PRELIMINARY NOTE ON THE CARABOFAUNA OF THE SUPERIOR VALLEY BÂLEA-FĂGĂRAŞ MOUNTAINS

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Abstract: *The study focuses on the carabidae fauna present in the superior valley Bâlea (Făgăraş Mountains) between altitudes of 1200 and 2040 m; the collections were carried out along both sides of the Transfăgărăşan road. We observed an altitudinal staging of the carabofauna apparition determined by the gradually melting snow and an activity corresponding to the environmental humidity. The altitudinal localization of the majority of species is not strict, except for a few Nebria, Pterostichus and Bembidion. In the mountains, three extreme cases of the carabid species distribution occur frequently. The catch comes either from sight hunting under stones and slabs in areas without shrubby vegetation or trees or from using Barber traps at the level of Vaccinium and Pinus mugo. The Pinus mugo zone offers favourable conditions for a temporal succession of species; on the other hand the very short activity (1 to 3 weeks) depends on the dampness persistence. The study areas can be separate in altitudinal zone towards 1700 m., Pinus mugo zone and altitude brooks under rocks. Towards a 1700 m rocky area, in the meadow or under stones, thousands of Platynus glaciale Reit. with some Calathus metallicus Dej. and Pterostichus pilosus Host abound. In the arboreal vegetation of Pinus mugo, Crysocarabus auronitens escheri Pall. and Orinocarabus linnaei macaierei Dej. are well represented. The species Pterostichus pilosus Host. is also very abundant but its population undergoes a downsizing in July caused by dampness depletion. In the altitude brooks under rocks along the streams, Nebria reichi Dej and Nebria bissenica Bielz and various Bembidion sp can be found in great numbers. In grassy meadows of the Natural Park Bâlea and on grassy slopes in the proximity of the tunnel, Calathus metallicus Dej. and various altitude Pterostichus sp. dominate. Some species, although belonging to forest populations, can be observed outside forests, a fact explained by deforestation due to pastoralism. The altitudinal distribution presents some rather strict locations but various species are found at all levels.*

Key word: carabidae, Bâlea Valley, distribution, frequency

INTRODUCTION

The Făgăraş Mountains, also called the Transylvanian Alps by E de Martonne, formed in the Carpathian chain an immense eastern-western oriented crest with a length of about 70 km and a width of 40 km. This mountain chain is the highest in Romania, with 8 peaks exceeding 2500 m, of which Moldoveanu 2544 m, Negoi 2535 m, Viştea Mare 2527, Lespezi 2522 m Vânătoarea lui Buteanu 2507, Dara 2501 m. It also comprises 42 peaks exceeding 2400 m and 150 over 2300 m. The assembly dominates the Făgăraş depression to the north by a large tectonic steep versant (difference in level of 2000 m onto 8-10 km).

The climate is quite harsh: an average annual temperature of -2^0C, presence of snow until the end of June, annual precipitation highest in Romania with 1400 mm of annual rain.

This mountain has been difficult to access for a long time, until in 1974 when the Transfăgărăsan road crossing the Carpathians (2040 m) near Lake Bâlea and connecting with Curtea de Argeş was created.

This difficult access, except by mountain path, may explain the low number of

botanical and zoological work realized in the Făgăraş Mountains.

The botanical studies involve either the vegetation levels (GHISA 1940, CSUROS 1953, SCHNEIDER-BINDER E *et al.* 1979), relations or associations between plants and soil (PUSCARU *et al* 1967) or to pastures and their productivity (PUŞCARU 1969; SPIRESCU *et al.* 1977; PUŞCARU *et al.*1977; MOTCA *et al* 1985).

Among studies devoted to coleopteran, we quote BIELZ (1887), MEHELY (1895), HOLDHAUS *et al.* (1910) with a specific search for Bâlea Lake and Mount Negoi.

Geographic location and study framework

a. Localization:

Our research on carabofaune is located in the upper valley of Bâlea on both sides of the road Transfăgărăşan, starting with the top part of the Bâlea waterfall (1234 m) up to the tunnel Capra Bâlea (2040 m) displaying an oscillation level by 800 m.

b. Climate:

From the point of view of climate, the meteorological station of Bâlea Lac provides some information:

- the average temperature rarely exceeds 0^0C even in July and August after the melting of snow, always late (late June, mid July).
- low rainfalls during the first trimester (90 mm), they increase until in June (from April 350 mm) with 120 mm in July, the remaining months providing about 260 mm of rainfall (totalling 800 to 850 mm of precipitation).

The overall melting of snow intervenes progressive with the altitude. For the studied portion of the valley, it spreads from mid May at 1200 to mid July at 2000m. For the same level, the accumulated snow can persist longer in the excavations or areas not exposed to sunlight. Dampness, which results, and the recovery of vegetation will be heterogeneous.

c. Hydrography

The single permanent brook is the torrent Bâlea alimented by the lake of altitude, which receives many courses of temporary water, from the melting of snow, of which the most important are channelled through rock structures.

d. Vegetation zones:

This valley situated in the northern side presents fairly steep slopes (30 to 45) and levels of vegetation characterized by:

- a zone of *Vaccinium*, narrow range, above the waterfall
- groves of *Pinus mugo* planted on the western and eastern flanks, from the proximity of the creek up to an altitude of approximately 1700 m in dense but fragmented populations
- meadows in valley bottoms for the lower region and systematically of 1700 m until the vicinity of Lake Bâlea (and in particularly in the natural reserve Bâlea 200 ha). The relief of this reserve is very rugged with steep slopes facing north-south on the top Vânătoarea lui Buteanu 2508 m flank.

Rock clusters are found in many places, almost without vegetation except in the area with *Pinus mugo*. These areas are important refuges zone.

e. Implications for carabofaune:

The environmental characteristics described above have different implications for carabofaune:

1. an altitudinal staging of carabocenoses apparition determined by the gradually melting snow
2. for a given altitude, an activity corresponding to the environmental humidity

Most of carabidae, except some more xerophytic species, look for damp places and disappear from the surface when these locations dry out. In the mountains, three extreme cases

occur frequently:

- the shelters are stones arranged in grassland or rocky plates more or less superimposed. These stations dry out very quickly and the fauna disappears (mortality or refuge in the rock scree). The apparent carabofaune (collected) has a short activity (one to three weeks)

- the areas forming shelters, protected by tree vegetation (*Pinus mugo* area) with boulders blocks protecting organic-rich interstices, staying wet a very long time. The carabofaune persists longer and the species succession can be easily observed by trapping (Barber traps)

- small streams, sheltering under the shoreline stones a riparian carabofaune, sinking deep into the rock crevices when the water disappears.

MATERIALS AND METHODS

- The study covers the years 2006 to 2009: the most comprehensive being the 2008 and 2009, with several dates for collection.

The catch comes either from sight hunting under stones and slabs in areas without shrubby vegetation or trees or from using Barber traps at the level of *Vaccinium* and *Pinus mugo*.

RESULTS AND DISCUSSIONS

Among the many carabocenoses studied, we present the following results:

a) a zone of *Pinus mugo* towards 1400-1500 m.

b) peak area - Bâlea Lake and mountain slopes near the tunnel Capra Bâlea at 2000-2040 m,

c) sight hunting in grassland parts and altitude streams.

Also we mention that towards 1700 m a rocky area in the meadow or under stones abound thousands of *Platynus glaciale* Reit. with some *Calathus metallicus* Dej. and *Pterostichus pilosus* Host.

I. A zone of *Pinus mugo*
-altitude 1400-1500 m
-catches with Barber traps
-two dates 01and 06 June 09; 01 and 06 July 2009

Table 1

Species of the *Pinus mugo* zone

SPECIES	01 June 09			02 and 06 july 09			
	♂	♀	Σ	♂	♀	Σ	Total
Megodontus planicollis Kust.	13	16	29	4	1	5	34
Megodontus violaceus mehelyi Gangl.	1	1	2	0	0	0	2
Chrysocarabus auronitens escheri Pall.	11	3	14	5	1	6	20
Platycarabus irregularis montandoni Buyss.	1	2	3	1	0	1	4
Orinocarabus linnaei macaierei Dej.	2	4	6	76	29	105	111
Pterostichus foveolatus interruptestriatus Bielz.	6	4	10	0	0	0	10
Pterostichus pilosus Host.	48	62	110	18	13	31	141
Pterostichus findeli Dej.	17	9	26	3	14	17	43
Platynus glaciale Reitt.	1	4	5	0	0	0	5
Cychrus rostratus pygmaeus Chd.	1	0	1	0	1	1	2
TOTAL	**101**	**105**	**206**	**107**	**59**	**166**	**372**

The arboreal vegetation of *Pinus mugo* presents a very dense cover, with 1.5 to 1.8 m high trees in the lower part of the wooded area. Catches concerning this forest edge are brought in with Barber traps with vinegar, placed near the rock cluster. The comparison of the two dates of capture (1 month apart) indicates *(table 1)*:

- a rarefaction of the *Megodontus planicollis* Kust. with earlier discharge;
- downsizing of the *Pterostichus pilosus* Host. (very abundant specie) and of the *Pterostichus findeli* Dej.; species susceptible to dampness depletion;
- the increase in number of the *Orinocarabus linnaei macaierei* Dej. exemplars, late exit case;
- a very low presence of the *Megodontus violaceus mehelyi* Gangl., more abundant in the *Vaccinium sp.* zone (1200-1300 m) and the *Platycarabus irregularis montandoni* Buyss., never very abundant.

The *Crysocarabus auronitens escheri* Pall. and the *Orinocarabus linnaei macaierei* Dej. are well represented in forest areas.

II. Altitude brooks

-2040 m. right zone, near the tunnel Capra Bâlea

-date 06 July 2009

-under rocks along the streams, the following can be found in great numbers:

-*Nebria reichi* Dej and *Nebria bissenica* Bielz in similar proportion, but often separate in population, these species being very abundant. In addition, there are some specimens of *Nebria transsilvanica* Germ. resembling the form of *alpigrada* Csiki individuals, displaying elytra brown rust colour.

- various *Bembidion* of which *glaciale* Heer, *fellmani* Mannh., *ruficorne* Sturn. *millerianum* Heyd.

III. Altitude meadow at 2000-2400 m;

In grassy meadows of Natural Park Bâlea and grassy slopes in the proximity of the tunnel, *Calathus metallicus* Dej. and various altitude *Pterostichus sp.* dominate *table 2.*

Table 2

Species of the altitude meadow zone

SPECIES	06. July 09		
	♂	♀	Σ
Megodontus planicollis Kust.	0	1	1
Orinocarabus linnaei macaierei Dej.	1	1	2
Orinocarabus sylvetris transylvanicus Dej.	1	0	1
Calathus metallicus Dej.	25	30	55
Pterostichus rufitarsis Dej.	24	24	48
Pterostichus kokeili Mill.	11	9	20
Pterostichus unctulatus Duft.	3	8	11
Pterostichus pilosus Host.	1	3	4
TOTAL	**66**	**76**	**142**

IV Altitudinal distribution and frequency of species

The delineation between alpine and subalpine levels is a controversial topic in terms of altitude, the sub alpine lying between 1800 and 2300 m, and the alpine above 2300 m. In principle the last one corresponds to the upper limit of the forest but the anthropogenic pressure for the extension of the grass surfaces (pastoralism) has modified this delineation. The bushes formed by *Pinus mugo, Juniperus communis, Rododendron kotskyii, Alnus viridis, Vaccinium myrtilus* were destroyed by the pastoral activities and replaced by herbaceous grasses. For the Făgăraş Mountains two studies, VOICULESCU 2002 (using the climatic data) and TOROCH-

OANCEA et al. 2006 (teledection and GIS techniques) provide precise data. The lower limit of the alpine level is defined by the annual isotherm 3^0 C (upper limit of the forest): it ranges from 1500 to 1900 m depending on the hydrographic basin, being lower on the north-facing side than the theoretic climatic limit. For the Bâlea valley it is situated towards about 1600 meters.

A classical point of view distinguishes among different species of insects present in the alpine and subalpine level without that causes of distribution being always elucidated. In fact some species of the alpine zone can be found at a lower level, having been carried by torrents (case of *Nebria reichi* and *bissenica*). The abundance of a species in a given area confirms its altitudinal belonging more than the presence of a isolated species.

Our observations provide the following results:

- *Megodontus planicollis* Kust presents isolated individuals of the subalpine zone can be found on higher levels up to Bâlea Lake.
- *Megodontus violaceus mehelyi* Gangl. abundant towards 1200-1300 m., can also be found at higher levels up to the alpine area, but in smaller numbers.
- *Chrysocarabus auronitens escheri* Pall. is localized in *Pinus mugo* zone or its proximity with rarely form *laevipennis* Seidlitz.
- *Platycarabus irregularis montandoni* Buyss., very infrequent and scattered, can be observed in rather high, especially sunny spots.
- *Orinocarabus linnaei macaierei* Dej. abundant in the zone of *Pinus mugo* but represented by isolated individuals up to near Bâlea Lac.
- *Oreocarabus sylvestris transylvanicus* Dej., a rare specimen, can be found at Bâlea Lac, but also in the *Pinus mugo* zone.
- *Pterostichus pilosus* Host very abundant everywhere and to all altitudes like *Pterostichus findeli* Dej. less frequently and at lower altitudes.
- *Pterostichus foveolatus interruptestriatus* Bielz, infrequent occupies the median zone.
- *Calathus metalicus* Dej. is found in meadows from 1700 to 2000 m
- *Platynus glaciale* Reit. is very abundant under very sunny rocks, rather in zone of average altitude.
- *Nebria reichi* Dej., *Nebria bissenica* Bielz. and various *Bembidion* inhabit the streams banks more densely at altitude.
- *Pterostichus rufitarsis* Dej. *kakeili* Mill. and *unetulatus* Duft. species listed as altitude species.
- Other species were encountered as unique specimens: *Trechus pulchellus* Putz. and *procerus* Putz. under embedded stones.

CONCLUSIONS

These results confirm the data of HOLDHAUS *et al.*, collected in July 1895 except some common species, spread in altitude forest populations *(Crysocarabus auronitens escheri* Pall., *Orinocarabus linnaei macaierei* Dej.). They complete the previous data by providing the composition of various carabocenoses and their temporal evolution at *Pinus mugo*. Some species, although belonging to forest populations, can be observed outside forests, a fact explained by deforestation due to pastoralism. The altitudinal distribution presents some rather strict locations but various species are found at all levels.

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