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Distribution of harvestmen of the genus *Paranemastoma* Redikorzev, 1936 (Opiliones: Nemastomatidae) in Poland

Rozmieszczenie kosarzy z rodzaju *Paranemastoma* Redikorzev, 1936
(Opiliones: Nemastomatidae) w Polsce

SUMMARY

The genus *Paranemastoma* is represented in Polish fauna by two vicariant species: *P. quadripunctatum* and *P. kochi*. The present paper gives new information on distribution of both species in Poland. Literature data together with new localities allowed a compilation into map clearly showing their vicariance.

Keywords: *Paranemastoma quadripunctatum*, *Paranemastoma kochi*, distribution, Poland

STRESZCZENIE

Na podstawie danych z piśmiennictwa oraz wyników badań terenowych przedstawiono rozmieszczenie kosarzy z rodzaju *Paranemastoma* w Polsce. Zaprezentowane materiały uzupełniają dane na temat występowania tych dwu, wikariujących ze sobą gatunków, na terenie Polski oraz precyzują informacje na temat ich rozmieszczenia pionowego.

Słowa kluczowe: *Paranemastoma quadripunctatum*, *Paranemastoma kochi*, rozmieszczenie, Polska

INTRODUCTION

The genus *Paranemastoma* Redikorzev, 1936 is represented in the Polish fauna by two species [35]: *P. quadripunctatum* (Perty, 1833) and *P. kochi* (Nowicki, 1870). *P. quadripunctatum* is a West-European-alpine species known in Poland from some localities scattered from the Karkonosze

Mts (Riesengebirge) in the Sudeten to the Kraków-Częstochowa Upland [27, 29, 31, 35]. *P. kochi* is a North-Carpathian species [15, 35], known in Poland from several localities scattered from the Barania Góra Mt in the Beskid Mts, through Babia Góra Mts, Tatra Mts, Pieninen Mts to the Bieszczady Mts [30, 35, 37]. Although the general distribution and habitat preferences of both species are relatively well known [15, 33, 35], their localities in Poland are scarce [21, 22, 35]. Moreover, a great part of the information is several decades old or even older [6, 11, 19, 20, 22, 23, 40], and often not precise enough [e.g. 6, 8, 21, 23, 24, 25, 26, 40].

The material in the present paper enlarges the information on the *Paranemastoma* species in Poland as well as on habitat preferences and vertical distribution. The specimens were collected by different methods: pitfall traps, entomological sieve and looking for individual specimens under stones, logs of fallen trees etc. The majority of it is stored in the collection of the senior author in Lublin, only several series are in the reference collection of the second author (RCWS – marked in the text).

GENUS DIAGNOSIS AND KEY TO THE POLISH SPECIES

Diagnosis. Body oval, relatively high arched, in both sexes with scutum magnum (in juveniles scutum parvum). Abdominal tergites with pairs of spines, tubercles or humps. Coloration very dark brown or even black, usually with golden points or patches. Chelicerae small, in males with a dorsal-apical apophysis or a crevice opening of glandular organs on basal segment. Pedipalps gracile, elongate. Legs moderately long to very long, femora with several basal or medial pseudoarticulations. Penis with long and slender shaft and strongly incrassate basis. Glans bipartite, the thinner branch working as stylus. Ovipositor not segmented, short, apical furca with some setae. Receptacula seminis: two pairs of small, thin-walled bubbles [15, 35].

Key to the species

1. Abdominal tergites I–IV with pairs of low tubercles (♂) or humps (♀). Back angles of prosoma with pairs (sometimes melted) of golden (or golden-whitish) patches, strikingly larger than points on the tergite V and next tergites. Basal cheliceral segment with finger-shaped, thickly setose dorsal apophysis (♂) or without it (♀)..... *P. quadripunctatum* – only abdominal tergite II with a pair of sharp spines, the others unarmed. Golden patches in frontal margins of prosoma, much smaller than those on the tergite V and next abdominal tergites. Basal cheliceral segment in both sexes with large subapical hump, setose in males or bald in females.....*P. kochi.*

The copulative apparatus and the other morphological characters are exactly described and depicted in papers of Šilhavý [33], Staręga [35] and Martens [15].

GENERAL AND POLISH DISTRIBUTION

Paranemastoma quadripunctatum

General distribution: from eastern France over Belgium, Netherlands, Luxemburg, Germany (mainly western, southern and central parts but reaching even to the North Sea), Switzerland, northern Italy, Austria, Slovenia, Croatia, Bosnia, western Hungary, Czech Republic, western Slovakia, to south-western Poland (7, 9, 13, 15, 16, 17, 33, 35, 41]. It was recorded also from Rumania [1, 26] but these data are doubtful.

Polish distribution: the Sudeten (with the Karkonosze = Riesengebirge), the Stołowe Mts (Heuscheuergebirge), Lower Silesia, the Kraków-Częstochowa Upland [5, 6, 12, 21–27, 29, 31, 32, 35].

Paranemastoma kochi

General distribution: from the Moravian Gate over the Carpathians up to Rumanian Eastern and Southern Carpathians: eastern Moravia, Slovakia, southern and south-eastern Poland, south-western Ukraine, Rumania [1, 3, 4, 15, 35, 36].

Polish distribution: the Beskid Śląski Mts, Babia Góra Mts, Tatra Mts, Pieninen Mts, Eastern Beskides Mts, Bieszczady Mts [8, 10, 11, 18–26, 30, 34, 35, 37, 40].

PHENOLOGY AND HABITAT

Paranemastoma quadripunctatum is an eurychronic species living in litter, under stones, wet tree logs etc. in forests of the mountain and submountain zone. Apart from forests it is known from sod of open biotopes, from peat-bogs, over meadows and pastures up to alps [15]. Noted also from rocky niches and entrance parts of caves [32]. The hitherto known Polish localities comprised altitudes from 250 to 620 m a.s.l [35] but in the Alps this species reaches about 2000 m a.s.l. [15].

Paranemastoma kochi is also eurychronic, living mainly in subalpine forests of the mountain and submountain zone, from about 300 to 1600 m a.s.l., reaching along the streams to layers of dwarf mountain pine and alps [15, 35, 39]. Most often it occurs under stones, tree logs and on walls of hollows in the next vicinity of streams. It also lives in forest litter, particularly in beech forests, and sod of clearings [15, 35]. Sporadically it occurs in caves (trogloxene) [10, 35]. The juveniles often form small aggregations (several to a dozen or so specimens), adults live rather solitarily or in smaller groups.

NEW DATA

The localities are arranged in accordance with the UTM grid.

Paranemastoma quaripunctatum

Izerskie Mts, Forest Insp. Świeradów, forest sec. 383a [WS 13], dead upper mountain spruce forest with 5–15 years old understorey, ca 1060 m a.s.l., pitfall traps, leg. A. Mazur: 18.05.–10.06.2005 – 3 ♂♂, 3 ♀♀; 10.06.–14.07.2005 – 11 ♂♂, 12 ♀♀; 6.09.–20.10. 2005 – 12 ♂♂, 3 ♀♀, 1 juv.; 15.05.–12.07.2006 – 2 ♂♂, 1 ♀; 12.07.–26.10.2006 – 3 ♂♂, 2 ♀♀.

Izerskie Mts, Forest Insp. Świeradów, forest sec. 358d [WS 23], ca 100 years old upper mountain spruce forest with 6 years old understorey, ca 1080 m a.s.l., pitfall traps, leg. A. Mazur: 18.05.–10.06.2005 – 11 ♂♂, 9 ♀♀; 10.06.–14.07.2005 – 17 ♂♂, 6 ♀♀; 14.07.–16.08.2005 – 2 ♂♂, 2 ♀♀; 16.08.–6.09.2005 – 7 ♂♂, 5 ♀♀; 15.05.–12.07. 2006 – 9 ♂♂, 9 ♀♀; 12.07.–26.10.2006 – 3 ♂♂, 1 ♀.

Karkonosze Nat. Park, forest sec. 157d [WS 32], 180 years old upper mountain spruce forest, ca 1180 m a.s.l., pitfall traps, leg. A. Mazur 04.08.–15.10.2007 – 3 ♂♂, 1 ♀.

Karkonosze Nat. Park, Protection area Szrenica, forest sec. 193g [WS 32], 200 years old declining upper mountain spruce forest, ca 1100 m a.s.l., pitfall traps, leg. A. Mazur: 07.06.–15.07.2005 – 1 ♂, 1 ♀, 1 juv.; 15.07.–15.08.2005 – 1 ♂; 15.08.–09.09.2005 – 1 ♀.

Karkonosze Nat. Park, Protection area Szrenica, forest sec. 193g [WS 32], 200 years old declining upper mountain spruce forest with ferns in the undergrowth, ca 1100 m a.s.l., pitfall traps, leg. A. Mazur: 07.06.–15.07.2005 – 8 ♂♂, 5 ♀♀; 15.07.–15.08.2005 – 1 ♀; 15.08.–09.09.2005 – 8 ♂♂, 6 ♀♀; 09.09.–21.10.2005 – 5 ♂♂, 8 ♀♀; 16.05.–28.07. 2006 – 2 ♂♂, 2 ♀♀; 16.09.–26.10.2006 – 2 ♂♂.

Karkonosze Nat. Park, Protection area Szrenica, forest sec. 201c [WS 32], 180 years old declining wetland upper mountain spruce forest with *Sphagnum*, ca 1180 m a.s.l., pitfall traps, leg. A. Mazur: 07.06.–15.07.2005 – 1 ♂, 5 ♀♀; 16.09.–26.10.2006 – 1 ♂.

Karkonosze Nat. Park, Protection area Szrenica, forest sec. 201d [WS 32], 180 years old upper mountain spruce forest, waterlogged forest clearing with *Sphagnum*, ca 1100 m a.s.l., pitfall traps, leg. A. Mazur: 25.07.–15.08.2005 – 2 ♂♂, 2 ♀♀; 07.09.–21.10.2005 – 4 ♂♂, 1 ♀; 16.05.–28.07.2006 – 3 ♂♂, 2 ♀♀.

Karkonosze Nat. Park, Protection area Szrenica, forest sec. 201d [WS 32], 180 years old upper mountain spruce forest in transition zone to peat bog spruce forests with *Sphagnum*, ca 1200 m a.s.l., pitfall traps, leg. A. Mazur: 08.06.–15.07.2005 – 4 ♂♂, 9 ♀♀; 15.07.–15.08.2005 – 6 ♂♂, 7 ♀♀; 15.08.–07.09.2005 – 1 ♂; 07.09.–21.10.2005 – 7 ♂♂, 5 ♀♀; 16.05.–28.07.2006 – 2 ♂♂, 1 ♀.

Karkonosze Nat. Park, Protection area Przełęcz, forest sec. 139i [WS 42], 90 years old upper mountain dense spruce forest, ca 1110 m a.s.l., pitfall traps, leg. A. Mazur: 08.06.–15.07.2005 – 19 ♂♂, 21 ♀♀; 15.07.–07.09.2005 – 5 ♂♂, 3 ♀♀; 07.09.–21.10.2005 – 5 ♂♂, 2 ♀♀.

Karkonosze Nat. Park, Protection area Przełęcz, forest sec. 150h [WS 42], 5 years old young spruce forest in dead spruce upper mountain forest, ca 1040 m a.s.l., pitfall traps, leg. A. Mazur: 09.06.–18.07.2005 – 8 ♂♂, 9 ♀♀; 18.07.–07.09.2005 – 8 ♂♂, 9 ♀♀; 07.09.–21.10.2005 – 4 ♂♂, 5 ♀♀.

Karkonosze Nat. Park, Protection area Przełęcz, forest sec. 150h [WS 42], 130 years old dead upper mountain spruce forest with 15 years old greenwoods, ca 1090 m a.s.l., pitfall traps, leg. A. Mazur: 08.06.–15.07.2005 – 11 ♂♂, 12 ♀♀; 15.07.–07.09.2005 – 3 ♀♀; 07.09.–21.10.2005 – 18 ♂♂, 14 ♀♀; 12.07.–02.09.2006 – 2 ♂♂, 4 ♀♀.

Karkonosze Nat. Park, forest sec. 160a [WS 42], dying 190 years old upper mountain spruce forest with ferns in undergrowth, ca 1120 m a.s.l., pitfall traps, leg. A. Mazur: 09.06.–15.07.2005 – 3 ♀♀; 30.06.–30.07.2006 – 18 ♂♂, 12 ♀♀.

Lewin Kłodzki, distr. Kłodzko [WR 98], ca 430–440 m a.s.l., under stones in Bystra valley, leg. R. Rozwałka, 17.09.2007 – 1 ♀.

Góry Stołowe Nat. Park, valley of Kudowski Potok [WR 98 and WR 99], ca 520–600 m a.s.l., sieved from litter, leg. R. Rozwałka: 18.06.2007 – 2 ♂♂, 3 ♀♀, 3 juv.; 19.09.2007 – 5 ♂♂, 7 ♀♀, 4 juv.

Góry Stołowe Nat. Park, valley of Pośna stream [WR 99], ca 660–665 m a.s.l., sieved from litter, leg. R. Rozwałka, 18.09.2007 – 2 ♂♂, 1 ♀.

Góry Stołowe Nat. Park, Rogowa Kopa [WR 99], ca 660–665 m a.s.l., sieved from litter, leg. R. Rozwałka, 19.09.2007 – 2 ♂♂, 1 ♀.

Góry Stołowe Nat. Park, Narożnik Mt [WR 99], ca 800 m a.s.l., sieved from litter, leg. R. Rozwałka, 19.06.2007 – 1 ♀.

Góry Stołowe Nat. Park, Wielkie Torfowisko Batorowskie Nat. Res. [WR 99], leg. K. Baldy, 21.10.1995 – 2 ♂♂ (RCWS – II/0054).

Śnieżnik Massif, Czarna Góra, Forest Insp. Międzylesie, forest sec. 115a [XR 26], 5 years old culture of spruce, ca 1200 m a.s.l., pitfall traps, leg. A. Mazur: 03.–30.07.2005 – 12 ♂♂, 17 ♀♀, 1 juv.; 09.09.–08.10.2005 – 1 ♀.

Śnieżnik Massif, Czarna Góra, Forest Insp. Międzylesie, forest sec. 117c [XR 26], ca 140 years old upper mountain spruce forest, ca 1180 m a.s.l., pitfall traps, leg. A. Mazur: 03.–30.07.2005 – 3 ♂♂, 3 ♀♀; 09.09.–08.10.2005 – 3 ♂♂, 4 ♀♀.

Śnieżnik Massif, Czarna Góra, Forest Insp. Lądek-Zdrój, forest sec. 339h [XR 26], ca 160 years old upper mountain spruce forest, ca 1180 m a.s.l., pitfall traps, leg. A. Mazur: 18.05.–10.06.2005 – 1 ♀; 03.–31.07.2005 – 25 ♂♂, 19 ♀♀, 9 juv.; 09.09.–08.10.2005 – 4 ♂♂, 6 ♀♀, 1 juv.

Śnieżnik Massif, Forest Insp. Międzylesie, forest sec. 223b [XR 36], ca 140 years old upper montane spruce forest, ca 1260 m a.s.l., pitfall traps, leg. A. Mazur, 30.08.–22.10.2005 – 7 ♂♂.

Śnieżnik Massif, Forest Insp. Lądek-Zdrój, forest sec. 288c [XR 36], ca 170 years old upper mountain conspicuous spruce forest, ca 1230 m a.s.l., pitfall traps, leg. A. Mazur: 03.–30.07.2005 – 2 ♂♂, 8 ♀♀; 30.07.–30.08.2005 – 8 ♂♂, 13 ♀♀; 30.08.–22.10.2005 – 8 ♂♂, 11 ♀♀.

Śnieżnik Massif, Forest Insp. Lądek-Zdrój, forest sec. 288f [XR 36], small open mountain peat bog without trees, surrounded by upper montane spruce forest, ca 1250 m a.s.l., pitfall traps, leg. A. Mazur: 03.–30.07.2005 – 4 ♂♂, 5 ♀♀; 30.07.–30.08.2005 – 2 ♂♂, 2 ♀♀; 30.08.–22.10.2005 – 3 ♂♂.

Śnieżnik Massif, Forest Insp. Lądek-Zdrój, forest sec. 287b [XR 36], ca 185 years old upper montane spruce forest, ca 1260 m a.s.l., pitfall traps, leg. A. Mazur. 03.–30.07.2005 – 4 ♂♂, 5 ♀♀; 30.07.–30.08.2005 – 2 ♂♂, 2 ♀♀; 30.08.–22.10.2005 – 3 ♂♂.

Śnieżnik Massif, Śnieżnik Kłodzki Nat. Res., forest sec. 296a [XR 36], 175 years old dense upper mountain spruce forest; ca 1230 m a.s.l., pitfall traps, leg. A. Mazur: 03.–31.07.2005 – 3 ♂♂, 6 ♀♀; 30.08.–22.10.2005 – 1 ♂, 1 ♀; 03.07.–15.08.2006 – 1 ♂, 3 ♀♀; 15.08.–20.09.2006 – 1 ♂, 2 ♀♀; 20.09.–20.10.2006 – 1 ♀.

Śnieżnik Massif, Śnieżnik Kłodzki Nat. Res., forest sec. 296a [XR 36], 175 years old incompact upper mountain spruce forest; ca 1230 m a.s.l., pitfall traps, leg. A. Mazur: 03.–31.07.2005 – 6 ♂♂, 11 ♀♀; 15.08.–20.09.2006 – 7 ♂♂, 1 ♀.

Bialskie Mts, Rudawiec, Forest Insp. Lądek-Zdrój, forest sec. 336o [XR 46], 55 years old spruce forest of anthropogenic origin, ca 1112 m a.s.l., pitfall traps, leg. A. Mazur: 30.06.–30.07.2005 – 8 ♂♂, 7 ♀♀; 30.07.–9.09.2005 – 6 ♂♂, 7 ♀♀; 09.09.–08.10.2005 – 2 ♂♂, 5 ♀♀; 12.07.–01.09.2006 – 8 ♂♂, 10 ♀♀; 01.09.–21.10.2006 – 4 ♂♂, 1 ♀.

Bialskie Mts, Rudawiec, Forest Insp. Lądek-Zdrój, forest sec. 338a [XR 46], 7 years old culture of spruce, ca 1112 m a.s.l., pitfall traps, leg. A. Mazur: 30.06.–30.07.2005 – 1 ♀, 1 juv.; 09.09.–08.10.2005 – 1 juv.; 15.07.–01.09.2006 – 2 ♂♂.

Bialskie Mts, Śnieżna Białka Wilderness, Forest Insp. Lądek-Zdrój, forest sec. 361b [XR 46], ca 160 years old incompact mixed forest (beech, sycamore, spruce) in transition zone between mixed lower mountain forests and upper mountain spruce forests, ca 950 m a.s.l., pitfall traps, leg. A. Mazur: 30.07.–01.09.2005 – 2 ♂♂; 01.09.–08.10.2005 – 2 ♂♂; 01.06.–01.09.2006 – 6 ♂♂, 4 ♀♀; 01.09.–20.10.2006 – 6 ♂♂, 6 ♀♀.

Bialskie Mts, Śnieżna Białka Wilderness, Forest Insp. Lądek-Zdrój, forest sec. 367b [XR 46], ca 120 years old incompact mixed forest (beech, sycamore, spruce) in transition zone between mixed lower mountain forests and upper moun-

tain spruce forests, ca 980 m a.s.l., pitfall traps, leg. A. Mazur, 30.08.–08.11.2005 – 1 ♂.

Bialskie Mts, Śnieżna Białka Wilderness, Forest Insp. Lądek-Zdrój, forest sec. 368a [XR 46], ca 170 years old incompact mixed forest (beech, sycamore, spruce) in transition zone between mixed lower mountain forests and upper mountain spruce forests, ca 1007 m a.s.l., pitfall traps, leg. A. Mazur: 30.06.–30.07.2005 – 14 ♂♂, 8 ♀♀; 30.07.–09.09.2005 – 1 ♂, 9 ♀♀; 09.09.–08.10.2005 – 4 ♂♂, 3 ♀♀; 08.07.–01.09.2006 – 2 ♂♂.

Sowie Mts, Wielka Sowa, Forest Insp. Wałbrzych [XS 01], 120 years old mixed beech spruce forest, ca 950 m a.s.l., pitfall traps, leg. A. Mazur: 15.08.–19.10.2005 – 5 ♂♂, 1 ♀; 13.05.–15.08.2006 – 3 ♂♂.

Sowie Mts, Wielka Sowa, Forest Insp. Jugów, forest sec. 15a [XS 01], 15 years old young spruce forest on plateau at the top of Wielka Sowa, ca 1010 m a.s.l., pitfall traps, leg. A. Mazur: 15.08.–19.10.2005 – 4 ♂♂, 2 ♀♀; 13.05.–15.08.2006 – 3 ♂♂, 3 ♀♀.

Sowie Mts, Wielka Sowa, Forest Insp. Jugów, forest sec. 16a [XS 01], 120 years old declining upper montane spruce forest, ca 1000 m a.s.l., pitfall traps, leg. A. Mazur: 04.07.–01.08.2005 – 1 ♂; 01.08.–23.10.2005 – 2 ♂♂, 1 ♀; 13.05.–15.07.2006 – 11 ♂♂, 14 ♀♀.

Sowie Mts, Wielka Sowa, Forest Insp. Jugów, forest sec. 19a [XS 01], 15 years old young spruce forest on plateau at the top of Wielka Sowa, ca 1010 m a.s.l., pitfall traps, leg. A. Mazur: 03.07.–1.09.2006 – 1 ♀.

Muszkowicki Las Bukowy [Nature Res.], near Henryków, distr. Ząbkowice Śląskie [XS 31], ca 270–290 m a.s.l., beechwood by a stream, litter, leg. A. Kłosińska & J. Łaydanowicz 20.07.2010 – 1 ♂ (RCWS – II/0115).

Ojców Nat. Park, dry, cold (northem exposition) meadow near road to Skała [DA 16], sieved from litter, leg. R. Rozwałka, 17.11.2005 – 1 ♂ (RCWS – II/0101).

Ojców Nat. Park, Dolina Sąspowska [DA 16], under stone, leg. R. Rozwałka, 27.09.2011 – 1 ♂.

Ojców Nat. Park, Wąwóz Jamki [DA 16], on mushrooms, leg. R. Rozwałka & J. Stachowicz, 15.10.2011 – 1 ♀.

Ojców Nat. Park, Ojców [DA 16], on a path at night, leg. R. Rozwałka, 18.05.2011 – 1 ♀.

Paranemastoma kochi

Tatra Nat. Park, Dolina Kościeliska [DV 15], under stone near a stream, ca 970 m a.s.l., leg. R. Gosik, 30.06.2009 – 1 ♀.

Tatra Nat. Park, Wąwóz Kraków [DV 15], under stone, ca 1035 m a.s.l., leg. R. Rozwałka: 03.07.2009 – 1 ♂.

Tatra Nat. Park, stone-pit „Pod Capkami" [DV 25], sieved from mosses, ca 930 m a.s.l., leg. W. Cichocki & R. Rozwałka; 02.05.2009 – 3 ♂♂, 2 ♀♀, 7 juv.

Tatra Nat. Park, Kuźnice [DV 25], spruce forest, under stone, ca 980 m a.s.l., leg. R. Rozwałka, 01.07.2009 – 3 ♂♂.

Tatra Nat. Park, Polana Olczysko [DV 25], under stone, ca 1060 m a.s.l., leg. R. Rozwałka, 30.06.2009 – 1 ♂.

Zakopane-Harenda [DV 26], spruce forest, under stones, ca 880 m a.s.l., leg. R. Rozwałka, 29.06.–05.07.2009 – 1 ♀, 2 juv.

Gorce Mts, Rabka-Bardo [DV 29], upper course of Słonka stream, between Wierchowa Mt and Szumiąca Mt, spruce-fir forest, ca 850 m a.s.l., leg. A. Riedel, 23.09.1976 – 2 ♂♂ (RCWS – II/0122).

Tatra Nat. Park, Dolina Roztoki [DV 35], under stones near stream valley, ca 1200–1300 m a.s.l., leg. R. Rozwałka: 02.07.2009 – 2 ♀♀; 25.07.2009 – 2 ♂♂, 2 ♀♀ (and some ex. observ.); 09.07.2011 – 1 ♂, 1 ♀ (and some ex. observ.).

Tatra Nat. Park, Dolina Suchej Wody [DV 36], in mosses, ca 930 m a.s.l., leg. R. Rozwałka, 08.07.2011 – 1 ♂.

Pieniny Nat. Park, Zamczysko Mt [DV 57], humid rock debris in forest, ca 640–650 m a.s.l., leg. R. Rozwałka, 20.05.2011 – 1 ♀, 3 juv.

Pieniny Nat. Park, Wąwóz Sobczański [DV 57], under humid stones, ca 580 m a.s.l., leg. R. Rozwałka, 07.07.2008 – 2 ♂♂.

Pieniny Mts, Sromowce Niżne [DV 57], Dunajec River valley, under stone in riverbed, ca 450 m a.s.l., leg. R. Rozwałka, 20.05.2011 – 1 juv.

Beskid Wyspowy Mts, valley of Żmiącki Potok [DA 60], under stones, ca 630–660 m a.s.l., leg. R. Rozwałka & M. Szewczyk, 03.05.2007 – 5 ♂♂, 2 ♀♀, 24 juv.

Beskid Wyspowy Mts, Jaworzna [DA 61], distr. Limanowa, under stones by a stream, ca. 400–420 m a.s.l., leg. R. Rozwałka, 03.05.2007 – 2 ♂♂, 3 ♀♀, 2 juv. (RCWS – II/0103).

Beskid Wyspowy Mts, Łososina River valley near Kamionka Mała [DA 61], under stones, ca 400 m a.s.l., leg. R. Rozwałka: 02.05.2007 – 1 ♀; 30.07.2007 – 1 ♀.

Beskid Wyspowy Mts, Białowodzka Góra Nat. Res. [DA 70], mixed forest, under stone, ca 420 m a.s.l., leg. R. Rozwałka, 02.05.2007 – 2 juv.

Beskid Wyspowy Mts, Wola Stańkowska [DA 81], distr. Nowy Sącz, *Dentario glandulosae-Fagetum*, litter by a stream, ca. 530 m a.s.l., leg. R. Rozwałka, 30.07.2007 – 1 ♀ (RCWS – II/0098).

Bieszczady Mts, Chryszczata Mt [EV 86], fir mountain forest, in mould, ca 800 m a.s.l., leg. R. Rozwałka, 11.06.2011 – 1 ♀.

Bieszczady Nat. Park, Górna Solinka stream valley [FV 04], alder forest, litter, ca 720–740 m a.s.l., leg. R. Rozwałka, 16.–17.08.2011 – 1 ♂, 3 juv.

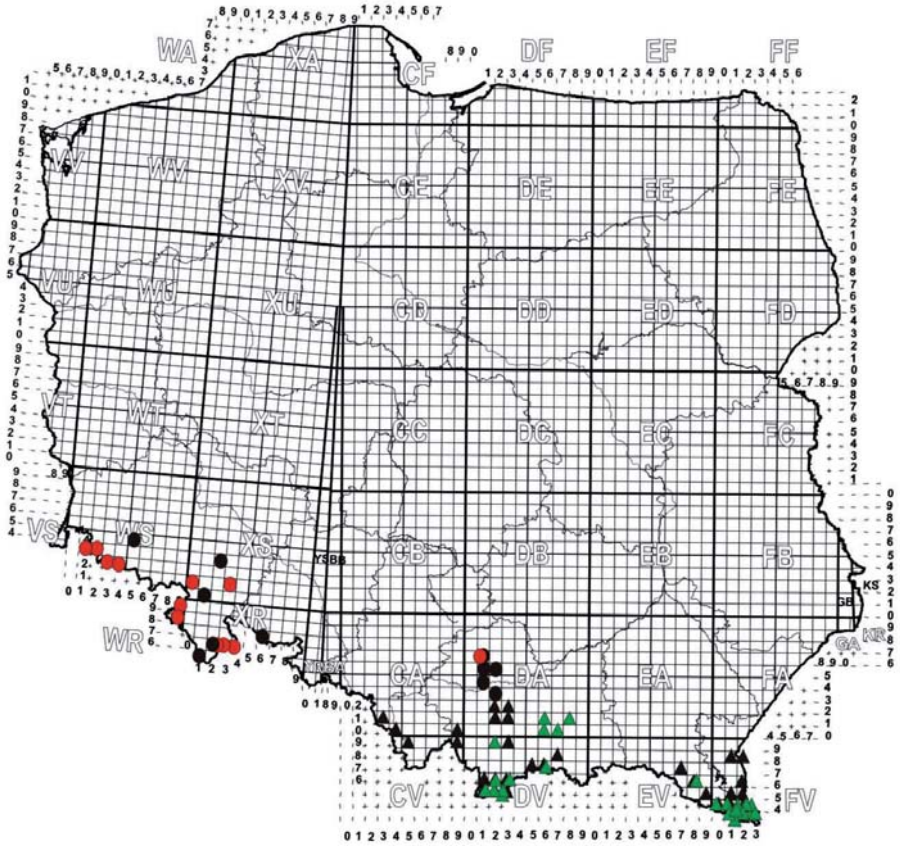

Fig. 1. Distribution of the genus *Paranemastoma* in Poland. *P. quadripunctatum*: black dots – literature data, red dots – new data. *P. kochi*: black triangles – literature data, green triangles – new data

Bieszczady Nat. Park, north slopes of Kamienna [FV 13], "Krummholz" beech-sycamore-rowan forest, in litter and mosses, ca 1180 m a.s.l., leg. R. Rozwałka – 18.08.2012 – 2 ♀♀.

Bieszczady Nat. Park, slopes of Hnatowe Berdo [FV 14], *Dentario glandulosae-Fagetum*, under stones and in litter, ca 750–1100 m a.s.l., leg. R. Rozwałka, 21.08.2008 – 3 ♂♂, 4 ♀♀, 7 juv.

Bieszczady Nat. Park, Berehy Górne [FV 14], *Dentario glandulosae-Fagetum*, under stone, ca 800 m a.s.l., leg. R. Rozwałka, 26.05.2010 – 1 ♀.

Bieszczady Nat. Park, Wołosaty stream valley at the foot of Wielka Rawka Mt [FV 14], under stone, 705–710 m a.s.l., leg. R. Rozwałka, 19.07.2010 – 1 ♀.

Bieszczady Nat. Park, Połonina Caryńska [FV 14], high mountain meadow, pitfall traps, ca 1200 m a.s.l., leg. R. Rozwałka: 26.05.–21.07.2010 – 2 ♂♂, 3 ♀♀; 21.07.–18.08. 2010; 18.08.–07.10.2010 – 3 ♂♂, 4 ♀♀.

Bieszczady Nat. Park, Połonina Caryńska [FV 14], *Dentario glandulosae-Fagetum*, pitfall traps, ca 830 m a.s.l., leg. R. Rozwałka, 18.08.–07.10.2010 – 2 ♂♂, 4 ♀♀.

Bieszczady Nat. Park, Suche Rzeki [FV 15], by a small unnamed stream, under stone, ca 690 m a.s.l., leg. R. Rozwałka, 08.06.2012 – 1 ♂.

Bieszczady Mts, between Sękowiec and Chmiel [FV 15], left bank of San River, sieved from debris, ca 500 m a.s.l., leg. R. Rozwałka, 09.06.2012 – 1 ♂.

Bieszczady Nat. Park, Rozsypaniec [FV 23], old beech-sycamore mountain forest, under stones, ca 1040 m a.s.l., leg. R. Rozwałka: 20.07.2010 – 1 ♂; 11.06.2011 – 1 juv.`

Bieszczady Nat. Park, Zwór stream valley [FV 24], alder forest, litter, ca 630 m a.s.l., leg. R. Rozwałka, 28.04.2011 – 1 ♂, 2 ♀♀, 8 juv.

Bieszczady Mts, Pszczeliny [FV 24], beach-sycamore forest by a small stream, litter, ca 600 m a.s.l., leg. R. Rozwałka, 19.08.2008 – 2 juv.

Bieszczady Nat. Park, Dźwiniacz [FV 24], alder thicket by a small stream, litter, 630–640 m a.s.l., leg. R. Rozwałka, 18.07.2010 – 1 ♂, 1 ♀.

Bieszczady Nat. Park, Bukowiec [FV 33], alder forest near car parking, litter, ca 760 m a.s.l., leg. R. Rozwałka, 28.04.2011 – 1 ♂, 4 juv.

Bieszczady Nat. Park, tourist trail from Bukowiec to Beniowa [FV 33], alder forest, litter, ca 755 m a.s.l., leg. R. Rozwałka, 30.04.2011 – 5 ♂♂, 3 ♀♀, 4 juv.

Bieszczady Nat. Park, Bukowiec [FV 33], about 15 years old fir forest, litter, ca 770–780 m a.s.l., leg. R. Rozwałka, 09.10.2010 – 1 ♂.

Bieszczady Nat. Park, NW slopes of Wołowy Garb [FV 33], *Dentario glandulosae-Fagetum*, under stones by a stream, ca 880 m a.s.l., leg. R. Rozwałka, 16.08.2012 – 4 ♂♂, 3 ♀♀.

Bieszczady Mts, Roztoka stream valley between Muczne and Tarnawa Niżna [FV 34], beech-sycamore forest, litter, ca 745–750 m a.s.l., leg. R. Rozwałka, 19.07.2010 – 1 ♂.

Bieszczady Nat. Park, Roztoka stream valley in Tarnawa Niżna [FV 34], alder forest, mosses, ca 680–700 m a.s.l., leg. R. Rozwałka: 03.05.2010 – 2 ♂♂, 1 ♀; 24.05.2010 – 1 ♂; 19.07.2010 – 8 ♂♂, 12 ♀♀; 20.07.2010 – 1 ♂, 4 ♀♀; 29.–30.04.2011 – 2 ♂♂, 3 ♀♀, 3 juv.; 14.–15.06.2011 – 1 ♂; 6 juv.; 18.08.2011 – 4 ♂♂, 3 ♀♀.

VERTICAL AND HORIZONTAL DISTRIBUTION

The up-to-date Polish publications on *P. quadripunctatum* [22, 31, 32] gave only information on single or small numbers of specimens and localities, which

could suggest the species is very rare in Poland. The presented material from different parts of the Sudeten Mts proves that it can be quite frequent and numerous. Moreover, its common occurrence in spruce forests near to the timberline add data on habitats and vertical distribution. Staręga [35] had very scarce information on *P. quadripunctatum* and believed it lives mainly in litter of deciduous forests in narrow vertical diapazone from about 250 to 620 m a.s.l. The new material allows to widen the habitat requirements on litter of different coniferous forests, wet forest clearings and even peat-bogs. The upper distribution limit is now about 1250 m a.s.l. instead of 620 m. Our observations are in full accordance with data of Martens [15]. So, the requirements of the species do not change and are the same in the centre of its distribution area (e.g. south Germany) as well as near the border (south-western Poland).

The present data show that *P. kochi* is a common species in the Polish Carpathians, although it is not known from some areas (e.g. the Middle Beskid Mts; Fig. 1) – it does not mean, however, its absence in those regions but is simply due to lack of faunistic research. Moreover it has been proved that *P. kochi* lives not only in forest habitats but is quite numerous on mountain pastures in the Bieszczady Mts, reaching there to about 1200 m a.s.l. In spite of intensive exploration it was impossible to find the species in the alp zone in the Tatras – it probably does not reach higher as the dwarf mountain pine zone. It was confirmed by the study of Łomnicki [14]. The upper border of vertical distribution lies probably about 1600 m a.s.l. [35, 39].

The juveniles of *P. kochi* occur very often in aggregations of several specimens under one stone. They used to be accompanied by the juveniles of *Gyas* cf. *titanus* Simon. The adults live solitary or in groups counting several specimens.

It is impossible to appoint the precise border of the distribution areas of these both vicariant species. The occurrence of *P. quadripunctatum* in the Ojców National Park has been recently confirmed [2 – without details, present data]. Historic data [11] suggest that *P. quadripunctatum* was a "not uncommon" species in the vicinity of Wieliczka, south of Kraków. The nearest localities of *P. kochi* were near Myślenice and Dobczyce [35: ex coll. W. Kulczyński], that is, merely 10–15 km apart.

It is also impossible to say if the localities of *P. quadripunctatum* in the Kraków-Częstochowa Upland [32] and in the vicinity of Kraków [11] have any connection with those in the Sudeten Mts or are disjunctive – there are no data from the Western Beskides, Upper Silesia and the Eastern Sudeten Mts. The whole area "in between" is either heavy industrialized or intensively used agriculturally with patches of forest of artificial origin. It is just the same situation as in the case of *Ischyropsalis hellwigi* (Panzer) [28].

Our field observations show clearly that *P. kochi* is a species more closely connected with valleys of mountain streams, occurring very often under stones hard by water. It has never been found on peat-bogs. *P. quadripunctatum* is also hygrophilous but not so strongly connected with stream valleys. Instead of this it occurs on mountain (and submountain) peat-bogs.

The main result of our investigation was an essential supplementing of distribution of *P. quadripunctatum* and *P. kochi* with numerous new localities. Both species are not as rare as it was shown by previous authors and the scarcity of information was simply due to the lack of investigations.

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REFERENCES

1. Avram S., Dumitrescu D. 1969. Contribuţii la cunoaşterea răspândirii geografice şi a ecologiei opilionidelor cavernicole, endogee şi epigee din Romania. Lucrarile Institutul Speleologiei „Emil Racoviţa" 8: 99–145.
2. Błoszyk J., Rozwałka R. 2009. Pajęczaki (Arachnida). In: A. Klasa, J. Partyka (eds). Monografia Ojcowskiego Parku Narodowego. Przyroda. Ojcowski Park Narodowy, Ojców [2008], pp. 519–534.
3. Dumitrescu D. 1972. Contributions à la connaissance de la faune d'Opilions (Arachnida) de Roumanie. Travaux du Musée d'Histoire Naturelle „Grigore Antipa" 12: 69–83.
4. Dumitrescu D. 1973. Contributions à la connaissance de la faune d'Opilions (Arachnida) du Massif Ciucas et de la vallée supérieure du Teleajen. Comunicârile Musei Ştiinţe Naturale Ploieşti 1973: 101–109.
5. Fickert C. 1875. Myriopoden und Araneiden vom Kamme des Riesengenbirges. Ein Beitrag zur Faunistik der Subalpinen Region Schlesiens. Zeitschrift für Entomologie 2: 1–48.
6. Grube E. 1871. Über die schlesische Arachnidenfauna. Jahresberichte der Schlesischen Gesellschaft für Vaterländische Cultur 48: 86–87.
7. Klimeš L. 2000. Checklist of harvestmen (Opiliones) of Czechia and Slovakia. Biológia (Bratislava) 19, Suppl. 3: 125–128.
8. Koch L. 1870. Beiträge zur Kenntniss der Arachnidenfauna Galiziens. Jahrbuch der Kaiserlich-Königlichen Gelehrten Gesellschaft Krakau 41¹: 1–56.
9. Komposch Ch. 2004. The harvestman fauna of Hungary (Arachnida: Opiliones). In: F. Samu, Cs. Szinetár (eds). European Arachnology 2002 (Proceedings of the 20th European Colloquium of Arachnology, Szombathely 22–26 July 2002), pp. 227–248.
10. Kowalski K. 1955. Fauna jaskiń Tatr Polskich. Ochrona Przyrody 23: 283–332.
11. Kulczyński W. 1876. Dodatek do fauny pajęczaków Galicyi. Sprawozdania Komisyi Fizyograficznej 10: 41–67.
12. Lebert H. 1875. Verzeichnis der Schlesischen Spinnen mit Aufzählung der Schlesischen Myriopoden. Tübingen, 63 pp.

13. Lengyel G.D. 2010. Contribution to the knowledge of the harvestmen of Hungary (Arachnida: Opiliones). *Folia Entomologica Hungarica* 71: 5–13.
14. Łomnicki A. 1963. The distribution and abundance of ground-surface-inhabiting arthropods above the timber line in the region of Żółta Turnia in the Tatra Mts. Acta Zoologica Cracoviensia 8: 183–249.
15. Martens J. 1978. Spinnentiere, Arachnida. Weberknechte, Opiliones. Die Tierwelt Deutschlands, 64. Gustav Fischer Verl., Jena, 464 pp.
16. Novak T. 2004. An overview of harvestmen (Arachnida: Opiliones) in Croatia. Natura Croatica 13: 231–296.
17. Novak T. 2005. An overview of harvestmen (Arachnida: Opiliones) in Bosnia and Herzegovina. Natura Croatica 14: 301–350.
18. Nowicki M. 1870a. Beschreibung neuer Arthropoden. Jahrbuch der Kaiserlich-Königlichen Gelehrten Gesellschaft Krakau 41[1]: 57–58.
19. Nowicki M. 1870b. Zapiski faunistyczne. Sprawozdania Komisyi Fizyograficznej 4: (1)–(28).
20. Nowicki M. 1871. Opisy nowych członkonogów. Rocznik Cesarsko-Królewskiego Towarzystwa Naukowego Krakowskiego 42: 69–74.
21. Rafalski J. 1960. Kosarze (Opiliones). Katalog Fauny Polski, 32, 2. PWN, Warszawa, 29 pp.
22. Rafalski J. 1961. Prodromus faunae Opilionum Poloniae. Prace Komisji Biologicznej PTPN 25: 325–372.
23. Roewer C. F. 1914. Die Familien der Ischyropsalididae und Nemastomidae der Opiliones-Palpatores. Archiv für Naturgeschichte A 80, 3: 99–169.
24. Roewer C. F. 1919. Über Nemastomatiden und ihre Verbreitung. Archiv für Naturgeschichte A 83, 2: 140–160.
25. Roewer C. F. 1923. Die Weberknechte der Erde. Systematische Bearbeitung der bisher bekannten Opiliones. Gustav Fischer Verl., Jena, 1116 pp.
26. Roewer C. F. 1951. Über Nemastomatiden. Weitere Weberknechte XVI. Senckenbergiana 32: 95–153.
27. Rozwałka R. 2011. *Ischyropsalis hellwigi* (Panzer, 1794) (Arachnida: Opiliones) w Parku Narodowym Gór Stołowych. Przegląd Zoologiczny 52–54 [2008]: 167–170.
28. Rozwałka R., Mazur A., Staręga W. 2012. Distribution of harvestmen of the genus *Ischyropsalis* C.L. Koch (Arachnida: Opiliones) in Poland. Fragmenta Faunistica 55: 11–18.
29. Sanocka E. 1983. Kosarze (Opiliones) strefy przełomów pod Książem (woj. wałbrzyskie). In: E. Głowacka-Migula M. Skowerska, W. Wojciechowski (eds). Postępy zoologii (Materiały informacyjne na XIII Zjazd Polskiego Towarzystwa Zoologicznego. Katowice, wrzesień 1983). Wydawnictwo Uniwersytetu Śląskiego, Katowice, p. 124.
30. Sanocka E. 2003. Kosarze (Opiliones) masywu Babiej Góry. In: B. W. Wołoszyn, D. Wołoszyn, W. Celary (eds). Monografia fauny Babiej Góry. Publikacje Komitetu Ochrony Przyrody PAN, Kraków, pp. 103–118.
31. Sanocka E., Oślizło D. 1986. Kosarze (Opiliones) Ziemi Nyskiej (woj. opolskie). Przegląd Zoologiczny 30: 49–55.
32. Sanocka-Wołoszyn E. 1981. Badania pajęczaków (Aranei, Opiliones, Pseudoscorpionida) Wyżyny Krakowsko-Częstochowskiej. Acta Universitatis Wratislaviensis 548, Prace Zoologiczne 11, 92 pp.
33. Šilhavý V. 1956. Sekáči – Opilionidea. Fauna ČSR, 7. Akademie Věd, Praha, 272 pp.
34. Staręga W. 1966. Kosarze (Opiliones) Bieszczad. Fragmenta Faunistica 13: 145–157.
35. Staręga W. 1976. Kosarze – Opiliones. Fauna Polski, 5. PWN, Warszawa, 197 pp.
36. Staręga W. 1978. Katalog der Weberknechte (Opiliones) der Sowjet-Union. Fragmenta Faunistica 23: 197–241
37. Staręga W. 1979. Kosarze (Opiliones) Pienin. Fragmenta Faunistica 24: 175–183.

38. Staręga W., Błaszak C., Rafalski J. 2002. Arachnida – Pajęczaki. In: Z. Głowaciński (ed.). Czerwona Lista Zwierząt Ginących i Zagrożonych w Polsce. IOP PAN, Kraków, pp. 133–140.
39. Stašiov S. 2008. Altitudinal distribution of harvestmen (Eucheliceratа: Opiliones) in Slovakia. Polish Journal of Ecology 56: 157–163.
40. Wajgiel L. 1874. Pajęczaki galicyjskie. Kołomyja, 36 pp.
41. Wijnhoven H. 2009. De Nederlandse hooiwagens (Opiliones). Entomologische Tabellen, 3 (Supplement bij Nederlandse Faunistische Mededelingen), 118 pp.