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. (Boreonebria) gyllenhali Schonherr 1806 et N. (Alpaeonebria) fusipes 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 Maramureș Mountains, Rodna Mountains, Bucegi Mountains, and Făgăraș 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 3rd 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 (Horvato维奇 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) fusipes Fuss 1850 (synonym fusii Bielz 1850), N. (Eunebria) jockischi hopfneri Dejean 1825.
- Romanian endemic species - N. (Alpaeonebria) bissenica Bielz 1887, N. (Alpaeonebria) carpatica Bielz 1850, N. (Nebria) femoralis Chaudoir 1843 (with
taxon alpigrada Cski 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), Cski (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), Cski (1951), HURKA (1975)
  - the Transylvania Mountains =PETRI (1911), Făgărăș Mountains HOFFMAN (1916)
  - Szel et al. 1996
  - the Maramures Mountains = HORVATOVICH (1972); MERKL (2008); NIȚU (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 carpathica, other species being black, sometimes showing greenish reflection (femoralis and especially transylvanica).
  - 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 reichei by bissenica for example with which it coexists in Făgărăș Mountains or the form alpigrada (palps reddish yellow) by transylvanica.

Table 1. Macroscopic features

<table>
<thead>
<tr>
<th>Species</th>
<th>Size mm.</th>
<th>Appendages color*</th>
<th>Pronotal ratio L/h</th>
<th>Elytra ratio L/I</th>
<th>Number of discal pores 3 I</th>
<th>Legs color**</th>
<th>ta-ti, ti</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. jockischi Blumm</td>
<td>11-14</td>
<td>b</td>
<td>1.4 1.7</td>
<td>3-5</td>
<td>ta-ti-b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. gyllenhali Schonherr</td>
<td>8-12</td>
<td>b-dh</td>
<td>1.6 1.6</td>
<td>4-5</td>
<td>ta-ti-b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. hoegeri Dejean</td>
<td>9-12</td>
<td>b</td>
<td>1.6 1.6</td>
<td>2-3</td>
<td>ta-ti-b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. reichei Dejean</td>
<td>10-13</td>
<td>rb, gy</td>
<td>1.3 1.3</td>
<td>3-5</td>
<td>ti-ggy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. bissenica Bielz</td>
<td>9-11</td>
<td>b-dh</td>
<td>1.4 1.5</td>
<td>4-5</td>
<td>ti-b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. carpathica Bielz</td>
<td>10-12</td>
<td>rb</td>
<td>1.3 1.3</td>
<td>2-3</td>
<td>ti-ggy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. femoralis Chandler</td>
<td>9-11</td>
<td>rb</td>
<td>1.4 1.6</td>
<td>3-4</td>
<td>ta-ti-b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N. transylvanica Geyri</td>
<td>12-12</td>
<td>rb-gy</td>
<td>1.5 1.6</td>
<td>4-5</td>
<td>ti-ggy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Appendages: b (bright), rb (reddish brown), db (dark brown), gy (golden yellow)
**Legs: ta-ti (tarsi-tibia), b (black), rb (reddish brown), gy (golden yellow)
(1) except alpigrada (Cski) 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 (Alpaeonebra) bissenica Bielz, 1887. (M. Făgăraș)
Figure 2. *Nebria* (*Alpaeonebria*) *reichei* Dejean, 1826, (M. Făgăraș)
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>
<thead>
<tr>
<th>Species</th>
<th>First shape</th>
<th>number of apical setae</th>
<th>Second shape</th>
<th>number of submentum setae</th>
<th>Number of ventrites 4-5-6 setae</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. jockeich Sturm</td>
<td>sub</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2(3)</td>
</tr>
<tr>
<td>B. gyllenhali Schonherr</td>
<td>ol</td>
<td>1</td>
<td>0</td>
<td>1(0)</td>
<td>10</td>
</tr>
<tr>
<td>B. heegeri Dejean</td>
<td>ol</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>A. fuscipes Fuss</td>
<td>sub</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>A. reitleri Rybinsky</td>
<td>cy</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>4(5)</td>
</tr>
<tr>
<td>A. reichel Dejean</td>
<td>sub</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3(4)</td>
</tr>
<tr>
<td>A. bissetica Bielz</td>
<td>c</td>
<td>2</td>
<td>0</td>
<td>1(2)</td>
<td>10-12</td>
</tr>
<tr>
<td>A. carpathica Bielz</td>
<td>c</td>
<td>2(3)</td>
<td>2(4)</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>N. femoralis Chaudoz</td>
<td>cy</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2(3)</td>
</tr>
<tr>
<td>N. transsylvanica</td>
<td>st</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2(3)</td>
</tr>
</tbody>
</table>

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 abscession among for the submentum (examination at high magnification allows to indicate the insertion of pores).
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1(2) First antennal article with at least of 2 setae
3(4) Form of the setae: 2ª article with 2-4 setae upper ventrites 4-5-6 with 2 setae........ A. carpathica, BIELZ, 1850
4(3) Shiny black, 2ª 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. biventrica, BIELZ, 1887
6(5) Elytra has a metallic reflection, antennae reaching basal third elytra, black legs, submentum 2-3 setae........................................................................... A. transylvaniaica, CHAUDOIR, 1843

2(1) First antennal article with 1 setae
1(3) Upper part black bristles, appendages, antennae (except 1ª article), femora, tarsi
7(8) reddish yellow, pronotum very large (1.6 times wider than long).............................. A. fascipes. 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 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. jeckischii, STURM, 1815
14(13) Reduced membranous wings, has stumps
17(18) Pronotum moderate large (1,4 fois plus large que long)........................................ 1ª article conique assez court
Pronotum moderately wide (1.4 times wider than long) 1ª article conical, rather short. Ventrites 4-5-6 with 2 setae........ A. rettleri, RYBINSKY, 1992
18(17) Pronotum assez large (1,6 plus large que long) 1ª article ovoide long
Pronotum rather broad (1.6 wider than long) 1ª article ovoide long. Ventrites 4-5-6 with 1 seta................................. B. hegeri, DEJEAN, 1826

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