

Terrestrial isopods (Crustacea, Izopoda) of peat bogs in Romania

Nicolae Tomescu^{1,✉}, István Urák² and Lucian Alexandru Teodor³

SUMMARY. Nine terrestrial isopod species were identified in five peat bogs in Romania. Out of these six were marshland species (*Ligidium germanicum*, *Ligidium hypnorum*, *Hyloniscus riparius*, *Hyloniscus transylvanicus*, *Hyloniscus mariae*, *Hyloniscus siculus*) and three woodland species (*Protracheoniscus politus*, *Porcellium conspersum* and *Trachelipus difficilis*). Most species (seven species) were identified in the „Răbufnitarea” peat bog, which was the smallest habitat, its area being only 1 ha. In the habitat of the Băgău peat bog (3 ha) four species were identified, out of which two were present with a single individual only. In the other habitats with a relative large area between 38 and 120 ha, only one or two species were identified. *Protracheoniscus politus* was present in all studied habitats, *Ligidium germanicum* in 3 habitats, all the other species in only one or two habitats. All studied habitats are surrounded with spruce (*Picea abies*) and deciduous forests and pastures. The populations of the peat bogs are proceeded from the surrounding habitats. In Romania research considering terrestrial isopods of these habitat types has never been done.

Keywords: peat bogs, marshland, terrestrial isopods, woodland.

Introduction

Ecological and faunistic studies concerning the terrestrial isopods of Romania were made in: woodlands, river banks, hayfields, pastures and scrublands (Radu, 1939, 1950, Radu and Tomescu, 1972, 1976, 1981, Tomescu, 1974 – PhD thesis, Tomescu, 1992, 2010, Tomescu *et al.*, 1979a, b, 1995, 2000, 2001, 2002, 2005, 2008, 2011a, b). The study of terrestrial isopods in peat bogs is a first for Romania. The lack of similar studies might be a result of the high level of difficulty in sampling peat bogs. Peat bogs are habitats with a highly acidic soil, which is generally less tolerated by isopods.

¹ Babeş-Bolyai University of Cluj-Napoca, Dept. of Taxonomy and Ecology

² Sapientia Hungarian University, Dept. of Environmental Sciences, Cluj-Napoca

³ Babeş-Bolyai University of Cluj-Napoca, Dept. of Taxonomy and Ecology

✉ Corresponding author: Nicolae Tomescu, Babeş-Bolyai University of Cluj-Napoca, Dept. of Taxonomy and Ecology, Str. Cliniciilor 5-7, RO-400006, Cluj-Napoca, E-mail: ntomescu@hasdeu.ubbcluj.ro

Description of the studied habitats

Our research has been done in five Romanian peat bogs.

Mohoş peat bog with an area of 80 ha, located in the Ciomatu Mare Massive, at 1050 m altitude, surrounded with beech forest. The pitfall traps were set in two distinct habitats of the peat bog: **a**) habitat with birch, where the dominant plant association is the *Vaccinio-Betuletum pubescens* Libbert 1933, and **b**) habitat with Scots pine, where the dominant plant association is *Vaccinio-Pinetum sylvestris* Kleist 1929, with a layer of *Sphagnum* moss. In both habitats the pitfall traps were set approximately 200 m from the beech forest edge.

Luci peat bog with an area of 120 ha, situated in the Harghita mountains, at 1080 m altitude surrounded by beech forest. On the area of the peat bog there are no open water surfaces, in the moss layer the *Sphagnum* species dominate, blueberry bushes and trees are present in low densities. Pitfall traps were set in three habitats:

- **a**) the open bog area with some sporadic dwarfed pine and birch trees, the dominating association being *Eriophoro vaginati-Sphagnetum recurvi* Hueck 1925.
- **b**) wooded bog with Scots pine and dense blueberry bushes, mostly described as *Vaccinio-Pinetum sylvestris (betuletosum nanae)* Kleist 1929.
- **c**) spruce forest, with a dense moss layer, where the dominant association is *Piceetum sphagnoso-Polytrichetosum* Soó 1944 (Tanțău *et al.*, 2003). In all habitats, Barber pitfall traps were set at distance of 200-300 m from the neighbouring beech forest.

Răbufnitoarea peat bog, a protected natural area (1 ha) – Ciomad-Balvanyos, situated in the Bodoc Mountains, at 925 m altitude, sorrounded by a beech forest. Within the peat bog patches of open water are present. The vegetation mainly consists of Sphagnum and scattered birch trees, the dominant plant association being *Eriophoro vaginati-Sphagnetum recurvi* Hueck 1925 (Pop, 1960). Pitfall traps were set approximately 50-100 m from the forest edge.

Fântâna Brazilor peat bog, a protected natural area with a surface of 38 ha, in the Harghita Mountains, at a 950 m altitude, sorrounded by a spruce forest an a pasture. On the area of the peat bog Scots pine and dense blueberry and raspberry bushes are present, the dominant association is *Vaccinio-Pinetum sylvestris* Kleist 1929 (Pop, 1960). Pitfall traps were applied approximately 50-100m from the spruce forest edge.

Băgău peat bog, with a surface area of 3 ha is a protected natural area, at an altitude of 450m, situated near Băgău village at 9 km from Aiud city, Alba County. The bog is surrounded by beech forest. The pitfall traps were placed in the open part of the bog, where open water patches are present, the dominant plant association was *Sphagnetum magellanici* Kastner & Flosner 1933 (syn. *Eriophoro vaginati-Sphagnetum* Pop *et al.*, 1987).

Materials and methods

In all studied habitats 15 pitfall traps were set on the 1st of May 2012. The isopods were collected on the 30th of June 2012 and studied in laboratory. Species were identified and the individuals were counted. Due to the low number of individuals collected in the peat bogs (with the exception of the Răbufnitoarea peat bog) quantitative ecological analysis were not possible.

Results and discussion

In the five studied peat bogs nine species of terrestrial isopods were identified, of which six were marshland species (*Ligidium germanicum*, *Ligidium hypnorum*, *Hyloniscus riparius*, *Hyloniscus transylvanicus*, *Hyloniscus mariae*, *Hyloniscus siculus*) and three woodland species (*Protracheoniscus politus*, *Porcellium conspersum* and *Trachelipus difficilis*) (Table 1).

Table 1.
Terrestrial isopod species identified in peat bogs: number of collected individuals

Species name	Peat bog name						Total number of individuals/species
	Mohoş		Luci		Răbufni-toarea	Fântâna Brazilor	
	80 ha		120 ha		1 ha	38 ha	
	a	b	a	b	c		
<i>Ligidium germanicum</i>					11	7	6
<i>Ligidium hypnorum</i>						44	5
<i>Hyloniscus riparius</i>						1	1
<i>Hyloniscus transylvanicus</i>					2		1
<i>Hyloniscus mariae</i>					10		10
<i>Hyloniscus siculus</i>						4	4
<i>Protracheoniscus politus</i>	4	7	3	409		42	37
<i>Porcellium conspersum</i>	5					14	
<i>Trachelipus difficilis</i>						3	
Total captured individuals/peat bog	9	7	3	409	23	115	37
							13

The terrestrial isopod fauna of the peat bogs are originated from the surrounding forests. Some species, which were found in a relative large number of individuals, *Protracheoniscus politus*, *Ligidium hypnorum*, *Ligidium germanicum*,

Porcellium conspersum, *Hyloniscus mariae*, formed permanent populations in the epigaion of the peat bogs. These species tolerate the low pH of peat bogs. Other species, which were collected in a low number of individuals, *Hyloniscus riparius*, *H. transylvanicus*, *H. siculus*, *Trachelipus difficilis*, are accidentally present species in these peat bogs. This can be caused by the high acidity of these habitats. It is also possible, that other factors as the chemical composition of the detritus on which isopods feed, the density of vegetation, etc. might influence the presence or absence of isopod species in these habitats.

The number of isopod species identified in each habitat is different in concordance with the specific community structure of the nearby forests, and also the area of the peat bogs. The small number of isopod species in large peat bogs can be explained by the number of the isopod species which exist in the surrounding forests. In the large area peat bogs (Mohoş – 80 ha, Luci – 120 ha, Fântâna Brazilor – 38 ha) a number of 1-3 species were collected (Table 1). In these peat bogs *Protracheoniscus politus* is the dominating species, present in large populations. *Ligidium germanicum* and *Hyloniscus mariae* have permanent populations in the surfaces with spruce and the thick *Sphagnum* layer of the Luci peat bog. In the peat bogs with a small area, individuals of 4-7 species were collected. In the Răbufnitoarea peat bog (1 ha) 3 species were identified in permanent populations: *Ligidium hypnorum*, *Protracheoniscus politus* and *Porcellium conspersum* and 4 accidentally present species: *Ligidium germanicum*, *Hyloniscus riparius*, *Hyloniscus siculus* and *Trachelipus difficilis*. In the Băgău peat bog, all 4 species of which only a small number of individuals were collected, these individuals migrated accidentally from the neighbouring forests. The large number (15) of pitfall traps placed in every peat bog, for a sampling period of two months makes possible the identification of terrestrial isopod populations as permanent or accidental ones in these types of habitats. *Protracheoniscus politus* is the species with the largest distribution, being present in all peat bogs. It's a species with a large spread of ecological needs, tolerant to different levels of environmental factors, this conclusion being also drawn from our previous studies (Tomescu *et al.*, 1971, 2002, 2005, 2008, 104, Mureşan *et al.*, 2003). This species is a woodland species, present in all types of forests in Romania and also inhabiting montane pastures (Tomescu *et al.*, 2001, 2002).

Conclusions

- In the peat bogs, wet habitats with *Sphagnum*, the following terrestrial isopod species are present with permanent populations, in a relatively large number of individuals: *Ligidium germanicum*, *L. hypnorum*, *Hyloniscus mariae*, *Protracheoniscus politus*, *Porcellium conspersum*.

- The following species occur accidentally in some of the peat bogs, in very low number of individuals: *Hyloniscus riparius*, *H. transsylvanicus*, *H. siculus* and *Trachelipus difficilis*.

- In the large peat bogs (over 30 ha) a small number of terrestrial isopod species are present (1-3 species), while in the peat bogs of small surface (1-3 ha) the number of species is higher. The small number of isopod species in large peat bogs can be explained by the number of the isopod species which exist in the surrounding forests.

- The terrestrial isopod populations of the peat bogs are proceeded from the populations of the neighbouring forests, which migrated to these wet habitats. Species which tolerate the ecological conditions of the peat bogs, and form permanent populations.

- The specific structure of the isopod species community in the peat bogs is related to the specific structure of the communities of the neighbouring forests and the specific feature of the ecological factors of each peat bog.

- *Protracheoniscus politus* has permanent populations in all studied peat bogs. *Ligidium hypnorum*, *L. germanicum*, *Hyloniscus mariae* and *Porcellium conspersum* have permanent populations in only one of the peat bogs.

REFERENCES

- László, E. (2006) Vegetation of the „Tăul Fără Fund” peat bog from Băgău village (Alba County, Transylvania, Romania), *Contribuții Botanice*, **41**, 67-76
- Pop, E. (1960) Mlaștinile de turbă din R.P.R., *Editura Academiei Române*, București
- Radu, G.V. (1939) Isopodes terrestres de Roumanie I. Isopodes des environs de Sinaia, *Ann. Sci. Univ. Jassy*, **25**, 447 – 462
- Radu, G.V. (1950) Izopode terestre recoltate în regiunea Poiana – Ruscă, Hunedoara, *Acad. R.P.R., Lucr. Ses. Gen. St. 1–6*, 1-33
- Radu, V., Tomescu, N. (1972) Studiu populației de *Protracheoniscus politus* (Crustacea, Isopoda) într-o pădure de foioase, *Studia UBB Biologia*, **1**, 75-82
- Radu, V., Tomescu, N. (1976) Quantitative ökologische Untersuchungen an Landisopoden, *Pedobiologia*, **16**, 36-43
- Radu, V., Tomescu, N. (1981) Cercetări ecologice cantitative asupra unor populații de izopode terestre, *Nyphaea (Folia Naturae Bihariae)*, **8-9**, 433-438
- Tanțău, I., Fărcaș, S., Reille, M., Beaulieu, J. (2003) L'analyse palynologique de la séquence de Luci: nouvelles données concernant l'histoire de la végétation tardiglaciaire et holocene des monts Harghita, *Contribuții Botanice*, **38**, 155-161
- Tomescu, N. (1974) Cercetări morfologice, biologice și ecologice la izopodele terestre, *Ph.D. Univ. „Babeș-Bolyai”*, Cluj-Napoca, pp 224
- Tomescu, N. (1992) Izopode terestre (Crustacea, Izopoda) din Delta Dunării, *An. Ști. Inst. Delta Dunării*, Tulcea, 89-90

- Tomescu, N. (2010) Izopode terestre (Isopoda, Crustacea), In: *Situl Natura 2000 Cușma*, Proorocu, M., Beldean, P., Crișan, A. (eds). Ed. Risoprint, Cluj-Napoca, pp 126-139
- Tomescu, N., Ceuca, T., Matic, Z., Crișan, D. (1979a) Cercetări ecologice cantitative asupra unor grupe de artropode din litieră, *Studia UBB Biologia*, **1**, 41-46
- Tomescu, N., Schneider, E., Weiss, I. (1979b) Die Isopoden eines Südhagens in hügelland Südsiebenbürgens, *Muz. Brukenthal Stud. Comun., St. nat.*, **23**, 275-286
- Tomescu, N., Accola, S., Pașca, C. (1995) Ecology of the populations of terrestrial isopods (Crustacea: Isopoda) in Cheile Turzii, *Studia UBB Biologia*, **40** (1-2), 78-94
- Tomescu, N., Ardelean, G., Mureșan, D., Popa, V. (2000) Ecology of terrestrial isopods in the nature resvre Scărița-Belioara, Romania, *Studia UBB Biologia*, **45** (1), 57-64
- Tomescu, N., Mureșan, D., Popa, V. (2001) The terrestrial isopod fauna in the superior basin area of the Someșul Cald river, *Studia UBB Biologia*, **46** (2), 43-47
- Tomescu, N., Mureșan, D., Popa, V. (2002) Faunistic and ecological researches on the terrestrial isopods from the superior sector of the Arieș river basin, *Studia UBB Biologia*, **47** (1), 3-14
- Tomescu, N., Mureșan, D., Olaru, L., Hotea, R. (2005) Terrestrial Isopod communities (Crustacea, Isopoda) in riverside coppices and meadows of mountainous, hilly and depression areas, *Studia UBB Biologia*, **50**(2), 19-25
- Tomescu, N., Bogdan, H., Peter, V., Covaci, S., Sas, I. (2008) Terrestrial Isopods from the Western and North-Western Romania, *Studia UBB Biologia*, **53**(2), 3-15
- Tomescu, N., Ferentă, S., Teodor, L.A., Covaci-Marcov, S.D., Cicort-Lucaci, A.Ş., Sucea, F.N. (2011a) Terrestrial Isopods (Isopoda: Oniscoidea) from Jiului Gorge National Park, Romania, *North-Western Journal of Zoology*, **7**(2), 277-285
- Tomescu, N., Mureșan, D., Teodor, L. A. (2011b) Izopodele terestre din bazinul inferior al Arieșului: cercetări faunistice și ecologice, In: *Volum comemorativ – Bogdan Stugren*, Rákosi, L., Momeu, L. (eds), Ed. Presa Univ. Clujeană, pp 39 – 45