PRELIMINARY OBSERVATIONS ON THE SPECIES OF THE GENUS *NEBRIA* FROM THE ROMANIAN CARPATHIANS

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Abstract. *The Romanian Carpathians, with an altitude of over 1000 m., harbour 10 species of the Nebria Genre, of which 3 are undoubtedly endemic: N. (Nebria) femoralis Chaudoir 1843; N. (Alpaeonebria) bissenica Bielz 1887; N. (Alpaeonebria) carpatica Bielz 1850. Some other species: N. (Alpaeonebria) reitteri Rybnisk 1902; N. (Nebria) transylvanica Germar 1824; N. (Boreonebria) heegeri Dejean 1826, and N. (Alpaeonebria) reichei Dejean 1826, occur in the Ukraine or have a wider distribution: N. (Nebria) femoralis Chaudoir 1848; N. (Eunebria) jockischi hopfneri Dejean 1826; N. (Boronebria) gyllenhali Schonher 1806 et N. (Alpaeonebria) fuscipes Fuss. 1850. This preliminary study examines the morphological features that are likely to ensure the very difficult distinction of these species. The insects studied are originating from the Maramureş Mountains, Rodna Mountains, Bucegi Mountains, and Făgăraş Mountains, collected over several years. The descriptive characters selected are divided between the macroscopic and the stereomicroscopic criteria. The macroscopic criterion retains mainly the size, the elytral and appendages color, the shape of the pronotum and elytra, the elytra length, the leg color, the number of discus pores from the 3^0 interstries (table 1.). These data provide only a separation per group of species. Additional criteria, obtained by stereomicroscopic observations, are necessary for an accurate identification: shape of the antennal basal article and mainly the chaetotaxy of the first two antennal articles, of the submentum and of the ventrites 4-5-6 (table 2). This type of study is either old (CSIKI 1946), either partial (HORVATOVICH 1972, HURKA 1975), the most comprehensive for the descriptive part being the recent work by LEDOUX et al. 2005. The comparative study allows to identify the relevant criteria for differentiating the species and to establish a dichotomy table. This latter table uses the chaetotaxy, which implies to group the individuals according to the integrity of the bristles.*

Key words: *Nebria Carpathians species, morphological features, differentiating criteria.*

Framework of the study:

The *Nebria* are more or less hygrophilous insects, encountered especially in cool, even cold, places especially for mountain species, among which there are also winter species. In the Romanian Carpathians, they are found near the water (plate of melting snow, small flows, streams, creeks and river, in the banks) or the edge of the rock scree where they search refuge from the drying out of the environment.

Species:

- Species with wide distribution - *N. (Boreonebria) gyllenhali* Schonherr 1806.
- Carpathian species (Carpathian Arc, RO, HU, UK, SK, PL) - *N. (Alpaeonebria) fuscipes* Fuss 1850 (synonym *fussi* Bielz 1850), *N. (Eunebria) jockischi hoepfeneri* Dejean 1825,
- Common species for Romania and Ukraine: *N. (Alpaeonebria) reitteri* Rybnisk 1902, *N. (Nebria) transsylvanica* Germar 1824, *N. (Boreonebria) heegeri* Dejean 1826, *N. (Alpaeonebria)reichei* Dejean 1826
- Romanian endemic species - *N. (Alpaeonebria) bissenica* Bielz 1887, *N. (Alpaeonebria) carpathica* Bielz 1850, *N. (Nebria) femoralis* Chaudoir 1843 (with

taxon *alpigrada* Csiki 1906). The form *radnaensis* Horvatovich 1972, from Rodna Mountains is rejected as a subspecies by LEDOUX et al 2005.

They were studied by FUSS (1850), BIELZ (1850 and 1887), CSIKI (1946), HORVATOVICH (1972) and more recently by LEDOUX *et al* (2005)

Geographical distribution in Romania

The geographical distribution of species in the Carpathians has been established as follows:

- quite thorough by HOLDAUS *et al.* (1911) for most of the mountains

more locally for:

- the Rodnei Mountains =GANGLBAUER (1896), CSIKI (1951), HURKA (1975)
- the Transylvania Mountains =PETRI (1911), Făgăraş Mountains HOFFMAN (1916) SZEL *et al.* 1996
- the Maramures Mountains = HORVATOVICH (1972); MERKL (2008); NIŢU (2008).

Distinctive morphological criteria:

These are grouped in the tables below distinguishing the macroscopic criteria from those requiring the use of a stereomicroscope.

A. Macroscopic characters. (Table 1)

- The size varies somewhat according to the altitude poorly differentiated species, except perhaps the smallest ones (*femoralis, carpathica*)

- Besides individuals *rufinos (gyllenhali),* the brown color of the setae covering the body characterize *carpatica,* other species being black, sometimes showing greenish reflection (*femoralis* and especially *transsylvanica*).

-The vertex of the head sometimes has a bright reddish spot, inconstant in different individuals (*femoralis, transylvanica, jockischi*).

-Appendages (palps, mandibles) are either completely black or dark brown (*jockischi, heegeri*, *reitteri*), reddish brown or reddish-yellow, or light yellow for most *reichei* species. This criterion has a relative value, except for clearly distinguished *reicheri* by *bissenica* for example with which it coexists in Făgăraş Mountains or the form *alpigrada* (palps reddish yellow) by *transylvanica.*

Table 1.

Macroscopic features

Species	Size mm.	Appendages color*	Pronotal ratio l/h	Elytra ratio L/l	Number of discal pores 3^0 I	Legs color** ta-ti, ti
E. jockischi Sturm	11-14	db	1,4	1,7	0	ta-ti= b
B. gyllenhali Schonherr	8-12	b-db	1,6	1,6	4-5	ta=rb
B. heegeri Dejean	9-12	db	1,6	1,6	2-3	ta-ti= b
A. fuscipes Fuss	10-13	rb- gy	1,6	1,5	3-4	ti=rb(1)
A. reitteri Rybinsky	10-12	db	1,4	1,7	3-4	ta-ti= b
A. reichei Dejean	9-11	gy	1,5	1,5	3-5	ti=gy
A. bissenica Bielz	9-11	b-db	1,4	1,5	4-5	ti= b
A. carpathica Bielz	10-12	rb	1,5	1,7	2-3	ti=gy
N. femoralis Chaudoir	9-11	rb	1,4	1,6	3-4	ta-ti= b
N. transsylvanica Germar	9-12	rb- gy	1,5	1,6	4-5	ti=gy

*Appendages: b (bright), rb (reddish brown), db (dark brown), gy (golden yellow)
**Legs: ta-ti (tarsi-tibias), b (black), rb (reddish brown), gy (golden yellow)
(1) except *alpigrada* (Csiki) with legs golden yellow

-The pronotum has a not very variable (1.4 to 1.6) ratio (width / height). The figure (indentation of anterior edges, sinuosity of the rear part, the character sharp or blunt of the anterior or posterior angles) differs significantly, but the differences are only usable in

comparative studies.

Elytra have a ratio (length / width L /l) ranging from 1.4 to 1.6; with the greatest width usually toward their middle part, except for *femoralis* and *transylvanica*, which are wider at the rear (apical third). The 3rd interstrie has a different stock of discal pores (except *jockischi*) but their number differs according to individuals and must be appreciated taking the population into account.

The antennas generally reach half of the elytra except for the group *transylvanica (femoralis, transylvanica)*, which surpasses only the basal third.

The legs, long and slender possess tarsi and tibias of different colors (see table), which are more or less constant. These organs are golden to *reichei*, *femoralis* and *transylvanica*; black or brown for the other species. The aberration of *femoralis* named *alpigrada* (black legs) has yellow tarsi and tibias.

The dorsal side of the tarsi is glabrous with *jochischi* (Sg *Eunebria*), pubescent with all other species.

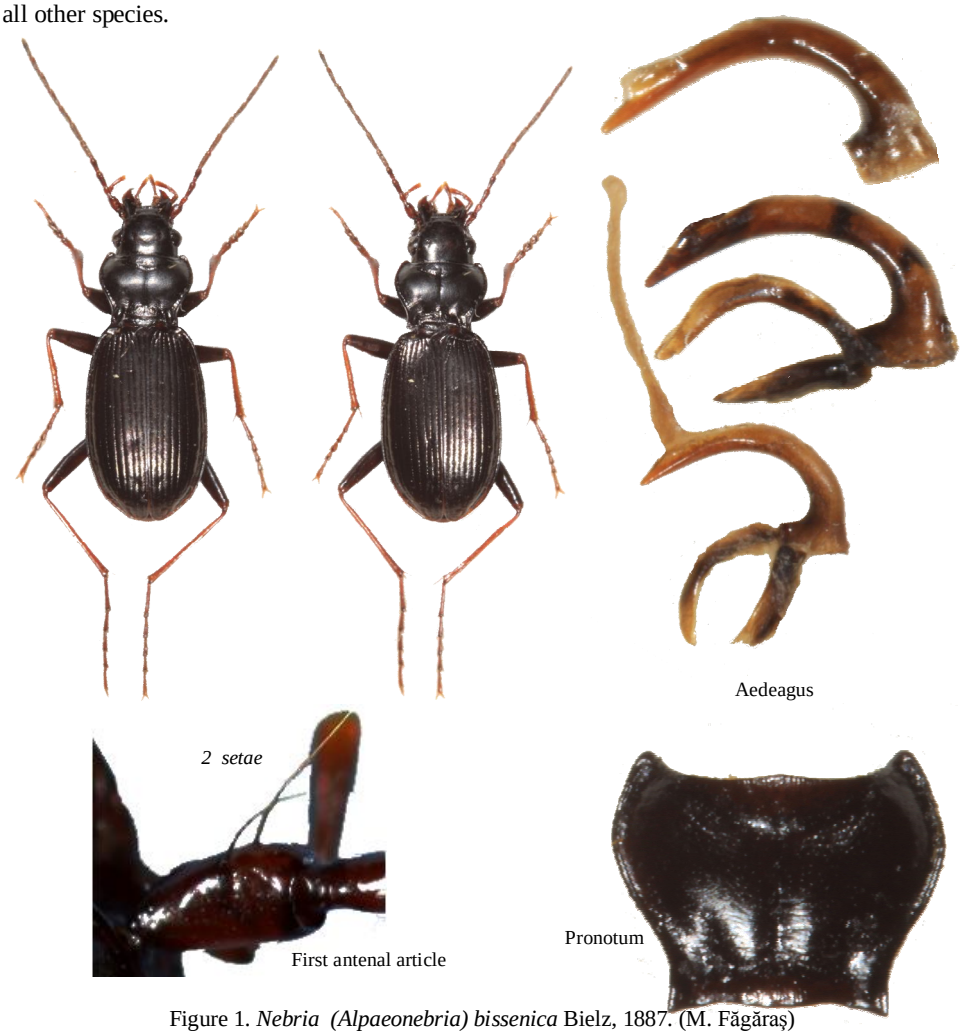

Figure 1. *Nebria (Alpaeonebria) bissenica* Bielz, 1887. (M. Făgăraş)

Figure 2. *Nebria (Alpaeonebria) reichei* Dejean, 1826, (M. Făgăraş)

B. The characters detectable with the stereomicroscopy (Table 2).

The first antennal article has a particular shape = cylindrical, conical, ovoid, sensibly varying according to the species (see table) and provided with one or two setae on the upper part, to the extremity. The second article has sometimes 1 (*fuscipes*) to 2 setae (*femoralis*) on the upper part and generally 1 or more (*carpatica*) on the lower part.

The posterior edge of the submentum is provided with setae whose number varies according to the species (see table).

The ventrites 4-5-6 have 1-2 setae on each side of their middle part according to the species

The chaetotaxy of the antennal articles of the submentum, useful for distinguishing species, involves the integrity of the setae (or at least a fragment in case of a rupture)

The aedeagus presents some differences of curvature, of thickness to the base and to the median lobe but is a poor criterion of differentiation (except for the distinction between sG.). The female genitalia after a meticulous extraction could be interesting (LEDOUX *et al.*).

Table 2.

Stereomicroscopic features

Species	First		Second		Number of submentum setae	Number of ventrites 4-5-6 setae
	shape	number of apical setae	upper	lower		
E. jockischi Sturm	sub	1	0	1	2(3)	2(6)
B. gyllenhali Schonherr	ol	1	0	1(0)	10	1
B. heegeri Dejean	ol	1	1	1	4	1
A. fuscipes Fuss	sub	1	0	1	3	1
A. reitteri Rybinsky	cy	1	0	1	4(5)	2(1)
A. reichei Dejean	sub	1	0	1	3(4)	1
A. bissenica Bielz	c	2	0	1(2)	10-12	1(2)
A. carpathica Bielz	c	2(3)	2(4)	2	10	2
N. femoralis Chaudoir	cy	1	0	1	2(3)	1
N. transsylvanica Germar	st	2	0	1	2(3)	1

Shape of the article: ol (ovoid long), c (conical), sub (sub cylindrical), cy (cylindrical), st (short very tick).

Note. The most distinctive features cited have been verified compared to the data of LEDOUX *et al*. 2005.

C. Dichotomous table

HURKA 1975 proposes a dichotomy for a few species of *Alpaeonebria* mainly based on the shape of the pronotum and the basal line of the elytra, rather sensitive criteria of appreciation. The provided dichotomous table favors the chaetotaxy criterion despite the risk of the setae's abscission among for the submentum (examination at high magnification allows to indicate the insertion of pores).

1(2) First antennal article with at least of 2 setae
3(4) Form of the setaes : 2^0 article with 2-4 setae upper ventrites 4-5-6 with 2 setae..... .....***A. carpathica*, BIELZ, 1850**
4(3) Shiny black, 2^0 article without setae, upper ventrites 4-5-6 with 1 seta
5(6) Elytra shining black, antennae reaching half elytra, bright tarsi, submentum 10-12 setae.....***A. bissenica* , BIELZ, 1887**
6(5) Elytra has a metallic reflection, antennae reaching basal third elytra, black legs, submentum 2-3 setae.....***A. transsylvanica*, CHAUDOIR, 1843**
2(1) First antennal article with 1 setae
Upper part black bristles, appendages, antennae (except 1^0 article), femora, tarsi
7(8) reddish yellow, pronotum very large (1,6 times wider than long).....***A. fuscipes*. FUSS, 1850**
8(7) Upper part shiny black
9(10) Shiny appendages, golden antennae, legs.....***A. reichei* DEJEAN, 1826**
10(9) Barely thinning or black appendages, black legs
11(12) Upper part black with reflection green bronze, antennae reaching basal third elytra sometimes reddish stain on the vertex..... ..... ***A. femoralis* CHAUDOIR, 1843**
Appendages, antennae, legs are golden..... ..... ***f. alpigrada* CSIKI, 1906**
12(11) Upper part shiny black, antennae reaching middle elytra without stain on the vertex
13(14) Entirely membranous wings
15(16) Ventrites 4-5-6 with 1 seta submentum 10 setae.
Sometimes reddish…… .....***B. gyllenhali*, SCHÖNHERR, 1806**
16(15) Ventrites 4-5-6 with at least 2 setae (up to 5). Submentum 2-3 setae shiny black.....***E. jockischi*, STURM, 1815**
14(13) Reduced membranous wings, has stumps
17(18) Pronotum moderement large (1,4 fois plus large que long) 1 article conique assez court
Pronotum moderately wide (1.4 times wider than long) 1^0 article conical, rather short. Ventrites 4-5-6 with 2 setae... .....***A. reitteri*,, RYBINSKY, 1902**
18(17) Pronotum assez large (1,6 plus large que long) 1 article ovoid long.
Pronotum rather broad (1.6 wider than long) 1^0 article ovoid long. Ventrites 4-5-6 with 1 seta.....***B. heegeri*, DEJEAN, 1826**

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