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Syntaxonomic position of *Hydrocharitetum morsus-ranae* van Langendonck 1935

Z. PODBIELKOWSKI AND H. TOMASZEWICZ

Institute of Botany, Warsaw University

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Abstract

The syntaxonomic appurtenance of *Hydrocharitetum morsus-ranae* is discussed. On the basis of data concerning its ecology, social correlates and its position in succession, the authors are against including this association into the class *Lemnetea*. They would rather be inclined to classify it to the alliance *Nymphaeion*, class *Potametea*.

The syntaxonomic position of *Hydrocharitetum morsus-ranae* has so far not been definitively established. According to one of the controversial opinions this association should belong to the class *Lemnetea*, and, according to the other view, to the class *Potametea* (*Nymphaeion*). Polakowski and Dziedzic (1972) in their synthetic review favour the first taxonomic classification, affirming this on the basis of calculation of the taxonomic value of groups of species (Tüxen, Ellenberg 1937). The publication of their paper indicated the need of deciding this problem and prompted the present authors to express their views, particularly, as they do not agree with those of the above named authors. We consider that *Hydrocharitetum morsus-ranae* should be included in the class *Potametea* (*Nymphaeion*).

The class *Lemnetea* groups associations comprising freely floating communities of minute pleuston. In larger water bodies, under the influence of wind, these communities are continuously translocated and wide changes occur in the quantitative relations between their components. The species floating on the water surface are most rapidly and radically translocated (e. g. *Lemna minor*, *Spirodela polyrrhiza*, *Wolffia arrhiza*), the under-water species are much less mobile (e. g. *Lemna trisulca*).

The structure of these communities is primitive and the social correlates between the particular components of these phytocenoses are very weak. On the other hand, the phytocenoses of *Hydrocharitetum morsus-ranae* occupy as a rule a permanent site in deep water bodies or sometimes cover the whole surface of water bodies which have become shallow. They are never translocated by wind from one end

of the water body to another. The quantitative composition of the particular phytocenoses does not change either with strong winds or high waves. At most, the phytocenoses at the end of the water body opposite to the direction from which the wind blows may be somewhat compressed, and when the wind and waves subside they return to their previous position. This is the case because the main component of these phytocenoses, *Stratiotes aloides* has a well developed system of stolons which form a weft among the particular individuals and reinforce the patches. The long filamentous roots growing from the lower part of the shoot "anchor" the plants growing in deeper water and the patches partly emerging above it. Similar properties are exhibited in the morphological structure of the second characteristic species of the association *Hydrocharis morsus-ranae*. None of the communities of the class *Lemnetea* forms phytocenoses of subaqueous rooted plants. Such patches are formed by *Stratiotes aloides* with other species which have among others been described by the present authors (Polakowski and Dziedzic, 1972). The underwater phytocenonses of *Hydrocharitetum morsus-ranae* occur also in slowly flowing deeper water. Then *Stratiotes aloides* grows permanently under water firmly fixed to the bottom.

As seen from the quoted examples, the species characteristic for *Hydrocharitetum morsus-ranae* (particularly the dominant component of most phytocenoses, *Stratiotes aloides*) have not much in common as regards their biology and morphology with the micropleuston freely floating species of the class *Lemnetea*. Finally, if we would even accept the taxonomic classification suggested, then such species as *Utricularia vulgaris*, *Ceratophyllum demersum*, *C. submersum*, *Elodea canadensis* and perhaps even others should be also included into the class *Lemnetea*.

What is, however, most important, and cannot be disregarded in considerations of this kind, are the ecological requirements and the ecological amplitude of the particular phytocenoses associated with them as well as the position of the latter in plant succession and their role in the process of overgrowth of water bodies. Communities of the class *Lemnetea* have a very wide ecological amplitude and settle in various water bodies. They occur in lakes, usually forming complex communities with vegetation possessing floating leaves and rushes. They are found in all village ponds. They develop abundantly in peat hags, fish ponds, clay pits, old river beds etc. If the water bodies are small, independently of their depth, how shallow they become and the kind of origin and of the subsoil communities of the class *Lemnetea* may cover their entire surface. They do not show any tendency to develop towards other communities, they cannot therefore be considered as initial stages of plant communities. Their role in the process of effective overgrowth and filling of water bodies, particularly those completely infested by them is quite different than the role of communities of the class *Potametea*. The presence of compact patches of vegetation of the *Lemnetea* class, namely, particularly in small water bodies where the wind does not translocate them delays overgrowth and filling. This is so because the compact pleuston cover shades so much the deeper water spaces that no macrophytes can develop there. There is no doubt that phytocenoses of the class *Lemnetea* produce large amounts of phytomass per surface area unit, however, the latter contains very little fibrin and is quickly disintegrated.

If we now consider from the same aspect the *Hydrocharitetum morsus-ranae* phytocenoses, it will be seen that their ecological requirements are precisely defined. They develop best in water bodies which have become very shallow or in shallow parts of deeper water biodeis. For development they require an organic substrate. They are not found, contrary to the communities of the class *Lemnetea*, in water bodies with a mineral substrate such as clay pits, ponds, quiet shallow bays in lakes with a mineral substrate, fish ponds etc. The position of *Hydrocharitetum morsus-ranae* phytocenoses in plant succession is precisely marked. They are the last stage of aquatic vegetation in natural processes of overgrowth of stagnant waters. It seems to be in the succession order one of the first communities of aquatic plants which produces the largest amounts of phytomass per surface area unit in optimal development conditions. The shallowing of the water body up to the moment when its whole bottom or surface is overgrown with *Hydrocharitetum morsus-ranae* phytocenoses is drastic.

As seen, the differences in the phytocenoses of the class *Lemnetea*, as compared with those of *Hydrocharitetum morsus-ranae*, are pronounced. Since the former include typical freely-floating species of stagnant water, they cannot occur independently in large water bodies, because the wind and waves do not let them. On the other hand they develop in rushes and communities with floating leaves on the water surface, finding there protected sites where driven by the wind or waves they can find protection and prosper. Of course they also penetrate into *Hydrocharitetum morsus-ranae* phytocenoses where they may frequently be found and find convenient conditions, but they are here an accidental or at most an accompanying element. In this way complex communities are formed as is the case with other aquatic and rush phytocenoses. This finds confirmation in the synthetic elaboration of *Hydrocharitetum morsus-ranae* (Polakowski, Dziedzic 1972) and in that of rush communities (Tomaszewicz, 1973), where *Lemna minor* and *Lemna trisulca* prevail among the companion species. The conclusion is that the species of the class *Lemnetea*, both in the phytocenoses *Hydrocharitetum morsus-ranae* and in those of rush communities in various types of water bodies, find similar good conditions for development. On cannot, however, on this basis classify the phytocenoses with which they form complex communities as *Lemnetea*. Although the presence of species of the class *Lemnetea* is sometimes dependent at the given site on the presence of *Hydrocharitetum morsus-ranae* patches, there is no reverse dependence: the *Hydrocharitetum morsus-ranae* phytocenoses are never dependent on the presence of *Lemna* communities.

As seen from the foregoing considerations, classification of *Hydrocharitetum morsus-ranae* as an association of the class *Lemnetea* does not seem to be justified. It should have its place in the alliance *Nymphaeion* class *Potametea*.

REFERENCES

Polakowski B., Dziedzic J., 1972. Zespół *Hydrocharitetum morsus-ranae* van Langendonck 1935—Das *Hydrocharitetum morsus-ranae* van Langendonck 1935 in Nordostpolen, Fragm. Flor. Geobot. 18(3-4): 353—358.

Tomaszewicz H., 1973. The position of *Scirpo-Phragmitetum* W. Koch 1926 in systematics, Acta Soc. Bot. Pol. 42, 3: 379—380.

Tüxen R., Ellenberg H., 1937. Der systematische und der ökologische Gruppenwert. Ein Beitrag zur Begriffsbildung und Methodik der Pflanzensoziologie, Mitt. Flor-soziol. Arbeitsgem. Niedersachsen, 3, Hannower.

Stanowisko syntaksonomiczne Hydrocharitum morsus-ranae van Langendonck 1935

Streszczenie

Istnieją dwa poglądy na przynależność systematyczną *Hydrocharitetum morsus-ranae* van Langendonck 1935. Według jednego z nich zespół ten należy zaliczyć do klasy *Lemnetea*, według drugiego — do związku *Nymphaeion* z klasy *Potametea*. Ze względu na odmienne właściwości zbiorowisk z klasy *Lemnetea* w porównaniu z cechami fitocenoz *Hydrocharitetum morsus-ranae* autorzy skłaniają się do przyjęcia tego drugiego ujęcia systematycznego. O ile bowiem fitocenozy zespołów z klasy *Lemnetea*:

1. ulegają ciągłym przemieszczeniom w obrębie zasiedlanych przez nie akwenów, przy czym zmieniają się ich stosunki ilościowe i jakościowe;
2. mają bardzo dużą amplitudę ekologiczną i występują w akwenach o bardzo różnych właściwościach siedliskowych;
3. nie wykazują tendencji rozwojowych w kierunku innych zbiorowisk roślinnych;
4. hamują proces lądowacenia zbiorników wodnych;

to fitocenozy *Hydrocharitetum morsus-ranae*:

1. są bardzo stabilne i nie wykazują większych zmian ilościowych i jakościowych;
2. mają określone wymagania ekologiczne i osiedlają się zwykle w wodach płytkich o podłożu organicznym;
3. mają określone miejsce w sukcesji zbiorowisk roślinnych, stanowiąc ostatnie ogniwo w naturalnym procesie zarastania wolnej powierzchni wodnej;
4. bardzo silnie przyśpieszają proces lądowacenia zbiorników wodnych.