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LONG-TERM CHANGES IN THE BOTTOM VEGETATION OF HOGLAND (SUURSAARI) ISLAND COASTAL WATERS

Henn KUKK. PIKAAJALISED MUUTUSED HOGLANDI SAARE RANNIKUMERE PÕHJATAIMES-
TIKUS

Хенн КУКК. МНОГОЛЕТНИЕ ИЗМЕНЕНИЯ ФИТОБЕНТОСА ПРИБРЕЖНЫХ ВОД о-ва ГОГЛАНД

Hogland is a long (11 km) and relatively narrow (1.5—3 km) island in the north-eastern part of the Gulf of Finland. As the island is situated comparatively far from the sources of pollution, we are of the opinion that the changes observable in the bottom vegetation of its coastal waters ought to reflect those in the phytobenthos of the Gulf of Finland as a whole. The first data on the bottom vegetation of Hogland's coastal waters were published over a hundred years ago by C. Gobi (1874, 1877) who studied the samples collected with the help of mechanical means, and also the washed-out algae in the coastal waters of Hogland Island.

C. Gobi (1874, 1877) has determined 7 species of brown algae, two of them appeared to be one and the same species: *Dictyosiphon chordaria* f. *baltica* Gobi and *Cladosiphon balticus* Gobi (= *Dictyosiphon chordaria* (Aresch.) Du Rietz; *D. foeniculaceus*, *Ectocarpus siliculosus*, *Fucus vesiculosus*, *Pilayella littoralis*, *Ralfsia verrucosa* and *Dictyosiphon tortilis* (Rupr.) Gobi (= *Stictyosiphon tortilis* (Rupr.) Reinke. Beside the above species C. Gobi has mentioned two species of brown algae *Chorda filum* and *Eudesme virescens*, which he personally has not found.

C. Gobi (1877) has found three species of red algae: *Hildenbrandtia rosea* Kütz. Gobi (= *Hildenbrandtia prototypus* Nardo), *Ceramium gracillinum* Griff. et Harv. (= *C. tenuicorne* (Kütz.) Waern and *Bangia fuscopurpurea*.

In 1939 the Finnish algologist E. Häyrén (1940) studied the bottom vegetation in the eastern coastal sea of Hogland Island, (at 5 stations in its open part) and in Suurkylä Bay. Apart from 5 species of blue-green algae he recorded 9 species of green algae, 11 taxa of brown algae and 3 species of red algae.

The next studies on bottom vegetation in this area were performed by the author in 1976 (Кукк, 1979, 1980) and in July, 1983. In 1983 the samples were collected from 10 transects at 29 stations within the depth interval of 0—17 m, embracing the Hogland's coastal sea as a whole.

Brown algae

Pilayella littoralis (L.) Kjellm. was registered at 9 stations within the

depth interval 3—8 m, attached to rocks and *Fucus*. Frequent but not abundant throughout the whole study area. Described earlier by C. Gobi (1874) and E. Häyrén (1940).

Ectocarpus confervoides (Roth.) Le Jolis was recorded at 7 stations within the depth interval of 1—5 m. The species is common for the whole study area. Described earlier by E. Häyrén (1940) in Suurkylä Bay.

Ectocarpus siliculosus (Dillw.) Lyngb. Single specimens were found at a depth of 3 m attached to rocks in Liivalahti Bay. C. Gobi (1874) registered it in the washed-out algae. Earlier the species was abundant in the bays of Suurkylä, Liivalahti and Kappellahti.

Sphacelaria arctica Harv. was found at the south-eastern coast of the island at a depth of 8 m on rocks. Earlier the species has been described under the name of *Sph. racemosa* Grev. in Suurkylä Bay (Häyrén, 1940).

Pseudolithoderma subextensum (Waern) Lund was found twice at the depths of 5 and 8 m at the south-eastern coast of the island. C. Gobi (1874) has described the species *Ralfsia verrucosa* Aresch., which E. Häyrén (1940) identifies as *Lithoderma fatiscens* (= *Pseudolithoderma subextensum* (Waern) Lund).

Elachista fucicola (Vellej) Aresch. was registered 4 times attached to *Fucus* at the depth of 1—3 m in the coastal waters of the bays of Liivalahti and Kiiskinkylä. In 1939 the species was abundant in Suurkylä Bay (Häyrén, 1940).

Dictyosiphon foeniculaceus (Huds.) Grev. f. *foeniculaceus* is frequent in the coastal waters of the island; it occurs from the water surface down to the depth of 5 m everywhere. Earlier registered in the bays of Suurkylä and Liivalahti where it was of scattered distribution.

Dictyosiphon foeniculaceus (Huds.) Grev. f. *hippuroides* (Lyngb.) Levring. Single specimens were found at the depths of 1 and 5 m in Kiiskinkylä Bay and in the coastal waters of the north-western part of the island. In 1939 abundant from Suurkylä up to Liivalahti Bay.

Stictyosiphon tortilis (Rupr.) Reinke occurs everywhere within the depth interval 3—5 m, but is of scattered distribution. C. Gobi (1874) registered the species in the washed-out algae. According to E. Häyrén (1940) it was abundant in the area from Hirsikallio to Liivalahti Bay.

Fucus vesiculosus L. f. *vesiculosus* frequent at depths 1—10 m. Almost at all the stations the species occurred as a dominant or a subdominant. C. Gobi (1874) has mentioned the species, but without showing its exact habitat.

Fucus vesiculosus L. f. *angustifolia* Ag. was found at a depth of 1 m in the south-eastern part of the island and in Kappellahti Bay. The species is of scattered distribution. According to E. Häyrén (1940) the species was abundant near the Cape of Hirsikallio, in Suurkylä Bay and to the south of it. In 1939 E. Häyrén registered the species *Chorda filum* in the area of Suurkylä Bay at a depth of 5 m. The author has failed to find both *Chorda filum* and *Eudesme virescens*, mentioned by C. Gobi (1874).

Red algae

Chroodactylon ramosum (Thwait.) Hangs. was found at one station scattered between the filaments of *Cladophora glomerata* in Liivalahti Bay. The species has not been registered earlier in Hogland's coastal waters.

Phyllophora truncata (Pall.) Newroth. et Taylor f. *angustissima* (Ag.) Sjöstedt was found at a depth of 10 m west of Hogland Island. The species has not been registered earlier.

Ceramium tenuicorne (Kütz.) Waern is one of the most frequent

species within the depth interval 1—5 m. A vast majority of plants has tetrasporangia. Earlier described east of Hogland (Häyrén, 1940).

We did not find the species *Bangia fuscopurpurea* and *Hildenbrandtia prototypus* described by C. Gobi (1874), although, in 1939 they were rather abundant in the study area.

Green algae

Enteromorpha intestinalis (L.) Link was collected both in Suurkylä Bay as well as from the stones of the mole separating the bay from the open sea. The species dominates in the phytocoenoses of Suurkylä Bay. According to E. Häyrén (1940) in 1939 the species was of scattered distribution in the area of the harbour.

Enteromorpha prolifera (Müll.) J. Ag. The species was represented by scattered assemblages on the mole. E. Häyrén (1940) has registered it in the area of Suurkylä harbour and the cape of Hirsikallio under the names of *E. tubulosa* Kütz. f. *prolifera* and *E. crinita* (Roth.) J. Ag. Alongside the above species he mentions *E. hopirkii* (M'Calla) J. Ag = *E. clathrata* (Roth.) Grev. which we have failed to find.

Enteromorpha ahlneriana Blid. was found on the sea-side part of the mole.

Cladophora rupestris (L.) Kütz. was registered at a depth of 5—6 m. At a depth of 6 m it occurs as a subdominant in the association of *Fucus vesiculosus*. At a depth of 5 m it forms an association and is overgrown by *Ceramium tenuicorne*. The species is distributed throughout the whole study area. E. Häyrén (1940) has registered it near the Cape of Hirsikallio and in Suurkylä Bay.

Cladophora glomerata (L.) Kütz. is distributed down to the depth of 5 m everywhere in the study area. It often acts as a dominant and forms an association. E. Häyrén (1940) has recorded the species east of Hogland Island where it was not abundant. Beside the above species he has mentioned the species *C. marina* Roth., however, it seems to be identical with *C. fracta* (Müll.) Kütz.

From the above it follows that the species composition of bottom vegetation has undergone remarkable changes since 1939. The share of green algae *Cladophora* and *Enteromorpha* as well as that of brown algae *Pilayella* and *Ectocarpus* has considerably increased in associations. However, at the same time the number of species sensitive to eutrophication of water, e. g. *Elachista fucicola*, has decreased. The red algae *Bangia fuscopurpurea* and *Hildenbrandtia prototypus* and the brown alga *Chorda filum* have disappeared. Changes in the bottom vegetation and in the share of species in phytocoenoses show that the waters of the open part of the Gulf of Finland are subjected to eutrophication.

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