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SHORT COMMUNICATION

Finding of alien brown macroalgae *Chorda tomentosa* Lyngb. in the Ukrainian Black Sea coast

Galina Minicheva

Institute of Marine Biology, National Academy of Sciences of Ukraine, 37 Pushkinskaya St., Odessa 65011, UKRAINE

Corresponding author: minicheva@ukr.net

Abstract

Brown algae *Chorda tomentosa* Lyngb. 1819, representative of order *Laminariales* Mig. 1909, was found in the north-western part of the Black Sea (Ukraine, Odessa Bay, Cape Bolshoi Fontan) in spring 2015. This is a new invasive species in the Black Sea ecosystem and the only representative of brown laminarian algae. Ecological activity of this species is 82.2±4.3 $m^2 \cdot kg^{-1}$, that corresponds to the nutrient level of the area where it was found.

K e y w o r d s : *Chorda tomentosa*, alien (biological invasion, non-indigenous species), Black Sea, Ukraine

Development of sporophytic phase of brown algae *Chorda tomentosa* (genus *Chorda*, family *Chordaceae*, order *Laminariales*, class *Phaeophyceae*, subclass *Fucophycidae*, division *Ochrophyta*) (http://www.algaebase.org) was found on April 30, 2015 in the Cape Bolshoi Fontan (north-western Black Sea, Ukraine, Odessa Bay: 46° 22.469 N, 30° 45.249 E) during underwater survey on the sandy and shelly substratum at the depth of 5–8 m and temperature of 9°C (Figure 1).

Identification of the species was performed taking into account the fact that the genus *Chorda* contains only two species – *C. filum* (L.) Lam. and *C. tomentosa* Lyngb. (Boldumanu 1990). The first one has «naked» thallus, while *C. tomentosa* has much fibrils between one-celled sporothecae and paraphyses; the fibrils have the same diameter all along their lengths.

The results of the above survey have shown that there were no single specimens, but quite a developed population of *C. tomentosa* having patchy distribution. In places the «rosettes» of the algae with 5–10 thalli develop at the distance of 1.5–3 m from each other. The height of thallus in the population is

50 to 80 cm in general (the maximum was 85 cm) and they form biomass reaching 100–150 g·m^{-2}. This is a big macroalgae rising above the level of local phytobenthos coenoses and easy to spot visually. At present *C. tomentosa* fills the places in cold (up to 10 °C) and deep (below 5 m) phytocoenoses dominated by *Desmarestia viridis* and *Ceramium diaphanum* var. *elegans* (Roth) Roth (Figure 2).

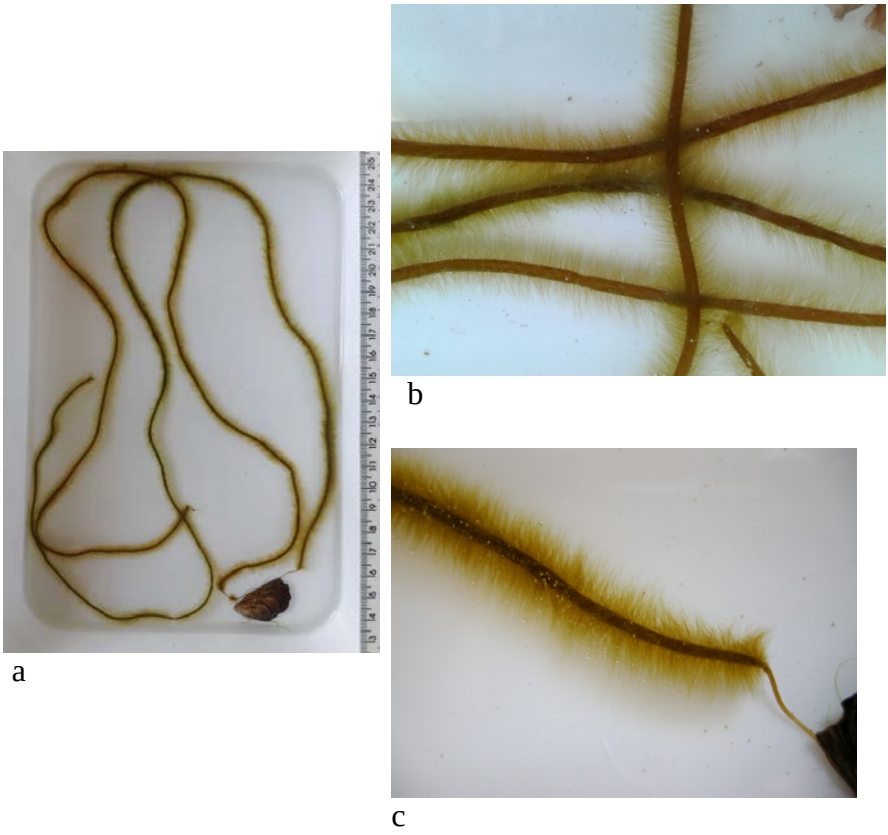

Figure 1. *Chorda tomentosa* found at Cape Bolshoi Fontan, north-western Black Sea, in April 2015: *a* – general view of thalli; *b* – middle part of thallus with fibrils; *c* – thallus base with bottom.

Figure 2. *Chorda tomentosa* as an element of a phytocoenosis dominated by *Desmarestia viridis* and *Ceramium diaphanum* var. *elegans* (photo by A.P. Kurakin)

C. tomentosa, as well as order *Laminariales* to which it refers, is absent from the checklists of Ukrainian algal flora (Tsarenko *et al.* 2006), the Black Sea macrophytobenthos (Black Sea Monitoring Guidelines 2015) and basic identification guide to green, brown and red algae of southern seas of the USSR (Zinova 1967), thus, was found for the first time not only in the Ukrainian waters, but also in the whole Black Sea. It is known that the genus *Chorda* Tymp. is widespread in arctic and boreal waters of the Arctic Ocean, as well as in boreal waters of the Atlantic and the Pacific Oceans (Perestenko 1980). Mass development of *C. tomentosa* takes place in spring and early summer in the Barents and the White Seas (Zlygostev 2011). Its known habitat covers the Arctic Ocean and the North Atlantic (Kiselev *et al.* 1953).

Southern boundary of its habitat is located further north than *C. filum* habitat (http://www.ecosystema.ru/08nature/vod/019.htm). At present *C. filum* has the status of alien species with high level of introduction in the Mediterranean Sea (CIESM 2009) and is entered into the list of the Marmara Sea alien species (Zeybek *et al.* 1986).

Calculation of specific surface of *C. tomentosa* has shown that the S/W value of tubular thallus is 5.69±0.47 $m^2 \cdot kg^{-1}$ and of the fibrils – 197.20±8.79 $m^2 \cdot kg^{-1}$. In general, the coefficient of ecological activeness of the alien species population is 82.2±4.3 $m^2 \cdot kg^{-1}$. At present, in the coastal zone of Odessa Bay, such development is characteristic of macroalgae with the S/W value of population equal to 25–140 $m^2 \cdot kg^{-1}$; the average regional value of this indicator makes ~ 80 $m^2 \cdot kg^{-1}$ (Minicheva 1998). Apparently the species feature of *C. tomentosa*, connected with dense pubescence of quite coarse tubular thalli with thin fibrils, determines the intensity of metabolic processes and enables this species to use

optimally the nutrients of its new area and conditions of the winter season with low temperatures.

In summary, the brown algae *C. tomentosa* found near Odessa coast is an alien species which has formed its population in the north-western Black Sea by spring 2015. Apparently the invasion area of *C. tomentosa* in the Black Sea is the utmost southern boundary of the species distribution and the ecological activeness of the species (S/W – 82.2±4.3 $m^2 \cdot kg^{-1}$) corresponds optimally to the current trophic condition in the area of invasion.

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