pits. Colour and lustre pearly.

619. Brindled Beauty Eggs (*Biston hirtaria*).—Elliptical, semi-transparent, with a steely lustre. The surface rough with minute irregular depressions.

620. Gooseberry-Moth Eggs (*Abraxas grossulariata*). —Almost the shape of miniature hen's eggs. The surface neatly and minutely reticulated in a hexagonal manner. They have a delicate silvery lustre, and are very translucent. (Pl. VIII., fig. 30.)

621. Thorn-Moth Eggs (*Ennomos erosaria*).—Curious

elongated four-sided eggs, surmounted by a coronet or circlet of minute beads. Opalescent when empty.

622. Mottled-umber Eggs (*Hybernia defoliaria*).—Long ovoid eggs, with comparatively large and distinct reticulations of a hexagonal shape, with the depressions finely dotted or punctate. Each angle of the hexagons has a prominent boss or button. (Pl. VIII., fig. 32.)

623. Cabbage-Moth Eggs (*Mamestra Brassicæ*).—Resembling in form the bulb of a crocus. Traversed with numerous parallel ribs, united by transverse bars. The teat-like apex smooth. (Pl. VIII., fig. 34.)

624. Small Silver Lines (*Pyralis prasinana*).—Conical, with an abrupt apex. The sides supported by parallel ribs, with connecting transverse bars.

625. Yellow Belle Eggs (*Aspilates citraria*).—Cylindrical, with flattened ends. Of a pearly lustre, and with the surface rough with minute irregular puncta.

626. Buff Ermine Eggs (*Arctia lubricipeda*).—Obtusely conical, with a rounded apex and flattened base, horn-coloured, and almost smooth. Not an attractive species.

627. Chimney-sweeper Eggs (*Odezia chærophyllata*).—Elliptical, small, with a long narrow cleft-like depression down the centre. (Pl. VIII., fig. 35.)

628. Vapourer-Moth Eggs (*Orgyia antiqua*).—Spherical, with a broad raised rim about the apex. (Pl. VIII., fig. 37.)

629. Coxcomb Prominent Eggs (*Lophopteryx camelina*).—Nearly spherical; surface smooth, with the peculiar milky appearance and lustre of opal. (Pl. VIII., fig. 40.)

630. Chevalier Eggs (*Euplexia leucipara*).—Onion-shaped, with prominent ribs from the apex downwards, forked, and connected by transverse bars.

631. Buff Tiger Eggs (*Euthemonia russula*).—Spherical, covered by a fine reticulation of irregular hexagons, and remarkably translucent.

632. Eggs of Fly (*Anthomyia pluvialis*).—Cylindrical, three or four times as long as broad, with a winged expansion throughout the entire length on either side.

Surface honeycombed, with hexagonal pits; wings reticulated. Yellowish white. (Pl. VIII., fig. 28.)

633. Eggs of Lacewing (*Chrysopa perla*).—Translucent greenish. Elliptical; attached to the apex of a filament or stalk four or six times the length of the egg, and which has its base secured to the leaves of plants. (Pl. VIII., fig. 29.)

634. Bed-Bug Eggs (*Acanthia lectularia*).—The little coronated eggs of this 'metropolitan' have been recommended.

635. Dung-Fly Eggs (*Scatophaga stercoraria*).—These winged eggs are common on every patch of cow-dung.

636. Eggs of Stone-Mite (*Tetranychus lapidus*).—Well known almost discoid little eggs, found on stones and other substances.

637. Eggs of Water-Mite (*Diplodontus mentor*).—These are deposited on water-weeds in crustaceous gelatinous patches, each egg being indicated by a crimson spot surrounded by a transparent mucus.

The following marine Zoophytes (638 to 654) must not be confounded with the Polyzoa formerly classed with Zoophytes:

638. Herring-bone Coralline (*Halecium halecinum*).—Irregularly branched and pinnate, like a herring-bone. Cells alternate, bell-shaped. From four to eight inches in length. On old shells and stones in deep water.

639. Great-tooth Coralline (*Sertularia polyzonias*).—Slightly branching, one inch or more in length. Cells alternate and rather distant, urn-shaped, with the mouth four-toothed. Vesicles large, often wrinkled. On shells, corallines, and seaweeds.

640. Trefoil Coralline (*Sertularia rugosa*).—Also with the cells alternate, but readily distinguished by the cells being transversely wrinkled. Seldom above an inch in height. On flustra, sponges, and seaweed. (Pl. VIII., fig. 16.)

641. Sea-oak Coralline (*Sertularia pumila*).—Cells

opposite each other, in pairs. Small and parasitic on different species of sea-wrack.

642. Sea-fir Coralline (*Sertularia abietina*).—Erect and rigid, from four to ten inches high. Regularly pinnate and flattened. Cells nearly opposite, rather small, swollen at the base so as to resemble a miniature Florence flask. (Pl. VIII., fig. 14.)

643. Sea-hair Coralline (*Sertularia operculata*).—From four inches in height, growing in tufts; branches very slender, hair-like, and graceful; cells opposite, with the outer angle ending in a point. Common on large seaweeds. (Pl. VIII., fig. 19.)

644. Sheep's-tail Coralline (*Sertularia argentea*).—From six inches in height, with compound forked branches. Cells nearly opposite, like a Florence flask with a bent neck. On oyster-shells and seaweeds. (Pl. VIII., fig. 17.)

645. Sea-cypress Coralline (*Sertularia cupressina*).—Larger than the last, and also with compound forked branches. Cells nearly opposite, with the margin cut into two or three teeth. Not uncommon on mussels and oysters.

646. Lobster-horn Coralline (*Antennularia antennina*).—Eight inches in height. Grows in clusters of unbranched stems, which are surrounded at regular distances by whorls of delicate branchlets. Cells small, bell-shaped.

647. Branched-horn Coralline (*Antennularia ramosa*).—Resembling the last; but with the main stem branched, and the hair-like branchlets are longer. On old shells and stones in deep water.

648. Sickle Coralline (*Plumularia falcata*).—From six to twelve inches in length, rising in spiral turns, with branches on the outer side. The branches are pinnate. Cells on the branches and branchlets in two rows pointing alternately to opposite sides. (Pl. VIII., fig. 15.)

649. Sea Bristles (*Plumularia setacea*).—Scarcely reaching six inches in height, pinnate. Cells very remote, bell-shaped, with an even margin. Parasitical on other zoophytes. (Pl. VIII., fig. 18.)

650. Sea-thread Coralline (*Laomedea dichotoma*).—Stem thread-like and wavy, from twelve inches in length, branched in an alternate manner. Cells bell-shaped, seated on ringed stalks or peduncles. Common on old shells. (Pl. VIII., fig. 20.)

651. Knotted-thread Coralline (*Laomedea geniculata*).—Clustered, with thread-like, seldom-branching stems. Cells bell-shaped, seated on ringed stalks or peduncles. Parasitical on seaweeds near low-water mark.

652. Climbing-bell Coralline (*Campanularia volubilis*).—Stem creeping, thread-like, very small. Cells on long, slender, ringed stalks or peduncles, somewhat bell-shaped, with a toothed margin. Parasitical on other zoophytes and seaweeds.

653. Creeping-bell Coralline (*Campanularia syringa*).—With a creeping stem, slender and hair-like. Cells long and narrow, seated on twisted peduncles. Parasitical on small seaweeds and other zoophytes.

654. Horny-bell Coralline (*Campanularia dumosa*).—Either bushy and erect or creeping; irregularly branched. Of a horny texture. Cells long and tubular, and almost or entirely without peduncles. On crabs, rocks, and zoophytes in deep water.

The following Polyzoa, though placed immediately after Zoophytes, are of a higher order, and follow here for convenience of reference:

655. Purple Tubipore (*Tubulipora serpens*).—Of a faint purple or white, irregularly divided, flat, half an inch in length, polyp-tubes in transverse rows. Commonly adherent to zoophytes, old shells, and seaweeds.

656. Tufted Ivory Coralline (*Crisia eburnea*).—In little bushy tufts of ivory whiteness, from one quarter of an inch in length, on seaweeds and zoophytes. Branched with cells in two rows, tubular, narrowed below, transparent and granulous.

657. Goat's Horn Coralline (*Crisidia cornuta*).—Slender and erect, half an inch in height, one cell rising upon the apex of another. Cells horn-shaped, with the

openings turned in one direction, and a long bristle above each cell. On zoophytes.

658. Snake Coralline (*Anguinaria spatulata*). — Creeping, club-shaped cells, bent at the upper portion, rise at irregular intervals from the creeping, fibrous stem. Parasitic on seaweeds.

659. Mail Coralline (*Gemellaria loriculata*).—Very bushy; the branches slender, thread-like, and numerous. Cells smooth, and in pairs. Growing below low-water mark.

660. Rough Cellepore (*Cellepora pumicosa*).—Cells conglomerated into a calcareous mass, encrusting other bodies, rough and porous. Aperture sometimes with a short tooth. On stones, zoophytes, and seaweeds.

661. Ringed Lepralia (*Lepralia annulata*).—Crustaceous on seaweeds. Cells unshaped, with transverse rows of punctures. Opening surrounded by a smooth rim. (Pl. VIII., fig. 1.)

662. Punctate Lepralia (*Lepralia punctata*).—Crustaceous; cells almost cylindrical, with transverse rows of obscure punctures. Opening roundish, uneven, with three or four obsolete teeth on the rim. On rocks and old shells.

663. Rough Lepralia (*Lepralia variolosa*).—Crustaceous; cells oblong, depressed, roughish, punctured between the cells. Opening roundish, with a plain margin. On stones and bivalved shells. (Pl. VIII., fig. 2.)

664. One-horned Lepralia (*Lepralia unicornis*).—Crustaceous; cells ovate, scaly, with a short knob above the opening, which is roundish, with a distinct notch in the upper margin. On rocks and the roots of seaweeds. (Pl. VIII., fig. 3.)

665. Immersed Lepralia (*Lepralia immersa*).—Crustaceous; cells ovate, immersed in the crust. Openings roundish, with a tooth at the upper and several spines on the lower margin. On shells and stones, in deep water. (Pl. VIII., fig. 5.)

666. Reddish Lepralia (*Lepralia coccinea*).—Crustaceous; cells shortly cylindrical, rough. The aperture toothed on the upper margin, and with four or five long

spines on the lower. On stones and shells. (Pl. VIII., fig. 4.)

667. Membranaceous Coralline (*Membranipora membranacea*).—Forming a greyish-white crust on stones near low water-mark. Cells ovate, with a blunt, hollow, conical process at the summit of each. (Pl. VIII., fig. 6.)

668. Hairy Coralline (*Membranipora pilosa*).—Encrusting, following the shape of the object it grows upon. Cells short, tubular, with large roundish openings; toothed at the margin, and a long tubular bristle near the mouth. On seaweeds, &c. (Pl. VIII., fig. 7.)

669. Creeping Stony Coralline (*Cellularia scruposa*).—Creeping, often covering a space one inch square; branches diverging, forked. Mouth of the cells oval, regular. On each side of the cell in front are two slender spines. On zoophytes, shells, seaweeds, &c.

670. Creeping Coralline (*Cellularia reptans*).—Creeping, with forked branches. Cells with an oblique opening, armed with short spines at the top. On *Flustra foliacea*, &c. (Pl. VIII., fig. 13.)

671. Bird's-head Coralline (*Cellularia avicularia*).—Erect, one or two inches high, with forked branches. Cells with a helmet-like figure over the opening, and two spines on the top of each. On the outward margin a bird's-head process. On zoophytes, &c.

672. Broad Hornwrack (*Flustra foliacea*).—Spreading and leaf-like, with cells on both sides. Cells narrow at the base, surface roughish, arched at the top with four or six conical spines. Common. (Pl. VIII., fig. 8.)

673. Papery Hornwrack (*Flustra chartacea*).—In small bushy tufts. Cells on both sides, oblong, swelling a little in the middle. Substance brittle and paper-like. Common on the Sussex coast. (Pl. VIII., fig. 9.)

674. Narrow Hornwrack (*Flustra truncata*).—Bushy, four or five inches in length, forked; branches narrowed at their base; cells narrow oblong; walls thin; opening small and circular. In deep water. (Pl. VIII., fig. 12.)

675. Membrane Hornwrack (*Flustra membranacea*).—Crustaceous, forming a gauzy incrustation; cells oblong,

with a short blunt spine at each corner. Common on the fronds of seaweeds. (Pl. VIII., fig. 10.)

676. Capsular Hornwrack (*Flustra avicularis*).—About an inch in height, fan-like, of a greyish colour; cells in four or five rows, oblong, with a spine at each side of the opening, and a globose pearly capsule seated between them. On old shells and zoophytes.

677. Bugle Coralline (*Salicornaria farciminoides*).—Erect, with forked branches; cylindrical, constricted at the joints; cells lozenge-shaped, with a central opening. On old shells and zoophytes. (Pl. VIII., fig. 11.)

678. Waved Bugle Coralline (*Salicornaria sinuosa*).—Resembling the last, but with the cells oblong, and the apertures in the upper portion. Often mixed with the preceding.

679. Foliaceous Coralline (*Eschara foliacea*).—Often of a large size, like a membrane twisted into winding folds; light and crisp; cells on both sides, opening obliquely by roundish apertures. In deep water.

680. The Cristatella (*Cristatella mucedo*). — In colonies, of an oval shape, convex on the upper surface. In ponds, creeping slowly over stones and aquatic plants. Polyps in three concentric series around the margin. Tentacula very numerous—about eighty.

681. The Plumatella (*Plumatella repens*).—In ponds and streams, attached to the underside of stones and aquatic plants. Irregularly branched; polyp-cells usually single, sometimes in pairs along the branches. Tentacula about sixty.

682. The Lophopus (*Lophopus crystallinus*). — In ponds, attached to aquatic plants. Colonies invested in transparent gelatine, from which the polyps emerge as from sacs. Tentacles numerous.

683. Smooth Alcyonidium (*Alcyonidium gelatinosum*).—A marine species, attached to shells and stones. Gelatinous, of a pale brownish colour, and very irregular elongated form, six or more inches long. Polyps, with sixteen tentacula, emerge from small orifices covering the surface.

684. Hairy Alcyonidium (*Alcyonidium hirsutum*).—Equally common on seaweeds at low-water mark. Surface covered with little conical teats or papillæ, from each of which emerges a polyp-head, furnished with sixteen tentacles.

685. Green Hydra (*Hydra viridis*).—Very common in ditches, attached to duckweed. Green, just visible to the naked eye, like buds; body nearly cylindrical, ending in from six to ten tentacles, each scarcely the length of the body. (Pl. XI., fig. 20.)

686. Brown Hydra (*Hydra fusca*).—Not common, under similar conditions. Brownish, with from six to eight arms, which are capable of being extended to a great length. (Pl. XI., fig. 13.)

687. Orange Hydra (*Hydra vulgaris*).—In weedy ponds. About the same size as the Green Hydra; of an orange or orange-brown colour. Tentacles seven or eight, sometimes more, longer than the body

Palates or Tongues of Molluscs afford a great variety of objects. They are sometimes mounted dry, and sometimes in balsam.

688. Palate of Dog-whelk (*Purpura lapillus*).—In three series; the central simple and broad, the side teeth flat. The palates are easily obtained from these common molluscs, and are favourite objects.

689. Palate of Whelk (*Buccinum undatum*).—The central band consists of equal rows of straight teeth, seven in a row. The outer band on either side V-shaped, with three inner and one outer curved teeth.

690. Palate of Limpet (*Patella vulgata*).—Central teeth in fours, alternating with inner lateral teeth in pairs. The outer teeth on each side in threes.

691. Palate of Periwinkle (*Littorina litorea*).—Narrower and simpler than in *Cyclostoma elegans.*

692. Palate of Neritine (*Neritina fluviatilis*).—Teeth in several series: central minute, inner lateral large; the outer lateral teeth uniform and very numerous.

693. Palate of Cyclostoma (*Cyslostoma elegans*).—With seven series of teeth: the central recurved at the

top; the inner lateral broader, and also recurved; the two outer lateral series more or less conical.

694. Palate of Mud-Shell (*Limnæa stagnalis*).—Teeth in numerous series, entirely or nearly uniform.

FORAMINIFERA.—If common chalk be carefully broken up and washed, the shells of several species of fossil Foraminifera may be obtained, and these will constitute a very attractive series of microscopic objects. Some of these we have figured and enumerated.

695. Obtuse Bulimina (*Bulimina obtusa*).—This is one of four species, belonging to the same genus, which are to be found in English chalk. The outline is very similar to that of some of our small land-shells. (Pl. IX., fig. 1.)

696. Murchison's Bulimina (*Bulimina Murchisoniana*).—This is a broader, shorter, and more acutely pointed form than the preceding, and is found in chalk from the neighbourhood of Gravesend.

697. Slender Toothshell (*Dentalina gracilis*).—This long, slender, and delicate shell is also from the chalk. It is liable to be broken or washed away in the cleaning, unless that process is conducted with considerable care. (Pl. IX., fig. 2.)

698. Ribbed Toothshell (*Dentalina sulcata*).—This is a more common form of Toothshell than the last, from which it may be known by its longitudinal ribs, which give a stellate appearance to an end view of the shell.

699. Prickly Toothshell (*Dentalina aculeata*).—The distinctly moniliform arrangement of this shell, and its surface studded with little acute processes, serve to distinguish it from its allies. It occurs in Gravesend chalk. (Pl. IX., fig. 8.)

700. Wheeled Cristellaria (*Cristellaria rotulata*) has more the form of a minute Nautilus than any other chalk species. It may be obtained from washings of Sussex chalk, and is the only British species of the genus found in the chalk. (Pl. IX., fig. 3.)

701. Cone Textularia (*Textularia turris*).—This is the most compact and regular of the fossil Textularias, having an elongated conical form, and may be obtained from chalk-washings. (Pl. IX., fig. 4.)

702. Striated Textularia (*Textularia striata*).—As its name indicates, this species has a striated surface. The double row of confluent, nearly globose chambers are gradually attenuated towards the apex. It is from Gravesend chalk. (Pl. IX., fig. 6.)

703. Long-chambered Textularia (*Textularia aciculata*).—This singular and characteristic Textularia is found in the chalk of Brighton. (Pl. IX., fig. 13.)

704. Rough Textularia (*Textularia aspera*).—The arrangement and general appearance of this species resembles the Striated Textularia; but, instead of being striate, the surface is rough and granular. Found at Brighton.

705. Perforated Textularia (*Textularia perforata*). —This species has more of the Nautilus form than the rest, and occurs in Gravesend chalk.

706. Chalk Globigerina (*Globigerina cretacea*) is a very interesting shell, closely allied to species found living at the present day, and is not uncommon in Sussex chalk. (Pl. IX., fig. 5.)

707. Another species, named *Globigerina elevata*, is found in the chalk of Kent.

708. Globose Rotalia (*Rotalia globulosa*). — Several species of *Rotalia* are found in the chalk; and this, which consists of a spiral of globose chambers, is one of them. In was first detected by Professor Ehrenberg, in the year 1838. (Pl. IX., fig. 7.)

709. Cordier's Rotalia (*Rotalia Cordieriana*) has a Nautilus form in one view, though when seen edgewise it is very different (fig. 9 a). Indeed, a correct estimate of the form of the Foraminifera can hardly be formed from seeing them only in one position. (Pl. IX., fig. 9.)

710. Lobed Rotalia (*Rotalia Voltziana*).—Another coil shell of the chalk, for which we must refer to the figure. (Pl. IX., fig. 11.)

711. Swollen Rotalia (*Rotalia turgida*).—Common

in Kentish chalk. Shell thin; divisions of the chambers straight. (Pl. IX., fig. 12.)

712. Smooth Rotalia (*Rotalia Micheliniana*).—With a Nautilus form, obliquely divided into chambers. Found in chalk.

713. Lobed Rotalina (*Rotalina Lorneriana*).—Three kinds of *Rotalina* are found in Gravesend chalk, of which this is one. It is a beautiful and very characteristic form, having the chambers spirally arranged and lobulate. (Pl. IX., fig. 10.)

714. Clement's Rotalina (*Rotalina Clementiana*).—An elegant form, with teat-like projections at the inner angle of each chamber.

Other forms of Foraminifera are found in British chalk, which we cannot figure and describe within the limits of the present work.

Recent forms of Foraminifera are also plentiful in salt water, not only around our own coasts, but all the world over.

715. Flask Shells (*Lagena vulgaris*).—Shaped like a flask with a long neck, and a rim around the mouth; smooth and transparent, acquiring a bluish-white tint with age. It has been collected at Whitehaven, Swansea, Scarborough, &c. (Pl. IX., fig. 14.)

716. Globose Shell (*Entosolenia globosa*).—Nearly of an egg shape and smooth, slightly projecting at one extremity, at which is the opening. Found at Exmouth, Southport, Swansea, Scarborough, and other localities. (Pl. IX., fig. 15.)

717. Margined Entosolenia (*Entosolenia marginata*).—The commonest of British species. Nearly spherical, with a marginal ridge; opaque, and of a dirty-white colour; transparent when young. Found at Portsmouth and other localities.

718. Tooth Shells (*Dentalina subarcuata* and *Dentalina legumen*).—These two species are not uncommon, and are very variable in form, especially the former. They occur on the south coast of England, and around the Scotch islands.

719. The NUMMULITE (*Nummulina planulata*).—Though elegant, this species is rare. It has a lens or lentil form and spiral arrangement, smooth, bright-brown, translucent, with radiating septal lines. The only localities named for it are Portsmouth and Scarborough. (Pl. IX., fig. 16.)

720. RAISED POLYSTOMELLA (*Polystomella crispa*).—This shell is also of a lens shape and spiral; the segments or chambers divided by raised lines, with intermediate elevations and depressions; in young shells the extremities of the septal ridges are elongated into pointed spines; the mature shell is opaque and dirty white. Found all round the coast.

721. DEPRESSED POLYSTOMELLA (*Polystomella umbilicatula*).—The shell is of a Nautilus form, compressed sideways; but the septal lines are depressed, and not elevated as in the preceding, and the intermediate furrows are only along one side of each segment; texture transparent. Occurs at Plymouth, Exmouth, Torquay, Southport, Shetland, and other places. (Pl. IX., fig. 17.)

722. COMMON ROTALINA (*Rotalina Beccarii*).—This has the form of a Trochus shell, being convex on one side and flattened on the other; the chambers are divided by depressions on the surface, the under or flattened side having numerous protuberances, especially near the centre; semi-transparent. Found on every part of the coast.

723. OCHRACEOUS ROTALINA (*Rotalina ochracea*).—The rarest of British *Rotalinæ*, having only been found at Shetland. The septa of a pale ochre tint, and the segments of a deep brown. (Pl. IX., fig. 18.)

724. OBLONG ROTALINA (*Rotalina oblonga*).—This shell has a curious, unequal appearance, being developed broadly on one side of the spiral, then rapidly diminishing. It is a pale olivaceous tint, and semi-transparent. Found at Skye, the Shetlands, Guernsey, and a few other localities. (Pl. IX., fig. 22.)

725. ROTALINA (*Rotalina concamerata*).—The form is that of a Trochus shell. It is chiefly found in its young state attached to other bodies, and is then very different

in appearance from its mature stage. In the former condition it is very common. (Pl. IX., fig. 23.)

726. The GLOBIGERINA (*Globigerina bulloides*).—This very much resembles the Chalk Globigerina, and is by some authors regarded as the same species. It is like a spiral mass of little globes. This species is found almost everywhere, not only around our coasts, but from the bottom of the Atlantic.

727. The TRUNCATULINA (*Truncatulina lobatula*).—This is a parasitic species, with a spiral form, containing numerous segments. It is found attached to the larger sea-weeds and the shells of molluscs, and abounds on all parts of the coast.

728. VARIABLE TEXTULARIA (*Textularia variabilis*).—This genus has the segments arranged in two series; and in this species the form is oblong, with the segments a little elongated transversely, diminishing slightly towards the apex. It is somewhat transparent, and of a dirty-white colour. (Pl. IX., fig. 19.)

729. WEDGE-SHAPED TEXTULARIA (*Textularia cuneiformis*).—The outline of this shell is wedge-shaped, with numerous segments divided by depressions. Of a pale dirty-brown colour. Found in numerous localities around the British coast. (Pl. IX., fig. 24.)

730. TWIN-CELLED SHELL (*Biloculina ringens*). — The shell is oval, with its last segment projecting beyond the previous one, with a rounded margin. It is white, glossy, and opaque. Found at Exmouth, Scarborough, Whitehaven, Plymouth, and other places. (Pl. IX., fig. 20.)

731. SEED-LIKE MILIOLINA (*Miliolina seminulum*).—Of a very peculiar structure, generally with only five segments visible. Oblong, and compressed on one side. In texture it resembles porcelain, being white, opaque, and glossy. (Pl. IX., fig. 21.)

732. PARASITIC SPONGE (*Grantia compressa*).—Small, whitish, pear-shaped, flattened objects attached to sea-weeds; may be sliced lengthwise into two thin segments, mounted dry or in balsam, and thus exhibit sponge structure.

733. Spicules of Grantia (*Grantia compressa*).—The calcareous spicules of this sponge are (1) club-shaped, curved at the thick end, and also (2) three-rayed, sometimes with one ray elongated. (Pl. IX., figs. 26, 33, 45.)

734. Fresh-water Sponge Gemmules (*Spongilla fluviatilis*).—The green spherical gemmules of this sponge bear some resemblance to a Volvox without internal globes, and are sometimes plentiful in waters containing the sponge.

735. Fresh-water Sponge Spicules (*Spongilla fluviatilis*).—The birotulate spicules of this sponge are a very good example of this type of spicules. (Pl. IX., fig. 44.)

736. Bombay Sponge (*Spongilla Meyeni*).—The spicules of the gemmules belonging to a fresh-water sponge found in the tanks of Bombay are sold mounted by some opticians, and are beautiful examples of birotulate spicules.

737. River Sponge Spicules (*Spongilla lacustris*).—This second species of British fresh-water sponge has spicules straight, spindle-shaped, and also curved and pointed at each end, both kinds being spiny. (Pl. IX., fig. 36.)

738. Branched Sponge (*Chalina oculata*).—One of the commonest sponges thrown on the beach around our coasts is this. A section of the sponge may be cut to show its structure. The siliceous spicules are short, straight, and pointed at both ends.

739. Skull Sponge (*Tethia cranium*).—Sponge nearly spherical. Spicules needle-like, pointed at both ends; others three-pronged, or recurved ternate; others minute, and hooked at each end. (Pl. IX., figs. 27, 34.)

740. Stellate Spicules (*Tethia lyncurium*).—Sponge globular. Spicules long, needle-shaped, pointed at each end, collected in bundles; others stellate. Found in several localities around the coast.

741. Clustered Parasitic Sponge (*Leucosolenia botryoides*).—Sponge cylindrical, branched, parasitic on seaweeds and zoophytes. Spicules three-rayed.

742. Crumb of Bread Sponge (*Halichondria panicea*).—Sponge variable, enveloping seaweeds or zoophytes, or

free. Spicules numerous, simple, needle-shaped, pointed at both ends. The sponge is common. (Pl. IX., fig. 48.)

743. JOHNSTON'S SPONGE (*Pachymatisma Johnstonia*).—Sponge massive and undulating. Spicules stellate or three-rayed, some spindle-shaped and minute. Found attached to rocks. (Pl. IX., fig. 28.)

744. INCRUSTING SPONGE (*Halichondria incrustans*).—Sponge massive, with an uneven surface. Spicules of two or three kinds, some slightly curved and spiny, others slender and curved like an S. (Pl. IX., figs. 30, 32.)

745. PLUMOSE SPONGE (*Hymeniacedon plumosa*). — Sponge sessile, scarlet when alive. Spicules needle-shaped, in bundles, and anchorate with angular hooks. Rare on the Devonshire coast. (Pl. IX., fig. 29.)

746. TOW SPONGE (*Dictyocylindrus stuposus*).—Sponge branching; branches slender and forked. Spicules needle-shaped and cylindrical; those of the dermal membrane stellate. The sponge is rare on the south coast. (Pl. IX., fig. 46.)

747. RIGID BRANCHED SPONGE (*Dictyocylindrus ramosus*). — Sponge branched in a variable manner, about three inches high. Spicules needle-shaped, slender; some pointed at one end, some at both, often flexuous; some of them minutely spined. Sponge common.

748. LATTICED SPONGE (*Desmacidon ægagropila*). — Sponge sessile and irregular, red when alive, often incrusting seaweeds. Spicules of two or three kinds, almost club-shaped; others needle-shaped, and others two-hooked or three-curved.

749. FRAGILE SPONGE (*Dysidea fragilis*). —Sponge, when young, coating stones; afterwards in fan-like ridges, and irregular. Skeleton coarsely reticulated, and without spicules of its own, enclosing sand, &c. A section should be examined for structure.

750. PINK SPONGE (*Isodictya fucorum*).—Sponge sessile and irregular. Pink or bright red when alive. The texture is delicate, and the spicules either needle-shaped or hooked at both ends. Common around the coast.

751. OYSTER-SHELL SPONGE (*Cliona celata*).—Yellowish;

filling the interior of channels and excavations in old shells. Spicules pin-shaped. Very common all around the coast. (Pl. IX., fig. 43.)

752. Common Gorgonia Spicules (*Gorgonia verrucosa*).—The spicules of this common Gorgonia are calcareous, and of two kinds—one elongated, straight, pointed at each end, and rough with spines; the other bottle-shaped, spined at the apex, base, and centre. (Pl. IX., fig. 47.)

753. Violet Gorgonia (*Gorgonia anceps*).—Not at all a common species on our coasts. The calcareous spicules are similar in shape, but larger than the next, and the warts are in bands round the spicules.

754. Fan Gorgonia (*Gorgonia flabellum*).—Not British, but often met with at natural-history dealers'. Spicules calcareous, elongated and pointed at each end, covered with warty projections.

755. Dead Man's Fingers (*Alcyonium digitatum*).—Common on oyster and scallop shells, grey, yellow, or white. Variable in shape, soft but tough; contains calcareous spicules. (Pl. IX., fig. 49.)

756. Venus's Flower-Basket (*Euplectella aspergillum*).—This beautiful exotic sponge is now so common, that we cannot forbear introducing it here, and calling attention to the structure of the threads at the base, amongst which other objects are often entangled.

757. Cruciate Spicule (*Alcyoncellum sp.?*). — The spicule here figured was obtained entangled in the meshes of a common sponge, dredged at the Orkneys; so that not only is it rare, but the sponge is unknown to which it belongs. (Pl. IX., fig. 31.)

758. Spicules of Glass-rope (*Hyalonema mirabilis*).—The Glass-rope, concerning which so much discussion has arisen, is encased in its basal portion by a *Palythoa*, in which lie embedded the beautiful cruciate spicules here figured. (Pl. IX., fig. 37.)

759. Anchors of Synapta (*Synapta digitata*).—This Holothurian is found in the British seas, and yields anchors and plates such as we have figured. (Pl. IX., fig. 35.)

760. Anchors of Synapta (*Synapta inhærens*).—This

is also a British Holothurian. The plates which accompany the anchors are more rounded than in the last, and the margin of the orifices is minutely toothed. (Pl. XI., fig. 38.)

761. Spicules of Sea-Urchin (*Echinus sphæra*).—The C-shaped spicules are not uncommon in Echinoderms, and occur in this British species of Urchin. (Pl. XI., fig. 39.)

762. Spicules of Sea-Urchin (*Echinus sphæra*).—Other similar spicules are found in the same animal, and in a foreign species of *Mespilia*, which are swollen in the centre. (Pl. XI., fig. 40.)

763. Spicules of Sea-Urchin (*Echinus Drobrachiensis*).—Curved dumb-bell spicules, with lobed ends, are found in another Sea-Urchin which occurs on our coasts. (Pl. XI., fig. 41.)

764. Spicules of Echinometra.—In an exotic species of *Echinometra* very singular elongated perforated plates, or spicules, are found, of which modifications may be traced in some species of *Cidaris*. (Pl. XI., fig. 42.)

765. Anchors of Busk's Synapta (*Synapta Buskii*).—Dr. McIntosh has found a Synapta in the Outer Hebrides with singular anchor plates, having a long handle.

766. Plates of Thyone (*Thyone flexus*).—The discoid perforated plates of this British Thyone, found on several parts of our coast, are, when perfect, attractive objects.

767. Vinegar Eels (*Anguillula aceti*).—Found in the mucilage of common vinegar, which has been exposed to the air.

768. Paste Eels (*Angillula glutinis*).—Not uncommon in sour paste.

769. Wheat Eels (*Anguillula tritici*).—Sometimes called Vibriones. Found in diseased kernels of wheat. They will revive, and become active in water, after having been kept dry for years.

770. The Trichina (*Trichina spiralis*).—A small Entozoon, unfavourably known of late years as the cause of a peculiar disease in man, in whose muscles it is found encysted, as well as in some of the lower animals.

INFUSORIA are such a large and heterogeneous group, that we can only indicate some of the most common.

771. FLAT MONAS (*Monas lens*).—Rounded or flattened, with an apparently tuberculated surface and a long slender vibratile filament. Common in infusions. The most minute member of the animal kingdom. (Pl. X., fig. 27.)

772. RED ASTASIA (*Astasia hæmatodes*).—Body spindle-shaped; tail very short. At first green; ultimately reddish. In stagnant water. (Pl. X., fig. 26.)

773. GREEN EUGLENA (*Euglena viridis*).—Body spindle-shaped, retractile; head short. Filament twice the length of the body, delicate. Colour green, with a red eye-spot. In stagnant water. (Pl. X., fig. 11.)

774. THE AMŒBA (*Amœba diffluens*). — Colourless. Form constantly varying; sometimes globose, at others elongated, or with finger-like processes. Common amongst duckweed.

775. PEAR-SHAPED DIFFLUGIA (*Difflugia pyriformis*).—Pear-shaped, granular, and dark coloured. Processes colourless. Amongst stagnant water. (Pl. X., fig. 28.)

776. COMMON OPHRYDIUM (*Ophrydium versatile*). — Body spindle-shaped, tapering in one direction, and in the other contracted into a cylindrical neck with a funnel-shaped head and a ciliated disc. In salt or fresh water. (Pl. X., fig. 22.)

777. OVATE OPHRYOGLENA (*Ophryoglena acuminata*).—Ovate, brown, and compressed. Tail short. Eye-spot red. Cilia numerous, in regular longitudinal rows. In peaty swamps and turf hollows. (Pl. X., fig. 8.)

778. EICHHORN'S ACTINOPHRYS (*Actinophrys Eichhornii*). — Globose, white. Tentacles distributed freely over the body, and tapering. Shorter than the diameter of the body. Amongst aquatic plants. (Pl. X., fig. 9.)

779. The SUN ACTINOPHRYS (*Actinophrys sol*).—Globose, greyish. Tentacles diverging from every part of the surface, and tapering. Equal in length to the diameter of the body. Amongst Confervæ.

780. COMMON PARAMECIUM (*Paramecium aurelia*).—

Oblong and flattened. Ciliated on all sides in longitudinal series. Abundant in infusions and in stagnant water. (Pl. X., fig. 7.)

781. Barrel Animalcule (*Coleps hirtus*).—Oval, with abrupt ends. Shelly covering barrel-shaped, apparently composed of small polygonal plates, between which are the cilia. Movements brisk. Amongst Confervæ. (Pl. X., fig. 3.)

782. Muller's Chætospira (*Chætospira Mulleri*).—Inhabiting a flask-shaped sheath, which is imbedded in the cells of duckweed, a ciliated feather-like spire above projecting. Probably not uncommon. (Pl. X., fig. 4.)

783. Sheathed Bell Animalcule (*Tintinnus cothurnia*).—Inhabiting a cylindrical hyaline sheath. Transparent, cup-shaped, with a patulous mouth surrounded by rather long cilia, a flexible pedicle attached to one side of the sheath. In brackish water. (*J. G. Tatem.*) (Pl. X., fig. 5.)

784. Muller's Stentor (*Stentor Mulleri*).—Trumpet-shaped, large; when contracted, ovoid. With a wreath of cilia. Swimming freely, and disposed to congregate. Amongst duckweed and other aquatic plants. (Pl. X., fig. 2.)

785. Sheathed Trumpet Animalcule (*Vaginicola crystallina*).—Enclosed in a transparent cylindrical case, slightly narrowed at the extremity. Body capable of extension and retraction within the case. Attached to duckweed. (Pl. X., fig. 6.)

786. Urn-shaped Vorticella (*Vorticella microstoma*).—Body urn-shaped, attached to a pedicel six times its length. When contracted, exhibiting transverse rings. Pedicel readily and quickly contracted. Apex with a ciliary wreath. In stagnant water. (Pl. X., fig. 14.)

787. Bell-shaped Vorticella (*Vorticella convallaria*).—Body bell-shaped, attached to a pedicel six times its length; mouth broader than the last. bundant, attached to water-weeds and other objects.

788. Gregarious Vorticella (*Vorticella nebulifera*).—Body somewhat bell-shaped, attached to a pedicel five

times its length. Collecting in colonies, so as to form a white film on duckweed, &c.

789. BRANCHED BELL ANIMALCULE (*Carchesium polypinum*).—A kind of branched Vorticella, with a retractile stem; each branch terminated by a little bell, and forming an exceedingly beautiful object.

790. FOXGLOVE EPISTYLIS (*Epistylis digitalis*).—Also like a branched Vorticella, with a rigid stem. The bells terminating the branches, like foxglove flowers. Parasitic on the body of the four-horned Cyclops.

791. EGG ANIMALCULE (*Trachelius ovum*).—Egg-shaped, with a kind of proboscis, so that at times it is almost pear-shaped. Body ciliated. In stagnant water.

792. GREEN TOP ANIMALCULE (*Uroleptus piscis*).—Top-shaped, of a green colour. Body and tail covered with cilia. Amongst dead leaves in ponds. Early spring.

793. HYDRA PARASITE (*Kerona polyporum*).—Parasitic on the brown Hydra. Whitish and somewhat kidney-shaped, with a series of cilia in front.

794. MUSSEL STYLE-BEARER (*Stylonychia mytilus*).—Oblong and flattened, with a row of strong cilia, armed posteriorly with numerous styles. Climbs and swims, back downwards. In stagnant water.

795. PLATTER STYLE-BEARER (*Euplotes patella*).—Nearly circular, covered with a shield or carapace; body armed with styles and hooks. Crawls backwards and forwards amongst duckweed, or swims, with great facility.

Although ROTIFERS are enumerated here, their affinities are with Crustaceans rather than with the Infusoria, with which they were till recently associated.

796. HAIRY ROTIFER (*Chætonotus larus*).—Elongated, with hairs in lines down the back and forked tail. In muddy water. (Pl. X., fig. 10.)

797. LARGE HAIRY ROTIFER (*Chætonotus maximus*) is a larger species, with the hairs all short and equal.

798. The CONOCHILUS (*Conochilus volvox*).—United in masses, enclosed in a gelatinous envelope. From ten to forty animals compose a spherical revolving mass.

799. The Stephanoceros (*Stephanoceros Eichornii*).—Enclosed in a transparent sheath. Animal club-shaped, with five long ciliated arms. Attached to water-weeds, &c. (Pl. X., fig. 23.)

800. Hornwort Limnias (*Limnias ceratophylli*).—Enclosed in a brownish case, smooth externally. Wheel two-lobed. On hornwort and other water-plants.

801. The Melicerta (*Melicerta ringens*). —Enclosed in a case, which is brownish red, granulated externally. Wheel four-lobed. On duckweed, &c.

802. Horned Floscule (*Floscularia cornuta*).—Enclosed in a thin transparent case. Head surrounded by five rounded lobes, each with a tuft of long cilia, and a supplementary naked horn outside one of the lobes. Amongst water-plants. (Pl. X., fig. 21.)

803. Beautiful Floscule (*Floscularia ornata*).—With five lobes, one higher than the rest, similar to the last.

804. Funnel Rotifer (*Hydatina senta*).—Conical and transparent, with a wreath of cilia at the broad end. (Pl. X., fig. 12.)

805. Furcularia.—Four species of this genus are recorded in Britain, but none of them appear to be very common.

806. Long-tailed Rotifer (*Monocerca rattus*).—Oblong, with one eye-spot, and a long thin foot, the length of the body. Amongst Confervæ. (Pl. X., fig. 18.)

807. Volvox Parasite (*Notommata parasita*).—Oval, with a short foot. Wheel of three or four lobes. Lives in the globes of *Volvox globator*.

808. Long Volvox Parasite (*Notommata petromyzon*). —Elongated, narrowed towards each end. Also parasitic in Volvox.

809. Eared Rotifer (*Notommata aurita*).—Often pear-shaped; sometimes cylindrical. Head with two retractile ear-like lobes. Amongst Confervæ. (Pl. X., fig. 1.)

810. Oblong Synchæta (*Synchæta oblonga*).—Oblong, with six rotary clusters, and armed with four styles. In spring, amongst Confervæ.

811. Two-horned Synchæta (*Synchæta pectinata*).—

Short and conical, with two styles and two crest-like horns. Amongst Confervæ.

812. Little Monostyla (*Monostyla cornuta*).—Egg-shaped, with a simple foot at the broad end. Enclosed in a transparent shell or lorica. Amongst water-weeds. (Pl. X., fig. 13.)

813. Crescent Euchlanis (*Euchlanis luna*).—Enclosed in a cup-shaped lorica, with the mouth curved out in a lunate manner. Amongst Confervæ.

814. Three-sided Euchlanis (*Euchlanis triquetra*).—Lorica large and inversely pear-shaped, almost triangular.

815. Spiny Salpina (*Salpina spinigera*).—Lorica, or shell, with four front and three posterior horns. Amongst hornwort. (Pl. X., fig. 17.)

816. Skeleton Rotifer (*Dinocharis pocillum*).—Shell, or lorica, nearly cylindrical. Foot long, with three toes. Two spines at the base of the foot. Amongst hornwort. (Pl. X., fig. 19.)

817. Long-toed Skeleton (*Dinocharis tetractis*).—With longer toes than the last. Lorica triangular. Amongst duckweed.

818. Rounded Metopidia (*Metopidia lepadella*).—Lorica nearly flat, broad, and ovate. Rounded behind. Eyes two. Toes longer than the foot.

819. Pointed Metopidia (*Metopidia acuminata*).—Flattened, ovate, and pointed behind. Amongst Confervæ.

820. Spiny Stephanops (*Stephanops lamellaris*).—Lorica depressed, front expanded in a hood-like manner. Three posterior spines. Amongst Confervæ. (Pl. X., fig. 16.)

821. Spineless Stephanops (*Stephanops muticus*).—Lorica depressed, with a frontal hood. Without the posterior spines. In standing water.

822. Common Rotifer (*Rotifer vulgaris*).—Without lorica. Body spindle-shaped. Eyes two. Double wheel or rotatory organ. Common in standing water, &c. (Pl. X., fig. 20.)

823. Four-horned Rotifer (*Noteus quadricornis*).—Lorica rounded and flattened, with four frontal and two

posterior spines. No eyes. Double wheel. In stagnant water, with decayed leaves. (Pl. X., fig. 15.)

824. Smooth Brachionus (*Brachionus urceolaris*).—Lorica smooth, compressed, with six short spines in front, rounded behind. One eye. Foot forked. (Pl. X., fig. 25.)

825. Rough Brachionus (*Brachionus Bakeri*).—Lorica rough and tesselated, with six unequal teeth in front, and two posterior spines. Foot forked. (Pl. X., fig. 24.)

826. Round Pterodina (*Pterodina patina*).—Round or oval. Lorica thin and transparent. Eyes two. Foot simple. Amongst duckweed.

827. Water-Bears (*Tardigrada*).—Curious little eight-footed animals, crawling slowly, like miniature bears, about water-weeds, in company with Rotifers, though not belonging to them.

The following are Crustaceans belonging to the division called Entomostraca.

828. Fairy Shrimp (*Chirocephalus diaphanus*).—An inch in length, nearly transparent, with a pinkish tinge. In pools.

829. Brine Shrimp (*Artemia salina*).—About half an inch long. In salt-pans.

830. Common Water-Flea (*Daphnia pulex*).—The most common of water-fleas. Shell oval, with a sharp serrated spine at the base. In ponds and ditches. (Pl. XI., fig. 6.)

831. Great Water-Flea (*Daphnia Schæfferi*).—The largest of British species. Shell nearly circular, with a sharp basal spine. Surface reticulated. Ponds. Autumn.

832. Spineless Water-Flea (*Daphnia vetula*).—Shell ovate, and smaller that the foregoing, without a basal spine. The surface striated. Ponds and ditches.

833. Spurred Water-Flea (*Daphnia mucronata*).—Front edge of shell straight, ending below in a sharp spine. Ponds. June to October. (Pl. XI., fig. 7.)

834. Elephant Water-Flea (*Bosmina longirostris*).—Shell oval, rounded behind, terminating in a basal spine. Upper antennæ large, curved, cylindrical, and many-jointed. In ponds. (Pl. XI., fig. 14.)

835. Large Eurycercus (*Eurycercus lamellatus*). — Nearly as large as the Great Water-Flea. Subquadrangular. The abdomen very broad, form of a flat plate, densely serrated. Ponds and ditches. Summer.

836. Globose Water-Flea (*Chydorus sphæricus*). — Almost spherical. Beak long, sharp, and crescent-shaped. Lower antennæ very short. Ponds and ditches. (Pl. XI., fig. 15.)

837. Green Cypris (*Cypris tristriata*).—Oval, nearly kidney-shaped, greenish. Lower antennæ hairy. Shell with short dark hairs. Swimming in ponds.

838. Clouded Cypris (*Cypris monacha*).—Shell rhomboidal, reticulated, white above, clouded below with yellow green. (Pl. XI., fig. 11.)

839. White Cypris (*Cypris vidua*).—Oval, fringed with short hairs, dull white, with three black bands. Lower antennæ hairy. Swimming in ponds. (Pl. XI., fig. 8.)

840. Brown Cypris (*Cypris fusca*).—Oval, narrower in front. Covered with fine hairs. Brown. Lower antennæ with three hairs. Swimming in ponds. (Pl. XI., fig. 10.)

841. Pearly Crawler (*Candona lucens*). — Kidney-shaped, smooth, except at the edges, which are fringed. Pearly white. Lower antennæ bare. Creeping amongst water-plants. (Pl. XI., fig. 18.)

842. Hairy Crawler (*Candona hispida*).—Oval, narrowed behind. Brown, with one or two darker marks. Shell covered with spiny hairs. Lower antennæ bare. Creeping amongst water-plants. (Pl. XI., fig. 17.)

843. Four-horned Cyclops (*Cyclops quadricornis*).—Common, and well known in every pond. Ovaries double. (Pl. XI., fig. 9.)

844. Short-horned Cyclops (*Cyclops brevicornis*). — With the egg-sacs long and narrow. Sir John Lubbock distinguishes this and six other species in the Kentish ponds as unrecognized British species.

845. Claus's Cyclops (*Cyclops Clausii*).—First described by Sir John Lubbock, and recorded as common in several localities. (Linn. Trans., vol. xxiv., p. 197.)

846. Little Vaulter (*Canthocamptus minutus*). — Smaller than Cyclops, with shorter antennæ, and but one ovary. Ponds and ditches.

847. The Diaptomus (*Diaptomus castor*).—Antennæ large and strong, with twenty-six articulations. Ovary single. In ponds.

848. Ribbed Water-Flea (*Camptocercus macrouru* ,.— Ovoid; pellucid; finely ribbed longitudinally. Beak rounded and blunt. Eye small. Ponds and ditches. (Pl. XI., fig. 16.)

849. Fish Louse (*Argulus foliaceus*).— This curious parasite may often be found crawling slowly over the body of the pike and other fish. It has some resemblance in form and size to the bed-bug.

PARASITES.—Animals of all kinds are more or less subject to parasites, quadrupeds and birds especially, several kinds being sometimes found on the same host. These parasites may be fleas, lice, mites, or ticks; and under these four heads the majority may be classed. The following are common examples of each group:

850. Cat Flea (*Pulex felis*).—This flea is of a pale pitchy-brown colour; the head is naked and shining, with scattered dots. Common on the domestic cat.

851. Dog Flea (*Pulex canis*).—Similar in colour to the last, with the head punctate behind, the lower part of the head and the protothorax with a comb-like fringe. This, as well as another species, is not uncommon on the dog.

852. Mole Flea (*Pulex talpæ*).—This species has a long and slender body, and is found in company with a tick and two species of mites, as a parasite on the mole.

853. Mouse Flea (*Pulex musculi*).— This little flea is occasionally found on the mouse; but it often happens that a number of mice will be examined without meeting with a single specimen.

854. Fowl's Flea (*Pulex gallinæ*) has an elongated head, and a comb-like fringe to the protothorax. Not uncommon on the barn-door fowl.

855. Hedgehog Flea (*Pulex erinacei*).—Not uncommon on the hedgehog.

856. Squirrel Flea (*Pulex sciurorum*).—Common on the squirrel, all over Europe. (Pl. XII., fig. 11.)

857. Bat Flea (*Pulex vespertilionis*).—Found on several species of Bat, especially the Great-eared Bat. Another species (*Pulex elongata*) occurs on the Yellow Bat.

858. Rat Flea (*Pulex fasciatus*).—This, as well as *Pulex muris*, are found on the rat, and sometimes also the Mole Flea

859. Hare Flea (*Pulex leporis*).—Found by Curtis on the hare; but apparently not common.

860. Pigeon Flea (*Pulex columbæ*).—Occurs on the domestic pigeon.

861. Other species of Bird Flea are said to be found on the swallow, the martin, and the starling; which we have never seen.

862. Slender Pigeon Louse (*Lipeurus baculus*).—Long but very slender body; the female about one-fifth larger than the male; the latter distinguished by the antennæ, of which the third joint is hooked. Common on all kinds of pigeons. (Pl. XII., fig. 2.)

863. Robust Pigeon Louse (*Goniocotes compar*).—About one-twelfth of an inch long, but three times as broad, with a large head, broad and angular behind. Common on all varieties of the pigeon. (Pl. XII., fig. 4.)

864. Long Coot Louse (*Lipeurus luridus*).—Occasionally with the more common species, hereafter named, on the coot and water-hen.

865. Long Turkey Louse (*Lipeurus polytrapezius*).—Very common about the wing-feathers of the turkey.

866. Small Bird Louse (*Docophorus communis*).—Found on several kinds of small birds, as the bullfinch, bunting, sparrow, and white-throat.

867. Rook Louse (*Docophorus atratus*).—The most common of the four species found on the rook, this has a large triangular head, the upper portion white, shining, and hairy; the segments of the abdomen with an angular dark-coloured patch on each side.

868. Banded Louse (*Colpocephalum subæquale*).—Almost as common as the last on the rook, with a shorter head and banded abdomen.

869. Martin Parasite (*Nirmus elongatus*).—Not one of the commonest. Found on the House-Martin. (Pl. XII., fig. 1.)

870. Grouse Parasite (*Nirmus cameratus*).—Common on the Red and Black Grouse.

871. Fowl Parasite (*Menopon pallidum*).—In great plenty on poultry; unpleasantly manifest to those who are engaged in plucking fowls. (Pl. XII., fig. 3.)

872. Coot Louse (*Nirmus fulicæ*).—The old notion about the coot is true as far as parasites are concerned. They are truly plentiful. (Pl. XII., ng. 8.)

873. Louse of Fowl (*Lipeurus variabilis*).—Generally amongst the wing-feathers of poultry, often associated with another species. (Pl. XII., fig. 9.)

874. Turkey Louse (*Goniodes stylifer*).—A peculiar species, found about the head, neck, and breast of the common turkey. (Pl. XII., fig. 10.)

875. Duck Louse (*Docophorus icterodes*).—Common parasite on the wild duck, widgeon, teal, and several other ducks. (Pl. XII., fig. 7.)

876. Ox Parasite (*Hematopinus eurysternus*).—Very common about the mane and shoulders of oxen. (Pl. XII., fig. 5.)

877. Dog Parasite (*Hematopinus piliferus*).—This cadaverous insect is thickly hairy, and is to be found on dogs out of condition. (Pl. XII., fig. 17.)

878. Parasite of Pig (*Hematopinus suis*).—This not very attractive insect is often found on lean Irish pigs recently imported.

879. Parasite of Ass (*Hematopinus asini*).—On the mane and back of the ass, and occasionally on the horse.

880. Rat Parasite (*Hematopinus spinulosus*) infests the common rat. They should be sought on half-starved and sickly-looking animals.

881. Human Associate (*Pediculus capitis*).—Not a

particularly interesting associate, appealing to the head rather than to the heart.

882. Body-Companion (*Pediculus vestimenti*).—Fortunately, not so common as the last; but amongst dirty specimens of humanity this parasite is by no means extinct.

883. Dog Tick (*Ixodes ricinus*).—This and other ticks are found on dogs; they are of considerable size. The body is shortly oval, almost spherical, of a darkish violet tint, with brown legs. (Pl. XII., fig. 12.)

884. Sheep Tick (*Ixodes reduvius*).—This is not what is commonly denominated the Sheep Tick, which belongs to a different order. The present creature is of a pallid yellowish-red colour, with black legs.

885. Sand-Martin Tick (*Ixodes plumbeus*).—The body of a leaden colour, with a heart-shaped shield. It is not uncommon in the nests of the Sand-Martin.

886. Hedgehog Tick (*Ixodes hexagonus*).—The body is whitish or of a pale lead-colour, with a hexagonal shield.

887. Small Hedgehog Tick (*Ixodes megathyreus*), a smaller species, is also found on the same animal, of a brown colour, with an obovate shield; and both are occasionally found together.

888. Great Tit Tick (*Ixodes pari*).—This tick is altogether brownish, with an elongated, somewhat hexagonal shield. Found in the spring, on the Great Tit.

889. Pointer Tick (*Ixodes autumnalis*).—A rare tick, found in the autumn occasionally on pointers, with a lead-coloured abdomen marked with three obscure lines, and the rest of the body of a rusty brown.

890. Ticks are also found on deer; and one, which we have not seen described, has been taken from the mole. No one has hitherto paid much attention to them in England since the days of Leach.

891. Sparrow Mite (*Tyroglyphus sp.*).—A mite which is common on the bodies of sparrows and finches. (Pl. XII., fig. 15, male; fig. 16, female.)

892. Cage-bird Mite (*Dermanyssus avium*) occurs on many small birds, especially singing-birds confined in cages.

893. Swallow Mite (*Dermanyssus hirundinis*).—Plentiful in the nest of the swallow.

894. Poultry Mite (*Dermanyssus gallinæ*).—Found amongst the feathers of poultry.

895. Chaffinch Mite (*Dermaleichus fringillarum*).—A mite commonly found on the chaffinch, of which the male is figured. (Pl. XII., fig. 14.)

896. Fork-tail Mite (*Dermaleichus furcatus*).—A mite with a long body and forked extremity. Common on sparrows.

897. Mouse Mite (*Myobus musculinus*).—A curious little mite, which is found on the common mouse.

898. Beetle Mite (*Gamasus coleoptratorum*).—Attached in numbers to several species of beetles, especially those found on the ground. (Pl. XII., fig. 6.)

899. Bee Mite (*Trichodactylus Osmiæ*).—This curious little mite has been found by the Rev. W. W. Spicer, on a wild bee (*Osmia rufa*), which is the only record of its occurrence in England; but it is probably not uncommon.

900. Fly Mite (*Hypopus muscorum*).—Often found attached to the common house-fly.

901. Lobster Chelifer (*Chelifer cancroides*).—This 'false scorpion' has been longest known of all the British species. It sometimes attaches itself to flies. In this genus the eyes are two; in *Obisium*, they are four.

902. Moss Chelifer (*Chelifer muscorum*).—With a short, broad body. Found amongst moss.

903. Latreille's Chelifer (*Chelifer Latreillei*).—Under the bark of trees, &c. (Pl. XII., fig. 13.)

904. Banded Chelifer (*Chelifer fasciatus*).—The abdominal segments banded with white. Also under the bark of trees.

905. Sea-side Chelifer (*Obisium maritimum*).—Found amongst rocks on the sea-shore.

906. Little Chelifer (*Obisium orthodactylus*).—About one-sixteenth of an inch long; found under stones, &c.

907. Long Chelifer (*Obisium muscorum*).—About two lines in length; amongst moss. More common in the Scotch mountains than in England.

Water Mites are usually of a reddish colour, and are common in ponds, &c., during summer. Mr. W. S. Kent has detected nearly forty distinct British species.

908. Deceitful Water Mite (*Diplodontus mendax*).—Body elliptical, roseate, with two rays at the fore part of the body; coxæ in four groups; genital plate heart-shaped, pointed forwards. These creatures can hardly be satisfactorily distinguished from each other without regard to the coxæ and genital plates of the under surface. (Pl. XI., fig. 1.)

909. Harlequin Water Mite (*Atax histrionica*).—Dark red; palpi and legs blackish green; body ovoid. Rather common in ponds, &c. (Pl. XI., fig. 2.)

910. Hunchback Water Mite (*Arrenurus globator*).—Mouth rounded. Body of the female truncated behind; greenish; eyes red; much larger than the male. In ponds. (Pl. XI., fig. 3, female.)

911. Hunchback Water Mite (*Arrenurus globator*).—Body of the male narrowed behind, so as to give the mite a very singular appearance. (Pl. XI., fig. 4, male.)

912. Great Water Mite (*Hydrachna geographica*).—Body nearly spherical, black, with red spots; palpi red; legs red at the ends. One of the largest species. In ponds. (Pl. XI., fig. 5.)

913. Walking Water Mite (*Limnochares holosericeus*).—Crawls about in the water, instead of swimming; body smooth, red; legs slightly hairy. (Pl. XI., fig. 12.)

914. Furrowed Water Mite (*Eylais extendens*).—Body elongated, soft, and furrowed; brownish red; eyes four; rostrum short. In ponds. (Pl. XI., fig. 19.)

915. Claret Water Mite (*Hydrachna cruenta*).—Body rounded, scarlet or claret-coloured; rostrum short; eyes in two pairs; eggs attached to stems of *Potamogeton*, or pond-weed.

916. Green Angular Mite (*Arrenurus viridis*).—Of a bluish-green colour; the body of the male terminating in two pointed angles.

917. Round Red Water Mite (*Hydrachna punicea*).

—Subglobose, rather convex, purplish red; palpi and feet red. In ponds.

918. Thin-legged Water Mite (*Diplodontus filipes*). —Body elliptical, depressed, bright red, sometimes mottled with brown; legs red; palpi curved downwards.

919. Yellow Water Mite (*Atax lutescens*).—Body oval; yellowish, with black spots—three in front oval, two abdominal spots crescent-shaped. In ponds, occasionally.

920. Buttercup Mite (*Bryobia haustor*).—A small dusky-red mite, that feeds upon the foliage of herbaceous plants; eyes seated on the shoulders; runs rapidly. Common upon the creeping buttercup and other plants.

921. Margined Mite (*Notaspis marginatus*).—Of a chestnut-brown colour, with a white margin. Found in the neighbourhood of the sea-shore

922. Yellow Frame Mite (*Gamasus luteus*).—Resembling the beetle-mite, elongated, ochraceous; pallid behind, where it is broadest. Sometimes plentiful in cucumber-frames. Different from No. 940.

923. Rosy Moss Mite (*Bdella dorsata*).—Roseate, about the size of a grain of millet, with a black spot each side of the back. Amongst moss.

924. Broad-beaked Mite (*Scirus latirostris*).—Scarlet, obovate; head thickened; rostrum short; palpi long; legs thick. On the ground, amongst moss.

925. Long-legged Mite (*Erythræus phalangioides*).—Oval, almost globose; red, with interrupted black spots; hind legs very long; eyes four, in two groups. On the ground.

926. Soldier Mite (*Trombidium holosericeum*).—This bright red mite, called also the Tant, has long been known to inhabit Britain. It occurs in gardens, on the ground and about trees, sometimes abundantly.

927. Book Mite (*Cheyletus eruditus*).—Body somewhat lozenge-shaped, white; palpi very large; legs furnished with long hairs. In books, especially about the backs, and papers in damp places.

928. Meal Mite (*Tyroglyphus farinæ*).—Plentiful in flour-bins and flour-mills; often amongst flour and meal.

929. Cheese Mite (*Tyroglyphus siro*).—Extremely common on old cheese. Formerly known as *Acarus domesticus*.

930. Long Cheese Mite (*Tyroglyphus longior*).—Not uncommon on Dutch and Gruyere cheese. Body longer than the last.

931. Sugar Mite (*Acarus sacchari*).—Often to be seen amongst brown sugar, and around the wooden taps of wine-casks.

932. Raisin Mite (*Tyroglyphus passularum*).—Found amongst old raisins and figs.

933. Cabinet Mite (*Tyroglyphus destructor*).—Very fond of destroying butterflies in cabinets. Is clad with long hairs.

934. Vegetating Mite (*Uropoda vegetans*).—A curious mite, attached by a thread or umbilicus to the bodies of beetles of the family *Elateridæ*.

935. Furze Mite (*Tetranychus ulicis*).—Lives in colonies, and spins a delicate web about furze bushes. When mature, of a bright red colour.

936. Lime Mite (*Tetranychus tiliarius*).—Another sociable species, found in colonies on lime-trees. One found on plane-trees may be the same species.

937. Harvest Mite (*Leptus autumnalis*).—Too well known to many persons by the pertinacity with which it adheres to the human skin, and torments the human body, about harvest-time. Six-legged.

938. Stone Mite (*Tetranychus lapidum*).—Found about stones and rubbish, to which its eggs are attached.

939. Red Spider (*Tetranychus telarius*).—The little red insect so common in green-houses. It is not a spider, but a mite.

940. Brown Notaspis (*Notaspis obscurus*).—A little, shining, brown mite, often found in cucumber-frames, which has of late years been troublesome to gardeners.

941. Vine Coccus (*Coccus vitis*).—The young of the 'scale,' which attacks vines in houses, are a good object.

942. Herbarium Insect (*Atropos divinatoria*).—This

common little insect is worth the trouble of mounting whole. It is found amongst dried plants, &c.

Many other insects may be examined or mounted entire, as—

943. House Ant (*Diplorhoptrum molesta*).—Rather more free than welcome in many metropolitan houses. Should be caught and mounted whole.

944. Garden Ant (*Formica nigra*).—Either this or the common yellow ant (*Formica flava*), found in banks, will furnish, with the preceding and succeeding, good representatives of these curious insects.

945. Great Wood Ant (*Formica rufa*).—Plentiful in woods where fir-trees predominate, building large hillocks. This is a large species.

946. House-Fly (*Musca domestica*).—A common but very interesting object. It may be mounted entire in a deep cell, for low powers.

947. Rain Fly (*Anthromyia pluvialis*).—Sometimes almost as common in houses as the house-fly. Lighter coloured, and more prettily marked and banded.

948. Gall Insect (*Cynips Kollari*).—This insect may be reared from the common gall of the oak, of late years so plentiful in this country.

949. Oak Apple Fly (*Cynips terminalis*).—This little fly may easily be obtained from the common oak-apple gall, and is soon developed.

950. Oak Spangle Fly (*Cynips longipennis*) may be reared from oak spangles, so plentiful on the under surface of oak leaves. Leaves that have lain on the ground during the winter should be selected for bearing the insects, which are developed in March.

951. Twenty-plume Moth (*Alucita polydactyla*).—One of the prettiest of moths for the microscope, with plumed wings. Commonly beaten out of hedges, and often seen at dusk, in summer, fluttering against the window.

952. Turnip Diamond Moth (*Cerostoma xylostella*).—A pretty little moth, common in turnip-fields, in which the caterpillar feeds.

953. Clothes Moth (*Laverna sarcitella*).—One of the common little moths, the larvæ of which are so destructive to woollens, clothing, &c.

954. Wolf Moth (*Tinea granella*).—A pretty little moth, found in granaries and similar places. Larva destructive.

955. Potato Fly (*Sciara fucata*).—A little two-winged fly, developed from amongst rotten potatoes and potato-parings and rubbish.

956. Mangel Fly (*Anthomyia Betæ*).—The larva of this fly mines and blisters the leaves of the field beet, and from this the insect may be reared

957. Wheat Thrips (*Thrips cerealium*).—This species of Thrips is common upon the cereals, especially wheat.

958. Potato Thrips (*Thrips minutissima*).—A very small species, which often infests the potato-plant.

959. Gnat (*Culex pipiens*).—Both mature insects, male and female, and larvæ found in any water-butt are good objects.

960. Turnip Gnat (*Trichocera hiemalis*).—This little insect is plentiful, in autumn, about turnip-fields.

961. Cabbage Butterfly Ichneumon (*Microgaster glomeratus*).—A small fly, which commences its existence in the chrysalis of the common cabbage butterfly, from which it may be reared.

962. Wheat Midge (*Cecidomyia tritici*).—Found flying over wheat-fields in swarms, when the corn is in the ear. Antennæ jointed and beautiful.

963. Potato Frog Fly (*Eupterix Solani*).—A kind of frog-hopper, with a predilection for the potato-plant.

964. Plant-louse Lion (*Chrysopa perla*).—The larva of this fly, which is reared from the stalked eggs already figured, is a great enemy to the plant-lice.

965. Turnip Beetle (*Haltica nemorum*).—A lively, skipping, little beetle, sometimes called the 'turnip flea,' found on the ground, in fields.

966. Corn Weevil (*Calandra granaria*).—A troublesome beetle in granaries, and very destructive to wheat and other grains.

967. Bed Bug (*Acanthia lectularia*).—Better known

than appreciated. Not at all uninteresting as a microscopical object.

968. ORANGE SCALE (*Lecanium Hesperidum*).—Elongated scales, attached to the rind of oranges, are the remains of the female of this species, with the eggs and, at length, the young ones beneath.

969. MEALY BUG (*Coccus adonidum*) is well known in hot-houses, attached to vines and other plants. It is reddish, and covered with a mealy substance, whence its popular name is derived.

970. POTATO SPRINGTAIL (*Smynthurus Solani*).—Very small Podura-like insect, found leaping about potato-leaves in July.

271. TURNIP APHIS (*Aphis rapæ*).—The commonest of the plant-lice which infest turnip crops, of which there are three or four species.

972. PEA APHIS (*Aphis pisi*).—Sometimes very plentiful on plants of the garden pea. The number of species of Aphis is almost a legion.

973. BEAN APHIS (*Aphis fabæ*).—The blackish plant-louse infesting the field and garden bean, too well known to farmers and gardeners.

974. HOP APHIS (*Aphis humuli*).—The insect usually found on the hop plant is this species of Aphis. Both winged and wingless Aphides should be examined.

975. SNOUT BEETLES (*Apion sp.*).—Almost every dry stem of a herbaceous plant will, in the autumn, furnish small beetles of this genus.

POLARIZING OBJECTS.—In order to render this catalogue more complete, we enumerate a selection of these objects. The crystals are difficult for an amateur without experience to prepare for himself.

976. FINEST INDIA MUSLIN.—The interlaced fibres of cotton polarize beautifully.

977. SOLE SCALE, or any characteristic fish-scale.

978. SECTION OF GRANITE is one of the most interesting of this class of objects.

979. WHALEBONE.—A thin section, either oblique or longitudinal.

980. STARCHES of all kinds, especially with large granules, exhibit crosses.

981. SALICINE CRYSTALS.—An alkaloid obtained from willow bark.

982. QUININE CRYSTALS.—An alkaloid obtained from Peruvian bark.

983. CHLORATE OF POTASH, a well-known chemical, is with some a favourite object.

984. ASPARAGINE.—An alkaloid from the asparagus plant.

985. SULPHATE OF IRON, or green copperas, well managed, furnishes beautiful crystals.

986. SANTONINE.—The chemical principle of worm-seed.

987. BENZOIC ACID.—The sublimed crystals from green benzoin, or Benjamin.

988. BORACIC ACID.—Derived from borax, which is also employed as a polariscope object.

989. PALMITIC ACID, derived from palm oil, if warmed till the acid melts, will exhibit the phenomena of crystallization as it cools.

990. SULPHATE OF CADMIUM.—A metallic sulphate, often commended.

991. SULPHATE OF MAGNESIA, or Epsom salts, and also the heavy carbonate of magnesia.

992. PHLORIDZINE.—An alkaloid derived from the roots of the apple-tree.

993. OXALATE OF LIME, or oxalate of ammonia.

994. LITHIC ACID and gallic acid may either of them be used.

995. CARBONATE OF LIME, under almost any form, polarizes well.

996. BICHROMATE OF POTASH.

997. IODIDE OF POTASSIUM.

998. CITRIC ACID or tartaric acid.

999. BI-TARTRATE OF AMMONIA.

1000. SULPHATE OF NICKEL AND POTASH.—A double salt, of which several have been recommended for the polariscope.

EXPLANATION OF PLATES.

PLATE I.

FIG.		NO.
1.	Hair of Virginia Stock	25
2.	„ Deutzia	26
3.	„ *Viburnum opulus*	24
4.	Peltate Hair of Chrysanthemum	23
5.	Hair of Stinking Hellebore	33
6.	„ *Arabis sinensis*	31
7.	„ Anther of *Verbascum*	34
8.	„ *Scrophularia nodosa*	36
9.	„ *Niphobolus*	32
10.	Pappus of Coltsfoot	41
11.	Scale of *Hippophaè rhamnoides*	44
12.	Spiral fibre of Cow Parsnip	50
13.	Hair of *Geum urbanum*	35
14.	Scale of "Rusty-back Fern"	42
15.	„ *Nothochlæna lævis*	43
16.	Hair of Hollyhock	27
17.	Form of stomate	2
18.	Compound spiral fibre	54
19.	Hair of *Leontodon hispidus*	22
20.	Scale of Mayweed (*Anthemis cotula*)	45
21.	Hair of Gourd (*Cucurbita maxima*)	37
22.	Hair of Shepherd's-purse	21
23.	Lupuline gland of Hop	47
24.	Hair of Ivy	28
25.	Anther of Heath (*Erica tetralix*)	68
26.	Anther of Whortleberry	69
27.	Anther of Strawberry-tree	71
28.	Hair of Mullein	30
28*.	Anther of Blushwort	67
29.	Fibre of Flax	63
30.	Stigma of *Anthemis arvensis*	73
31.	„ Goat's-beard	74
32.	„ Mayweed	75
33.	Cuticle of Lesser Duckweed	4
34.	„ Leek	1
35.	„ Stinking Hellebore	8
36.	„ Water Crowfoot	7
37.	Cells of Iris	6
38.	Fibrous cell of Mezereon	56
39.	Spiral tissue of Gourd	53
40.	Discs of Pine-wood	60
41.	Cells of Quillwort	48
42.	Cells of Bog-Moss	14
43.	Cells of curved-leaved Scale-Moss	18
44.	Punctate vessel of Poppy	58
45.	„ Mezereon.	57
46.	„ Balsam	59
47.	Cuticle of Mistletoe	5
48.	Spiral of Horsetail	49
49.	Cells of Scale-Moss (*Gymnomitrium*)	15
50.	Cells of Scale-Moss (*Plagiochila*)	16
51.	Starch of Oat	82
52.	„ Potato	85
53.	„ Bean	86
54.	„ Orchis (*O. bifolia*)	88
55.	„ Lily	90
56.	„ Hyacinth	91
57.	„ Horse Chestnut	93
58.	„ Acorn	94
59.	„ Ginger	95

PLATE II.

1.	Pollen of *Sherardia arvensis*	101
2.	„ Nasturtium	102
3.	„ Yellow Fumitory	103
4.	„ St. John's Wort	104
5.	„ Musk-plant	106
6.	„ Sowthistle	107
7.	„ Rush	108
8.	„ Linseed or Flax	109
9.	„ Willow Herb	110
10.	„ Crowfoot (*Ranunculus acris*)	111
11.	Pollen of Scorzonera	112
12.	„ Narrow-leaved Plantain	114
13.	Pollen of *Zamia Mexicana*	116
14.	„ Cedar of Lebanon	117
15.	„ Dock	118
16.	„ Primrose	119
17.	Seed of Wahlenbergia (*E. Marks*)	133
18.	Seed of *Plantago psyllium*	138
19.	„ Eccremocarpus	127
20.	„ Poppy	125
21.	„ Snapdragon	142
22.	„ *Coreopsis tinctoria*	132
23.	„ China Grass Plant	141
24.	„ *Lepigonum marinum*	137

PLATE III.

PLATE IV.

PLATE V.

PLATE VI.

PLATE VII.

PLATE VIII.

PLATE IX.

PLATE X.

PLATE XI.

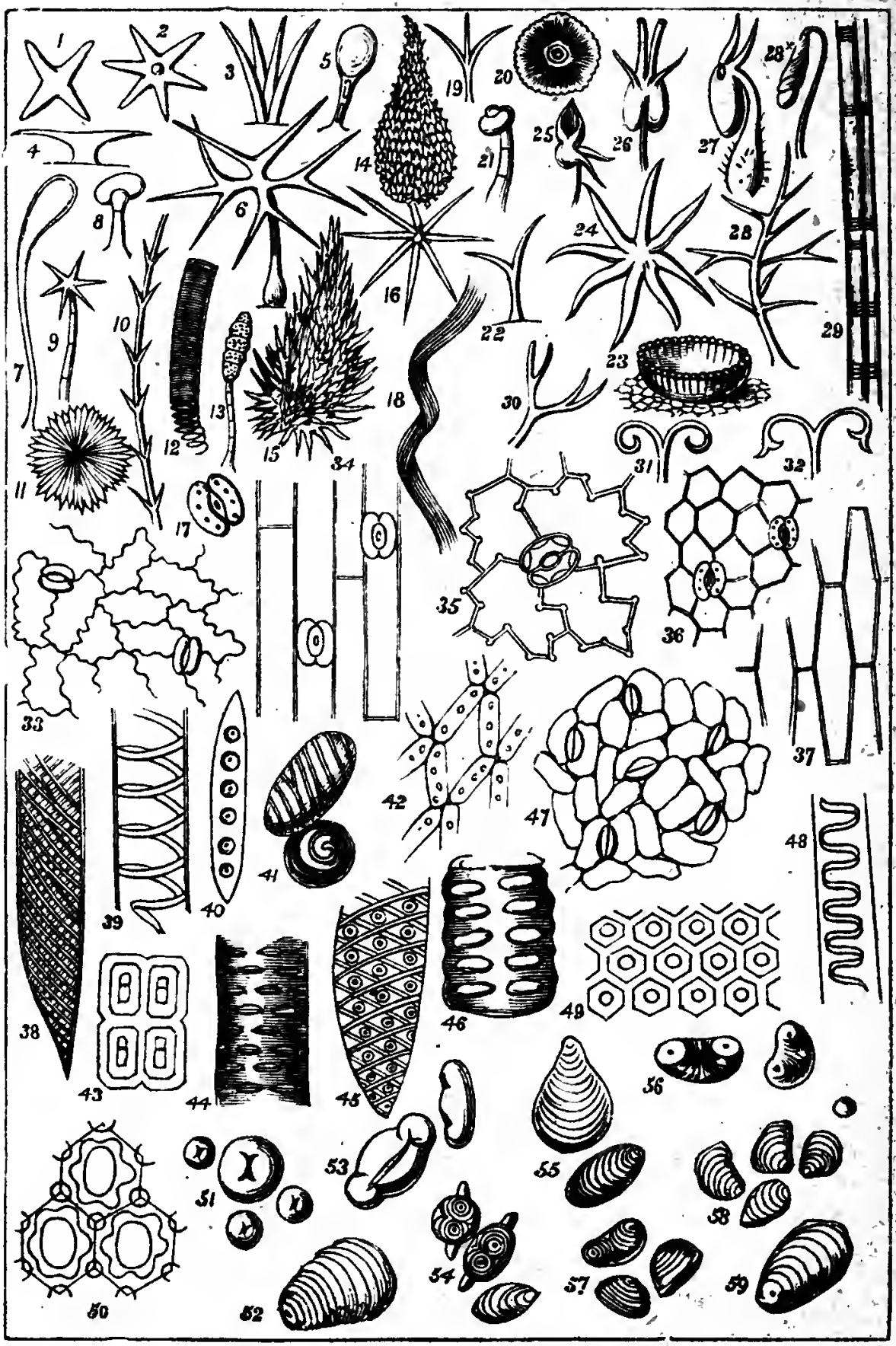
PLATE XII.

N.B.—The numbers following the names refer to the letterpress description.

FINIS.

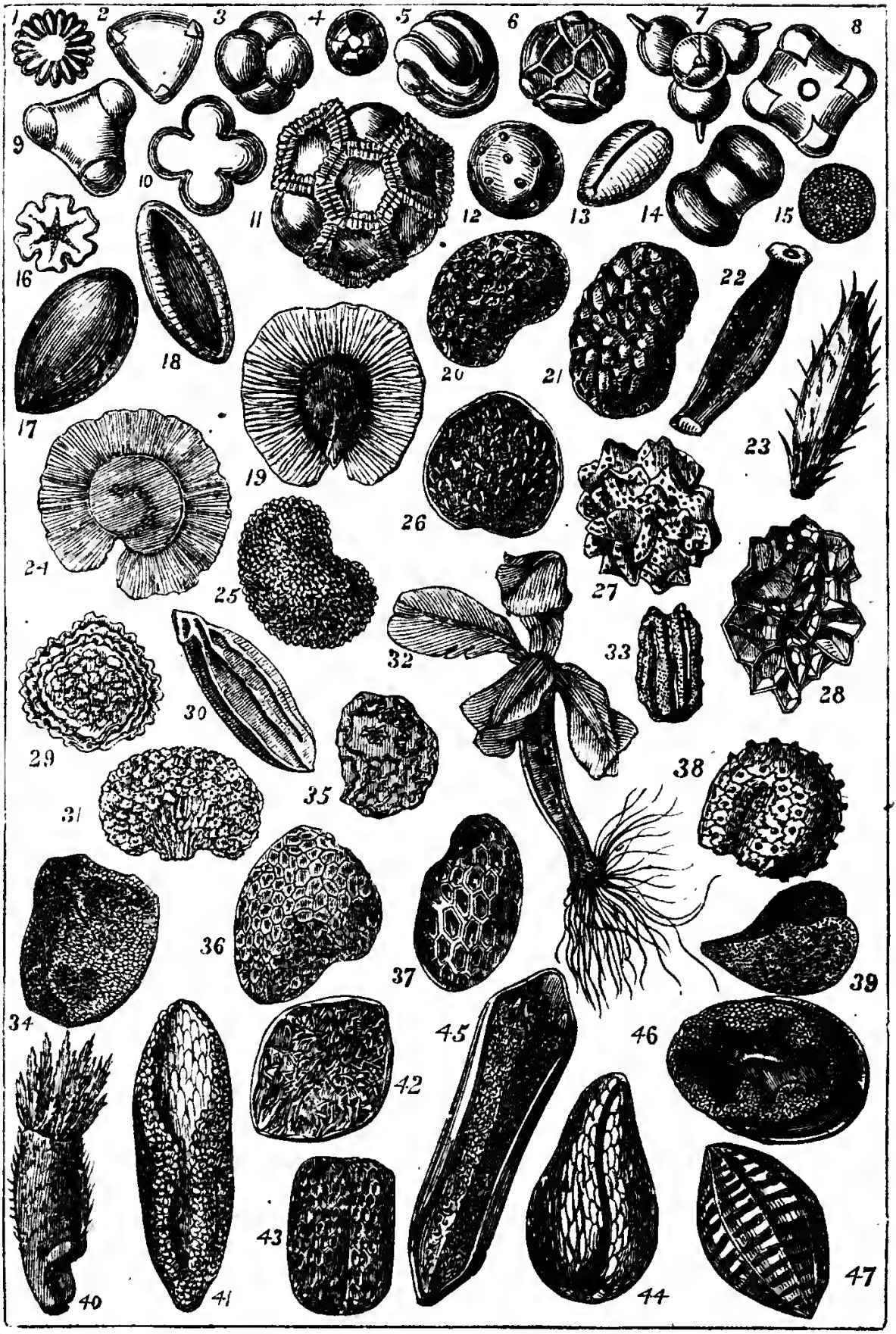
DALZIEL BROTHERS, CAMDEN PRESS, LONDON, N.W.

PLATE I.



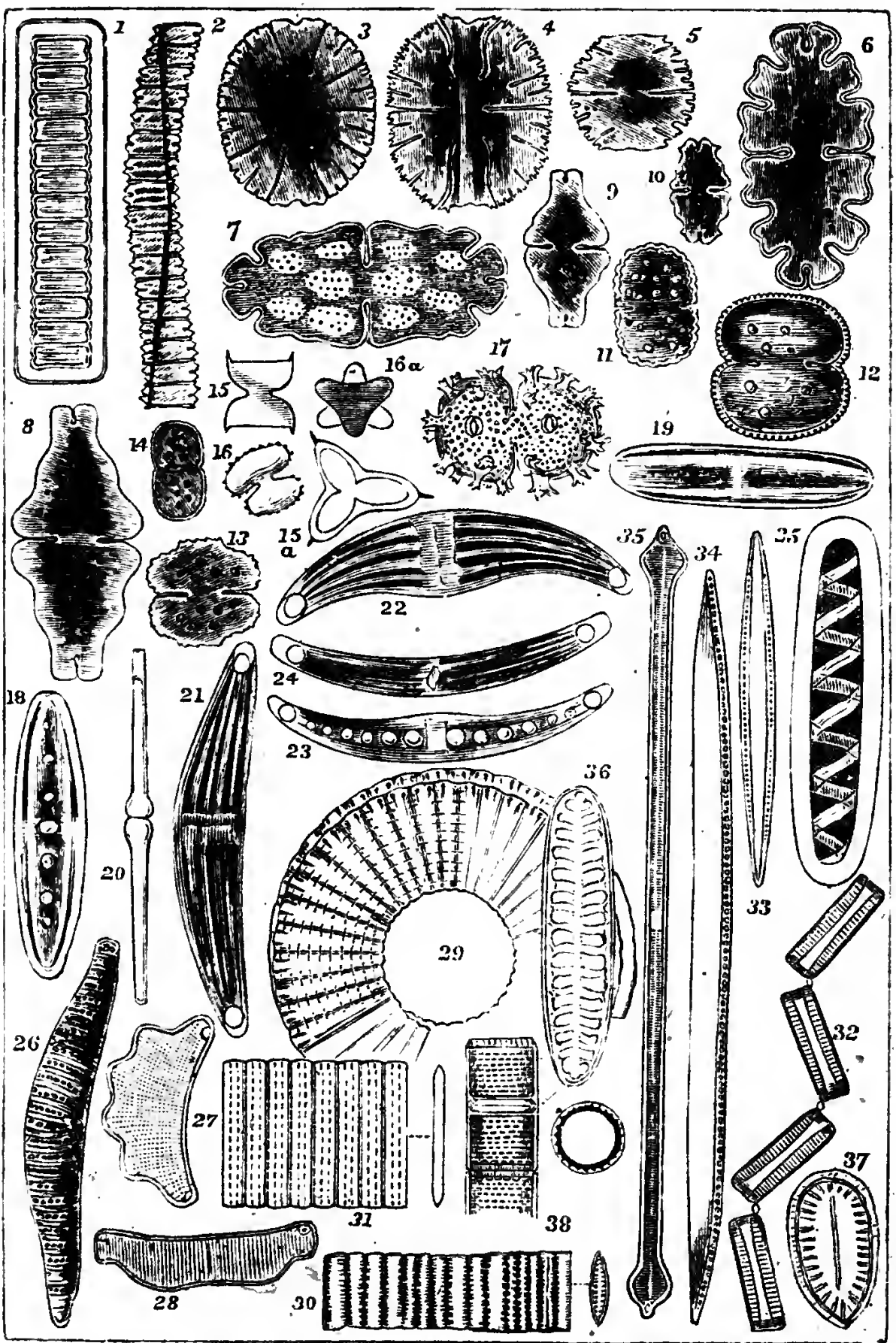
VEGETABLE TISSUES, &c.

PLATE II.

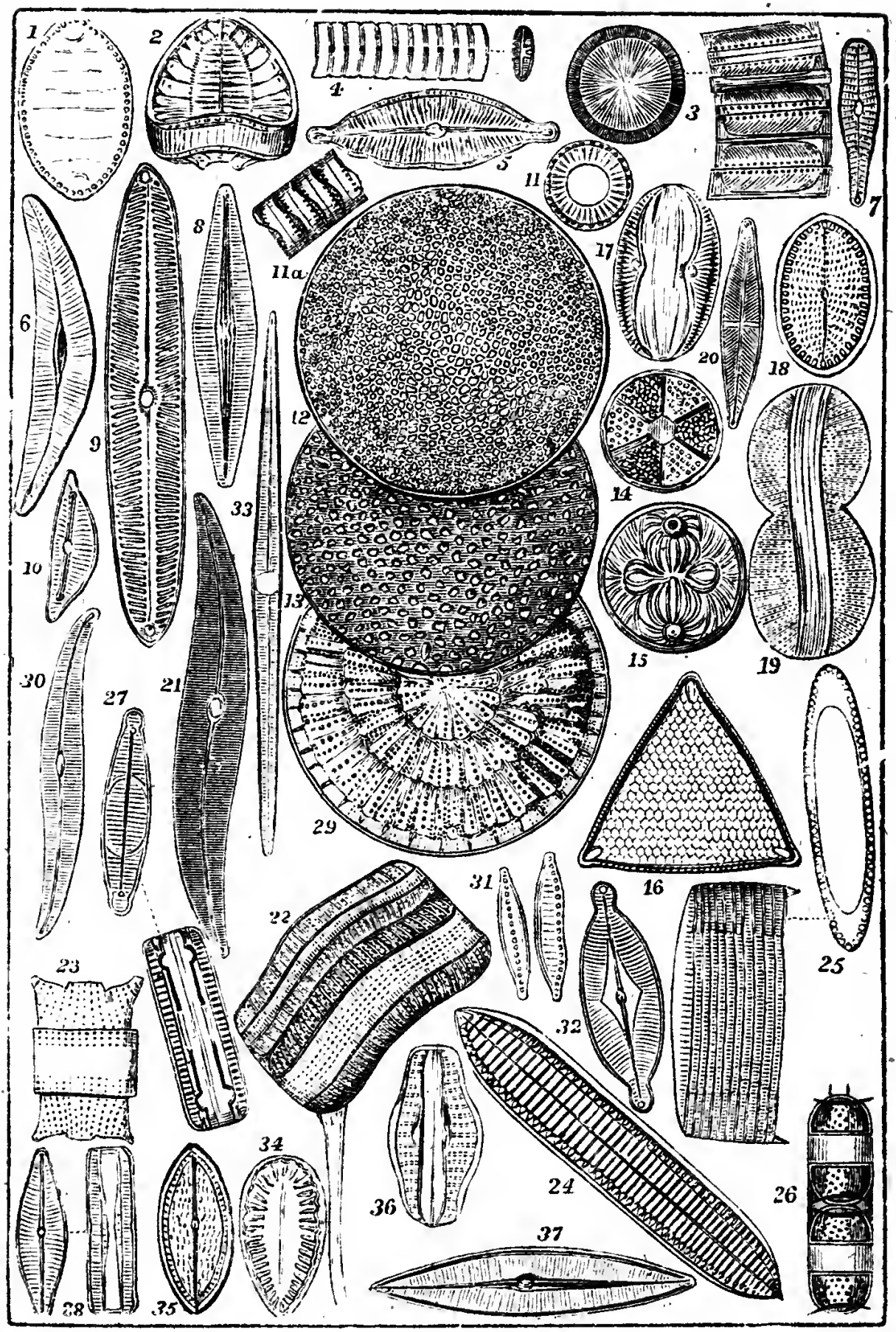


POLLEN AND SEEDS.

PLATE III.



DESMIDS AND DIATOMS.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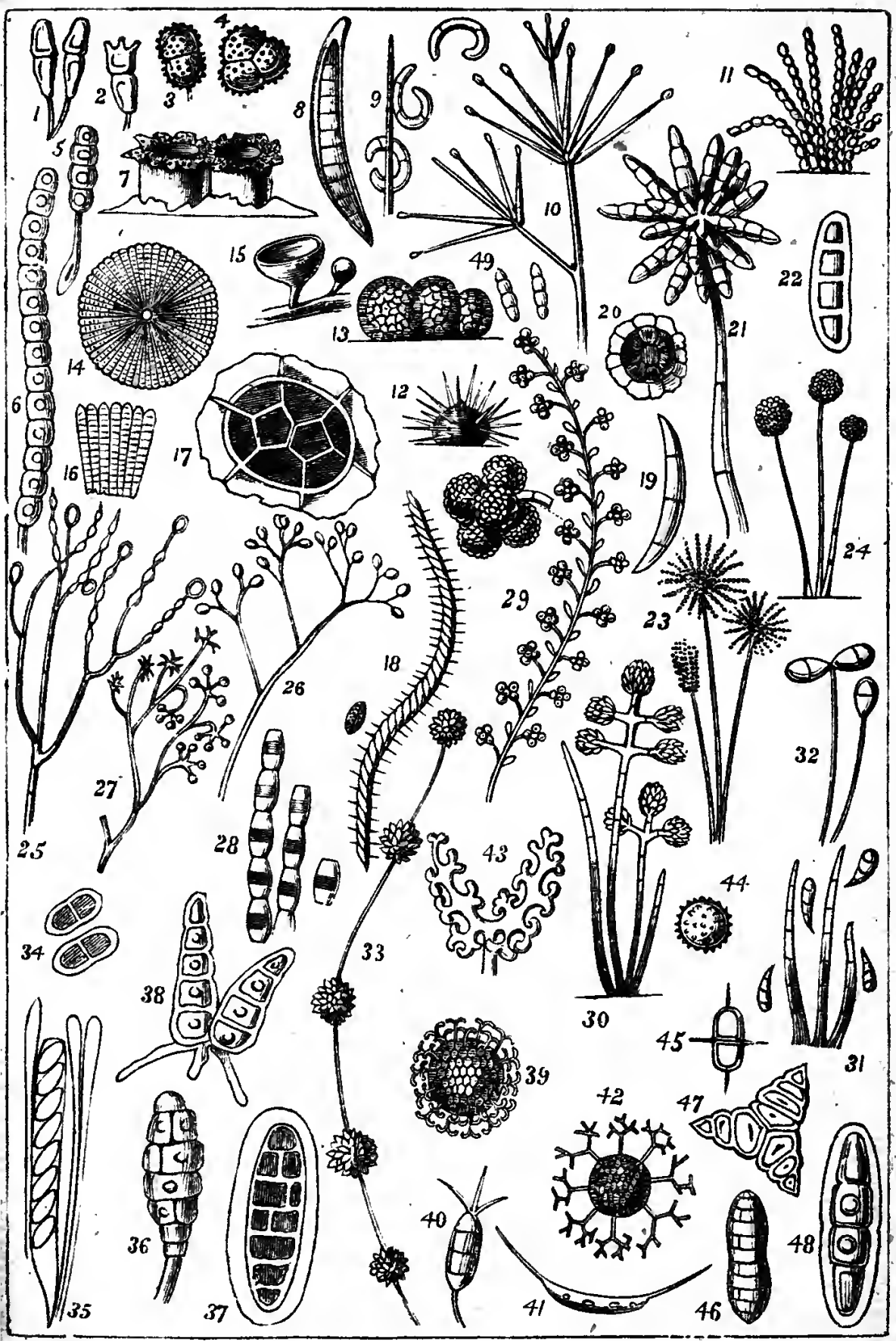
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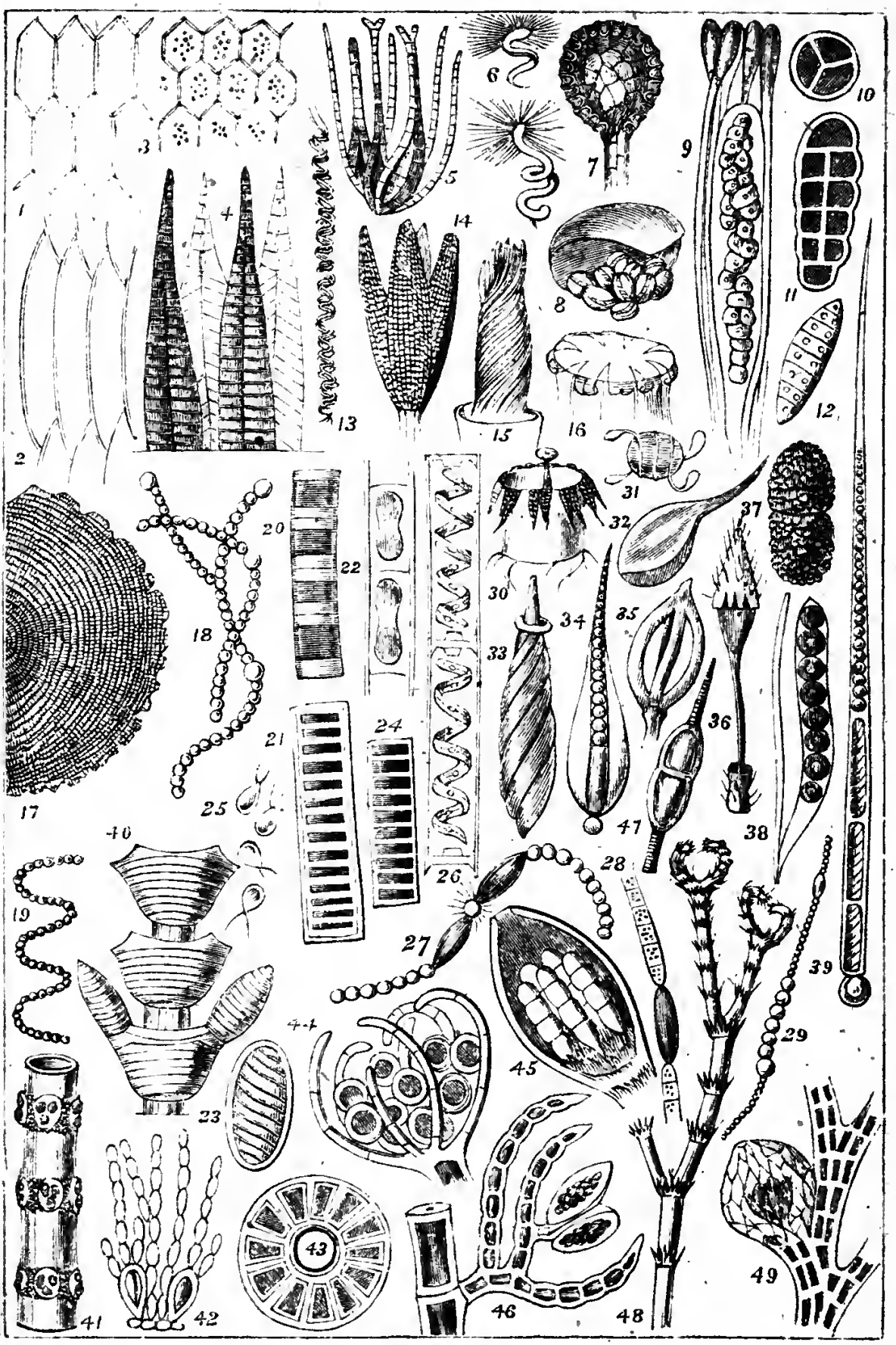
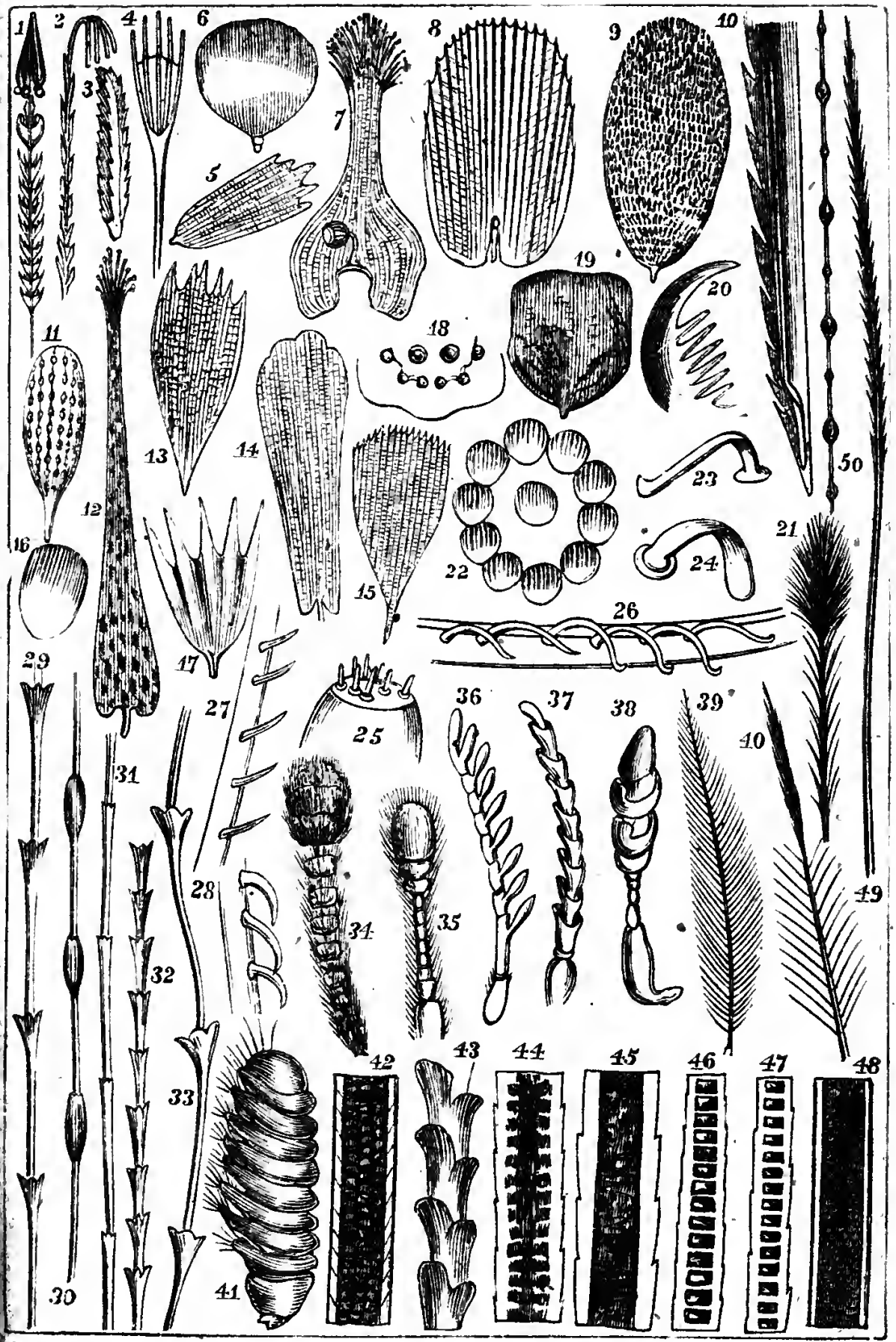
FUNGI.

PLATE VI.



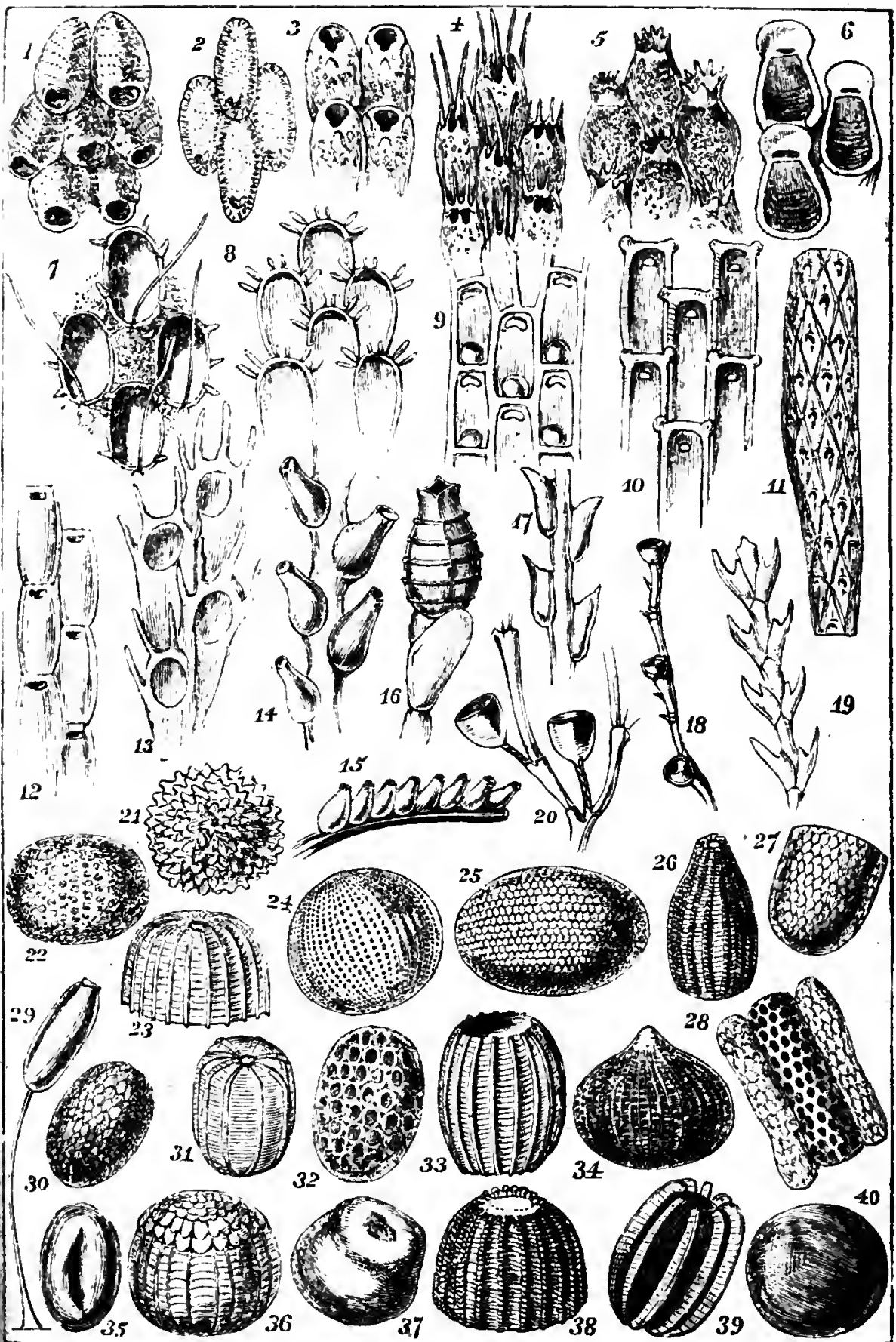
FERNS. MOSSES. ALGÆ.

PLATE VII.

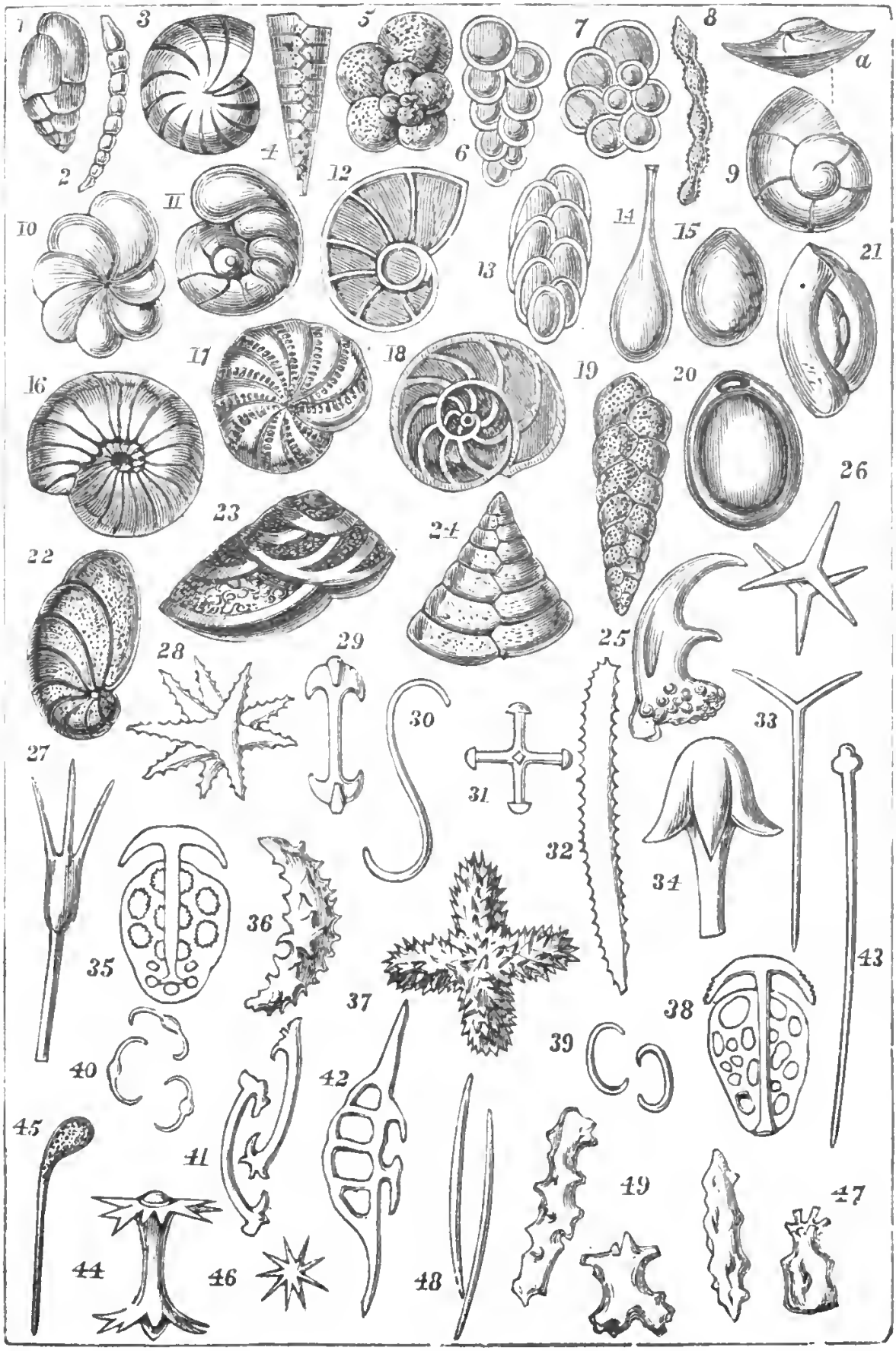


SCALES. ANTENNÆ. HAIRS, &c.

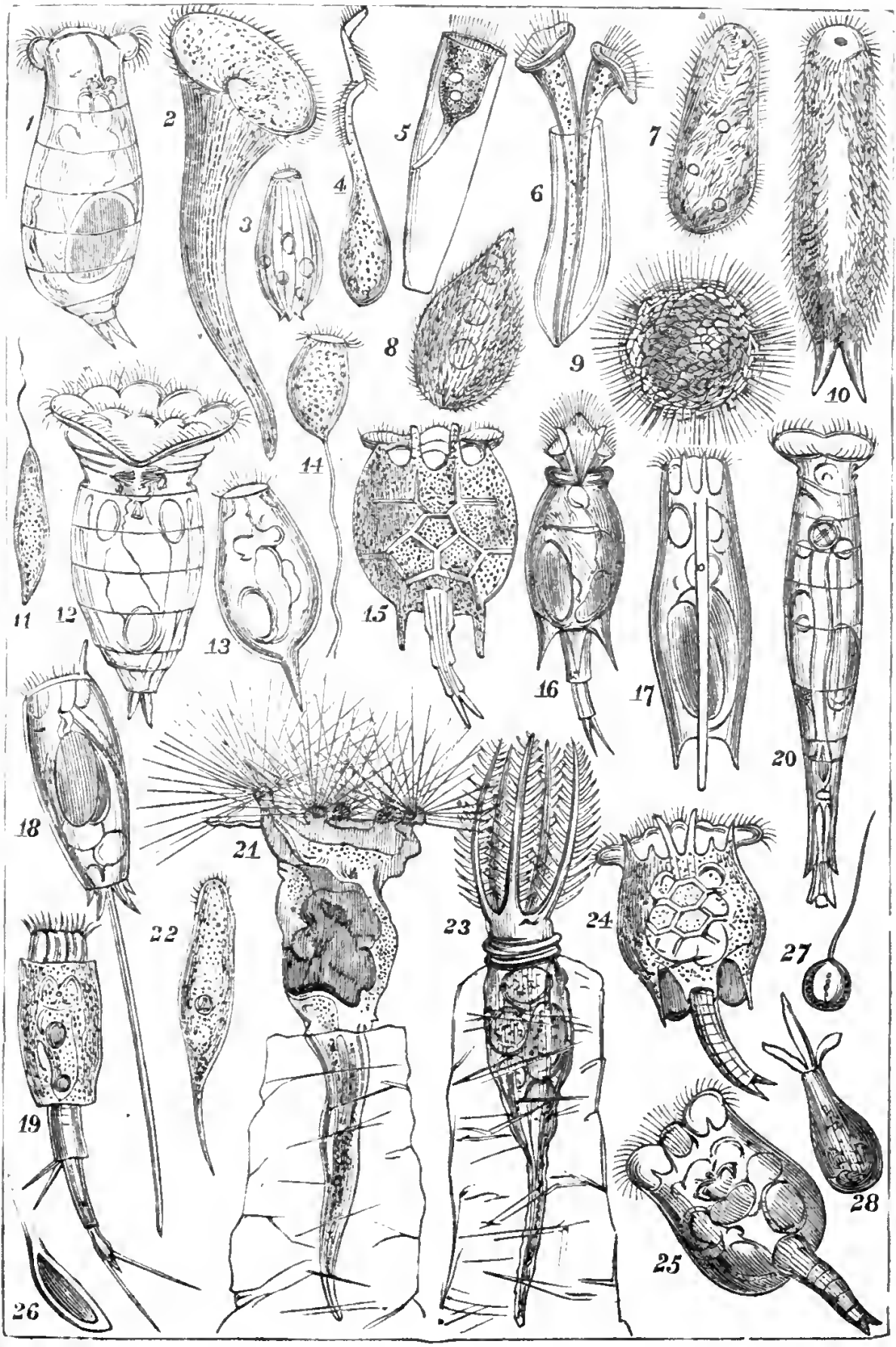
PLATE VIII.



POLYZOA. INSECT EGGS.



FORAMINIFERA. SPICULES.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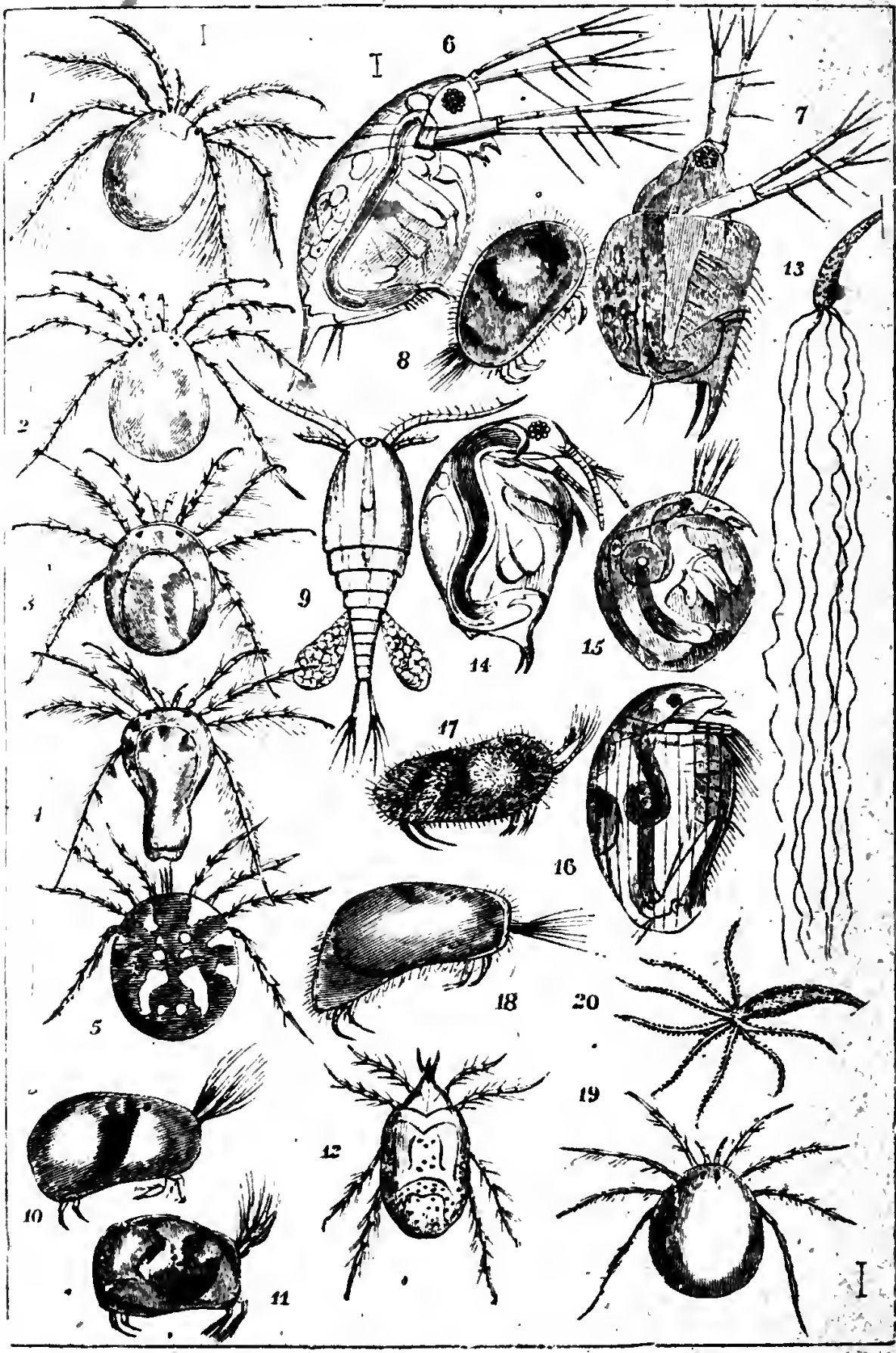

WATER MITES. WATER FLEAS, &C.