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Citation style: Węgierek Piotr, Zherikhin V.V. (1997). An Early Jurassic insect fauna in the Holy Cross Mountains. "Acta Palaeontologica Polonica" (1997, no. 4, s. 539-543).

ACTA PALAEONTOLOGICA POLONICA

Vol. 42, No. 4, pp. 539–543, Warszawa, 1997

Brief report

An Early Jurassic insect fauna in the Holy Cross Mountains

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This note reports on a new locality of Early Jurassic insects in Poland and offers a preliminary list of its entomofauna.

Previously, the only record of fossil insects from the Mesozoic of Poland was based on wings found in middle Early Jurassic fireclays at Grojec, south of Cracow (Raciborski 1894; Fig. 1). Unfortunately, no data on systematic composition of the Grojec insect assemblage were published, and the specimens have probably been lost (A. Skalski personal communication). The clay pits there have long since been abandoned, and no new material can be collected.

Our visits in 1990 and 1991 to another Early Jurassic site, Odrowąż (known also as Sołtyków) near Kielce, Holy Cross Mountains, Poland (Fig. 1), resulted in the discovery of a relatively rich insect assemblage. The collection of fossil insects from that locality is housed in the Muzeum Przyrodnicze, Instytut Systematyki i Ewolucji Zwierząt PAN in Cracow (abbreviated MPK, collection No 5).

The insects have been collected from an old brick-pit situated near the village Odrowąż at the northern edge of the Holy Cross Mountains, between the towns of Skarżysko-Kamienna and Końskie north of Kielce in Central Poland (Fig. 1). The brickyard is abandoned and partly overgrown at present, but dumps and small temporary outcrops of the early Liassic beds, occasionally excavated for jet, are available for fossil collecting.

According to Pieńkowski (1983), early Liassic deposits in the region include three lithostratigraphic units: the Zagaje Formation, the Skłoby Formation and the Ore-bearing Przysucha Formation. The Odrowąż (Sołtyków) section is assigned to the Zagaje Formation (Pieńkowski & Gierliński 1987). The formation is composed of non-marine conglomerates, sandstones, siltstones, mudstones, and clays, and is about 150 m in total thickness, overlying Rhaetian sediments. This is a fluvial complex deposited by branching and meandering rivers and at a flood-plain with back swamps and oxbow lakes (Pieńkowski & Gierliński 1987).

The Odrowąż section, about a dozen or so metres in thickness, represents the lower part of the Zagaje Formation and is dominated by dark-grey and olive-green mudstones and siltstones of varied thickness interbeded with thin coal layers. Plant remains, abundant in the section, point to its early Early Jurassic age (Wcisło-Luraniec 1991b). Other fossils that occur here are the insect remains and isolated scales of palaeoniscid fish.

The plant fossils in the Odrowąż section are abundant and well preserved, but not very diverse. The list of plants (Wcisło-Luraniec 1991b) includes *Neocalamites* (two species), the matoniacean fern *Phlebopteris angustiloba*, the osmundacean fern *Todites princeps*, as well as some other indeterminate ferns, pteridosperm *Pachypteris* sp., bennettitaleans *Otozamites* sp. and *Pterophyllum* sp., conifers *Hirmeriella muensteri*, *Swedenborgia* sp., and *Podozamites* (two species). *Stachyopitys preslii*, a gymnosperm fructification *incertae sedis,* is also present. Conifers are the dominating group, *Hirmeriella* in particular (Reymanówna 1991), though in some layers the almost monospecific *Neocalamites* assemblage is represented. The presence of *H. muensteri* and *Ph. angustiloba* suggests a Hettangian age for the section (Wcisło-Luraniec

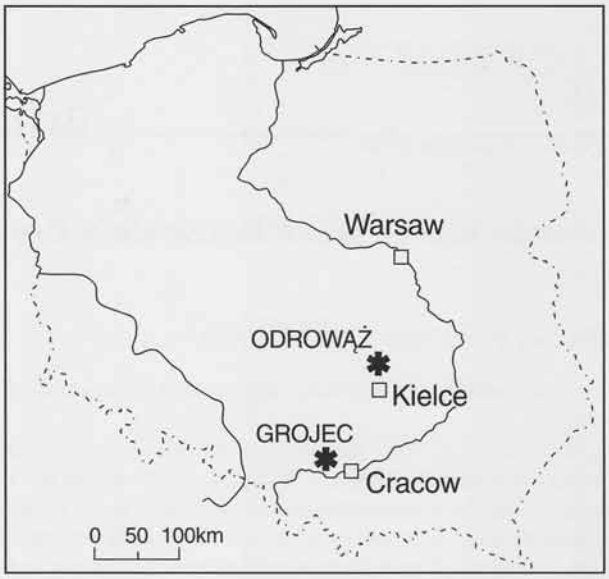

Fig. 1. Localities of Early Jurassic insect fossils in Poland.

1991b). The floristic assemblage includes mainly thermophilous taxa indicating a warm climate (Wcisło-Luraniec 1991a). The results of the palynological investigations (Ziaja 1991) correspond well with the data based on the macroflora. The palynomorph complex includes isoetalean spores determined as *Artrisporites minimus*, an index species for the earliest Jurassic.

All insect remains have been collected from a dump, so their precise position within the brick-pit section cannot be established with any certainty. However, insects seem to be confined to a few layers, if not a single layer, of a grey to yellowish-grey sandy mudstone with rather sparse plant remains (mainly *Hirmeriella* shoots); fish scales were collected from the same type of rock. A single beetle elytron was found in a grey mudstone with abundant *Hirmeriella* shoots and *Podozamites* leaves. The frequency of finds was not high, about 1.0–1.2 per man-hour of work.

Only two insect specimens demonstrate intact body parts: a small beetle with all legs missing and a large bug pro- and mesothorax with a pair of attached tegmina (Popov 1996). Other specimens are represented by most strongly chitinized disarticulated parts such as abdominal and thoracic segments, roach tegmina (Fig. 2B) and particularly beetle elytra (Fig. 2A). This state of preservation may suggest either a water current transport or a decay before burial. The latter possibility is most probable because the enclosing rock is fine-grained and contains plant remains in good preservation state. Nevertheless, a transport by a low-energy flow during a flood cannot be excluded. The insect remains, with a few exceptions, are coalified so that their microsculpture is hardly or not at all observable. Generally, this type of preservation is typical of insect fossils in many coal-bearing deposits.

Fifty-four insect specimens in total have been collected from the Odrowąż section, the majority of them (50) representing beetle remains. The following taxa have so far been identified:

Order Blattodea
?Blattulidae 1 specimen (MPK 5/1)(Fig. 2B)
unidentified 1 specimen (MPK 5/54)

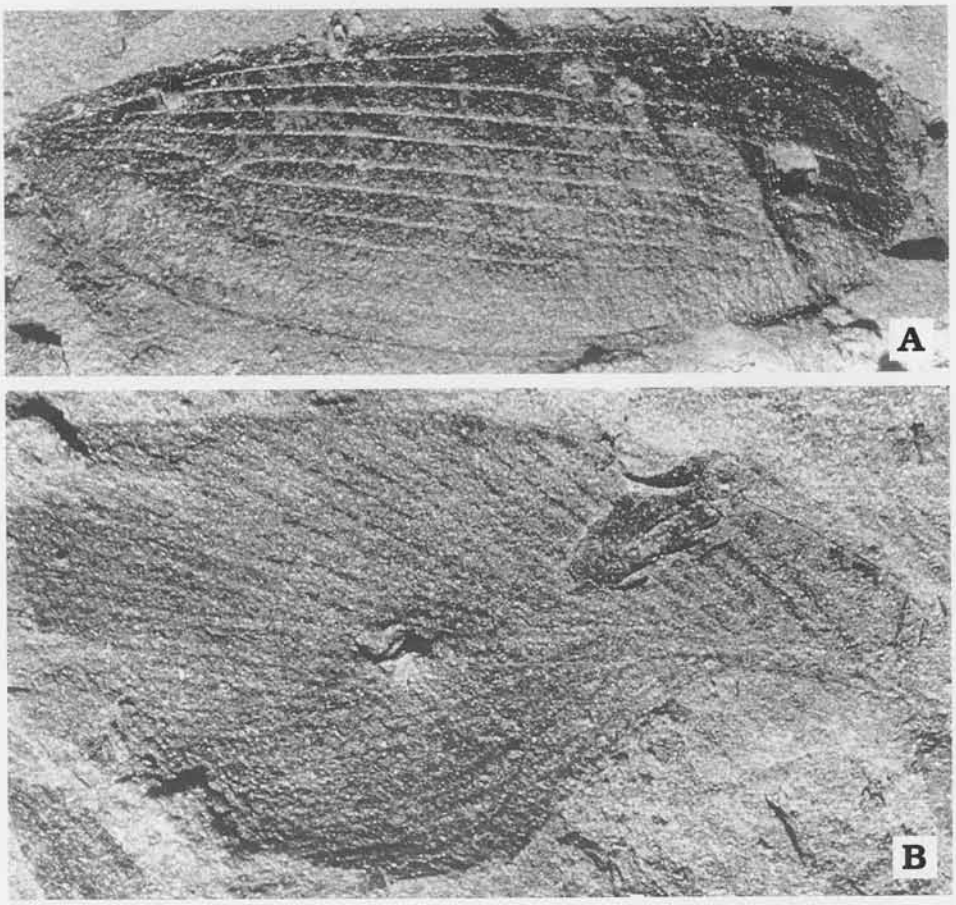

Fig. 2. **A**.?*Artematopodites* sp.; MPK 5/39; × 11. **B**. Blattodean tegmen ?Blattulidae; MPK 5/1, × 11.

Order Heteroptera
Belostomatidae: *Odrowasicoris polonicus* Popov, 1996. 1 specimen (MPK 5/2)

Order Coleoptera
Cupedidae: *Notocupes* sp. 1 specimen (MPK 5/6)
?Schizophoridae indet. 5 specimens (MPK 5/4, 5/5, 5/8, 5/20, 5/35)
?Caraboidea indet. 2 specimens (MPK 5/12, 5/15)
Hydradephaga *incertae sedis*: *Memptus* sp. 1 specimen (MPK 5/44)
?Hydrophilidae: *Hydrobiites* sp. 6 specimens, possibly conspecific (MPK 5/10, 5/13, 5/17, 5/22, 5/25, 5/33)
Polyphaga *incertae sedis*: ?*Polysitum* sp. 2 specimens (MPK 5/14, 5/29)
?*Artematopodites* spp. 3 specimens (MPK 5/36, 5/39, 5/40) (Fig. 2A)
unidentified: 31 specimens

The beetle remains represent probably 15–20 species, both aquatic and terrestrial, although aquatic larvae are absent. The autochthonous aquatic component consists of a belostomatid bug, schizophorids, gyrinids, *Memptus*, and *Hydrobiites*; the latter being the most abundant insect species at Odrowąż. Among the terrestrial insects, *Notocupes* probably lived in a coniferous

forest dominated by *Hirmeriella* (Wcisło-Luraniec 1991a), while habitat preferences of the others are uncertain.

Although the total number of Liassic insects known from Europe is high, the majority of them are younger than the supposedly Hettangian fauna of Odrowąż. The main English Liassic faunas are Sinemurian in age (Whalley 1985) (though there are also some earliest Liassic sites, see Whalley 1982). The most diverse and well-known German faunas are of late Liassic age (Toarcian) (Bode 1953; Ernst 1967; Zessin 1982, 1988; Berger 1989; Ponomarenko 1992), as are the occasional insect finds in Belgium, Luxemburg (Delsate *et al.* 1992) and The Netherlands (Hucke & Voigt 1967). The rich fauna of Aargau (Switzerland) is similar in age to the fauna of Odrowąż (middle to late Hettangian, see Jordan 1983) but was last described more than 140 years ago (Heer 1852) and is in need of a modern revision.

Almost all European Liassic insects were found in marine deposits and represent coastal faunas, while Liassic inland insect communities remain virtually unknown. A comparison between coastal European faunas and inland Siberian, Central Asian and Chinese ones is thus difficult. The discovery of insects in non-marine Liassic deposits in Poland may provide a new source of data on the inland European faunas.

The preliminary investigation of the Odrowąż entomofauna indicates that it resembles fairly closely the insect faunas of coal-bearing Early Jurassic deposits of Asia, such as beetle assemblages from southern Siberia described by Ponomarenko (1985). For example, the caraboid beetles are rare in Poland and Siberia, in contrast to most European faunas (Ponomarenko 1992). Some other common European beetle taxa are entirely absent in Odrowąż, including *Holcoptera*, an easily recognizable genus of uncertain systematic position, and elaterids. Perhaps, the abundance of those taxa should be characteristic rather of certain coastal habitats than of the European Liassic beetle fauna as a whole. On the other hand, the Odrowąż assemblage shows some features in common with other European sites, and those characters are probably more important for paleobiogeographic interpretation. For example, belostomatid water bugs are represented in the Sinemurian fauna of Dorset, England (Popov *et al.* 1994), but are not found in the Siberian Early Jurassic. Cupedid beetles are extremely rare in Siberia but common in Europe, Central Asia and China; at Odrowąż, the cupedid genus *Notocupes* is represented by a relatively small number of specimens. Schizophorids and *Artematopodites* are undoubtedly much more common in Odrowąż and in other European faunas than in Siberian ones, while *Memptus* demonstrates an opposite distributional trend. One of the most characteristic Siberian beetle genera, *Dzeregia*, is not represented in European assemblages. Thus, the faunistic differences between the temperate Siberian and warm subtropical Euro-Chinese regions seem to be considerable, though possibly not as sharp as the floristic ones.

Acknowledgments

The authors are indebted to Dr. A.G. Ponomarenko and Dr. Yu.A. Popov (Paleontological Institute, Russian Academy of Sciences, Moscow) for help in the identification of beetles and bugs, to Dr. M. Reymanówna (W. Szafer Institute of Botany, Polish Academy of Science, Cracow) for access to paleobotanical data, and Prof. S. Jachowicz (University of Silesia, Sosnowiec) for suggesting the locality for study.

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