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RECORDS OF THE BROWN ALGA *HALOSIPHON TOMENTOSUS* (LYNGBYE) JAASUND (PHAEOPHYCEAE) IN THE SOUTH-EASTERN BALTIC SEA

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For the first time, *Halosiphon tomentosus* (Lyngb.) Jaasund (*Chorda tomentosa* Lyngb.) was recorded in the South-Eastern Baltic Sea in May–June 2016, in several locations of the Sambia Peninsula northern coast. The species was found in the upper horizon of sublittoral on boulders in assemblages with green and brown algae (*Ulva intestinalis*, *Ulva prolifera*, *Cladophora glomerata*, *Ectocarpus siliculosus*, *Pylaiella littoralis*, and sometimes *Pseudolithoderma subextensum* and *Hildenbrandia rubra*). The species was recorded in 2017–2018 as well. The length of thread-like thalli ranged 3–30 cm, with the mean value of (9.2 ± 2.3) cm. The mean biomass was of (73.3 ± 41.9) g·m⁻² in 2016 and (11 ± 8.8) g·m⁻² in 2018. The reasons for *H. tomentosus* occurrence in the South-Eastern Baltic and its absence in the adjacent sea areas require further research.

Keywords: *Halosiphon tomentosus*, South-Eastern Baltic, new species records

The species composition of macroalgae of coastal fouling in the Russian area of the South-Eastern Baltic Sea is studied year-round since 2009. *Halosiphon tomentosus* (Lyngbye) Jaasund (*Chorda tomentosa* Lyngb.) (AlgaeBase, 2021) was recorded in May–June 2016 on the Sambia Peninsula northern coast – from Zelenogradsk town in the east to Lesnoy village in the west (Figs 1, 2). For the South-Eastern and Southern Baltic, *H. tomentosus* was not mentioned either at the early XX century (Lakowitz, 1907) or in the modern period until 2016 (Kostkevičienė & Sinkevičienė, 2008 ; Labanauskas, 2000 ; Pliński & Surosz, 2013 ; Volodina & Gerb, 2013, 2018).

Macroalgae quantitative sampling was carried out, and communities were described in the locations of *H. tomentosus* record from depths of 0–0.50 m on 0.01-m² sites. The macroalgae samples were weighed. The length of thread-like thalli ranged from 3 to 30 cm, with the mean value of (9.2 ± 2.3) cm. The color varied from golden to brown. In all the habitats, the species was recorded in the upper horizon of sublittoral on boulders or concrete structures at depths of 0–0.20 m. The ratio of the species in samples averaged 18 %. Air-dried phytomass ranged from less than 0.01 to 407 g·m⁻²; its values averaged (73.3 ± 41.9) g·m⁻² in 2016 and (11 ± 8.8) g·m⁻² in 2018. The projective cover of the species was low – 0.5–5 % (Table 1).

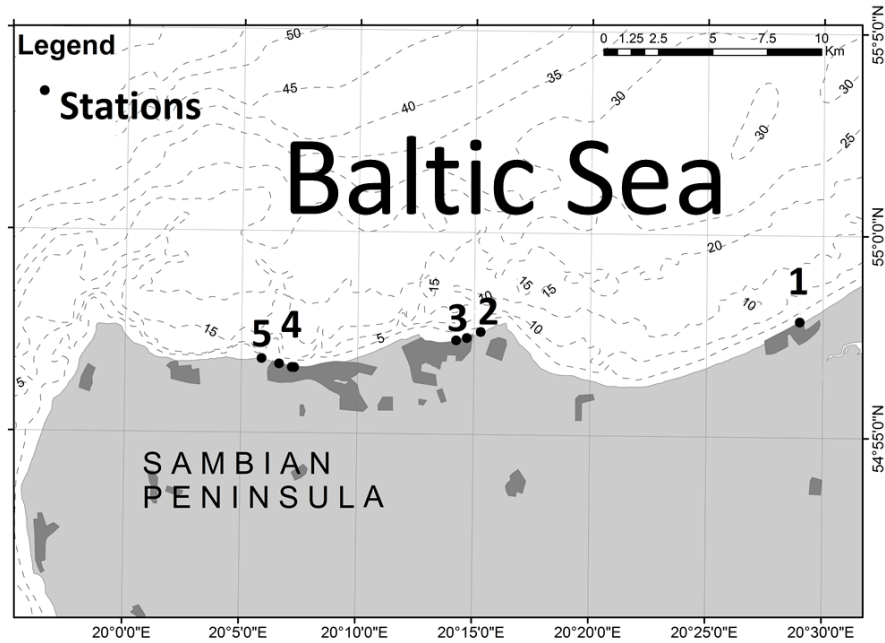


Fig. 1. Location of *Halosiphon tomentosus* sampling stations in the South-Eastern Baltic in 2016: 1, Zelenogradsk town; 2, Zaostrovie village; 3, Pionersky town; 4, Otradnoe village; 5, Lesnoy village

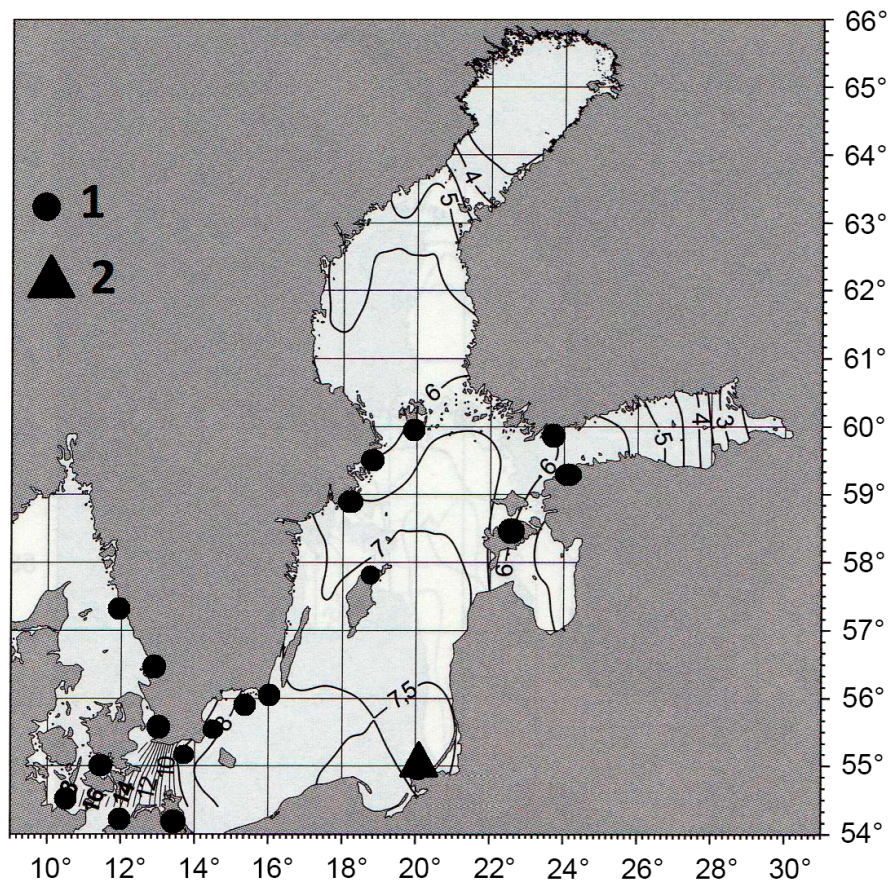


Fig. 2. *Halosiphon tomentosus* distribution in the Baltic Sea and salinity on the sea surface (practical salinity units, PSU) in December (1954–2000) (Dubravín, 2014); 1, *H. tomentosus* distribution in the Baltic Sea according to (Kontula & Fürhapter, 2012); 2, species record in the South-Eastern Baltic (2016–2018)

The highest value of *H. tomentosus* phytomass was registered on 5 June, 2016, in the area between Otradnoe and Lesnoy villages. On the locations studied, the species occurred in assemblages of annual green (*Ulva intestinalis* Linnaeus, 1753, *Cladophora glomerata* (Linnaeus) Kützinger, 1843, and *Ulva prolifera* O. F. Müller, 1778) and brown macroalgae (*Pylaiella littoralis* (Linnaeus) Kjellman, 1872 and *Ectocarpus siliculosus* (Dillwyn) Lyngbye, 1819), as well as in assemblages involving corticated perennial red and brown macroalgae (*Hildenbrandia rubra* (Sommerfelt) Meneghini, 1841 and *Pseudolithoderma subextensum* (Waern) S. Lund, 1959).

Table 1. Algae occurrence, species projective cover in assemblages, and species ratio in biomass (%) in *Halosiphon tomentosus* habitats

No.	Species	Occurrence, %	Projective cover, %	Species ratio in total biomass, %
1	<i>Cladophora glomerata</i>	93.3	20–95	46
2	<i>Ectocarpus siliculosus</i>	40	0–0.5	2
3	<i>Pylaiella littoralis</i>	46.6	0.5	6
4	<i>Ulva intestinalis</i>	69	50–100	16
5	<i>Ulva prolifera</i>	13.3	1–5	12
6	<i>Pseudolithoderma subextensum</i>	29	0–0.5	–
7	<i>Hildenbrandia rubra</i>	20	0–1	–
8	<i>Halosiphon tomentosus</i>	68.4	0.5–5	18

H. tomentosus diagnostic feature is a thread-like thallus densely covered along its entire length with multicellular golden-brown hairs. In the Baltic Sea, thalli up to 1 m long and 4 mm wide occur in sublittoral on boulders and shell rocks at depths of 1–15 m (Pankow, 1990).

H. tomentosus is a typical representative of the Arctic cold-boreal North Atlantic flora. In 2015, the species was recorded in the north-western Black Sea (the Odesa Bay). This habitat is the southernmost spot of *H. tomentosus* range (Minicheva, 2015).

The species occurs in seas varying in salinity – from 35 PSU (the North Sea) to 6 PSU (the Baltic Sea) (Hällfors & Heikkonen, 1992). Winter (+7 °C) and spring temperatures (+5...+13 °C) in the Baltic Sea (Dubravín, 2014) are suitable for its widespread distribution up to the Gulf of Bothnia. L. Zenkevich (1963) classified *H. tomentosus* as a species characteristic of the Baltic Sea. According to current floristic lists, *H. tomentosus* distribution in the Baltic Sea is concentrated in its western and south-western areas. The species is also recorded in the Bornholm Basin, the Western Gotland Basin, and the North-Eastern Baltic (the Gulf of Finland and Gulf of Riga) (Kontula & Fürhapter, 2012 ; Möller et al., 2010) (see Fig. 2). The reasons for *H. tomentosus* occurrence in the South-Eastern Baltic and its absence in the adjacent sea areas require further research. Apparently, the species is not recorded there due to the fact that monitoring is carried out mainly in the second half of summer – in the period of maximum macroalgae development when there are no *H. tomentosus* sporophytes.

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**НАХОДКИ *HALOSIPHON TOMENTOSUS* (LYNGBYE) JAASUND
(PHAEOPHYCEAE)
В ЮГО-ВОСТОЧНОЙ БАЛТИКЕ**

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Первая находка *Halosiphon tomentosus* (Lyngb.) Jaasund (*Chorda tomentosa* Lyngb.) была сделана в юго-восточной части Балтийского моря в мае — июне 2016 г. на северном побережье Самбийского полуострова на нескольких участках. Вид был встречен в верхнем горизонте сублиторали на валунах в ассоциациях преимущественно с зелёными и бурыми водорослями (*Ulva intestinalis*, *Ulva prolifera*, *Cladophora glomerata*, *Ectocarpus siliculosus*, *Pylaiella littoralis*, изредка *Pseudolithoderma subextensum*, *Hildenbrandia rubra*). Также вид был обнаружен в 2017–2018 гг. Длина нитевидного слоевища варьировала от 3 до 30 см, в среднем равнялась $(9,2 \pm 2,3)$ см. Средняя биомасса составила $(73,3 \pm 41,9)$ г·м⁻² в 2016 г. и $(11 \pm 8,8)$ г·м⁻² в 2018 г. Причины появления *H. tomentosus* в Юго-Восточной Балтике и его отсутствия в прилегающих районах Балтийского моря требуют дальнейшего изучения.

Ключевые слова: *Halosiphon tomentosus*, Юго-Восточная Балтика, новые местонахождения вида