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New localities evidence that *Macronychus quadrituberculatus* P. W. J. Müller, 1806 (Coleoptera: Elmidae) is not rare in Poland

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With 1 figure

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Seven new localities of the riffle beetle *Macronychus quadrituberculatus* from Poland are given. All the material (except a single specimen atracted to light) was collected using hydrobiological methods in either alpha-mesosaprobic or polysaprobic waters. Based on these data we discuss the role of *M. quadrituberculatus* as a bioindicator of clean waters, as well as of the relevance of hydrobiological collecting methods in evaluation frequency and distribution of this species.

1 Introduction

The first faunistic investigations on riffle beetles (Coleoptera: Elmidae) from the area of Poland were reported at the end of 19th century (Kotula 1873, Lentz 1879). Currently the fauna of Polish Elmidae includes 8 genera with 18 species: *Stenelmis* Dufour (1 species), *Riolus* Mulsant & Rey (2), *Oulimnius* Des Gozis (2), *Limnius* Illiger (4), *Esolus* Mulsant & Rey (3), *Elmis* Latreille (4), *Potamophilus* Germar (1), and *Macronychus* P. W. J. Müller (1). Further 4 species, *Dupophilus brevis* Mulsant & Rey, *Elmis rioloides* (Kuwert), *Normandia nitens* (P. W. J. Müller), and *N. sodalis* (Erichson) were erroneously recorded from the area of Poland (Burakowski et al. 1983, Więźlak 1986). From the ecological point of view Elmidae were classified by Jäch (1998) as "true water beetles" what means that they spent most of time of their adult stage under the water surface. Unfortunately, because of their specific habits and biology, Elmidae species are rarely collected by Polish coleopterologists, and weakly studied. We do not know much about the frequency and general distribution of these beetles. Many of the species were found in Poland only in few localities (Burakowski et al. 1983).

One of the most enigmatic Polish elmid species is *Macronychus quadrituberculatus*, till the early 1980s known only from 3 localities in Poland (Burakowski et al. 1983).

Generally it is known that *M. quadrituberculatus* lives – both in adult and immature stages – in hyporthithral and epipotamal zones on submerged waterlogged wood and stones overgrown by algae (Moog & Jäch 1995, Čiampor & Kodada 1998). Like other species belonging to the Elmidae, also this species usually prefers unpolluted, unregulated and well-oxygenated rivers and streams (Więźlak 1986, Moog & Jäch 1995), and because of that it is often regarded as a biological indicator of clean freshwaters (Malzjan 1997, Čiampor & Kodada 1998, Kovács et al., Ambrus and Merkl 1999).

M. quadrituberculatus is widely distributed in the West Palaearctic region, including West, Central and East Europe (for more data see Kalisiak et al. 2003). A single locality is also known from Greece (Čiampor & Kodada 1998), and the other one from Morocco (Olmi 1976). Alas the knowledge of this species distribution is not accompanied by adequate data on its frequency. Only single individuals are known from many countries, often collected many years ago. Therefore many entomologists suggested that *M. quadrituberculatus* had became extinct in Europe (Holland 1972, Kaszab 1990, Jäch 1992). Based on these opinions, in some countries it was placed in, both in regional and national, Red Lists or Red Books of Threatened Animals (e.g. Kaszab 1990, Kubisz et al. 1998, Pawłowski et al. 2002). However, faunistic studies conducted during the last decade revealed, that the situation of this water beetle species is not so bad in some areas (Kalisiak et al. 2003). A good example is Poland, where *M. quadrituberculatus* had been known from only 5 localities (Burakowski et al. 1983, Babula 1991, Staniec 1997) until the Polish Red List of Threatened Animals was published by Pawlowski et al. (2002). Two of these records came from the end of 19th century (Kotula 1873, Lentz 1879), another one from the beginning of 20th century (Hild 1914) and only the remaining two date after the World War II (Babula 1991, Staniec 1997). Soon after the paper by Pawłowski et al. (2002), mainly as a result of hydrobiological investigations, further five new localities were found (Kalisiak et al. 2003, Buczyński & Pałka 2003).

One of the older records (Orawica) was misinterpreted by Hild (1914) as situated in Poland, while actually this locality belongs to Slovakia (Burakowski et al. 1983).

Below we enclose seven other new localities of *M. quadrituberculatus*, one from the Central, and six from the East part of Poland. In this study we accepted faunistic division of Poland after Burakowski et al. (1973).

2 Study area, material and methods

During our faunistic investigations nine specimens of *Macronychus quadrituberculatus* were collected:

Małopolska Lowland
11-06-2003 in Rawka river in Budy Grabskie Village (UTM: DC64), Rawka Nature Reserve, Bolimowski Landscape Park, 1 ex., R. Jaskuła et S. Ochocki leg. using hand net from the aquatic vegetation (*Elodea canadensis*), accompanied by *Gammarus fossarum, Calopteryx* and *Ephemeroptera*; littoral zone of the river on the sandy bottom covered by empty shells of molluscs (mainly Viviparidae), about 2 m from the river bank, 3-4 m below the water gate, water depth about 30 cm; water quality: alpha-mesosamprobic (mostly based on *Escherichia coli* titre; Glinkowska & al. 2002).
Lubelska Upland
04-08-2003 in Bug river in Gródek village (distr. Hrubieszów) (UTM: GB05), 2 ex., E. Serafin leg; on submerged stones in lenithic zone, water depth about 5 cm.
20-06-2003 in Bug river in Świerże village (FB97) 1 ex. from a submerged branch of *Salix*, P. Buczyński leg. using hand net; lenithic zone, water depth 30-60 cm.
05-08-2003 in Bug river in Świerże village, 1 ex. from *Potamogeton natans*, water depth 10-20 cm.
02-09-2003 in Bug river in Strzyżów village (UTM: KS93), 1 ex., P. Buczyński leg. by hand net from the submerged willow, in the water current, water depth several cm.
Podlasie
03-09-2003 in Bug river in Wołczyny Village (UTM: FB89), 1 ex., P. Buczyński leg. by hand net from sandy bottom close to the river's bank.
02-08- 2003 in Sobibór village near Włodawa (FC80), 1 ex. atracted to light, M. Wanat leg.; the lamp was situated about 10 m from a small pond, with its margins partly reinforced with a bundle of submerged willow and alder sticks; the locality is placed near the western margin of the Bug river valley, about 1 km from the main river.
19/22-05-2003 in Bug river in Matcze village (UTM: GB04), Strzelecki Landscape Park, 1 ex. M. Grabowski leg. by hand net from aquatic vegetation.

3 Discussion

Our new localities of *Macronychus quadrituberculatus* confirm the suppositions of Kalisiak et al. (2003) that this species is probably not so rare in Poland as it was suggested by Kubisz et al. (1998) and Pawłowski et al. (2002). Especially that number of localities discovered during the last six years makes 75 % of all records known from Poland (Staniec 1997, Babula 1991, Kalisiak et al. 2003, Buczyński & Pałka 2003). Figure 1 shows the current state of knowledge about the distribution of *M. quadrituberculatus* in Poland. It can be expected that further faunistic investigations will allow to find this species in many other localities in Poland, and possibly also to devaluate its "Near Threatened" category proposed by the authors of the Red List of Threatened Animals in Poland (Pawłowski & al. 2002).

The opinion about the real threat of *M. quadrituberculatus* in Poland should be also evaluated on the basis of its habitat requirements in Polish waters. Our present data, as well as the studies by Staniec (1997) and Kalisiak et al. (2003),

suggest that in Poland this species can occur not only in unpolluted, unregulated and well-oxygenated rivers and streams, but also very often in alpha-mesosaprobic waters and partly even in polysaprobic waters (Glinkowska et al. 2002, Bánkowska-Królikowska et al. 2002). Our material collected in the alpha-mesosaprobic River Bug in Gródek, close to Skryhiczyn Village, where *M. quadrituberbulatus* was recorded for the first time eight years ago by B. Staniec (1997), reveals that this species can adapt to polluted waters and its occurrence in other not very clean rivers like Rawka, Pilica and Nida (Kalisiak et al. 2003) is probably not accidental. Therefore, in our opinion, the bioindicative role of *M. quadrituberculatus* in clean waters suggested by many authors (e.g. Majzlan 1997, Čiampor & Kodada 1998, Kovács et al. 1999) is not so clear any more, even if we notice that all of our specimens were not collected in typical habitats for this species. On the other hand present material compiled with data given by Kalisiak et al. (2003) is still to inconspicuous to estimate the resistance of *M. quadrituberculatus* against water pollution. Because of that we think that only further intensive faunistic investigations allow to stay precisely the ecological preferendum for this species as well as to evaluate its real frequency in polluted freshwaters in Poland.

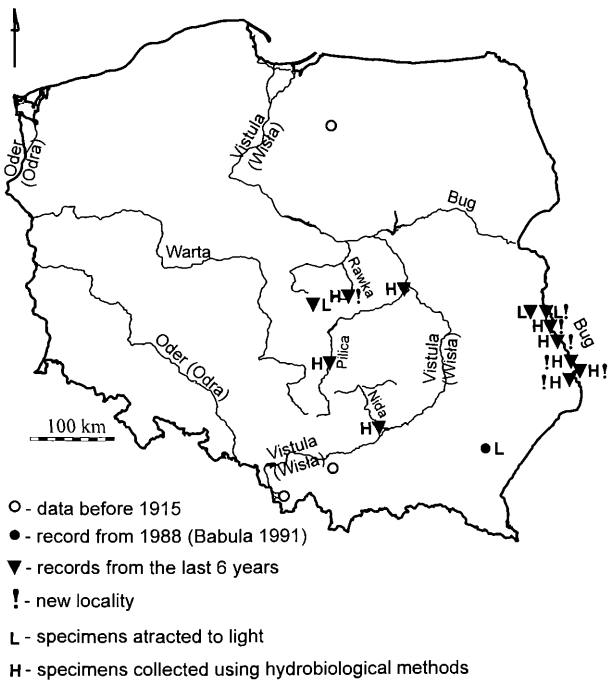

Fig. 1. Distribution of *Macronychus quadrituberculatus* in Poland

Collecting *Macronychus quadrituberculatus* in Rawka and Bug rivers confirms an important role of hydrobiological methods (understood mainly as using benthic hand net) in studying this species. Investigations from other European countries clearly show that this is the most efficient collecting method for this species. Atracting to light seems to be much less effective. An excellent example came from Hungary, where Kovács & al. (1999) in their investigations atracted to light only a few individuals of this species (less that 5 % of all collected specimens), while all other material was found in water habitats using benthic hand nets. Also investigations made by Jan Kodada (pers. com. to the first author) in Slovakia and Hungary show an inportant role of this method in collecting *M. quadrituberculatus*. In his studies about 500 specimens (some 95 %) were found on submerged water-logged wood. Also in Poland only in 4 of 13 recent localities and about 30 % of the specimens were recorded using light traps (Babula 1991, Kalisiak et al. 2003, Buczynski & Pałka 2003). As suggested by Čiampor & Kodada (1998), it probably results from the strongly reduced wings in some populations of *M. quadrituberculatus*. Moreover, hydrobiological studies allow to find not only adult specimens, but also immature stages of these beetles, which is not possible using any other method. Also, there is no season limit in sampling *M. quadrituberculatus* from water habitats while in all known cases beetles atracted at light were observed only from 31 July to 21 August (Babula 1991, Kovács et al. 1999, Kalisiak et al. 2003, Buczyński & Pałka 2003).

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References

Babula, P. J. (1991): Nowe stanowisko Macronychus quadrituberculatus (Ph. Müll.) (Coleoptera, Limniidae) w Polsce.- Wiadomości Entomologiczne 10: 64, Poznań

Bánkowska-Królikowska, J., E. Piebiak & E. Pomorska (eds) (2003): Raport o stanie środowiska województwa lubelskiego w 2002 roku. Wojewódzki Inspektorat Ochrony Środowiska, Lubelski Urząd Wojewódzki, Urzad Marszałkowski Województwa Lubelskiego, Wojewódzki Fundusz- Ochrony Środowiska i Gospodarki Wodnej w Lublinie, 256 pp., Lublin

Buczyński, P. & K. Pałka (2003): Nowe stanowiska Potamophilus acuminatus (Fabricius, 1792) i Macronychus quardutuberculatus Ph. Müller, 1806 (Coleoptera, Elmidae) z południowo-wschodniej Polski.- Wiadomości Entomologiczne 22: 245-246, Poznań

Burakowski, B., M. Mroczkowski & J. Stefańska J. (1973): Chrząszcze – Coleoptera, Biegaczowate – Carabidae.- Katalog Fauny Polski Cz. 23, T. 2., 206 pp. Warszawa

Burakowski, B., M. Mroczkowski & J. Stefańska (1983): Chrząszcze – Coleoptera, Scarabaeoidea, Byrrhoidea i Parnoidea.- Katalog Fauny Polski, 23, T. 9, 249 pp., Warszawa

Čiampor, F. & J. Kodada (1998): Elmidae: I. Taxonomic revision of the genus Macronychus Müller (Coleoptera).- In: Jäch M. A.& L. Ji (eds): Water beetles of China, Vol. II.- Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologen Verein: 219-287, Wien

Glinkowska, G., J. Marczak, M. Rusinek & A. Tomaszewska (2002): Wody.- In: Raport o Stanie Środowiska w Województwie Łódzkim w 2001 roku. 2002. Wojewodzki Inspektorat Ochrony Środowiska w Lodzi: 82-99, Łódź

Hild, L. (1914): Krajowe owady wodne. Hydrocanthares.- Pamietnik fizyograficzny 22,3: 1-131, Warszawa

Holland, D. G. (1972): A key to the larvae, pupae and adults of the British species of Elminthidae.- Freshwater Biological Association Scientific Publication 26, 58 pp., Ambleside, Cumbria

Horion, A. (1955): Faunistik der mitteleuropaischen Käfer. Band IV: Sternoxia (Buprestidae), Fossipedes, Macrodactylia, Brachymera.- Entomologische Arbeiten aus dem Museum Georg Frey 21: 172-173, München

Jäch, M. A. (1992): 42a. Familie: Elmidae.- In: Lohse, G. A. & W. H. Lucht (eds): Die Käfer Mitteleuropas, 2 Suppłementband mit Katalogteil: 69-82, (Goecke & Evers) Krefeld

Jäch, M. A. (1998): Annotated check list of aquatic and riparian/littoral beetle families of the world (Coleoptera).- In: Jäch M. A. & L. Ji (eds): Water beetles of China, Vol. II.- Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologen Verein: 25-42, Wien

Kalisiak, J., R. Jaskuła & G. Tończyk (2003): Rare or undiscovered: Macronuchys quadrimaculatus [sic!] Müller, 1806 (Coleoptera, Elmidae) in Poland – comments on distribution in the Central and Eastern Europe.- Baltic Journal of Coleopterology 3: 29-34, Daugauvpils

Kaszab, Z. (1990): Bogarak (Coleoptera) rendje.- In: Rakoczay, Z. (ed.).: Voros Konyv. A. Magyarorszagon kipusztult es veszelyeztetett noveny – es alltfajok.- 2. kiada, Akademiai Kiados: 245-258, Budapest

Kotula, B. (1873). Przyczynek do fauny chrząszczów Galicyi.- Sprawozdania Komisji Fyzyograficznej 7: 53-90, Kraków

Kovács, T., A. Ambrus & O. Merkl (1999): Potamophilus acuminatus (Fabricius, 1972) and Macronychus quadrituberculatus P. W. J. Müller, 1806: new records from Hungary (Coleoptera: Elmidae).- Folia Entomologica Hungarica 60: 187-194, Budapest

Kubisz, D., A. Kúska & J. Pawłowski (1998): Czerwona Lista Chrązszczy (Coleoptera) Górnego Śląska: 8-68.- In: Rarusel J. B. (ed.) Centrum Dziedzictwa Przyrody Górnego Śląska, Raporty – Opinie T. 3.- 82 pp., Katowice

Lentz, F. L. (1879): Catalog der Preussischen Käfer neu bearbeitet.- Beitrage zur Naturkunde Preussens 4: 64 pp. Königsberg

Malzjan, O. (1997): Chrobaky Coleoptera charakteristickych biotopov z okolia lokality Leles – CHKO Latorica (Vychodne Slovensko).- Natura Carpatica 38: 101-120, Kosice

Moog, O. & M. A. Jäch. (1995): Elmidae – Teil III A, B, C, D. 42 pp.- In: Moog, O. (ed.): Fauna Aquatica Austraca, Wasserwirtschaftskataster, Bundesministerium für Land- und Forstwirtschaft, Wien

Olmi, M. (1976): Coleoptera, Dryopidae, Elminthidae.- Fauna d'Italia 12, XII+272 pp., (Edizioni Calderini) Bologna

Pawłowski, J., D. Kubisz & M. Mazur (2002): Coleoptera.- In: Głowaciński, Z. (ed.): Red List of Threatened Animals in Poland.- Instytut Ochrony Przyrody PAN, 155 pp., Krakow

Staniec, B. (1997): Nowe stanowisko Macronychus quadriturberculatus Ph. Müller, 1806 (Coleoptera, Limniidae).- Wiadomości Entomologiczne, 15: 64, Poznań

Więźlak, W. (1986): Klucze do oznaczania owadów Polski, Część XIX, 48-49 Parnidae, Limnidae, Psephenidae.- PWN, 67 pp., Warszawa-Wrocław

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