

Grasshoppers, bush-crickets and crickets (Orthoptera) of Low Beskid Mountains (Poland)

Anna LIANA¹, Michał BRODAKCI², Przemysław ŻURAWLEW³ 

¹ Museum and Institute of Zoology, Polish Academy of Sciences, ul. Twarda 51/55, 00-818, Warszawa, Poland

² The Orthoptera of Poland Project, Poland, e-mail: m.brod@wp.pl

³ The Orthoptera of Poland Project, Żbiki 45, 63-304 Czermin, Poland, e-mail: grusleon@gmail.com,
ORCID: 0000-0001-8043-7883

Abstract: This paper presents the results of the study on the grasshopper, bush-cricket and cricket (Orthoptera) fauna of Low Beskid Mountains (part of Outer Western Carpathians) in southeastern Poland. During field surveys conducted in 2004, 2012, 2013, 2019 and 2020 at 68 sites, 37 orthopteran species were recorded. The results confirm that Low Beskid Mountains are the most important region of occurrence of *Isophya stysi* and *Mecostethus parapleurus* in Poland. The gravel banks of the local mountain rivers and streams are the habitat of the rarely recorded *Tetrix tuerki*. Low Beskid Mountains are another area in Poland where two expansive south European species have been recorded: *Oecanthus pellucens* and *Ruspolia nitidula*.

Key words: Carpathians, new records, biodiversity, faunistics, faunology

INTRODUCTION

The Carpathians are characterised by high orthopteran diversity, with 142 out of ca. 1382 European species of grasshoppers, bush crickets and crickets recorded in this mountain range (Krištin & Iorgu 2014, Jarčuška et al. 2015). Within Poland, only some parts of Carpathians have been surveyed for Orthoptera so far: Bieszczady Mountains and Sanocko-Turczańskie Mountains (Bazyluk 1971, Liana 2000a, 2010, Theuerkauf et al. 2005, Brodacki 2012, Guzik & Guzik 2023, 2024), Pieniny Mountains (Bazyluk 1978, Liana 2000b), Sub-Tatra Depression (Naskręcki 1993, Liana 2013), Żywiec-Orawa Beskid Mountains (Liana 2012), Tatra Range (Liana 2013) and Gorce Mountains (Liana & Armatys 2015). This paper presents the results of field surveys of grasshopper, bush-crickets and crickets of Low Beskid Mountains in southeastern Poland (an area not studied orthopterologically before), carried out by the first author from 2004 to 2020 as a part of her research on orthopteran fauna of Polish Carpathian ranges.

The Low Beskid Mountains (Polish: Beskid Niski) comprise the Polish part of Mid-Beskid Mountains (Polish: Beskidy Środkowe, Slovak: Nízke Beskydy), a mountain range in southeastern Poland and northeastern Slovakia making up the eastern part of the Outer Western Carpathians (Solon et al. 2018). The Low Beskid Mountains stretch over 100 km from the Kamienica Nawojowska river valley in the west to the Oślawa and Oślawica river valleys in the east. They are a watershed mountain chain located at the point of the greatest narrowing and lowering of the Carpathians. The highest peak of the Low Beskid Mountains is Lackowa, rising to 997 m above sea level. Sandstone outcrops are common in the local landscape, and there are passes in places where rocks less resistant to erosion occur. Several rivers, including Biała, Ropa, Wisłoka, Wisłok and Jasiołka, have their sources in the Low Beskid Mountains. The vegetation occurring in this region is of a transitional character between the Outer

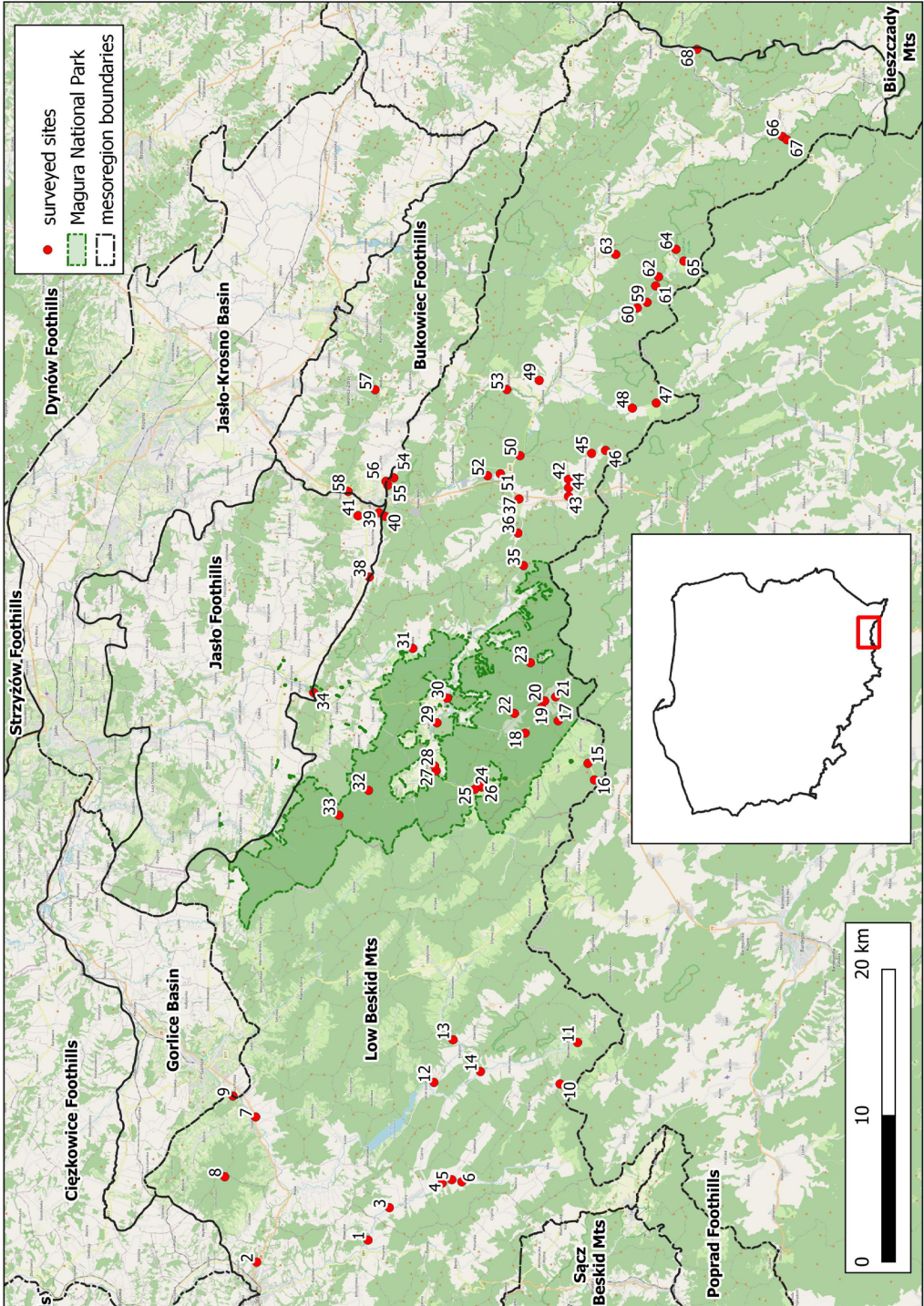


Figure 1. Study area.

Eastern Carpathians and Outer Western Carpathians. Most of the area is covered by forests with a high degree of naturalness. The vegetation is arranged in two zones – the foothill zone (meadows, arable fields and oak-hornbeam forests) and the lower montane zone (Carpathian beech forests, fir forests and sycamore forests). The river and stream valleys are home to alder forests, meadow communities and peat bogs. The long valleys of the Low Beskid Mountains have been the site of human settlement for centuries, and small, extensively cultivated fields and meadows have dominated there. After World War II, agricultural use ceased in many areas, resulting in secondary succession of forest communities. In 1995, the Magura National Park (Polish: Magurski Park Narodowy) was established in the central part of the Low Beskid Mountains (Stój 2010, Solon et al. 2018).

MATERIALS AND METHODS

Field surveys for Orthoptera were conducted at 68 sites (meadows, gravel and rocky banks of rivers and streams, roadsides, wastelands, forest clearings, raised bogs, montane grasslands and heathlands) in 2004, 2012, 2013, 2019 and 2020. Respectively, 9, 14, 9, 21 and 18 sites were surveyed in these years. Specimens and records were collected and all specimen determinations were made by Anna Liana. The specimens are housed in the collection of the Museum and Institute of Zoology of the Polish Academy of Sciences (Warsaw, Poland).

Below is the list of surveyed sites in their respective MGRS (UTM) 10 x 10 km squares (Fig. 1). The site number in square brackets is followed by the locality name, MGRS (Military Grid Reference System, a derivative of the Universal Transverse Mercator [UTM] grid system) grid square designation, geographical coordinates, habitat, altitude and dates of observation.

[1] Florynka, DV98, 49.5573, 20.9962, gravel bank and meadow by Biała Tarnowska river, 381 m a.s.l., 4.09.2012; [2] Grybów, DV99, 49.6251, 20.9755, wastelands, 382 m a.s.l., 2.09.2012; [3] Brunary, EV08, 49.5443, 21.0267, gravel bank of Biała Tarnowska river, 401 m a.s.l., 4.09.2012; [4] Śnietnica, EV08, 49.5122, 21.0496, gravel bank of Biała Tarnowska river, 439 m a.s.l., 3.09.2012; [5] Śnietnica, EV08, 49.5062, 21.0529, grazed meadow, south-facing slope by Biała Tarnowska river, 448 m a.s.l., 3.09.2012; [6] Śnietnica, EV08, 49.5001, 21.0510, gravel bank of Biała Tarnowska river, at Czynna mouth, 456 m a.s.l., 3.09.2012; [7] Szymbark, EV09, 49.6257, 21.1118, meadow within Ropa river meander, 306 m a.s.l., 1.08.2012, 5.08.2012; [8] Jelenia Góra and Maślana Góra, EV09, 49.6444, 21.0557, clearings at the foot and on the top of these mountains, 727 m a.s.l., 6.08.2012; [9] Ropica Polska, EV09, 49.6394, 21.1314, gravel bank and meadow by Ropa river, 291 m a.s.l., 30.07.2012; [10] Huta Wysowska, EV17, 49.4402, 21.1428, meadow on a hill, 600 m a.s.l., 11.08.2012; [11] Wysowa-Zdrój, EV17, 49.4295, 21.1817, narrow gravel banks and meadow margin in Ropa river valley, 516 m a.s.l., 31.07.2012, 1.08.2012; [12] Uście Gorlicke, EV18, 49.5171, 21.1442, gravel bank and meadows by Zdynianka river, 400 m a.s.l., 8.08.2012; [13] Skwirtne, EV18, 49.5055, 21.1842, meadow on a slope, forest margin, 420 m a.s.l., 8.08.2012; [14] Hańczowa, EV18, 49.4888, 21.1544, gravel banks of Ropa river, meadow, 441 m a.s.l., 4.08.2012; [15] Ożenna, EV37, 49.4232, 21.4436, glade within forest clearing, bushy and herbaceous vegetation, 535 m a.s.l., 11.08.2019; [16] Ożenna, EV37, 49.4193, 21.4281, roadside in a beech and spruce forest, 592 m a.s.l., 11.08.2019; [17] Magura National Park, Grab forestry area, EV37, 49.4414, 21.4836, raised bog, 609 m a.s.l., 7.09.2004; [18] Magura National Park, Wysokie, EV37, 49.4615, 21.4721, glade, mat grass grassland, 650 m a.s.l., 11.09.2019; [19] Magura National Park, Ciechania, EV37, 49.4517, 21.4961, heathland, 647 m a.s.l., 6.09.2004; [20] Magura National Park, Ciechania, EV37, 49.4496, 21.5022, xerothermic grassland, 608 m a.s.l., 6.09.2004, 8.09.2004; [21] Magura National Park, Ciechania, EV37, 49.4429, 21.5061, meadow,

583 m a.s.l., 6.09.2004; [22] Magura National Park, Żydowskie, EV37, 49.4681, 21.4906, managed meadow, 572 m a.s.l., 7.09.2004; [23] Magura National Park, Huta Polańska, Hajstra, EV37, 49.4583, 21.5381, meadow, 452 m a.s.l., 9.08.2019; [24] Magura National Park, Rostajne, EV38, 49.4880, 21.4240, tall herbaceous vegetation, gravel bank of Ryjak stream, 422 m a.s.l., 23.07.2013; [25] Rostajne, EV38, 49.4923, 21.4194, tall herbaceous vegetation, gravel bank of Wisłoka river, 419 m a.s.l., 23.07.2013; [26] Rostajne, EV38, 49.4881, 21.4214, meadow on the high slope of Wisłoka river valley, 439 m a.s.l., 7.09.2004, 23.07.2013; [27] Świątkowa Mała, EV38, 49.5158, 21.4367, gravel bank of Wisłoka river, 395 m a.s.l., 25.07.2013; [28] Świątkowa Mała, EV38, 49.5168, 21.4413, gravel bank of Wisłoka river, 394 m a.s.l., 25.07.2013; [29] Kotań/Krempna, EV38, 49.5153, 21.4817, gravel bank and meadow by Wisłoka river, 374 m a.s.l., 22.07.2013; [30] Krempna, EV38, 49.5089, 21.5048, meadow, 362 m a.s.l., 6.09.2004; [31] Myscowa, EV38, 49.5300, 21.5516, gravel bank of Wisłoka river, 331 m a.s.l., 25.07.2013, 9.08.2019; [32] Magura National Park, Jaworze forestry area, EV38, 49.5569, 21.4183, glade, 506 m a.s.l., 7.09.2004; [33] Magura National Park, Magura Wątkowska, EV29, 49.5750, 21.3950, glade, 711 m a.s.l., 7.09.2004; [34] Nowy Żmigród/Kąty, EV39, 49.5904, 21.5101, meadow in Wisłoka river valley, 289 m a.s.l., 6.08.2019; [35] Wilsznia, EV47, 49.4625, 21.6293, meadow in Wilsznia river valley, 479 m a.s.l., 31.07.2020; [36] Smereczne, EV47, 49.4659, 21.6598, Smereczynka river valley, managed meadows, 443 m a.s.l., 31.07.2020; [37] Tylawa, EV57, 49.4652, 21.6918, managed meadows, 403 m a.s.l., 31.07.2020; [38] Iwla, EV48, 49.5565, 21.6186, meadows in Iwla river valley, 384 m a.s.l., 9.08.2019; [39] Dukla, EV48, 49.5505, 21.6790, wet meadow, 365 m a.s.l., 25.07.2020; [40] Dukla, EV48, 49.5469, 21.6756, meadows and roadside, 444 m a.s.l., 25.07.2020; [41] Dukla/Nadole, EV49, 49.5634, 21.6761, meadows, 382 m a.s.l., 2.08.2020; [42] Barwinek, Przełęcz Dukielska, EV57, 49.4350, 21.7103, grass and herb belt along forest margin, 433 m a.s.l., 30.07.2020; [43] Barwinek, Przełęcz Dukielska, EV57, 49.4350, 21.6943, wasteland by gravel quarry, 430 m a.s.l., 30.07.2020; [44] Kiczera Telepakowa, EV57, 49.4349, 21.7024, top of the hill by Barwinek-Zyndranowa trail, flowery grassland, wet mowed meadow, 479 m a.s.l., 24.07.2020; [45] Zydranowa, EV57, 49.4210, 21.7346, Panna river valley, managed meadow, 492 m a.s.l., 15.08.2019, 28.07.2020; [46] Zydranowa, EV57, 49.4124, 21.7374, Panna river valley, wet roadside on a glade by the trail leading to Jałowa Kiczera, 471 m a.s.l., 28.07.2020; [47] Czeremcha, EV57, 49.3815, 21.7819, meadows by Droga Węgierska, 543 m a.s.l., 12.08.2019; [48] Lipowiec, EV57, 49.3961, 21.7771, meadows by Droga Węgierska, 522 m a.s.l., 12.08.2019; [49] Posada Jaśliska by Droga Węgierska, EV57, 49.4529, 21.8031, roadsides and meadows, 534 m a.s.l., 3.08.2020; [50] Przełom Jasiołki, EV57, 49.4647, 21.7325, wet meadows and roadsides by the nature reserve, 388 m a.s.l., 12.08.2019; [51] Tylawa Drymak, EV58, 49.4766, 21.7155, Jasiołka river valley, gravel bank and meadows, 370 m a.s.l., 20.07.2013; [52] Trzciana, EV58, 49.4844, 21.7137, Jasiołka river valley, gravel bank, 367 m a.s.l., 20.07.2013; [53] Szklary, EV58, 49.4727, 21.7945, meadows in Dalinówka river valley, 501 m a.s.l., 3.08.2020; [54] Cergowa Zakłuczyna, EV58, 49.5416, 21.7118, north slope of Mała Góra, glade nad meadow, 383 m a.s.l., 22.07.2020, 23.07.2020, 27.07.2020; [55] Cergowa, EV58, 49.5452, 21.7048, glade at the foot of Mała Góra, 388 m a.s.l., 22.07.2020; [56] Cergowa, EV58, 49.5464, 21.7084, managed meadow, 358 m a.s.l., 22.07.2020, 1.08.2020, 6.08.2020; [57] Iwonicz-Zdrój/Przymiarki, EV58, 49.5530, 21.7944, meadows on hilltops, 514 m a.s.l., 4.08.2020; [58] Cergowa, EV59, 49.5694, 21.6989, Pod Skałą, wastelands and meadow, 320 m a.s.l., 21.07.2020; [59] Wola Wyzna, EV67, 49.3871, 21.8764, glade, camping ground, 546 m a.s.l., 10.08.2019; [60] Wola Wyzna, EV67, 49.3930, 21.8712, glade, timber storage, 533 m a.s.l., 10.08.2019; [61] Rudawka Jaśliska, EV67, 49.3818, 21.8918, meadows and crop fields, 560 m a.s.l., 10.08.2019; [62] Źródlika Jasiołki, EV67, 49.3801, 21.9004, meadows on the slopes by the forest, 571 m a.s.l., 10.08.2019; [63] Moszczaniec, EV67, 49.4062, 21.9214, meadow,

518 m a.s.l., 13.08.2019; [64] Jasiel, EV66, 49.3694, 21.9262, roadsides and glades, 644 m a.s.l., 13.08.2019; [65] Jasiel, EV66, 49.3646, 21.9152, raised bog, 616 m a.s.l., 13.09.2019; [66] Radoszyce, EV76, 49.3043, 22.0320, car park by forest margin, 561 m a.s.l., 8.08.2019; [67] Radoszyce, EV76, 49.3016, 22.0291, glade, 560 m a.s.l., 8.08.2019; [68] Rzepedź, EV86, 49.3567, 22.1139, meadows by Oślawa river, 430 m a.s.l., 8.08.2019.

RESULTS AND DISCUSSION

During the five years of Orthoptera research in the Low Beskid Mountains 37 species of grasshoppers and crickets were recorded. The following nine species were the most widespread (found at >30 sites): *Phaneroptera falcata*, *Leptophyes albovittata*, *Roeseliana roeselii*, *Pholidoptera griseoaptera*, *Euthystira brachyptera*, *Chrysocraon dispar*, *Gomphocerippus rufus*, *Chorthippus biguttulus* and *Pseudochorthippus parallelus*. Four species were recorded at 21–30 sites, 5 species at 11–20 sites, and 19 species at 1–10 sites. The least frequently recorded (1–2 sites) were *Barbitistes constrictus*, *Ruspolia nitidula*, *Tettigonia viridissima*, *Oecanthus pellucens*, *Tetrix undulata*, *Omocestus haemorrhoidalis*, *Chorthippus mollis*, *Ch. vagans* and *Stethophyma grossum*. The complete list of recorded species is presented in Table 1.

Table 1. Grasshoppers, bush-crickets and crickets (Orthoptera) recorded in the Low Beskid Mountains (Poland) in 2004, 2012, 2013, 2019 and 2020 (species order after Ivković et al. 2024).

| No. | Species | Sites | N of sites |
|-----|--|---|------------|
| 1 | <i>Conocephalus fuscus</i> (Fabricius, 1793) | 23, 39, 41, 45, 56, 58, 65 | 7 |
| 2 | <i>Ruspolia nitidula</i> (Scopoli, 1786) | 56 | 1 |
| 3 | <i>Meconema thalassinum</i> (De Geer, 1773) | 18, 23, 54, 67 | 4 |
| 4 | <i>Barbitistes constrictus</i> Brunner von Wattenwyl, 1878 | 48, 54 | 2 |
| 5 | <i>Isophya stysi</i> Cejchan, 1957 | 23, 42, 44, 45, 62, 65 | 6 |
| 6 | <i>Leptophyes albovittata</i> (Kollar, 1833) | 8, 9, 15, 18, 20, 21, 23, 30, 31, 34, 35, 36, 37, 39, 41, 42, 43, 44, 45, 47, 48, 49, 51, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 68 | 34 |
| 7 | <i>Phaneroptera falcata</i> (Poda, 1761) | 1, 5, 6, 8, 9, 11, 12, 13, 14, 15, 18, 19, 20, 23, 24, 25, 26, 30, 31, 32, 33, 34, 35, 36, 39, 41, 42, 43, 44, 45, 47, 48, 49, 51, 52, 54, 55, 56, 57, 58, 59, 60, 61, 62, 67, 68 | 46 |
| 8 | <i>Decticus verrucivorus</i> (Linnaeus, 1758) | 15, 18, 19, 20, 22, 23, 24, 26, 33, 36, 37, 39, 42, 44, 45, 49, 51, 56, 57, 58, 59, 61, 62, 64, 67, 68 | 26 |
| 9 | <i>Metrioptera brachyptera</i> (Linnaeus, 1761) | 18, 19, 20 | 3 |
| 10 | <i>Pholidoptera griseoaptera</i> (De Geer, 1773) | 7, 8, 9, 11, 13, 14, 15, 18, 21, 22, 23, 26, 30, 32, 33, 35, 36, 38, 42, 43, 45, 46, 48, 50, 51, 53, 54, 56, 57, 58, 59, 64, 66, 67 | 34 |
| 11 | <i>Roeseliana roeselii</i> (Hagenbach, 1822) | 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 21, 23, 24, 26, 30, 32, 33, 35, 36, 39, 41, 42, 44, 45, 46, 47, 48, 49, 51, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67 | 45 |
| 12 | <i>Tettigonia cantans</i> (Fuessly, 1775) | 7, 11, 15, 17, 19, 21, 23, 24, 30, 32, 34, 35, 36, 38, 39, 41, 42, 44, 45, 47, 48, 50, 53, 54, 57, 58, 59, 60, 61, 62 | 30 |
| 13 | <i>Tettigonia viridissima</i> Linnaeus, 1758 | 36, 40 | 2 |
| 14 | <i>Gryllus campestris</i> Linnaeus, 1758 | 36, 40, 45, 46, 57 | 5 |
| 15 | <i>Oecanthus pellucens</i> (Scopoli, 1763) | 45 | 1 |

| | | | |
|----|---|--|----|
| 16 | <i>Tetrix bipunctata</i> (Linnaeus, 1758) | 16, 20, 26 | 3 |
| 17 | <i>Tetrix subulata</i> (Linnaeus, 1758) | 2, 3, 6, 11, 12, 14, 26, 29, 30, 31, 32, 45, 46, 50, 51, 53, 68 | 17 |
| 18 | <i>Tetrix tenuicornis</i> (Sahlberg, 1893) | 11, 12, 14, 24, 27, 29, 31, 40, 44, 45, 51, 54, 59, 64, 67, 68 | 16 |
| 19 | <i>Tetrix tuerki</i> (Krauss, 1876) | 1, 3, 4, 6, 14, 24, 25, 27, 29, 31, 52 | 11 |
| 20 | <i>Tetrix undulata</i> (Sowerby, 1806) | 11 | 1 |
| 21 | <i>Chorthippus albomarginatus</i> (De Geer, 1773) | 9, 37, 51, 58, 59, 64, 67 | 7 |
| 22 | <i>Chorthippus apricarius</i> (Linnaeus, 1758) | 11, 21, 30, 45, 49, 61 | 6 |
| 23 | <i>Chorthippus biguttulus</i> (Linnaeus, 1758) | 4, 5, 6, 10, 11, 12, 14, 15, 16, 18, 21, 23, 24, 26, 27, 30, 31, 32, 33, 34, 38, 40, 45, 46, 49, 51, 59, 60, 61, 62, 64, 67, 68 | 33 |
| 24 | <i>Chorthippus brunneus</i> (Thunberg, 1815) | 14, 44, 67 | 3 |
| 25 | <i>Chorthippus dorsatus</i> (Zetterstedt, 1821) | 2, 7, 12, 14, 15, 18, 23, 30, 36, 41, 44, 45, 48, 49, 54, 56, 57, 58, 59, 62, 63, 64, 66, 67 | 24 |
| 26 | <i>Chorthippus mollis</i> (Charpentier, 1825) | 31, 50 | 2 |
| 27 | <i>Chorthippus vagans</i> (Eversmann, 1848) | 16, 67 | 2 |
| 28 | <i>Chrysochraon dispar</i> (Germar, 1834) | 10, 11, 12, 13, 14, 15, 17, 18, 19, 21, 23, 24, 25, 27, 32, 33, 35, 36, 39, 40, 41, 42, 44, 45, 46, 47, 48, 49, 51, 53, 54, 57, 59, 61, 62, 63, 64, 65, 66, 67, 68 | 41 |
| 29 | <i>Euthystira brachyptera</i> (Ocskay, 1826) | 2, 5, 7, 8, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 35, 36, 37, 39, 41, 42, 43, 44, 45, 47, 48, 49, 51, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68 | 53 |
| 30 | <i>Gomphocerippus rufus</i> (Linnaeus, 1758) | 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 24, 25, 26, 30, 32, 33, 34, 36, 38, 39, 41, 45, 49, 50, 51, 54, 56, 57, 58, 61, 63, 64, 66, 67 | 40 |
| 31 | <i>Omocestus haemorrhoidalis</i> (Charpentier, 1825) | 19 | 1 |
| 32 | <i>Omocestus viridulus</i> (Linnaeus, 1758) | 5, 7, 11, 12, 14, 15, 17, 18, 21, 23, 24, 26, 29, 30, 32, 33, 36, 42, 44, 45, 48, 49, 51, 53, 57, 61, 62, 63, 65, 67 | 30 |
| 33 | <i>Pseudochorthippus montanus</i> (Charpentier, 1825) | 2, 5, 7, 12, 17, 18, 45, 56, 58, 63, 65 | 11 |
| 34 | <i>Pseudochorthippus paralellus</i> (Zetterstedt, 1821) | 2, 5, 7, 8, 9, 10, 11, 12, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 26, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 44, 45, 47, 48, 49, 51, 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67 | 50 |
| 35 | <i>Stenobothrus lineatus</i> (Panzer, 1796) | 18, 19, 20, 22, 23, 24, 26, 30, 44, 45, 49, 54, 60, 61, 62, 63, 67 | 17 |
| 36 | <i>Mecostethus parapleurus</i> (Hagenbach, 1822) | 23, 35, 45, 46, 56 | 5 |
| 37 | <i>Stethophyma grossum</i> (Linnaeus, 1758) | 17 | 1 |

The study results confirm that the Low Beskid Mountains are the most important area of occurrence in Poland of *Isophya stysi* and *Mecostethus parapleurus* (Krasoń et al. 2020, Guzik & Guzik 2022). The gravel banks of the mountain rivers and streams in this region provide habitat for *T. tuerki*, a species rarely recorded in Poland (Liana & Wawer 2018). This is also another area in Poland where two expansive southern European species of Orthoptera have been recorded in recent years: *Oe. pellucens* and *R. nitidula* (Brodacki 2014, 2018, 2022, Jirak-Leszczynska 2020, Mokrzycki et al. 2020, Bury & Mazepa 2022, Krajewski 2025).

The published literature lists three further orthopteran species found in Low Beskid Mountains which were not recorded during the surveys described in this paper: *Gryllotalpa gryllotalpa* (Linnaeus, 1758) (Kulczycki 1964, Turzański 2018), *Poecilimon schmidtii* (Fieber, 1853) (Jarčuška et al. 2015) and *Platypleis grisea* (Fabricius, 1781) (Czyżewski 2022). Thus, a total of 40 species of grasshoppers and crickets are found in this region. This number represents 48.8% of the current (recorded in the 21st century) orthopteran fauna of Poland, which comprises 82 species (Żurawlew et al. 2025).

The number of Orthoptera species found in the 21st century in the Low Beskid Mountains is the same as the number of species of these insects found in the same period in the Bieszczady Mountains, neighbouring the study area to the east (Theuerkauf et al. 2005, Liana 2010, Brodacki 2012, Jarčuška et al. 2015, Żurawlew et al. 2017, Guzik & Guzik 2023, 2024). However, after taking into account the 11 grasshopper and cricket species recorded in the Bieszczady Mountains in the 20th century that have not been found there recently (Bazyluk 1971, Liana 2000a, 2010, Theuerkauf et al. 2005), the lower species richness of the orthopteran fauna of the Low Beskid Mountains compared to the Bieszczady Mountains becomes apparent. However, due to the fact that no orthopterological surveys were conducted in the Low Beskid Mountains in the 20th century, it is possible that several additional orthopteran species occurred in this region in the past but subsequently disappeared, like in the Bieszczady Mountains.

The species composition of the grasshopper and cricket faunas of the Low Beskid Mountains and the Bieszczady Mountains, despite their general similarity, shows some characteristic differences. Particularly striking is the absence in the Low Beskid Mountains of four *Isophya* species: *I. camp-toxypha* (Fieber, 1853), *I. kraussi* Brunner von Wattenwyl, 1878, *I. pienensis* Maran, 1954 and *I. posthumoidalis* Bazyluk, 1971, which are common in the Bieszczady Mountains. Also absent in the Low Beskid Mountains are some other mountain species widespread in the Bieszczady Mountains: *Pholidoptera aptera* (Fabricius, 1793), *Capraiuscola ebneri* Galvagni, 1953 and *Chorthippus pullus* (Philippi, 1830). The absence of the four *Isophya* species, as well as *P. aptera* and *C. ebneri* in Low Beskid Mountains is probably related to the lack in this region of suitable habitats preferred by these insects – alpine and subalpine grasslands (polonynas). The absence of *Ch. pullus* in the Low Beskid Mountains is more difficult to explain, as suitable habitats for it – riverside gravel banks – are common here; moreover, the groundhopper *T. tuerki*, which has similar habitat requirements and co-occurs with *Ch. pullus* in some other regions of the Polish Carpathians (Bazyluk 1978, Liana 2010, 2013), is relatively widespread in Low Beskid Mountains. In Poland, however, *Ch. pullus* is a generally a rare species (Bazyluk & Liana 2000).

The orthopteran fauna of the Low Beskid Mountains also shows positive features in comparison with the grasshopper and cricket fauna the Bieszczady Mountains. *I. stysi*, the only species of the genus *Isophya* found in the Low Beskid Mountains, is much more common there than in the Bieszczady Mountains (where it has not been recorded since the second half of the 20th century – Theuerkauf et al. 2005, Liana 2010, Guzik & Guzik 2023). *L. albovittata* is also much more widespread in the Low Beskid Mountains. Two species occur in this region but have not been recorded in the Bieszczady Mountains, neither at present nor in the 20th century: *Conocephalus fuscus* and *S. grossum*. These two orthopterans are lowland species that probably find better living conditions in the Low Beskid Mountains than in the more elevated Bieszczady Mountains (Bazyluk & Liana 2000).

ACKNOWLEDGEMENTS

Professor A. Liana (1937–2021) was accompanied in the Low Beskid Mountains in her last years by her daughter Danuta Bazyluk, who helped her conduct field research. We (PŻ and MB) would

like to thank Danuta Bazyluk for providing us A. Liana's species records, field notes and other relevant materials and asking us to write and publish this paper after her mother's death. We also thank Ryszard Orzechowski for preparing the map of the study area in Fig. 1.

REFERENCES

- Bazyluk W. 1971. Prostoskrzydłe (Orthoptera) Bieszczadów Zachodnich wraz z opisem *Isophya posthumoidalis* n. sp. *Fragmenta Faunistica* 17(6): 127–159. [In Polish with French and Russian summary]
- Bazyluk W. 1978. Karaczany (Blattodea), prostoskrzydłe (Orthoptera) i skorki (Dermaptera) Pienin i góry Wżar. *Fragmenta Faunistica* 22(1): 7–50. [In Polish with French and Russian summary]
- Bazyluk W., Liana A. 2000. Prostoskrzydłe Orthoptera. *Katalog Fauny Polski* 17(2): 1–156. [In Polish]
- Brodacki M. 2012. Pierwsze stwierdzenie nabocznia *Mecostethus parapleurus* (Hagenbach, 1822) (Orthoptera, Acrididae) w Bieszczadach. *Naturalia* 1: 143–145. [In Polish with English summary]
- Brodacki M. 2014. First records of the Large Cone-head Bush-cricket *Ruspolia nitidula* (Scopoli, 1786) (Orthoptera, Tettigoniidae) in Poland. *Naturalia* 3: 123–126.
- Brodacki M. 2018. New and reappearing species of Orthoptera in Poland. In: Krištín A., Kaňuch P. & Hochkirch A. (eds), II. European Congress on Orthoptera Conservation, Smolenice, Slovakia, September 19–21, 2018, Book of Abstracts, pp. 7–8. Institute of Forest Ecology, Slovak Academy of Sciences, Zvolen, 36 pp.
- Brodacki M. 2022. Ekspansje zasięgu południowych gatunków prostoskrzydłych (Orthoptera) w Polsce. In: Bunalski M., Sienkiewicz P. (eds), 52 Zjazd Polskiego Towarzystwa Entomologicznego oraz Ogólnopolska Konferencja Naukowa “Zmiany zasięgów owadów, ich przyczyny i skutki”, Chęciny, 8–11 września 2022 r., Materiały konferencyjne, pp. 9–10. Polskie Towarzystwo Entomologiczne, Poznań, 38 pp. [In Polish]
- Bury J., Mazepa J. 2022. Nowe stanowiska nakwietnika trębacza *Oecanthus pellucens* (Scopoli, 1763) (Orthoptera: Gryllidae) w południowo-wschodniej Polsce. *Acta Entomologica Silesiana* 30(online 014): 1–6.
- Czyżewski Sz. 2022. Distribution of *Platycleis grisea* Fabricius, 1781 (Orthoptera: Tettigoniidae) in Poland. *Fragmenta Faunistica* 65(1): 77–83.
- Guzik P., Guzik W. 2022. Rediscovery of *Isophya stysi* (Čejchan, 1957) (Orthoptera: Tettigonioidae: Phaneropterinae) in south-eastern Poland. *Fragmenta Faunistica* 65(1): 69–75.
- Guzik W., Guzik P. 2023. przyczynek do poznania aktualnego rozmieszczenia zrównienek *Isophya* sp. (Orthoptera: Tettigoniidae: Phaneropterinae) w Bieszczadach. *Roczniki Bieszczadzkie* 31: 189–197. [In Polish with English summary]
- Guzik W., Guzik P. 2024. *Platycleis affinis* Fieber, 1853 (Orthoptera: Tettigoniidae) – nowy gatunek pasikonika w faunie Polski. *Acta Entomologica Silesiana* 32 (online 010): 1–3. [In Polish with English abstract]
- Ivković S., Husemann M., Tumbrinck J., Heller K.-G. 2024. An updated checklist of European Orthoptera. *Articulata*, Beiheft 39: 1–58.
- Jarčuška B., Kaňuch P., Krištín A. 2015. Orthoptera and Mantodea assemblages of East Carpathian Mts (Central Europe). *Folia faunistica Slovaca* 20(2): 167–182.
- Jirak-Leszczyńska A. 2020. Ponowne stwierdzenie nakwietnika trębacza *Oecanthus pellucens* (Scopoli, 1763) (Orthoptera: Gryllidae) na Wyzynie Krakowsko-Częstochowskiej. *Prądnik. Prace i Materiały Muzeum im. Prof. Władysława Szafera* 30: 183–188. [In Polish with English summary]
- Krajewski Ł. 2025. Kózka ciemnoskrzydła *Stauroderus scalaris* Fischer von Waldheim, 1846 (Orthoptera: Gomphocerinae) po 70 latach potwierdzona na Wyzynie Małopolskiej. *Naturalia* 11: 5–9.
- Krasoń K., Guzik P., Guzik W. 2020. Nowe dane o rozmieszczeniu nabocznia bagiennego *Mecostethus parapleurus* (Hagenbach, 1822) (Orthoptera, Acrididae) w Karpatach. *Parki Narodowe i Rezerwy Przyrody* 39(4): 67–73. [In Polish with English abstract]
- Krištín A., Iorgu I. Ş. (eds) 2014. Red List of Grasshoppers, Bush-crickets and Crickets (Orthoptera) of the Carpathian Mountains. In: Kadlečík J. (ed.), *Carpathian Red List of Forest Habitats and Species Carpathian List of Invasive Alien Species* (draft), pp. 186–199. The State Nature Conservancy of the Slovak Republic, Banská Bystrica, 234 pp.

- Kulczycki A. 1964. Badania nad składem pokarmu sów z Beskidu Niskiego. *Acta Zoologica Cracoviensia* 9: 529–559. [In Polish with English summary]
- Liana A. 2000a. Prostoskrzydłe (Orthoptera), skorki (Dermaptera) i karaczany (Blattodea) Bieszczadów. *Monografie Bieszczadzkie* 7: 173–189. [In Polish with English summary]
- Liana A. 2000b. Prostoskrzydłe (Orthoptera), karaczany (Blattodea) i skorki (Dermaptera). *Flora i Fauna Pienin – Monografie Pienińskie* 1: 151–154. [In Polish with English summary]
- Liana A. 2010. Operat ochrony owadów prostoskrzydłych (Orthoptera). In: *Plan ochrony Bieszczadzkiego Parku Narodowego*, pp. 241–264. *Krameko*. [In Polish]
- Liana A. 2012. Materiały do poznania fauny prostoskrzydłych (Orthoptera) Beskidu Żywieckiego. *Nowy Pamiętnik Fizjograficzny* 7: 7–23. [In Polish with English summary]
- Liana A. 2013. Orthopterans (Orthoptera) of the Tatra Mountains and Podhale (Poland). *Fragmenta Faunistica* 56(2): 113–129.
- Liana A., Armatus P. 2015. Prostoskrzydłe (Orthoptera) Gorców i Gorczańskiego Parku Narodowego. *Ochrona Beskidów Zachodnich* 6: 70–84. [In Polish with English summary]
- Liana A., Wawer W. 2018. *Tetrix tuerki* (Krauss, 1876) in Poland – endangered species of the Carpathian river valleys. In: *Buzetti F. M. (ed.), Workshop Abstracts: International Workshop “Orthopteroid insects: Biodiversity and ecology evolution in a changing environment”*, Rovereto, Italy, October 19–20, 2018. *Fondazione Museo Civico di Rovereto*.
- Mokrzycki T., Koczuk A., Kowalczyk R. 2020. *Oecanthus pellucens* (Scopoli, 1763) (Orthoptera: Gryllidae) w Białowieży z uwagami o rozmieszczeniu i biologii. *Wiadomości Entomologiczne* 39(4); online 20N: 11–12. [In Polish]
- Naskręcki P. 1993. Owady prostoskrzydłe. In: *Mirek Z., Piękoś-Mirkowa H. (eds), Przyroda Kotliny Zakopiańskiej, poznanie, przemiany, zagrożenia i ochrona*, pp. 279–280. *Tatrzański Park Narodowy, Kraków–Zakopane*, 418 pp. [In Polish]
- Solon J., Borzyszkowski J., Bidłasik M., Richling A., Badora K., Balon J., Brzezińska-Wójcik T., Chabudziński Ł., Dobrowolski R., Grzegorzczak I., Jodłowski M., Kistowski M., Kot R., Krąż P., Lechnio J., Macias A., Majchrowska A., Malinowska E., Migoń P., Myga-Piątek U., Nita J., Papińska E., Rodzik J., Strzyż M., Terpiłowski S., Ziaja W. 2018. Physico-geographical mesoregions of Poland – verification and adjustment of boundaries on the basis of contemporary spatial data. *Geographia Polonica* 91(2): 143–170.
- Stój M. 2010. Beskid Niski. In: *Wilk T., Jujka M., Krogulec J., Chylarecki P. (eds), Ostoje ptaków o znaczeniu międzynarodowym w Polsce*, pp. 429–431. *Ogólnopolskie Towarzystwo Ochrony Ptaków, Marki*, 595 pp. [In Polish with English summary]
- Theuerkauf J., Rouys S., Grein G., Becker A. 2005. New records of Orthoptera in the Bieszczady Mountains (Southeast Poland) with special regard to the genus *Isohya*. *Fragmenta Faunistica* 48(1): 9–14.
- Turzański M. 2018. Przyczynek do poznania letniego składu pokarmu puszczyka *Strix aluco* z parku w Dukli w Beskidzie Niskim. *Ptaki Podkarpacia* 14: 101–107. [In Polish]
- Żurawlew P., Grobelny S., Orzechowski R. 2017. Ekspansja długoskrzydłaka sierposza *Phaneroptera falcata* (Poda, 1791) (Orthoptera: Tettigoniidae) w Polsce. *Przegląd Przyrodniczy* 28(2): 39–62. [In Polish with English summary]
- Żurawlew P., Orzechowski R., Grobelny S., Brodacki M., Kutera M., Radzikowski P., Czyżewski S. 2018–2025. Prostoskrzydłe (Orthoptera) Polski. Available at: <https://orthoptera.entomo.pl> on 3 Mar 2025. [In Polish]

STRESZCZENIE

Prostoskrzydłe (Orthoptera) Beskidu Niskiego (Polska)

W artykule przedstawiono wyniki badań nad prostoskrzydłymi (Orthoptera) Beskidu Niskiego. Prace terenowe prowadzono w latach 2004, 2012, 2013, 2019 i 2020 na 68 stanowiskach (łąki, kamieńce, przydroża, nieużytki, polany, torfowiska wysokie, murawy i wrzosowiska). Stwierdzono występowanie 37 gatunków, przy czym na największej liczbie stanowisk (>30 stanowisk) zanotowano: *Phaneroptera falcata*, *Leptophyes albivittata*, *Roeseliana roeselii*, *Pholidoptera griseoptera*, *Euthystira brachyptera*, *Chrysochroan dispar*, *Gomphocerippus rufus*, *Chorthippus biguttulus* i *Pseudochorthippus parallelus*. Najrzadziej notowanymi gatunkami (1–2 stanowiska) były: *Barbitistes constrictus*, *Ruspolia nitidula*, *Tettigonia viridissima*, *Oecanthus pellucens*, *Tetrix undulata*, *Omocestus*

haemorrhoidalis, *Chorthippus mollis*, *Ch. vagans* i *Stethophyma grossum*. Otrzymane wyniki potwierdzają, że Beskid Niski jest najważniejszym miejscem występowania w Polsce dwóch gatunków prostoskrzydłych: *Isophya stysi* i *Mecostethus parapleurus*, a tutejsze kamieńce na brzegach górskich rzek są siedliskiem rzadkiego *T. tuerki*. W literaturze znaleźć można informacje o trzech kolejnych gatunkach zasiedlających omawiany obszar: *Gryllo-talpa gryllotalpa*, *Poecilimon schmidtii* i *Platycleis grisea*. Łącznie w Beskidzie Niskim stwierdzono występowanie 40 gatunków prostoskrzydłych, co stanowi 48,8% aktualnej (wykazanej w XXI wieku) fauny tych owadów w Polsce, obejmującej 82 gatunki.

Received: 26 May 2025

Accepted: 25 August 2025