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On distribution and habitat of *Barynotus makolskii* Smreczyński, 1955, *B. margaritaceus* Germar, 1824 and other *Barynotus* species (Coleoptera: Curculionidae: Entiminae)

by

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with 17 photos on 13 figures

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Abstract. It is reported about the presence of *Barynotus makolskii* Smreczyński, 1955 in Romania, according to the latest status characterized as endemic in eastern Poland, and the presence of *B. margaritaceus* Germar, 1824 in Germany, in current checklists listed as missing or absent, is confirmed. From Romania *B. makolskii* has been misreported previously as *B. alternans* Boheman, 1834, which is a rare species with main distribution area in the Alps. Recent findings of *B. alternans* in the Hochschwab mountain region (Styria) are also given. Habitat and host plant information of several *Barynotus* species are supplemented.

Keywords. Curculionidae, Entiminae, *Barynotus*, *alternans, moerens, obscurus*, faunistics, habitat, biology, Poland, Romania, Germany.

Introduction

With over 20 species, the genus *Barynotus* is of exclusively European origin (see Alonso-Zarazaga et al. 2017). The diversity center of the genus *Barynotus* is located in the montane regions of Italy and France with 13 and 11 species, respectively. All species are incapable of flight, are preferably nocturnal, live epigeic or in the upper soil layer and were often misidentified; thus, their distribution area is not entirely known. Parthenogenesis is a common phenomenon at least in the widespread species. New records of some rare *Barynotus* species were the main reason to publish information about finding circumstances, distribution, and habitats of selected species and to create a short identification key.

Materials and methods

Specimens of all species listed here were collected in the field or loaned from museum collections. Locality data are given as written on labels. Separate lines on labels are indicated by comma, and separate labels by semicolon; additional comments, explanations and translations are given in square brackets. Taxonomy follows Alonso-Zarazaga et al. (2017).

Images of adults were created using a Canon EOS 60D camera with Canon MP-E 65mm f/2.8 1-5x Macro lens, composed using Helicon Focus image-stacking software.

Abbreviations of the collections and type depositories:

HNHM	Hungarian Natural History Museum, Budapest, Hungary
JKPC	Jiří Krátký private collection, Hradec Králové, Czech Republic
JPPC	Jan Pelikán private collection, Hradec Králové, Czech Republic
MCSU	Marie-Curie-Skłodowska University, Dep. of Zoology and Nature Protection, Lublin, Poland

MWPC	Marek Wanat private collection, Wrocław, Poland
PSPC	Peter Sprick private collection, Hannover, Germany
SMNK	Staatliches Museum für Naturkunde Karlsruhe
USPC	Ulrich Schaffrath private collection

Studied species and bionomic notes

***Barynotus (Barynotus) makolskii* Smreczyński, 1955**

Poland: 1 ♂, 2 ♀♀: PL FV07 [UTM], Zwierzyń ad Lesko, [Lesko: Zwierzyń at San river, around 300 to 400 m], 25-26 V 1998, leg. M. Wanat; *Barynotus*, *makolskii*, (Smrecz.), det. M. Wanat (MWPC).
Romania: 1 ♀: Mehadia [Banat, Caras-Severin county, Almajului Mts.]; 161/87.; *Barinotus*, *n. sp.*, det. J. Frivaldszky; *Barynotus*, *alternans* Boheman, det. A. Podlussány 2005; *Barynotus s. str.*, *makolskii*, Smreczyński 1955, J. Krátký det. 2019 (HNHM). 1 ♀: N. Hagymás [Harghita county, Hasmas Mts.], 1942. VI. 10.; Balánbányai, hgys. Csiki; coll. E. Csiki; *Barynotus*, *alternans* Boheman, det. A. Podlussány 2005; *Barynotus s. str.*, *makolskii*, Smreczyński 1955, J. Krátký det. 2019 (HNHM). 5 ♀♀: Romania. Suceava, Putna. 1 km N, 1.6.2018, lgt. Jan Pelikán; 47°53'56"N 525 m, 25°36'49.5"E, louky. okraj lesa [meadows, margin of forest], noční osmyk [night sweeping]; *Barynotus s. str.*, *makolskii*, Smreczyński 1955, J. Krátký det. 2019 (JPPC). 1 ♀: Romania. Suceava, Putna. 1 km N. 525 m, 47°53'56"N 25°36'49.5"E, lgt. J. Krátký 1.6.2018; *Barynotus s. str.*, *makolskii*, Smreczyński 1955, J. Krátký det. 2019 (JKPC). **New species for Romania**.

Fig. 1. *Barynotus makolskii* Smreczyński, 1955 – living adult from Romania, Putna.

In Putna, Romania, *B. makolskii* (Figs 1, 4, 6) was found together with the related *B. obscurus* (Fabricius, 1775) (Fig. 9) during night sweeping at the edge of a deciduous forest (Fig. 13). A food link to any specific plant has not been observed. In Poland, the specimens (Fig. 5) collected near Lesko were swept and individually collected from the blossoms of unidentified, about 0.5 m high *Ranunculus* species growing in open meadows (M. Wanat, pers. comm.).

***Barynotus (Margaritius) margaritaceus* Germar, 1824**

Germany: 3 ♀♀, 1 specimen of undetermined sex. Bavaria, Allgäu, Oberstdorf: Einödsberg, habitat X03: elevated Geo montani-Nardetum, below Spätengundkopf, ungrazed (Fig. 3), 1896 m, lgt. I. Harry, pitfall, 26.9.2005, 1 ex.; Allgäu, Oberstdorf: Einödsberg, habitat X05: tall herb vegetation with *Deschampsia cespitosa* (L.) P. Beauv., *Aconitum napellus* L.*, Rumex alpinus* L. and others, ridge at Spätengundkopf, former „Lägerflur" (place where animals spend the night and leave faeces) with nitrophilous ruderal vegetation of strong herbs, now ungrazed, near ridge, 1993 m (Fig. 2b), lgt. I. Harry, pitfall, 3 ex. 19.7.2005, 1 ex. in pitfall 3, 1 ex. in 4 and 1 ex. without pitfall number; 3 ex. in PSPC, 1 ex. in JKPC. - Two further specimens from these sites are in the collection of SMNK: X03, 23.9.2007, 1 ex.; X05, 19./20.7.2005, 1 ex. Habitat information was taken from Höfer et al. (2010). **Confirmed presence in Germany**.

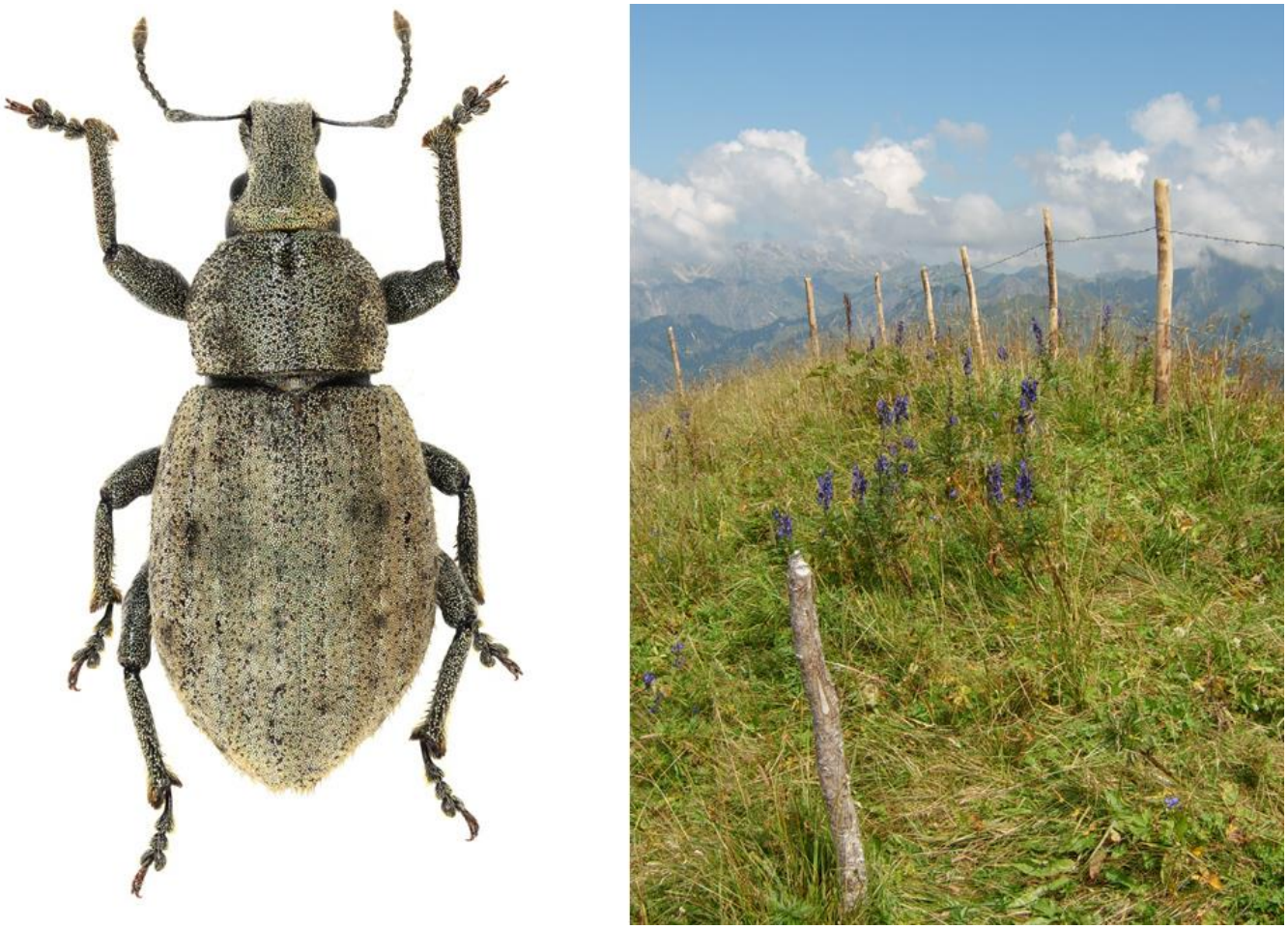

Fig. 2a, b. a - *Barynotus margaritaceus*. **b** - Its habitat at Spätengundkopf ridge with well visible blue-flowering *Aconitum napellus* L. plants and probably one specimen of *Rumex alpinus* L. between the posterior stakes (habitat X05, see text).

Rößler & Steinhausen (1990) found one specimen in July 1988 at 2000 m a.s.l. in the „Matscher Tal" (Austria: North Tyrol) on *Cirsium spinosissimum* (L.) Scop., another characteristic plant adapted to grazed environments (alliance Rumicion alpini) including „Lägerfluren". Apparently absent from the eastern and northeastern Alps: no records in Franz (1974), E. Geiser (2001) and Kapp (2001).

The only German records, not regarded in Alonso-Zarazaga et al. (2017) and classified as missing or extinct in the current red lists of Bavaria and Germany (R. Geiser 1998, Sprick et al. 2003), were already reported from Allgäu by Horion (1951) and from Augsburg by Kittel (1881). Also the latter seems entirely plausible if a long-distance transport via Lech river floodings from proximate Austrian regions (Tyrol: Allgaeu Alps, Lechtal Alps) is assumed. The Forggensee barrier and the many other Lech river barrages were erected later. In a current paper Delbol & Perez (2020) proposed to downgrade *Barynotus fairmairei* Tournier, 1876 and *B. maculatus* Boheman, 1842 from the Western Alps to subspecies of *B. margaritaceus* but did not perform this as taxonomical act.

Fig. 3. Habitat of *Barynotus margaritaceus* in the Allgäu Alps, plant association Geo montani-Nardetum, ungrazed (X03).

***Barynotus (Barynotus) alternans* Boheman, 1834**

Austria: 1 ♀: A-Styria. Seewiesen, Hochschwab Mts., 1000-1300 m smyky [= sweeping], lgt. J. Krátký 29.7.2007; *Barynotus*, *alternans*, Boh., det. J. Krátký 2007 (JKPC). 1 ♀: same locality, 28.6.2008, det. J. Krátký 2008 (JKPC). Habitats see on Figures 10 and 11.

The presence of this species in the area of Germany north of the Alps was considered doubtful by Dieckmann (1980). We obtained photos of two mounted specimens made by Ulrich Schaffrath from Dreienberg and Steinkopf in the Rhön Mountains where this species has been recorded at altitudes of 520 m and 850 m a.s.l. (Fig. 12). There are also records from the Pfalz region confirmed by M. Košťál (see www.coleokat.de/fhl/).

Apparently in Austria a rare species: Franz (1974) reported about only one record from the eastern Alps: Hochlantsch, a mountain area near Graz (Styria). Kahlen (2018) did not list any records from South Tyrol, and this species has not been found at any site in the entire area of Tyrol (M. Kahlen, pers. comm.); also not recorded in the province of Salzburg (E. Geiser 2001). These are the first records from the Hochschwab region due to Kapp (2001).

Habitat information is also rare: Ingo Wolf found one specimen at a steep northern slope with rather dense knee timber vegetation of alder by sifting, Berchtesgaden, Roßfeld, 1500 m a.s.l., 28. September 2008, already published in Wolf & Fuchs (2014). In May 2015 he collected another specimen west of Bergen near Traunstein at the northern slope of a foothill of Hochfelln named Pattenberg, over 550 m a.s.l., at forest edge with strong tall herb vegetation. Both specimens from Hochschwab were swept during the day on small meadows with rich vegetation in the upper parts of the mountain forest zone (Fig. 10).

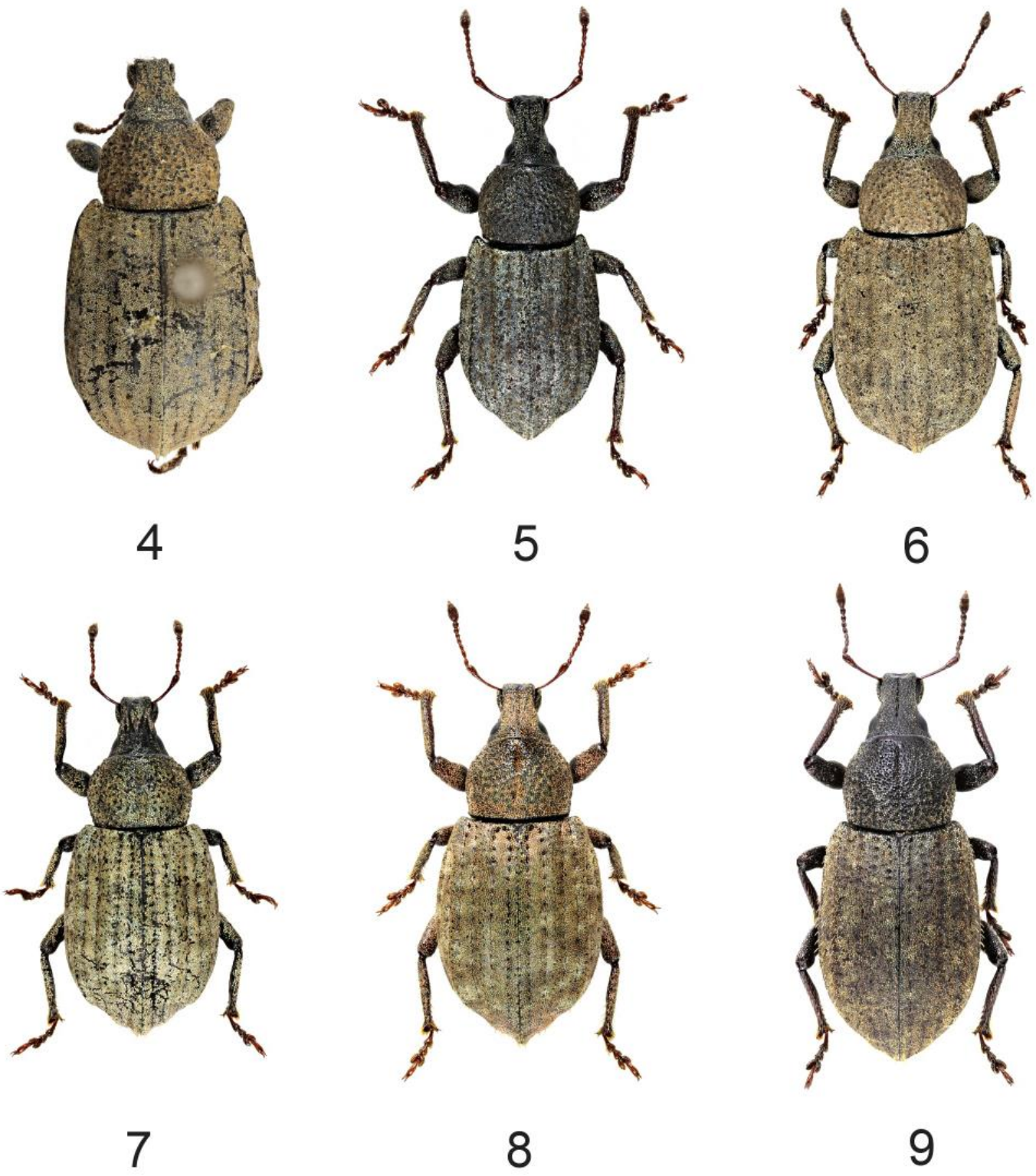

Fig. 4 – 9.
4. *Barynotus makolskii* Smreczyński, 1955, female from Romania, Mehadia.
5. *Barynotus makolskii* Smreczyński, 1955, male from Poland, Lesko: Zwierzyń.
6. *Barynotus makolskii* Smreczyński, 1955, female from Romania, Putna.
7. *Barynotus alternans* Boheman, 1834, female from Austria, Hochschwab Mts.
8. *Barynotus moerens* (Fabricius, 1792), female from Czech Republic, Frýdlant.
9. *Barynotus obscurus* (Fabricius, 1775), female from Romania, Putna.

Fig. 10. Hochschwab region with habitat of Barynotus alternans; collecting site was the meadow in front of the forest.

Fig. 11. Habitats of *Barynotus alternans* at the current northernmost localities in the Rhön Mountains, a deciduous forest close to the highest elevation at Dreienberg, 525 m a.s.l. (left), and at Steinkopf, around 850 m a.s.l. (right). It is unknown whether the specimen from Steinkopf was found in a pitfall at the rocks or in the meadow below.

***Barynotus (Barynotus) moerens* (Fabricius, 1792)**

Fig. 12. *Hosta lancifolia*, one of the host plants of *Barynotus moerens* in the botanical garden "Berggarten" in Hannover-Herrenhausen with some feeding marks at the leaf margins, the clay-coloured adult weevil and the mature larva with two characteristic light lines beneath the frontal sutures. *B. obscurus* is present is at this site, too.

Czech Republic: 4 ♀♀: CZ-Bohemia bor. 5056, Frýdlant. Křížový vrch, 50°54'48.4"N 15°4'50.8"E, lgt. J. Krátký 8.5.2013; *Barynotus*, *moerens*, (F.), J. Krátký det. 2014 (JKPC).
Germany: 6 ♀♀: Bavaria, Allgäu Alps, Einödsberg, 5 ex. 18.-20.7.2005, 1 ex. 21.7.2008, 5 ex. from grazed, 1 from ungrazed mountain meadows between 1562 m and 1993 m, all leg. I Harry by pitfall trapping. 1 ♀: Nordstemmen

(Hildesheim), garden area, 14.5.2010, this specimen was kept in captivity until 27.4.2011, when it was found dead (MCSU). In a garden area in Aerzen near Hameln *B. moerens* was found for over 20 years regularly in spring under the rosettes of *Primula elatior* (L.) Hill and cultivated primroses (Primulaceae family), occasionally before flowering, e.g., 1 ♀, 8.4.2007, 1 ♀, 14.6.2009, 1 ♀, 26.3.2012, 1 ♀, 9.5.2015. In the botanical garden in Hannover-Herrenhausen this species inhabits the native *Convallaria majalis* L., the cultivated *Hosta lancifolia* (Thunb.) Engl. (Fig. 12) and *Hosta sieboldiana* Engl. (syn. *H. montana* Maek.) (all Asparagaceae family) from Japan or Japan and the Russian Far East, respectively. Adults have been recorded from spring to early summer. Abundance of *B. moerens* adults was high enough to search for the larvae between the roots of *Hosta lancifolia*, mainly from autumn (November) to spring (May). Identity was confirmed by R. Gosik (Lublin): 4 larvae, 15.11.2012; 11 larvae, 17.4.2013; 8 larvae, 28.5.2013; 2 larvae, 25.3.2014; 1 larva, 17.4.2018 (all larvae lgt. P. Sprick are in the collection of MCSU). Dieckmann (1980) adds *Digitalis* and *Viola* as host plants, and Delbol & Perez (2020) *Cirsium oleraceum* (L.) Scop., *Lamium maculatum* L. and *Mercurialis perennis* L., but in all cases without any data about origin or kind of their host plant observations.

This species inhabits forests with well-developed, usually speciose layers of herbaceous plants of the colline and montane zone, and also occurs in parks and gardens; in the lowlands it is more restricted to alluvial hardwood forests, old parks and botanical gardens, rich in herbaceous plants, and in the mountains open habitats like meadows and pastures are preferred.

***Barynotus (Barynotus) obscurus* (Fabricius, 1775)**

Germany: 1 ♀, Bavaria, Allgäu Alps, Einödsberg, 1562 m, 11.6.2007, leg. I. Harry (pitfall trapping). Sun-exposed and grazed Geo montani-Nardetum. Record from a rather high elevation in this species.
Romania: 1 ♀: Suceava, Putna, 1 km N, 1.6.2018, lgt. Jan Pelikán; 47°53'56"N 525 m, 25°36'49.5"E, louky. okraj lesa [meadows. margin of forest], noční osmyk [night sweeping]; *Barynotus s. str.*, *obscurus* (F.), J. Krátký det. 2019 (JPPC); 1 ♀: Transylvania, Munţii Trascăului, Rimetea, mountain meadow, limestone grassland, 46°26,5'N, 23°35'E, 900 m, 20.7.2008, L. Behne det. (PSPC).

This species is widespread but usually found in small numbers. It is present in the lowlands, where it is frequent, up to the montane zone. *B. obscurus* inhabits treeless areas of very different kind, such as gardens, parks, cultivations, ruderal habitats, sand and gravel pits, meadows and pastures as well as in ecotones between grassland and forest.

Dieckmann (1980) reported on damages of crop plants, such as *Beta vulgaris* L., *Medicago sativa* L., and *Vicia faba* L. Adults were found on *Artemisia vulgaris* L., *Convallaria majalis* L., *Helleborus niger* L. (by M. Lehmann, pers. comm.), *Humulus lupulus* L., and one larva was reared with carrot, *Daucus carota* L. (see also Sprick & Stüben 2012; for more host plant information see e.g. Dieckmann 1980).

On the identity of *Barynotus makolskii* and *B. alternans*

As the first, J. Frivaldszky detected one indeterminable *Barynotus* specimen from Romania and recognized it as new species (Fig. 4) (see: Studies species), but he did not describe it. Petri (1912) did not mention this in his checklist of Romanian beetles. He probably did not know about the specimen deposited in the collections of Budapest Museum. Endrödi (1960) firstly recorded this species as *B. alternans* Boheman, 1834 from Romania. Romanian specimens were apparently never compared with typical *Barynotus makolskii* Smreczyński, 1955 specimens (Fig. 5), described from the environs of Sanok and Przemyśl in eastern Poland. Thus, an occurrence of *B. alternans* in Romania was repeatedly adopted until today (e.g., Teodor & Antonie-Vlad 2007, Delbol & Perez 2020), while *B. makolskii* was reported as endemic in Poland, most recently by Alonso-Zarazaga et al. (2017). New findings of *B. makolskii* near Putna in the northern Romanian Bucovina (Figs 1, 6) motivated us to study the specimens from museums reported by Endrödi (1960). Doing so, we found that both specimens from Banat and Hasmas Mountains are completely identical with those from Putna, collected by the first author and J. Pelikán, and they are also very similar to typical specimens from eastern Poland, but clearly different from alpine *B. alternans* (Fig. 7) and european *B. moerens* (Fabricius, 1792) (Figs 8, 12). In Putna, *B. makolskii* was found together with the related *B. obscurus* (Fabricius, 1775) (Fig. 9) during night sweeping at the edge of a deciduous forest (Fig. 13).

An identification key of the respective species, based on Smreczyński (1955), is given below. The newly presented range of *B. makolskii* shows the possibility of its occurrence also in eastern Slovakia and Ukraine, as two of the known localities, the locus typicus in Poland, as well as Putna in Romania, are located very closely to the Ukrainian border, and a connecting line would transect Ukrainian territory. Moreover, Lesko in Poland is located in the same type of landscape like the neighbouring Slovakian region.

The range of *Barynotus alternans* given by Alonso-Zarazaga et al. (2017) contains the areas of France, Switzerland, Liechtenstein, Germany (showing a scattered distribution until to Rhineland-Palatinate and Hesse in the North; see www.coleokat.de), Austria, and Romania. The data of Dieckmann (1980) concerning Slovenia and Croatia should be added, but the listing of Romania has to be deleted (see break before).

The species status of *Barynotus alternans* and *B. moerens*, which has been regarded as worth to be re-examined by Dieckmann (1980), is confirmed by Delbol & Perez (2020) as well as by our studies.

Figure 13: Habitat of both, *Barynotus makolskii* and *B. obscurus*, near Putna, eastern Romania.

Key to the species

1 In lateral view elytra in apical part vertical; eyes convex; rostrum completely smooth, median sulcus absent. Body length: 11-12 mm. Western and central Alps. ..... ***B. margaritaceus***

- In lateral view apex of elytra regularly rounded, obliquely terminated; eyes flat or very slightly convex. Body length: 7.0-9.5 mm. 2

2 Erected hairs only on odd elytral intervals. 3

- Erected hairs present on all elytral intervals. Body length: 8.0-9.5 mm. Europe. ..... ***B. obscurus***

3 Dorsal surface of rostrum flat, placed in the same plane as frons; middle channel on rostrum absent; eyes slightly convex; humeral calli strongly protruding forward, especially in males. Body length: 7.3-8.0 mm. Poland, Romania. ..... ***B. makolskii***

- Dorsal surface of rostrum separated from the frons by a shallow depression (viewed laterally); rostrum with well visible middle channel; eyes completely flat; humeral calli blunt, forming an obtuse angle, not protruding forward. 4

4 Middle channel of rostrum strongly developed, mainly in basal part; 5th elytral interval strongly elevated, forming a distinct tooth in the apical part; basal as well as apical margin of pronotum bent inwards in the middle. Body length: 7.0-8.5 mm. Alps and adjacent northern and southeastern mid-mountain areas (Germany: until Hesse, Croatia: until Plitvice). ..... ***B. alternans***

- Middle channel of rostrum shallow and uniform in all length; 5th elytral interval slightly elevated, continuously reduced in apical part, not forming a distinct tooth in the apical part; basal margin of pronotum continuously rounded. Body length: 7.0-8.3 mm. Europe except southern parts. ..... ***B. moerens***

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We would also like to thank Ingmar Guldner (master gardener) for the permission to collect and to dig for larvae in the botanical garden of Hannover-Herrenhausen. All others, who contributed to this publication in different ways, were cordially thanked, too: Rafał Gosik (Lublin, Poland), Ingmar Harry (Germany), Hubert Höfer (SMNK, Karlsruhe, Germany), Manfred Kahlen (Innsbruck, Austria), Manfred Lehmann (Neuhausen, Germany) and Ingo Wolf (Bad Endorf, Germany).

Photos
The weevils on Figure 2 and 4 to 9 and the habitats on Figures 10 and 13 were photographed by Jiří Krátký, the weevil on Figure 1 by Jan Pelikán, the habitats on Figure 2 and 3 by Ingmar Harry (received from Hubert Höfer) and on Figure 11 by Franz Rahn (received from Ulrich Schaffrath). All photos on Figure 12 were made by Peter Sprick.

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