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The Marine Algœ of Elie, with Map of the District (Plate VI.)

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The Marine Algæ of Elie, with Map of the District (Plate IV.). By GEORGE W. TRAILL, Joppa.

(Read 10th November 1887.)

This locality, extending from the "Lady's Tower" to the "Devil's Cave," is, so far as my experience goes, much more prolific than any other in the Firth of Forth.

It contains, indeed, within little more than three miles of shore, almost as many species as are to be found in the rest of the Firth; and the specimens are, generally speaking, fine.

This unusually favourable growth of Algæ I attribute to the dark basaltic rocks of the locality, together with the southern exposure and sheltered situation.

Finding the shores to be so prolific, I thought it might be advantageous to have a full list of the Algæ, accompanied by an algological map of the district; and I hope that the following attempt may prove of some assistance to botanists in collecting specimens.

The dates given for the fructification and duration of species are necessarily approximate in certain cases, varying according to the maturing influence of the seasons.

1. *Ahnfeldtia plicata*, Ag.
Common in sandy pools near low-water mark; always submerged. Perennial. Fruit early in winter.
2. *Alaria esculenta*, Grev.
Common in exposed places at low-water mark; always submerged. Perennial. Fruit in winter.
3. *Asperococcus echinatus*, Grev.
Common at 7, 9, 12,* &c., in shallow pools near high-water mark; always submerged. Often epiphytic on Algæ. Annual, April to October. Sporangia in summer.
4. *Bangia fusco-purpurea*, Lyngb.
On smooth stones and on rocks, at 2, at and above half-tide; usually dry at ebb tide, and in the sun. Annual, March to September. Fruit, May and June.
5. *Bonnemaïsonia asparagoides*, Ag.
Cast ashore at 12.
6. *Bryopsis plumosa*, Lx.
At 2, 4, &c., rare. (Fine at "Shell Bay.") In pools

* The numbers refer to the sections in the accompanying map.

from half-tide to low-water mark ; always submerged. Annual, May to October. In best condition in July and August.

7. *Callithamnion arbuscula*, Lyngb.

At 7, 8, 9, and 10, in great abundance, and often in very fine specimens. On vertical rocks in the shade, usually a little below half-tide, in places uncovered for some hours daily. Perennial, but in poor condition and stunted during winter. Fruit from April to Aug.

8. *Callithamnion barbatum*, Ag.

In deep pools at 2, usually on rocks. Sometimes epiphytic on Algæ ; always submerged, and in the shade.

9. *Callithamnion Brodiaei*, Harv.

On reefs at 9 in the shade, near low-water mark. Annual, May to October. Fruit, August, September.

10. *Callithamnion corymbosum*, Ag.

In deep pools at 2; always submerged. Annual, June to September. Fruit, July, August.

11. *Callithamnion floridulum*, Ag.

At 7, 8, 9, &c., on sandy rocks near low-water mark ; usually dry at ebb tide, and exposed to the sun. All the year. Fruit in autumn and winter.

12. *Callithamnion fruticulosum* ? J. Ag.

On rocks in the shade at 10, at about half-tide level. Fruit in July. Agardh, in writing to me regarding this plant, says—"From examination of the specimens, it looks as if it did not belong to the species with truly distichous branches ; and, if so, it may possibly belong to *Callithamnion fruticulosum*, J. Ag."

13. *Callithamnion gracillimum*, Ag.

In deep pools at 2; always on submerged rocks in the shade. Fruit, August, September.

14. *Callithamnion Hookeri*, Ag.

At 3, 7, 8, 9, 12, fine and common. On Algæ near low-water mark, usually in places uncovered for several hours daily. Annual, March to October. Fruit from May to August. This is supposed to be the *Callithamnion roseum* of the *Flora Edinensis*.

15. *Callithamnion plumula*, Lyngb.

"On Algæ, Elie," M'Bain. On rocks and Algæ near low-water mark. Annual, summer. Fruit, July, August.

16. *Callithamnion polyspermum*, Ag.
At 3, 7, 12, &c., at about half-tide level, on shaded vertical rocks and on Algæ; always in places which are uncovered for several hours daily. Annual, March to October. Best months for fruit, May, June, and July. Spores escape at the end of July.
17. *Callithamnion Rothii*, Lyngb.
Common on rocks near high-water mark, usually in the shade, and always at places which are uncovered for several hours daily. Perennial. Fruit in winter.
18. *Callithamnion secundatum*, Ag.
At 7, 8, 12, &c., from about half-tide level to low-water mark, on *Rhodomenia palmata*, &c.; fine. Annual, May to September. Fruit in summer.
19. *Callithamnion sparsum*, Harv.
Cast ashore on stems of *Laminaria Cloustoni*, Le Jolis; rare. Summer and autumn.
20. *Callithamnion Turneri*, Ag.
Chiefly at 4 and 12, on small Algæ at low-water mark; always submerged. Epiphytic on *Polyides rotundus*, *Furcellaria fastigiata*, *Phyllophora Brodiaei*, &c. Annual, May to September. Fruit in summer.
21. *Callophyllis laciniata*, Ag.
Cast ashore from deep water. Biennial. Capsules in spring; granules in summer.
22. *Calothrix confervicola*, Ag.
Common, especially at 7, on small Algæ in shallow pools above half-tide level; always submerged. Annual, summer and autumn.
23. *Calothrix fasciculata*, Ag.
At 12, on vertical rocks near high-water mark, in the shade; rare. Always in places uncovered for many hours daily.
24. *Calothrix pulvinata*, Ag.
At 12, on vertical rocks near high-water mark, in the shade; rare. Sometimes epiphytic on *Fucus canaliculatus*. Always in places uncovered for many hours daily.
25. *Calothrix scopulorum*, Ag.
At 1 and 2, on rocks near high-water mark.
26. *Catenella Opuntia*, Grev.
Fine and abundant at 12, on vertical rocks in the shade, near high-water mark. Perennial. Tetraspores in July.

27. *Ceramium acanthonotum*, Carm.
Common at 3, 10, &c., on rocks in the shade from about half-tide level to low-water mark. All the year. Fruit in winter and spring.
28. *Ceramium ciliatum*, Ducluz.
On rocks at the pier, according to Dr M'Bain.
29. *Ceramium Deslongchampsii*, Chauv.
Common on rocks between tide marks, and epiphytic on the smaller Algæ. All the year. Fruit, July, August, September.
30. *Ceramium diaphanum*, Roth.
At 7, 12, &c., on rocks and the smaller Algæ in pools between tide marks. Annual, March to September. Fruit in July and August.
31. *Ceramium rubrum*, Ag.
Common on rocks and Algæ in pools between tide marks. All the year. Fruit, June, July, August.
32. *Ceramium strictum*, Griff. and Harv.
At 3, 10, &c., on muddy rocks in the shade at about half-tide level. Annual, spring and summer.
33. *Chaetomorpha ærea*, Ag.
At the "Fish rock," according to Dr M'Bain.
34. *Chaetomorpha arenosa*, Ag.
In shallow pools at 7, at high-water mark, associated with *Enteromorpha percursa*.
35. *Chaetomorpha tortuosa*, Ag.
Common, especially at 3, on rocks and Algæ in pools about half-tide level. Very abundant at Rudden's Point, east of Largo Bay. Annual, May to October. Plants sometimes survive the winter. Spores escape end of July.
36. *Chaetomorpha melagonium*, Ag.
In pools near low-water mark, especially at 3. Perennial. Fruit in summer.
37. *Chorda filum*, Lx.
Common, chiefly in quiet sandy bays, from a little above low-water mark to 4 or 5 fathoms. Annual, April to December. Fruit in July and August.
38. *Chorda lomentaria*, Grev.
Usually on rocks in pools between the marks. Good at 8. Annual, March to November. Trichosporangia in July and August.

39. *Chorda tomentosa*, Ag.

On submerged rocks a little beyond the low-water mark of spring tides at 4, 5, 8, 9, and 10. Annual. I have seen the plant from May to August only, and two forms would seem to occur.

40. *Chordaria flagelliformis*, Ag.

In pools between tide marks; common. Annual, April to November, and sometimes later. Mr Holmes found capsules in August in one of my Elie plants. A handsome ramillose form occurs here, having its main stem nearly straight, and carried up much higher than in the typical plant, from which it also differs in the ramelli being more numerous, and in their being pointed and sharp at the tips.

41. *Chondrus crispus*, Lx.

Common on rocks between tide marks. Perennial. Fruit in spring and winter.

42. *Chylocladia clavellosa*, Harv.

Growing at 7, at very low tides, on rocks, stones, and Algæ. Annual, April to Oct. Fruit in July and August.

43. *Cladophora albida*, Huds.

At 12, according to Dr M'Bain.

44. *Cladophora arcta*, Kutz.

Not uncommon at 10 and 12, in pools near low-water mark. Annual, March to October.

45. *Cladophora glaucescens*, Grif.

In pools at 12, rare, according to Dr M'Bain. Annual, summer.

46. *Cladophora lætevirens*, Kutz.

Common on rocks and Algæ in pools, usually at about half-tide level. Annual, March to December. Many plants survive the winter. Fruit in summer. Young plants, and new shoots on plants of the previous season, have their ramelli *secund*; all the ramelli being produced on the inner side of the ramulus previously to those on the outer side.

47. *Cladophora lanosa*, Kutz.

Not uncommon, especially at 4 and 12, near low-water mark. Usually epiphytic on *Polyides rotundus*, *Furcellaria fastigiata*, and *Ahnfeldtia plicata*. Annual, April to August (G. W. T.); spring (Crouan).

48. *Cladophora refracta*, Kutz.

In pools near low-water mark at 10 and 12.

49. *Cladophora rupestris*, Kutz.

Common on rocks between tide marks, and at a lower level; rarely epiphytic on other Algæ. All the year. Fruit in summer.

50. *Cladophora uncialis*, Harv.

At 8 and 12, on flat rocks and stones near low-water mark. Life period, from spring one year till summer the next. In best condition in July, old plants losing their gloss, and becoming lighter in shade.

51. *Cladophora* (new species).

In shallow pools at 7, above the high-water mark of neap tides. This is a minute species, much and irregularly branched, with joints from 8 to 12 times as long as broad. It was growing in some abundance in August 1885, but had disappeared a month afterwards, when I returned to the locality in order to watch the plant. None of the specimens were sufficiently perfect to admit of the species being satisfactorily determined, nor has the plant since appeared.

52. *Cladostephus plumosus*, Holmes.

In a shaded pool at 2, often in fine specimens; always submerged. Perennial. Fruit in winter. This species is one of the specialities of the district. It much resembles the *Sphacelaria plumosa* of English botanists, especially when barren, and both were formerly confounded in the *Chaetopteris plumosa* of Kützing. I found it here in 1879, and, noticing some differences in its structure from *Sphacelaria plumosa*, suggested that it was entitled to rank as a sub-species or permanent variety of that plant. I observed the ramuli to be thicker in proportion, and to taper more suddenly towards the apex, and the pinnæ to be longer and less rigid, especially in young plants, also more closely set on the ramuli, and at a more acute angle. Mr Holmes, however, subsequently obtained fruited specimens, and, having thus been enabled to ascertain the true affinities of the plant, has shown that it belongs to the genus *Cladostephus*.

53. *Cladostephus spongiosus*, Ag.
Common on rocks and in pools near low-water mark.
Perennial. Fruit in winter.
54. *Corallina officinalis*, Linn.
Common in rock pools between tide marks. Perennial.
Fruit in winter and spring.
55. *Cordylecladia erecta*, Ag.
On sandy rocks at very low tides at 4 and 12, accompanying *Phyllophora Brodiaei* and *Plocamium coccineum*. Perennial. Tetraspores in July; capsules in September and October.
56. *Cruoria pellita*, Fries.
On rocks at 3, near low-water mark.
57. *Cystoclonium purpurascens*, Ag.
Common in pools and on exposed rocks from about half-tide level to low-water mark. Annual, April to Oct. (G. W. T.); "July to Oct." (Le Jolis); "spring and summer" (Crouan). Fruit, June, July, August.
58. *Dasya coccinea*, Ag.
Cast ashore. Annual, April to Oct. Fruit, July, Aug.
59. *Delesseria alata*, Lx.
On rocks and Algæ at 3, 4, 7, 8, 12, &c., at and below low-water mark. All the year. Fruit, March, April, May.
60. *Delesseria hypoglossum*, Lx.
"Dredged on Algæ near the Lady's Tower, rare" (M'Bain).
61. *Delesseria sinuosa*, Lx.
Not uncommon on rocks and Algæ in pools between tide-marks, also in deep water. Biennial. Fruit in winter.
62. *Dermocarpa prasina*, Bornet.
At 12, on *Catenella Opuntia*, and at many places on *Polysiphonia fastigiata*.
63. *Desmarestia aculeata*, Lx.
At 4, 9, &c., on stones and rocks in the sea from a little below the low-water mark of spring tides to deep water. Always submerged. Perennial.
64. *Desmarestia viridis*, Lx.
At 4, 9, &c., often accompanying the last mentioned. Annual, spring and summer.

65. *Dictyosiphon fœniculaceus*, Grev.

Common in pools at about half-tide level; epiphytic on Algæ. Annual, April to August. Spores escape in July and August.

66. *Dictyosiphon hippuroides*, Aresch.

Not uncommon in pools at 6, 7, 8, &c., at about half-tide level, where it sometimes grows to upwards of 3 feet in length. Almost always epiphytic on *Chordaria flagelliformis*. Annual, May to September. Spores escape at the end of July and in August.

67. *Dictyosiphon mesogloia*, Ag.

In shallow pools at from the high-water mark of neap tides to about half-tide level, at 2, 3, 6, 7, 12, &c. Annual, May to September. In fruit during July and August, when the spores are enveloped until maturity in gelatinous globules attached to the exterior of the frond.

68. *Dictyota dichotoma*, Lx.

Found by Dr McBain "in tide pools near low-water mark." Annual, summer.

69. *Dumontia filiformis*, Grev.

Common in rock pools at about half-tide level. All the year. In best condition from March to October, plants being stunted and comparatively rare during winter. Fruit in summer. The variety *crispata* occurs at places where there are fresh-water streams.

70. *Ectocarpus fasciculatus*, Harv.

At 2, 3, 7, &c., on *Laminaria saccharina* and *Chorda filum*; also on rocks in pools near low-water mark; always submerged. Annual, April to October. Fruit from May to September.

71. *Ectocarpus granulatus*, Ag.

Common on rocks in pools near low-water mark. Annual, April to Oct. Fruit from May to Sept.

72. *Ectocarpus littoralis*, Lyngh.

Common on *Fuci* in pools between tide marks; also on muddy exposed rocks. At all seasons. Fruit in summer.

73. *Ectocarpus secundus*, Kutz.

On limpet shells at 7, in pools between tide marks. Annual, May to September.

74. *Ectocarpus siliculosus*, Lyngb.
Common on Algæ between tide marks. Annual, May to September. Fruit best in June and July.
75. *Ectocarpus sphærophorus*, Carm.
At 7, 9, 12, &c., epiphytic on *Callithamnion arbuscula*, *Ptilota elegans*, &c., on exposed rocks between tide marks. Annual, April to Sept. Fruit from May to August.
76. *Ectocarpus tomentosus*, Lyngb.
Common on *Fuci* between tide marks. Annual, April to September. Fruit in summer.
77. *Elachistea flaccida*, Aresch.
Parasitical on Algæ at 7, at about half-tide level. Annual, June to September. Fruit, July, August.
78. *Elachistea fucicola*, Fr.
Common on *Fuci* between tide marks. Annual, June to September. Fruit, July, August.
79. *Elachistea scutulata*, Duby.
At 8, 12, &c., on *Himanthalia lorea*. Annual, summer and autumn.
80. *Enteromorpha compressa*, Grev.
Common on rocks and stones between tide marks; also epiphytic on Algæ. Vegetates at all seasons.
81. *Enteromorpha clathrata*, Grev.
Common at 7, in pools at about half-tide level. Annual, April to September.
82. *Enteromorpha intestinalis*, Link.
Common, chiefly where there is a mixture of fresh water. Annual, April to September.
83. *Enteromorpha percursa*, Hook.
In pools at 7, near high-water mark. Annual, spring and summer.
84. *Fucus canaliculatus*, Linn.
Common on rocks between half-tide level and high-water mark. Perennial. Fruit from June to Sept.
85. *Fucus nodosus*, Linn.
Common on rocks and boulders at about half-tide level. Perennial. Fruit from December to September.
86. *Fucus platycarpus*, Thuret.
On rocks from near high-water mark to about half-tide level, and occasionally at a lower level. Perennial. Fruit all the year. Spores escape in August.

87. *Fucus serratus*, Linn.
Common on rocks at about half-tide level. Perennial.
Best fruit in winter.
88. *Fucus vesiculosus*, Linn.
Common on rocks between tide marks. Perennial.
Fruit in winter and summer.
89. *Furcellaria fastigiata*, Grev.
On rocks, chiefly in sandy pools, near low-water mark.
Perennial. Fruit in winter.
90. *Gelidium corneum*, Lx.
In pools and on exposed rocks at about half-tide level.
Perennial. Typical at 7; var. *crinale* at 9; var. *clavatum* at 3.
91. *Gigartina mamillosa*, J. Ag.
Common on exposed rocks and in pools from half-tide level to low-water mark. Perennial. Fruit in winter.
92. *Gloiosiphonia capillaris*, Carm.
At 4, 7, 9, 10, but somewhat uncertain in its appearance. On rocks and stones a little below low-water mark; seldom in pools between tide marks. Annual, June to September. Fruit in July and August. The specimens at 9 and 10 are generally fine, and vary from 12 to 18 inches in height.
93. *Griffithsia corallina*, Ag.
On rocks at and below low-water mark, and epiphytic on *Odonthalia dentata* and other Algæ at 9. Annual. Fruit in summer. Rather rare.
94. *Griffithsia setacea*, Ag.
At 7 and 8 on the perpendicular sides of exposed rocks in the shade, near low-water mark; also in pools. Perennial. Fruit in April, May, and June. Rather rare.
95. *Halidrys siliquosa*, Lyngb.
Common in pools at and below half-tide level; always submerged. Larger plants in deep water. Perennial. Fruit in winter. Spores escape in April.
96. *Hildenbrandtia rubra*, Meneg.
On pebbles and smooth stones in shallow pools, generally at about half-tide level. All the year. Fruit in autumn.

97. *Himanthalia lorea*, Lyngb.
On rocks at low water at exposed places. All the year. Fruit in summer. Spores escape in August.
98. *Hydrolapathum sanguineum*, Stack.
Growing at 8 and 12, under projecting ledges of rock in the shade, near low-water mark; also in deep rock pools: rarely on other Algæ. Larger specimens cast ashore from deep water. Biennial. Fruit from November to March inclusive.
99. *Jania rubens*, Lx.
On Algæ between tide marks, according to Dr M'Bain.
100. *Laminaria Cloustoni*, Le Jolis.
Cast ashore from deep water. Perennial. Fruit in winter.
101. *Laminaria flexicaulis*, Le Jolis.
On rocks at low-water mark. Perennial. Fruit in winter.
102. *Laminaria Phyllitis*, Lx.
In pools near low-water mark, also in deep water. Rather uncertain in its appearance. Annual, spring and summer.
103. *Laminaria saccharina*, Lx.
In pools near low-water mark, also in deep water. Sometimes epiphytic. Fruit in summer and autumn.
104. *Laurencia hybrida*, Lenorm.
Common on exposed rocks, and in pools, at about half-tide level; rarely epiphytic. All the year. Tetraspores in winter and spring; ceramidia in July.
105. *Laurencia pinnatifida*, Lx.
Common on rocks at exposed places at low-water mark; sometimes epiphytic. All the year. Tetraspores in winter and spring; ceramidia in July.
106. *Leathesia tuberiformis*, Gray.
Common, especially at 3, from about half-tide level to low-water mark, on Algæ and rocks in the shade. Annual, May to October.
107. *Litosiphon Laminariæ*, Harv.
Epiphytic on *Alaria esculenta* at 2, 7, 8, 12, &c., in pools near low-water mark; always submerged. Annual, June to October. Fruit in August.

108. *Litosiphon pusillus*, Harv.
Epiphytic on *Chorda filum*, at 3, 6, 7, 8, 9, &c.
Annual. Spores escape in July and August.
109. *Lomentaria articulata*, Ag.
At 7, 12, &c., on rocks in the shade, and sometimes on Algæ, near low-water mark. Annual, April to October. Fruit in summer.
110. *Lyngbya æstuarii*, Liebm.
At 7, in pools in the shade, which are flooded only by spring tides; amongst decaying Algæ.
111. *Melobesia Laminariæ*.
On stems of *Laminaria Cloustoni*.
112. *Melobesia Lenormandi*, Aresch.
On stones and shells between tide marks.
113. *Melobesia polymorpha*, Harv.
Common on rocks between tide marks, and in deep water.
114. *Melobesia pustulata*, Lx.
On Algæ between tide marks. Perennial. "Fruit in autumn" (Crouan).
115. *Mesogloia vermicularis*, Ag.
At 3, 4, 5, &c., at low-water mark on stones and rocks; also epiphytic on *Polyides rotundus*, *Furcellaria fastigiata*, and *Phyllophora Brodiaei*. Always submerged. Annual, summer.
116. *Mesogloia virescens*, Carm.
Common on rocks and stones in pools at about half-tide level; very rarely on Algæ. Always submerged. Annual, spring and summer.
117. *Monostroma Grevillei*, Ag.
Not uncommon at 1 on rocks, stones, and Algæ, at about half-tide level. Occurs chiefly where there are fresh-water streams. Annual, March to June (G. W. T.); "spring" (Crouan); "February to April" (Le Jolis).
118. *Myrionema strangulans*, Grev.
At 4, parasitic on *Enteromorpha compressa*, at about half-tide level. Annual, summer and autumn. Fruit in July and August.
119. *Myrionema punctiforme*, Harv.
At 4, parasitic on *Porphyræ vulgaris*, at about half-

- tide level. Annual, summer and autumn. Fruit in July and August.
120. *Myriotrichia clavæformis*, Harv.
At 7, 10, 12, &c., in pools from near high-water mark to about half-tide level; epiphytic on Algæ. Annual, spring and summer.
121. *Myriotrichia filiformis*, Harv.
Associated with the preceding. Annual, spring and summer.
122. *Nitophyllum laceratum*, Grev.
Cast ashore; sometimes on *Laminaria Cloustoni*. Annual, May to Sept. Fruit in July and August.
123. *Nitophyllum punctatum*, Grev.
Cast ashore, rare. Dredged by Dr M'Bain off the Lady's Tower. Annual, May to September. Fruit in July and August.
124. *Odonthalia dentata*, Lyngb.
At 9, on stones and rocks from a little below low-water mark to deep water. Perennial. Fruit in winter.
125. *Oscillatoria subuliformis*, Thw.
Associated with *Leptothrix radians* on the dark walls of the Devil's Cave, near high-water mark.
126. *Petrocelis cruenta*, J. Ag.
Common on rocks near low-water mark. Perennial. Fruit in winter.
127. *Phlæospora brachiata*, Bornet.
At 2, 7, &c., on *Rhodymenia palmata*, in pools between tide marks. Annual. Fruit, June, July, August.
128. *Phlæospora tortilis*, Aresch.
At 3, 4, 5, 10, in pools at about half-tide level. Annual, March to Sept. Fruit in July and August.
129. *Phyllitis fascia*, Kutz.
At 5 and 6, on rocks and stones in pools at about half-tide level. Annual, March to November. Trichosporangia in spring and summer.
130. *Phyllitis cæspitosa*, Kutz.
Common on rocks and stones in pools at about half-tide level. Annual, March to November. Trichosporangia in spring and summer. The form *debilis* is associated with this.

131. *Phyllophora Brodiaei*, J. Ag.
At 4, 12, &c., usually in sandy pools near low-water mark; also in deep water. Perennial. Fruit in winter.
132. *Phyllophora membranifolia*, J. Ag.
At 4, and very fine at 12, on rocks and stones near low-water mark. Perennial. Fruit in winter.
133. *Phyllophora rubens*, Grev.
At 10 and 12, in fine specimens, in pools, and under shelving rocks near low-water mark; also in deep water. Perennial. Fruit in winter.
134. *Phyllophora Traillii*, Holmes.
At 3, 12, &c., at about the low-water mark of spring tides, on shaded rocks, or in pools; sometimes amongst sponges. All the year. Fruit in winter.
135. *Plocamium coccineum*, Lyngb.
At 4, 7, 8, 12, at low-water mark, but in small specimens, on rocks and acorn shells; sometimes on Algæ. Usually in deep water. Perennial. Fruit in summer.
136. *Polyides rotundus*, Harv.
Common on rocks in pools near low-water mark. Perennial. Fruit in winter.
137. *Polysiphonia atro-rubescens*, Grev.
On sand-covered rocks, also in pools, at 4, near low-water mark. All the year. Fruit in summer and autumn (G. W. T.); "winter and spring" (Crouan); "winter" (Le Jolis).
138. *Polysiphonia Brodiaei*, Grev.
At 1, 2, and 12, on rocks and Algæ in pools near low-water mark. Annual, May to September. Fruit in July and August.
139. *Polysiphonia byssoides*, Grev.
Cast ashore from deep water east of the Lady's Tower. Annual, June to October. Fruit in July and August. Sometimes cast ashore in great abundance at the east of St Monance after S.W. gales in summer.
140. *Polysiphonia elongata*, Grev.
On stones and shells in deep water; seldom between tide marks. Rarely growing at 3 and 4 at the

lowest level of spring tides. Perennial. Fruit in July and August.

141. *Polysiphonia elongella*, Harv.

"Near low water," according to Dr M'Bain.

142. *Polysiphonia fastigiata*, Grev.

Usually epiphytic on *Fuci*; sometimes growing on rocks. Perennial. Fruit from June to September.

143. *Polysiphonia fibrata*, Harv.

At 3, 7, &c., on damp, exposed rocks, and on Algæ, in the shade, a little below half-tide level; sometimes in pools. Annual, summer and autumn. Fruit from June to September inclusive.

144. *Polysiphonia fibrillosa*, Grev.

Chiefly at 7 and 8, on rocks, and on *Cladostephus spongiosus*, in clear sunny pools, usually a little above half-tide level. Very fine, and often abundant in pools a little to the east of the "crooked skerry." Perennial. Fruit in July, August, and September.

145. *Polysiphonia nigrescens*, Grev.

Common on rocks, especially at 2, and on *Corallina officinalis* in pools between tide marks. Perennial, but usual duration from March to October. Young shoots on old plants generally appear in January. Fruit from June to September. The form *affinis* also occurs.

146. *Polysiphonia parasitica*, Grev.

At 2 and 7, on rocks in shaded pools between tide marks; also cast ashore epiphytic on *Laminaria Cloustoni*. Always submerged. Annual, April to October. Fruit in July and August.

147. *Polysiphonia urceolata*, Grev.

On rocks and Algæ at 6, between tide marks, usually in pools. Usual duration from March to October, but plants sometimes survive the winter. Fruit in July and August. The variety *patens* also occurs.

148. *Porphyra laciniata*, Ag.

Common on exposed rocks, and on Algæ, usually between half-tide level and high-water mark. All the year. Fruit best in September.

149. *Porphyra leucosticta*, Thuret.
Epiphytic on Algæ from half-tide level to low-water mark. Annual, May to October. Fruit best in September.
150. *Porphyra vulgaris*, Ag.
On rocks and Algæ in pools between tide marks. Annual, May to October. Fruit in August and September.
151. *Prasiola marina*, Crouan.
On rocks and boulders at about the high-water mark of neap tides. All the year. In best condition in winter and spring, and generally poor in summer and autumn. Fruit in February and March.
152. *Protococcus* (*species?*), Thuret.
At 2 and 3, on rocks and stones in brackish pools above high-water mark; also epiphytic on *Enteromorpha compressa*.
153. *Ptilota elegans*, Bonnem.
At 3, 7, 12, &c., on shaded rocks and boulders, and in dark crevices, from a little below half-tide level to low-water mark. Perennial. Fruit in spring and summer.
154. *Ptilota plumosa*, Ag.
Cast ashore from deep water. Epiphytic on *Laminaria Cloustoni*. Perennial. Fruit, June, July, August.
155. *Punctaria plantaginea*, Grev.
At 5, 6, and 12, in pools from about half-tide level to near high-water mark. Annual, March to July.
156. *Punctaria tenuissima*, Grev.
At 2, in deep pools, epiphytic on *Laminaria flexicaulis* and *Laminaria saccharina*. Annual. Fruit in August and September.
157. *Ralfsia verrucosa*, Harv.
At 3, 12, &c., in shallow pools between high-water mark and half-tide level, incrusting rocks and stones; also on exposed rocks in damp places. Perennial. Fruit in July and August.
158. *Rhodomela lycopodioides*, Ag.
Cast ashore, epiphytic on *Laminaria Cloustoni*. Perennial. Fruit from March to June.

159. *Rhodomela subfusca*, Ag.
Common on rocks and stones in pools between tide marks. Perennial. Tetraspores in swollen ultimate ramuli in summer, in *stichidia* in winter.
160. *Rhizoclonium riparium*, Kutz.
At 3, 11, &c., on rocks and Algæ near high-water mark. All the year (G. W. T.); "winter and spring" (Crouan); "all the year" (Le Jolis).
161. *Rhizoclonium Kochianum*, Kutz.
At 3, on iron-work (Holmes).
162. *Rhodophyllis bifida*, Ag.
"On Algæ; very rare" (M'Bain).
163. *Rhodymenia palmata*, Grev.
Common on exposed rocks, and in pools between tide marks; also epiphytic on Algæ. Biennial. Granules, January, February; tetraspores, August; tubercles, June, July, August.
164. *Rivularia atra*, Roth.
At 6, 7, &c., on rocks, stones, and Algæ in pools near high-water mark. At all seasons.
165. *Saccorhiza bulbosa*, De la Pylaie.
Cast ashore from deep water.
166. *Schizymenia edulis*, Ag.
At 1, 2, 8, 12, &c., on rocks near low-water mark. Perennial. Tetraspores, July, August.
167. *Sphacelaria cirrhosa*, Ag.
At 5, 7, and 12, epiphytic on Algæ in pools at and above half-tide level. All the year. Fruit in June and July; propagula in July.
168. *Sphacelaria olivacea*, Dillwyn.
At 2 and 12, in velvety patches on rocks near high-water mark, accompanying *Callithamnion Rothii*. All the year. Unilocular sporangia, pedicellate, in winter.
169. *Sphacelaria plumigera* (?), Holmes.
At 12, on sand-covered rocks at low-water mark, according to Professor Henderson. The plant, however, was not collected for examination, and as the distinction between it and *Cladostephus plumosus* (Holmes) was not well understood at the time Professor Henderson saw the specimens, it may

have been the latter species which he found, and which occurs in the district.

170. *Sphacelaria radicans*, Harvey.

At 7 and 12, on sand-covered rocks near low-water mark. All the year. Fruit in winter.

171. *Sphacelaria scoparia*, Lyngb.

At 7 and 12, in fine specimens, and in considerable abundance, accompanying *Sphacelaria cirrhosa*, in deep shaded pools above the high-water mark of neap tides. All the year. These, which I discovered in the summer of 1885, are the only Firth of Forth localities recorded.

172. *Streblonema velutina*, Derb. et Sol.

At 8 and 12, parasitic on *Himanthalia lorea*, usually associated with *Elachistea scutulata*. Annual. Fruit, July, August.

173. *Symploca Harveyi*, Le Jolis.

At 2 and 7, in shallow rock-pools near high-water mark, the finest specimens being in the shade. Rarely epiphytic on *Cladostephus spongiosus*. Annual. Certified by Bornet (G. W. T., 1879).

174. *Ulothrix flacca*, Thuret.

At 8 and 12, on rocks and Algæ near high-water mark, usually in the shade; often associated with *Ulothrix isogona*. Annual, November to August. Fruit in winter and spring. Spores escape in May and June.

175. *Ulothrix isogona*, Thuret.

At 8 and 12, associated with the above. Annual, November to August. Fruit in winter and spring. Spores escape in May and June.

176. *Ulva latissima*, Linn.

Common on rocks and stones, and epiphytic on Algæ, in pools between tide marks. All the year. In best condition in May, June, and July.

177. *Ulva Linza*, Linn.

Common in pools at about half-tide level. Annual, May to September.

Map
to illustrate
the Marine Algæ
of
Elie.