

ORTHOPTERA FAUNA (INSECTA) OF PIATRA CLOȘANI MOUNTAIN (THE SOUTHERN CARPATHIANS, ROMANIA)

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Abstract. The Orthoptera species inhabiting the isolated mountain Piatra Cloșani are investigated for the first time and a total number of 39 species were determined in the biotopes of this mountain. Among the most remarkable species, the bush-cricket *Isophya speciosa* (FRIVALDSZKY, 1867) is reported here from a very high altitude, above 1400 m a.s.l. Another interesting species, *Stauroderus scalaris* (FISCHER DE WALDHEIM, 1846), forms a massive population in the meadows on top of this mountain. *Poecilimon thoracicus* (FIEBER, 1853), *Pholidoptera aptera* (FABRICIUS, 1793), *Pseudopodisma transilvanica* GALVAGNI & FONTANA, 1993, *Stenobothrus nigromaculatus* (HERRICH-SCHÄFFER, 1840) and *Chorthippus montanus* (CHARPENTIER, 1825) are the rarest sightings in the studied area. The grasshopper *Stenobothrus crassipes* (CHARPENTIER, 1825) is recorded for the first time in Oltenia. Species' particular habitat preferences and bioacoustics are detailed in the paper.

Keywords: Orthoptera, Piatra Cloșani, faunistics, ecology, bioacoustics.

Rezumat. Fauna de ortoptere (Insecta) din muntele Piatra Cloșani (Carpații Meridionali, România). Speciile de ortoptere care populează muntele Piatra Cloșani sunt studiate pentru prima dată, însumând un total de 39 specii determinate în biotopii acestui munte. Printre cele mai remarcabile specii, covașul *Isophya speciosa* (FRIVALDSZKY, 1867) este menționat de la o altitudine foarte ridicată, peste 1400 m. O altă specie interesantă, *Stauroderus scalaris* (FISCHER de WALDHEIM, 1846), prezintă o populație masivă în fânețele din creasta acestui munte. *Poecilimon thoracicus* (FIEBER, 1853), *Pholidoptera aptera* (FABRICIUS, 1793), *Pseudopodisma transilvanica* GALVAGNI & FONTANA, 1993, *Stenobothrus nigromaculatus* (HERRICH-SCHÄFFER, 1840) și *Chorthippus montanus* (CHARPENTIER, 1825) se numără printre raritățile din zona de studiu. Lăcusta *Stenobothrus crassipes* (CHARPENTIER, 1825) este menționată pentru prima dată în Oltenia. Preferințele pentru biotop și bioacustica speciilor sunt detaliate în lucrare.

Cuvinte cheie: Orthoptera, Piatra Cloșani, faunistică, ecologie, bioacustică.

INTRODUCTION

Piatra Cloșani is an isolated mountain in the south-western part of the Southern Carpathians. OPRENEȘCU & GIURGIU (2003) compare it with a camelback, with two summits: the smaller one, Piatra Mică (1163 m a.s.l.) and the higher peak, Piatra Mare (1421 m a.s.l.). Piatra Cloșani is abrupt towards North-West, with a massive vertical wall, but gently descends to South, near the villages Cloșani and Motru Sec (OPRENEȘCU & GIURGIU, 2003).

While studying the Orthoptera species in Romania, with particular interest in their acoustic behaviour, the author undertook many collecting-trips through the whole country in the past ten years. An important objective of this study was focused on Orthoptera inhabiting isolated mountains from the Carpathians, such as Piatra Cloșani. To our knowledge, this is the first investigation of the Orthoptera species inhabiting this mountain.

MATERIAL AND METHODS

Specimens were collected and examined during 4 days of intense field work in this mountain, developed in 36 areas (Fig. 1 and Table 1). Species nomenclature is according to The Orthoptera of Europe (2012) and Orthoptera Species File (2012).



Figure 1. Map rendering collecting areas in Piatra Cloșani Mountain (satellite image): a. lateral view; b. upper view.
Figura 1. Harta cu punctele de colectare din muntele Piatra Cloșani (imagine satelitară): a. vedere lateral; b. vedere de sus.

Table 1. Coordinates of the collecting areas in Piatra Cloșani Mountain.
Tabel 1. Coordonatele punctelor de colectare din muntele Piatra Cloșani.

Collecting area (see figure 1)	Coordinates (latitude; longitude)	Altitude (a.s.l.)	Collecting area (see figure 1)	Coordinates (latitude; longitude)	Altitude (a.s.l.)
1	45°04'03.57"N; 22°47'56.67"E	393 m	19	45°06'17.45"N; 22°46'33.20"E	1358 m
2	45°04'09.72"N; 22°47'50.79"E	434 m	20	45°06'20.65"N; 22°46'32.92"E	1375 m
3	45°04'17.63"N; 22°47'47.56"E	489 m	21	45°06'26.17"N; 22°46'36.86"E	1410 m
4	45°04'28.28"N; 22°47'39.00"E	535 m	22	45°06'29.16"N; 22°46'42.71"E	1394 m
5	45°04'30.12"N; 22°47'28.79"E	526 m	23	45°06'31.31"N; 22°46'48.80"E	1367 m
6	45°04'33.14"N; 22°47'21.60"E	545 m	24	45°06'35.31"N; 22°46'51.87"E	1373 m
7	45°04'40.73"N; 22°47'18.66"E	560 m	25	45°06'40.85"N; 22°46'59.58"E	1357 m
8	45°04'44.84"N; 22°47'11.47"E	577 m	26	45°06'43.25"N; 22°47'04.13"E	1347 m
9	45°04'49.02"N; 22°47'09.20"E	588 m	27	45°06'45.25"N; 22°47'05.54"E	1328 m
10	45°04'55.86"N; 22°47'05.72"E	613 m	28	45°06'54.86"N; 22°47'05.62"E	1245 m
11	45°05'04.21"N; 22°47'00.83"E	694 m	29	45°06'59.75"N; 22°47'09.78"E	1197 m
12	45°05'09.79"N; 22°47'09.78"E	662 m	30	45°07'03.13"N; 22°47'13.19"E	1153 m
13	45°05'16.89"N; 22°47'12.45"E	696 m	31	45°07'05.82"N; 22°47'19.11"E	1109 m
14	45°05'23.33"N; 22°47'03.44"E	708 m	32	45°07'14.11"N; 22°46'53.32"E	905 m
15	45°05'52.82"N; 22°47'24.71"E	898 m	33	45°07'17.46"N; 22°46'57.99"E	895 m
16	45°05'57.97"N; 22°47'09.50"E	879 m	34	45°07'07.13"N; 22°48'25.51"E	442 m
17	45°06'02.09"N; 22°46'56.95"E	1045 m	35	45°07'44.81"N; 22°48'20.71"E	517 m

Audio recordings were taken directly in the field with the digital audio recorder EDIROL R-09HR, whose incorporated stereo microphones have a frequency response of 0.02-40 kHz. Oscillographic and spectrographic sound analysis was made with Audacity 2.0. Temperature during recordings was 20-25°C. For the oscillogram analysis we used the terminology from RAGGE & REYNOLDS (1998) and HELLER *et al.* (2004): **syllable** - the sound produced by one to-and-fro movement of the stridulatory apparatus; **echeme** - a first-order assemblage of syllables; **impulse** - the sound impulse arising as the impact of one tooth of the stridulatory file.

RESULTS AND DISCUSSIONS

Order Orthoptera Suborder Ensifera Superfamily Tettigoniodea Family Phaneropteridae

1. *Phaneroptera nana* FIEBER, 1853

Material: 2♂♂ 1♀♀, 16.07.2011; 5♂♂ 2♀♀, 17.07.2011; 16♂♂ 10♀♀, 18.07.2011; 1♂, 19.04.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 4, 5, 7, 8, 10, 13, 19, 20, 26, 27, 32, 33, 34, 35, 36 (Fig. 1).

Habitat: mesophilous, meso-xerophilous and xerophilous shrubs.

2. *Isophya speciosa* (FRIVALDSZKY, 1867)

Material: 5♂♂ 2♀♀, 17.07.2011; 11♂♂ 9♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 15, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33 (Fig. 1).

Habitat: mesophilous shrubs.

Bioacoustics: males sing at dusk; the song consists of 2 syllables, the first one very fast and the last one slower (Fig. 2). Acoustic frequency: 8-40 kHz, with maximum at 22 kHz (Fig. 3).

Notes: this is the first record of this species at very high-altitude, more than 1400 m a.s.l.

3. *Leptophyes albovittata* (KOLLAR, 1833)

Material: 3♂♂ 5♀♀, 16.07.2011; 8♂♂ 4♀♀, 17.07.2011; 11♂♂ 5♀♀, 18.07.2011; 1♂, 19.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 3, 4, 5, 12, 13, 14, 18, 19, 20, 21, 22, 25, 26, 30, 31, 32, 34, 35 (Fig. 1).

Habitat: mesophilous, mesoxerophilous and xerophilous meadows, forest fringes and glades.

Bioacoustics: males sing short syllables (10-15 impulses) (Fig. 2), having an audio frequency of 20 up to more than 40 kHz (Fig. 3).

4. *Leptophyes discoidalis* (FRIVALDSZKY, 1867)

Material: 1♂ 2♀♀, 16.07.2011; 7♂♂ 4♀♀, 17.07.2011; 9♂♂ 5♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 3, 5, 6, 7, 8, 9, 10, 15, 18, 19, 20, 26, 27, 32, 33, 34, 35, 36 (Fig. 1).

Habitat: mesophilous and mesoxerophilous meadows, forest fringes and glades.

Bioacoustics: males sing short echemes formed of 13-17 syllables (Fig. 2). Sound frequency ranges between 10-15 kHz and 25 up to more than 40 kHz, highest peak at about 35 kHz (Fig. 3).

5. *Poecilimon schmidtii* (FIEBER, 1853)

Material: 8♂♂ 2♀♀, 17.07.2011; 11♂♂ 13♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 3, 5, 7, 12, 14, 15, 18, 19, 32, 33, 34, 35 (Fig. 1).

Habitat: mesophilous and mesoxerophilous shrubs.

Bioacoustics: isolated very short syllables, each consisting of 2-3 impulses (Fig. 2). Acoustic frequency: 15-40 kHz, peak at 25 kHz (Fig. 3).

6. *Poecilimon thoracicus* (FIEBER, 1853)**Material:** 1♂, 17.07.2011; Piatra Cloșani Mountain, collecting area: 15 (Fig. 1).**Habitat:** mesophilous shrubs.**Bioacoustics:** males sing at dusk, a song formed of very short syllables (4-7 impulses) (Fig. 2), with a frequency of 15-23 and 30-40 kHz, maximum recorded at 35 kHz (Fig. 3).**7. *Poecilimon affinis* (FRIVALDSZKY, 1867)****Material:** 6♂♂ 3♀♀, 17.07.2011; 10♂♂ 6♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 12, 13, 15, 18, 19, 21, 22, 29, 30, 31, 32, 33 (Fig. 1).**Habitat:** mesophilous forest fringes and glades.**Bioacoustics:** males sing in the afternoon and at dusk, short syllables lasting for 120-300 ms (Fig. 2), with a frequency of 8-28 kHz, maximum recorded at 18 kHz (Fig. 3).**Family Conocephalidae****8. *Conocephalus fuscus* (FABRICIUS, 1793)****Material:** 3♂♂ 5♀♀, 17.07.2011; Piatra Cloșani Mountain, collecting area: 34 (Fig. 1).**Habitat:** hygro-mesophilous meadows and forest fringes.**Bioacoustics:** long echeme sequences are produced during daytime, rarely at dusk (Fig. 2). Audio frequency: 10 up to more than 40 kHz, highest peak at 29 kHz (Fig. 3).**9. *Ruspolia nitidula* (SCOPOLI, 1786)****Material:** 1♂, 16.07.2011; 1♂, 2♀♀, 17.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 34 (Fig. 1).**Habitat:** hygro-mesophilous meadows.**Bioacoustics:** males sing at dusk and during night-time, a very long series of syllables (Fig. 2). Acoustic frequency: 5-40 kHz, maximum at 17 kHz (Fig. 3)**Family Tettigoniidae****10. *Tettigonia viridissima* (LINNAEUS, 1758)****Material:** 11♂♂, 16.07.2011; 20♂♂ 1♀, 17.07.2011; 16♂♂ 2♀♀ 18.07.2011; 3♂♂ 19.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 3, 4, 5, 6, 8, 10, 11, 12, 13, 14, 18, 20, 21, 22, 26, 28, 29, 30, 32, 33, 34, 35, 36 (Fig. 1).**Habitat:** mesophilous, mesoxerophilous and xerophilous shrubs; mesoxerophilous forest.**Bioacoustics:** one of the most familiar sounds is the one produced by males of this bush-cricket, singing especially at night-time a long series of echemes (Fig. 2). Acoustic frequency: 5-40 kHz, maximum at 12 kHz (Fig. 3).**11. *Decticus verrucivorus* (LINNAEUS, 1758)****Material:** 5♂♂ 4♀♀, 17.07.2011; 6♂♂ 8♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 3, 5, 8, 12, 13, 14, 18, 19, 20, 21, 22, 32, 33, 34 (Fig. 1).**Habitat:** mesophilous, mesoxerophilous and xerophilous meadows.**Bioacoustics:** males sing a very long series of short echemes, each formed of 4 syllables (Fig. 2). Sound frequency ranges between 5-40 kHz, maximum recorded at 12 kHz (Fig. 3).**12. *Platycleis albopunctata* (GOEZE, 1778)****Material:** 3♂♂, 17.04.2011; Piatra Cloșani Mountain, collecting area: 34 (Fig. 1).**Habitat:** mesophilous meadows.**13. *Metrioptera bicolor* (PHILIPPI, 1830)****Material:** 2♂♂ 1♀, 16.07.2011; 3♂♂ 2♀♀, 17.07.2011; 5♂♂ 5♀♀, 18.07.2011; 2♂♂, 19.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 7, 8, 9, 12, 13, 14, 20, 24, 25, 30, 32, 33, 34, 35, 36 (Fig. 1).**Habitat:** hygro-mesophilous, mesophilous and mesoxerophilous meadows.**Bioacoustics:** the song consists of a series of echemes, each formed of 3 syllables (Fig. 2). Audio frequency ranges between 8-40 kHz, maximum at 18 kHz (Fig. 3).**14. *Metrioptera roeselii* (HAGENBACH, 1822)****Material:** 5♂♂ 3♀♀, 17.07.2011; Piatra Cloșani Mountain, collecting area: 34 (Fig. 1).**Habitat:** hygro-mesophilous meadows.**Bioacoustics:** a very long series of syllables, usually lasting for more than 2-3 minutes (Fig. 2). Acoustic frequency: 7-40 kHz, highest peak at 18 kHz (Fig. 3).**15. *Pholidoptera littoralis* (FIEBER, 1853)****Material:** 2♂♂, 16.07.2011; 5♂♂ 2♀♀, 17.07.2011; 3♂♂ 1♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 6, 10, 11, 12, 13, 32 (Fig. 1).**Habitat:** mesophilous and mesoxerophilous forest fringes and glades.**Bioacoustics:** males sing echemes lasting for 1-2 s, formed of 20-30 syllables (Fig. 2). Sound frequency ranges between 5-40 kHz, maximum at about 17 kHz (Fig. 3).**16. *Pholidoptera fallax* (FISCHER, 1853)****Material:** 3♂♂, 16.07.2011; 5♂♂ 2♀♀, 17.07.2011; 3♂♂ 1♀, 18.07.2011; 1♂, 19.07.2011; Piatra Cloșani Mountain, collecting areas: 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17 (Fig. 1).**Habitat:** mesophilous, mesoxerophilous and xerophilous shrubs.

Bioacoustics: the short echemes consist of 3 syllables (Fig. 2), with the sound frequency of 8-40 kHz, highest peak 12 kHz (Fig. 3).

17. *Pholidoptera griseoptera* (DE GEER, 1773)

Material: 7♂♂ 2♀♀, 16.07.2011; 11♂♂ 4♀♀, 17.07.2011; 9♂♂ 4♀♀, 18.07.2011; 1♂ 19.06.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 4, 6, 7, 9, 10, 11, 12, 14, 15, 16, 23, 28, 29, 32, 33, 34 (Fig. 1).

Habitat: mesophilous and mesoxerophilous shrubs.

Bioacoustics: very short echemes are singed at dusk, rarely at daytime (Fig. 2). Acoustic frequency: 7-40 kHz, maximum at 16 and 25 kHz (Fig. 3).

18. *Pholidoptera transsylvanica* (FISCHER, 1853)

Material: 4♂♂ 1♀, 17.08.2011; 7♂♂ 4♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 18, 19, 20, 21, 25, 29, 31, 32, 33 (Fig. 1).

Habitat: mesophilous and mesoxerophilous meadows, forest fringes and glades.

Bioacoustics: males sing echemes formed of 3 syllables (Fig. 2), with an audio frequency of 4-40 kHz, highest peak at about 7 kHz (Fig. 3).

Notes: species protected, listed in Habitat Directive 92/43 EEC, Annex IV "Animal and plant species of community interest in need of strict protection".

19. *Pholidoptera aptera* (FABRICIUS, 1793)

Material: 3♂♂, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 16, 17 (Fig. 1).

Habitat: meso-xerophilous forest.

20. *Pachytrachis gracilis* (BRUNNER VON WATTENWYL, 1861)

Material: 3♂♂ 2♀♀, 17.07.2011; 6♂♂ 7♀♀, 18.07.2011, Piatra Cloșani Mountain, collecting areas: 4, 14, 15, 18, 19 (Fig. 1).

Habitat: meso-xerophilous and xerophilous shrubs.

Bioacoustics: the song consists of isolated echemes formed of 4-7 diplosyllables (Fig. 2). Acoustic frequency: 10-40 kHz, peaks at 27-29 kHz (Fig. 3).

21. *Rhacocleis germanica* (HERRICH-SCHÄFFER, 1840)

Material: 5♂♂ 3♀♀, 17.07.2011; 4♂♂ 4♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 2, 5, 8, 12, 15 (Fig. 1).

Habitat: xerophilous shrubs.

Family Bradyporidae

22. *Ephippiger ephippiger* (FIEBIG, 1784)

Material: 5♂♂, 16.07.2011; 9♂♂ 2♀♀, 17.07.2011; 11♂♂ 1♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 3, 6, 7, 8, 14, 15, 18, 20, 23, 27, 29, 32, 33, 34, 35 (Fig. 1).

Habitat: mesophilous, mesoxerophilous and xerophilous shrubs.

Bioacoustics: this bush-cricket sings at dusk, rarely during daytime, very short syllables (Fig. 2). Sound frequency: 10-35 kHz, maximum recorded at 20 kHz (Fig. 3).

Superfamily Grylloidea

Family Gryllidae

23. *Gryllus campestris* LINNAEUS, 1758

Material: 3♂♂ 4♀♀, 16.07.2011; 8♂♂ 11♀♀, 17.07.2011; 4♂♂, 18.07.2011; 1♀, 19.04.2011 (all larvae); Piatra Cloșani Mountain, collecting areas: 1, 2, 5, 6, 7, 8, 12, 14, 32, 34, 35, 36 (Fig. 1).

Habitat: hygro-mesophilous, mesophilous, meso-xerophilous and xerophilous meadows, forest fringes and glades.

24. *Pteronemobus heydenii* (FISCHER, 1853)

Material: 2♂♂, 16.04.2011; 5♂♂ 3♀♀, 17.04.2011; Piatra Cloșani Mountain, collecting areas: 1, 34 (Fig. 1).

Habitat: hygro-mesophilous meadows.

25. *Oecanthus pellucens* (SCOPOLI, 1763)

Material: 1♂♂, 16.07.2011; 5♂♂ 1♀, 17.07.2011; 4♂♂, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 3, 4, 5, 6, 34, 35, 36 (Fig. 1).

Habitat: mesophilous, mesoxerophilous and xerophilous shrubs.

Bioacoustics: the species sings at dusk and during night-time short echemes, very variable in length with the temperature (Fig. 2). Sound frequency was recorded between 2-22 kHz, maximum at 3 kHz (Fig. 3).

Suborder Caelifera

Superfamily Tetrigoidea

Family Tetrigidae

26. *Tetrix bipunctata* (LINNAEUS, 1758)

Material: 5♂♂ 3♀♀, 17.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 3, 7, 34 (Fig. 1).

Habitat: mesophilous and mesoxerophilous meadows, forest fringes and glades.

Superfamily Acridoidea

Family Acrididae

27. *Pseudopodisma transilvanica* GALVAGNI & FONTANA, 1993

Material: 1♂ 1♀, 18.07.2011; Piatra Cloșani Mountain, collecting area: 30 (Fig. 1).

Habitat: mesophilous meadows.

28. *Psophus stridulus* (LINNAEUS, 1758)

Material: 5♂♂ 4♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 26, 27, 30, 31, 32, 33 (Fig. 1).

Habitat: mesophilous meadows.

29. *Euthystira brachyptera* (OCSKAY, 1826)

Material: 3♂♂ 1♀, 16.07.2011; 6♂♂ 8♀♀, 17.08.2011; 10♂♂ 7♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 28, 29, 30, 31, 32, 33, 34, 36 (Fig. 1).

Habitat: hygro-mesophilous, mesophilous and mesoxerophilous meadows, forest fringes and glades.

30. *Chrysochraon dispar* (GERMAR, 1834)

Material: 7♂♂ 4♀, 17.04.2011; Piatra Cloșani Mountain, collecting areas: 30, 34 (Fig. 1).

Habitat: hygrophilous and hygro-mesophilous meadows and forest glades.

Bioacoustics: males' song can be heard during sunny summer days, consisting of a series of echemes, each one formed of 10-15 syllables (Fig. 2). Audio frequency ranges between 5-40 kHz, maximum at about 12 kHz (Fig. 3).

31. *Omocestus rufipes* (ZETTERSTEDT, 1821)

Material: 5♂♂ 2♀♀, 17.07.2011; 4♂♂ 1♀, 18.07.2011; 1♂, 19.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 2, 5, 8, 9, 12, 13, 34 (Fig. 1).

Habitat: mesophilous, mesoxerophilous and xerophilous meadows.

32. *Stenobothrus lineatus* (PANZER, 1796)

Material: 2♂♂ 1♀, 17.07.2011; 4♂♂ 1♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 34 (Fig. 1).

Habitat: mesophilous, mesoxerophilous and xerophilous meadows.

33. *Stenobothrus nigromaculatus* (HERRICH-SCHÄFFER, 1840)

Material: 1♂, 18.07.2011; Piatra Cloșani Mountain, collecting area: 19 (Fig. 1).

Habitat: mesoxerophilous meadows.

Bioacoustics: male calling song consists of isolated pairs of 2 echemes, each formed of 35-50 syllables (Fig. 2). Acoustic frequency: 3-40 kHz, highest peak at 11 kHz (Fig. 3).

34. *Stenobothrus crassipes* (CHARPENTIER, 1825)

Material: 3♂♂ 2♀♀, 17.07.2011; 2♂♂, 18.07.2011; Piatra Cloșani Mountain, collecting area: 14 (Fig. 1).

Habitat: mesophilous meadows.

Bioacoustics: males sing during sunny days. The isolated echeme series consist of 8-17 echemes, each one formed of 5-9 syllables (Fig. 2). Sound frequency ranges between 10-40 kHz, maximum recorded at 25 kHz (Fig. 3).

Notes: this is the first record of this species in Oltenia.

35. *Stauroderus scalaris* (FISCHER DE WALDHEIM, 1846)

Material: 47♂♂ 29♀♀, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31 (Fig. 1).

Habitat: mesophilous and mesoxerophilous meadows.

Notes: the population from Piatra Mare Cloșani is one of the largest known so far in the Romanian Carpathians.

36. *Chorthippus biguttulus* (LINNAEUS, 1758)

Material: 2♂♂ 3♀♀, 17.07.2011; 1♂, 18.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 34 (Fig. 1).

Habitat: mesophilous meadows.

37. *Chorthippus brunneus* (THUNBERG, 1815)

Material: 5♂♂, 9♀♀; Piatra Cloșani Mountain, collecting areas: 2, 3 (Fig. 1).

Habitat: mesoxerophilous and xerophilous meadows.

Bioacoustics: males sing very short echemes during sunny days. An echeme lasts for 200-300 ms and consists of 10-15 syllables (Fig. 2). Audio frequency: 5 up to more than 40 kHz, maximum at 11 kHz (Fig. 3).

38. *Chorthippus parallelus* (ZETTERSTEDT, 1821)

Material: 5♂♂ 8♀♀, 16.07.2011; 18♂♂ 10♀♀, 17.07.2011; 12♂♂ 9♀♀, 18.07.2011; 2♂♂, 19.07.2011; Piatra Cloșani Mountain, collecting areas: 1, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 19, 23, 24, 29, 30, 32, 33, 34, 35 (Fig. 1).

Habitat: hygro-mesophilous, mesophilous, mesoxerophilous and xerophilous meadows, forest fringes and glades.

Bioacoustics: males sing only during daytime short echemes, each consisting of 10-15 syllables (Fig. 2). Sound frequency ranges between 5-40 kHz, maximum recorded at about 12 kHz (Fig. 3).

39. *Chorthippus montanus* (CHARPENTIER, 1825)

Material: 2♂♂, 17.07.2011; Piatra Cloșani Mountain, collecting area: 13 (Fig. 1).

Habitat: mesophilous mountain meadows, forest fringes and glades.

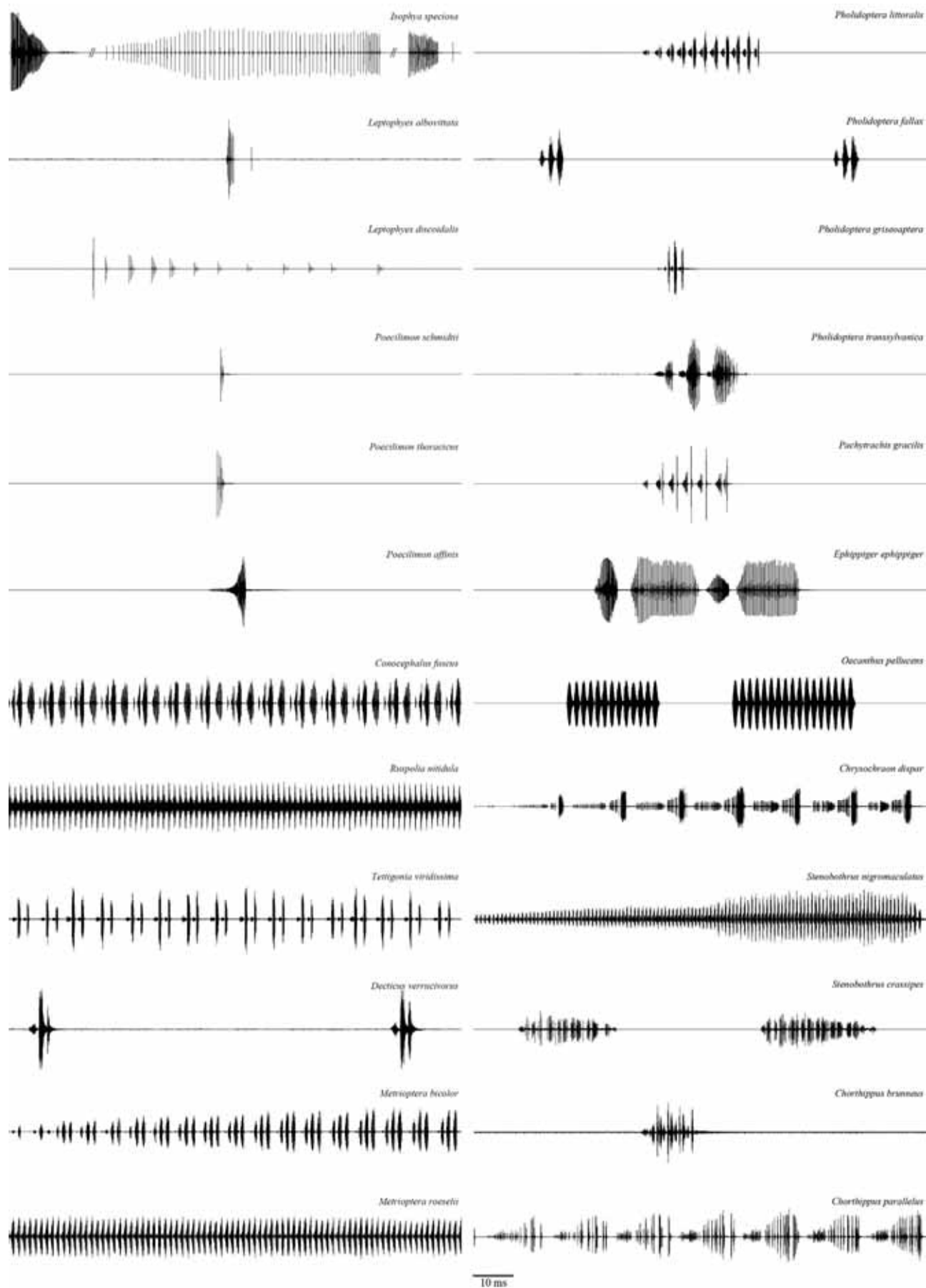


Figure 2. Oscillographic analysis of sound in recorded Orthoptera species from Piatra Cloșani.
 Figura 2. Analiza oscilografică a sunetului la speciile de ortoptere înregistrate în Piatra Cloșani.

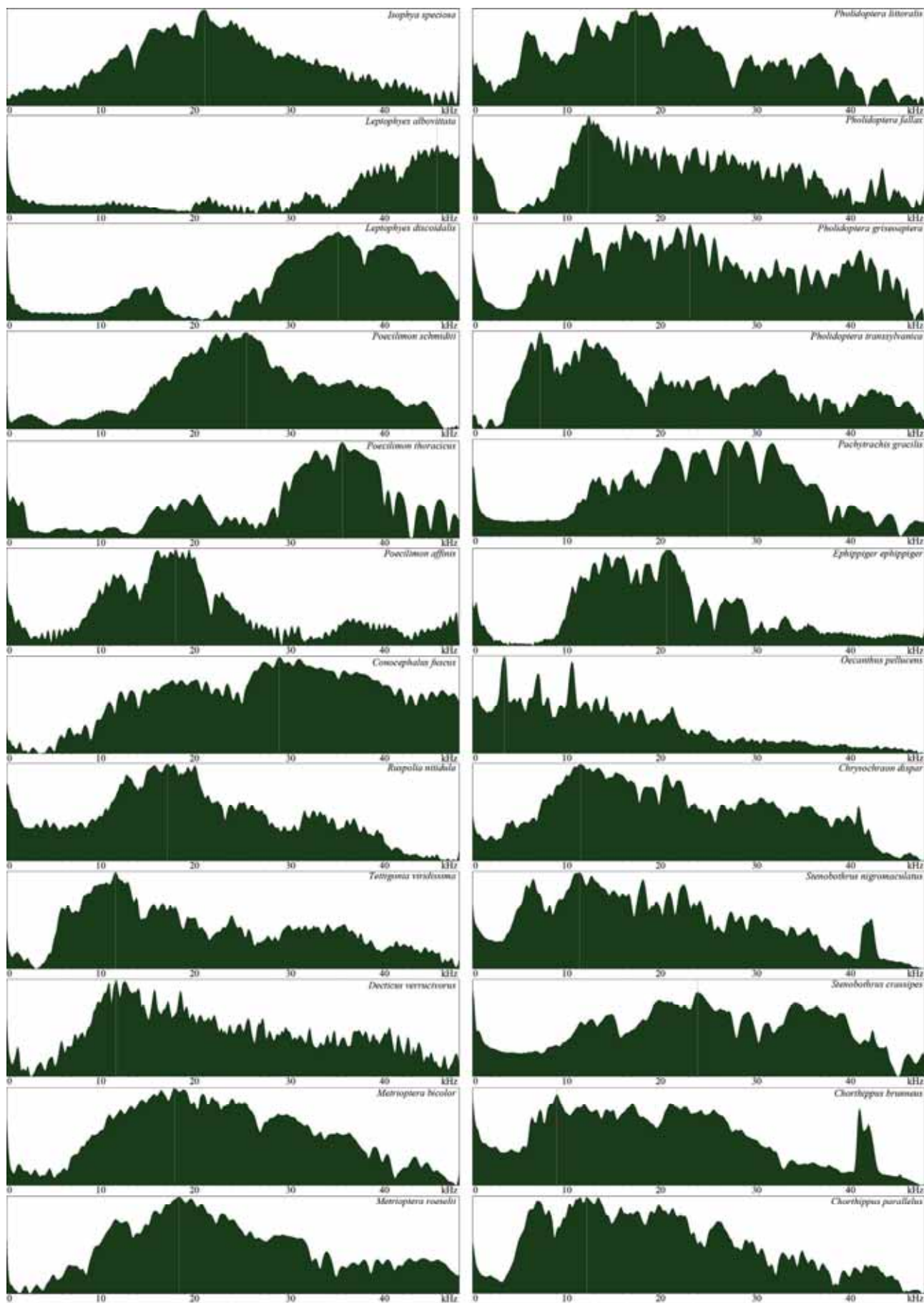


Figure 3. Spectrographic analysis of sound in recorded Orthoptera species from Piatra Cloșani.
 Figura 3. Analiza spectrografică a sunetului la speciile de ortoptere înregistrate în Piatra Cloșani.

In the present study, a total number of 39 Orthoptera species were found in Piatra Cloșani Mountain and a bioacoustic analysis, including both oscillographic and spectrographic description, was performed for 24 of them.

From the total number of 761 bush-crickets, crickets and grasshoppers collected in Piatra Cloșani Mountain, the majority are mesophilous (a total number of 321 individuals, 42.18%) and mesoxerophilous (259 specimens, 34.03%), while only 98 individuals (12.87%) are xerophilous, 69 hygromesophilous (9.06%) and 14 prefer hygrophilous habitats (1.83%), completing the ecological image of this mountain with Submediterranean climate (Fig. 4). Among the most abundant Orthoptera species, there are *Stauroderus scalaris* (76 specimens, 9.98%), *Chorthippus parallelus* (64 specimens, 8.4%), *Tettigonia viridissima* (53 specimens, 6.96%), while several species are extremely rare in the studied area: *Pholidoptera aptera* (3 specimens, 0.39%), *Pseudopodisma transilvanica* (2 specimens, 0.26%), *Chorthippus montanus* (2 specimens, 0.26%), *Poecilimon thoracicus* (1 specimen, 0.13%) and *Stenobothrus nigromaculatus* (1 specimen, 0.13%).

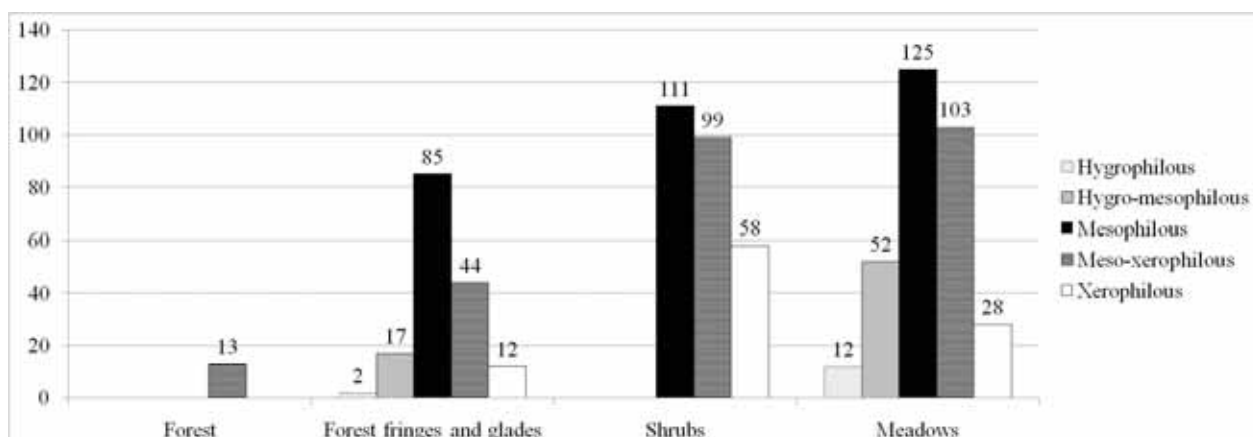


Figure 4. Habitat and moisture preferences of Orthoptera in Piatra Cloșani.
 Figura 4. Preferințele pentru habitat și umezeală ale ortopterelor în Piatra Cloșani.

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