

## **Rovno amber fauna: a preliminary report**

Evgeny E. PERKOVSKY, Vladimir Yu. ZOSIMOVICH and Anatolij Yu. VLASKIN

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**Abstract.** The conflicting views of Rovno amber being allochthonous, having been transported to the Pripyat area during the Eocene from the north across the sea and thus deriving from the same region as Baltic amber versus suggested local origins within the Ukrainian Crystalline Shield must have been tested by a comparison of inclusions of the Rovno and other ambers. The study of Rovno ants confirms Rovno amber being autochthonous.

**Key words.** Rovno amber, new amber fauna, Eocene.

Evgeny E. PERKOVSKY, Institute of Zoology of the National Academy of Sciences of Ukraine in Kiev, 15 B. Khmel'nitsky Street, Kiev 01-601 Ukraine.

E-mail: perkovsky@fromru.com

Vladimir Yu. ZOSIMOVICH, Institute of Geological Sciences of the National Academy of Sciences of Ukraine in Kiev, 55b O. Gonchar Street, Kiev 01-054 Ukraine.

Anatolij Yu. VLASKIN, Institute of Zoology of the National Academy of Sciences of Ukraine in Kiev, 15 B. Khmel'nitsky Street, Kiev 01-601 Ukraine.

### **I. INTRODUCTION**

An amber chemically identical to the dominating Baltic variety, succinite, is widespread in the Pripyat River basin in Byelorussia and the Ukraine, as pointed out by KATINAS (1987) and KOSMOWSKA-CERANOWICZ (1999). The amber area also covers southeast Poland (KOSMOWSKA-CERANOWICZ et al. 1990). The amber is most common in lignite-bearing sands and in glauconitic sands resembling the amber-bearing Prussian Formation of the Baltic area. Rovno amber has been collected from the Klesov (the vast majority of inclusions) and Dubrovitsa deposits which are a constituent part of the vast region of amber distribution in the north of Rovno and Zhitomir regions within the Ukrainian Polesye (Fig. 1). The amber has long been known from the region. Archeologists have described decorations and amulets of amber found during excavations of Palaeolithic and Neolithic sites.

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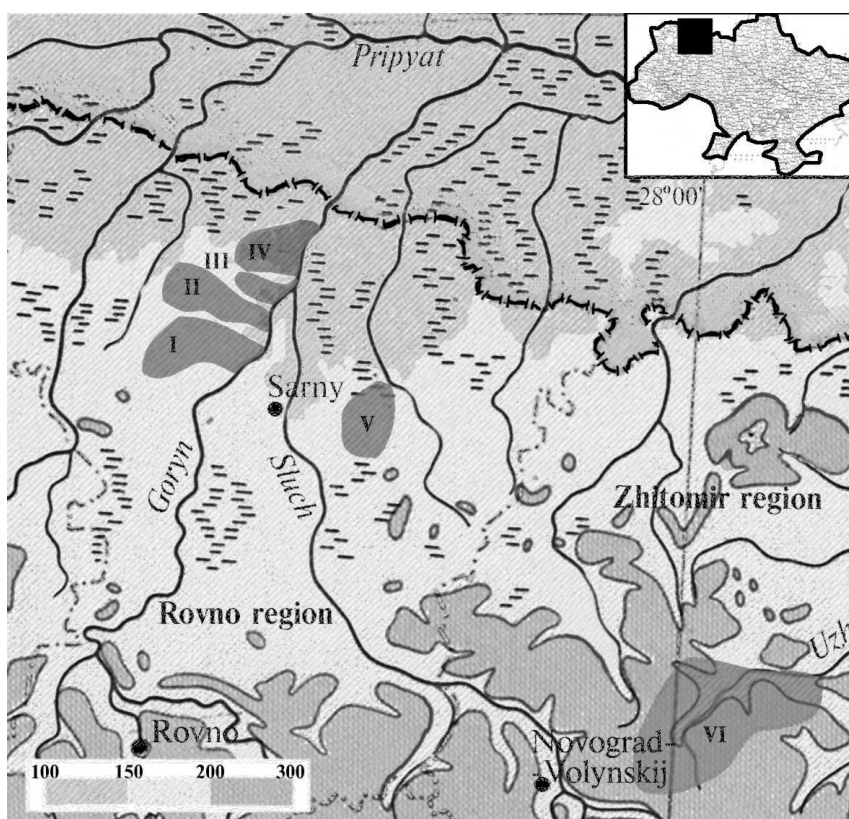


Fig. 1. Amber-bearing zones in Ukrainian Polesje: I – Vladimirets, II – Volnoje, III – Dubrovitsa, IV – Zolotoje, V – Klesov, VI – Barashi (by MATSUI & NESTEROVSKI 1995, with corrections).

Dr. V. K. ODNOSUM, Dr. V. Yu. NAZARENKO, Dr. E. V. RUTJAN, Dr. A. V. GUMOVSKY (all from the Institute of Zoology, National Academy of Sciences of Ukraine, Kiev), Prof. G. M. DLUSSKY, Prof. R. D. ZHANTIEV and Dr. N. V. BELYAYEVA (Moscow State University), Prof. N. B. NIKITSKY (Zoological Museum of the Moscow State University), Dr. N. I. ZELENTOV and Dr. N. A. SHOBANOV (Institute for Biology of Inland Waters, Russian Academy of Sciences, Borok, Yaroslavl Region), Dr. A. I. ZAITSEV (Institute for Problems of Ecology & Evolution, Russian Academy of Sciences), Dr. I. Ya. GRICHANOV and Dr. I. V. SHAMSHEV (All-Russian Institute of Plant Protection, Pushkin, Leningrad Region), Dr. A. V. GOROKHOV and Dr. A. G. KIREITCHUK (Zoological Institute, Russian Academy of Sciences, St. Petersburg), Dr. N. Yu. KLUGE (St. Petersburg State University), Prof. W. KRZEMIŃSKI, mgr D. KUBISZ, mgr. A. PALACZYK (Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Kraków), Prof. J. KOTEJA (Krakow Agricultural University), Dr. P. WĘGIEREK (Silesian University, Katowice), Prof. R. SZADZIEWSKI (University of Gdansk) and many other colleagues in their identification of amber material. Photos of the ants are courtesy of Prof. DLUSSKY, the others provided by Dr. D. Ye. SCHERBAKOV. Dr. S. I. GOLOVATCH (Moscow) has kindly checked the English of an advanced draft.

#### A b b r e v i a t i o n s

PIN – Paleontological Institute, Russian Academy of Sciences, Moscow

IZK – Institute of Zoology, National Academy of Sciences of Ukraine, Kiev

## II. HISTORICAL ACCOUNT

The first mentions of amber from the Ukrainian and Byelorussian Polesye in scientific literature go back to the middle of 18th century. Among the first papers about Rovno amber perhaps the most significant belonged to TUTKOVSKY (1911). Special research was carried out in the post-war years of the last century in order to understand the amber's origins, its chemical and physical composition and properties, features and regularities of deposit formation. The results were published in the papers and monographs of SAVKEVICH (1970), KATINAS (1971), TROFIMOV (1974) and some others. Although the main objective of those studies was Baltic amber, to a greater or lesser extent virtually all of them also considered the ambers of the Ukrainian Polesye. Both these ambers were united into a Baltic-Dnieper Subprovince. The works by MAIDANOVICH & MAKARENKO (1988) as well as of MATSUI & NESTEROVSKY (1995) were largely devoted to Rovno amber.

Recently, after the discovery of both above mentioned amber deposits (Fig. 1), amber extraction in the Ukraine has become industrialized. Earlier, amber was taken in a primitive way from sandy-argillaceous sediments of granite quarries in the outskirts of Klesov, from drainage channel dumps, from natural outcrops of amber-bearing deposits along the river banks.

## III. GEOLOGICAL BACKGROUND

Structurally, the region of amber-bearing deposits is referred to the northwestern margin of the Ukrainian Crystalline Shield. Terrestrial and shallow water marine Palaeogene sediments, terrestrial (mainly bog-lacustrine) Neogene and predominantly glacial formations of the Anthropogene overlie here the Pre-Cambrian formations and their weathering surface. The Palaeogene deposits in the most complete sections contain the Buchak (Lutetian), Kiev (Bartonian), Obukhov (Priabonian), Mezhygorje (Rupelian) and Berek (Chattian) suites; the Neogene deposits the Novopetrovtsy Suite and the strata of speckled and reddish-brown clays and the Anthropogene morainic fluvioglacial complex and alluvium of river valleys of the Anthropogene.

Amber occurs almost in all stratigraphic units of the sedimentary cover. It has not been found only in the Buchak deposits and is extremely rare in the Kiev ones. However, even in the part of the section where amber occurrences are abundant, its content in the rock is substantially different. The richest placers are associated with the Obukhov (Upper Eocene) suite. Placers in the Kiev region are known from the base of the Mezhygorje (Lower Oligocene) suite.

The Obukhov and Mezhygorje suites seem to have been formed in shallow water zones of marine basins, with their deep-water parts situated in the Pripyat and Dnieper-Donets depressions. The shorelines of these basins lay within the Ukrainian shield. The zone of littoral shallow waters in this shield was apparently the area where the formation of amber placers in the sea was simultaneous with the accumulation of primary sediment material of future suites. The Obukhov Suite consists of greenish gray and bluish gray sandy aleurites, clayey glauconite-quartz, non-carbonate, often with admixtures of carbonized vegetative detritus. The Mezhygorje Suite is represented by fine and medium-grained sands, light greenish gray, with yellowish or brown tint, with ferrugization nests and interlayers, slightly clayey. Interlayers of humidified sands of varied size with thin lenticular interlayers of coaly clays and brown coals, phosphoritic concretions, layers of gravel sands are confined to the base of the suite. The thickness of the strata usually varies from 2-3 to 5-7 m (MAKARENKO et al. 1987; ZOSIMOVICH 1992).

A late Eocene age of the Obukhov Suite and an Early Oligocene age of the Mezhygorje Suite have been determined palaeontologically. According to A. B. STOTLAND (personal communication), dinocysts of the Obukhov Suite together with *Charlesdowniea clathrata angulosa* make up a complex characteristic of the Obukhov Regio-Stage in the stratotypical section, of the Alma Regio-Stage of the Black Sea depression and Crimea, of the Beloglinka Horizon in the North Caucasus and of the Priabonian Stage of Western Europe. The complex of palynomorphs with *Myrica*

*pseudogranulata* – *Quercus gracilis* – *Q. graciliformis* is also characteristic of Upper Eocene deposits of various regions in the south of the East European Platform. The dinocyst complex of the Mezghorje Suite (A. B. STOTLAND, personal communication) contains species characteristic of the zonal assemblages of the Early Oligocene, *Phthanoperidinium amoenum* – *Wetzeliella symmetrica* – *W. gochtii*. This corresponds to the dinoflora characteristic of the Mezghorje Regio-Stage of the stratotype, of the Borysthen Suite of the Black Sea depression, the Planorbella Suite of the Crimea, the Pshech Suite of the Northern Caucasus, the Rupelian Stage of Western Europe.

Some authors believe that Rovno amber may have been transported to the Pripyat area during the Eocene from the north across the sea and thus it could have originated in the same region as Baltic amber (BACHOFEN-ECHT 1949; KATINAS 1971, 1987), while others suggest local origins of amber in the Ukrainian Crystalline Shield (KOMAROV 1935; KOSMOWSKA-CERANOWICZ et al. 1990; KOSMOWSKA-CERANOWICZ 1999; AZHGIREVICH et al. 2000).

During the Late Eocene and Early Oligocene, the territory between northwestern Europe and the southern Urals (the so-called Subparatethys Sedimentation Province) is known to have been covered by marine basins. So the existence of currents which could have transported amber seems realistic (GRIGYALIS et al. 1988; ZOSIMOVICH 1992). The palaeontological data appear to confirm the same age of basic amber-bearing strata of the Ukrainian Polesye and the Baltic, i.e. the Obukhov and Prussian suites, respectively (GRIGYALIS et al. 1988). However, analysis both of palaeogeographic and palaeosedimentation evidence during the Late Eocene to Early Oligocene in the north-western part of the Ukrainian Crystalline Shield permits to consider the amber of the Ukrainian shield autochthonous. An indirect confirmation of that is an apparently Eocene age of the autochthonous ambers of Parczew in the south-eastern Poland (KASIŃSKI & TOLKANOWICZ 1999).

According to the vegetation composition, the climate in the region seems to have been subtropical. The sea covering the northwestern part of the Ukrainian Crystalline Shield was apparently shallow, the shoreline was cut by numerous lagoons, skerries, bays etc., i.e. of a character considered optimum for amber accumulation (MAIDANOVICH & MAKARENKO 1988).

As predicted by ZHERIKHIN & ESKOV (1999), a comparison of the inclusions of the Rovno and other ambers offers a clue to resolving the origins of Rovno amber.

#### IV. FAUNA OF THE ROVNO AMBER – PRELIMINARY RESULTS

Before our study, only 11 insect inclusions in Rovno amber, deposited in the Rovno Museum of Regional Studies (Dolichopodidae, Cecydomyiidae, Psychodidae, Limoniidae, Mycetophilidae, Helodidae, Megalynidae), all identified by RASNITSYN and KOVALEV (PIN), plus some Rhagionidae, deposited in the Zhitomir Museum of Regional Studies, have been reliably identified to the family level (PIDOPLICHKO 1956; PERKOVSKY 2001). Unfortunately, all other identifications cited by TUTSKIY & STEPANJUK (1999) and later repeated by KOSMOWSKA-CERANOWICZ (1999) appear incorrect even at the family or, in the case of one ant and one pompilid, generic level. Four dipteran families, Lonchopteridae, Drosophilidae, Xylophagidae, and Platypezidae, erroneously reported in these publications, have hitherto not been found in Rovno amber. Thus, instead of *Xylophagus* sp. (TUTSKIY & STEPANJUK 1999), this insect inclusion actually represents a species of *Neoempheria* OSTEN-SACKEN (Mycetophilidae), the specimens of *Clythia* MG. (Platypezidae) is in fact a species of Dolichopodidae; the phoriid is in fact a sciariid, and instead of Drosophilidae there are six specimens of Phoridae or Collembola. These errors are summarized in Table I.

An analysis of the determinations of 1300 Rovno amber inclusions from the Klesov and Dubrovitsy deposits, Rovno Region, Ukraine acquired by the Institute of Zoology of the National Academy of Sciences of Ukraine in Kiev (IZK) from the «Ukramber» Company would allow for the first time to compare the Rovno amber fauna to the faunas of Baltic and Saxonian ambers. The Kiev collection has largely been studied by specialists of the PIN and IZK. To the list of families the Anthoridae can be added, found in the collection of Rovno amber of the Museum of the Earth,



Table I

## Corrected identifications of Rovno amber insects

No.	After TUTSKIJ & STEPANJUK (1999)	Correct determination
K-2	Phoridae, « <i>Muscidora</i> »	Sciaridae
K-3	Lestremiidae, <i>Lestremia</i>	Sciaridae
K-4	Theridiidae, <i>Clya</i> KOCH & BERENDT	Clubionidae
K-5	<i>Lasius</i> cf. <i>fuliginosus</i>	<i>Ctenobethylus goepperti</i> (MAYR)
K-6-8	Drosophilidae	6 Phoridae, 1 Collembola, 1 Acari
K-9	Platyppezidae, <i>Clythia</i>	Dolichopodidae
K-10	Xylophagidae	Mycetophilidae, <i>Neoempheria</i> sp.

Warszawa (Yu. A. POPOV, personal communication). First Rovno amber representatives of Leiodidae and Ichneumonidae have been identified in the private collection of S. A. SUVORKIN (Kiev).

Highly interesting are the discoveries in the first 1000 inclusions of members of Embioptera and, especially, gryllids from the currently tropical phytophilous subfamily Phaloriinae, a second amber representative of phaloriines (GOROKHOV 1995).

Among the Rovno amber beetles, Staphylinidae sensu lato (Fig. 2) are the most numerous (SEMENOV et al. 2001); weevils are represented by a new genus and species of Molytinae.

The first publication on Rovno amber dipteran fauna appears paper of GRICHANOV (2000). Some other dipteran families from Rovno amber are intensively studied now.

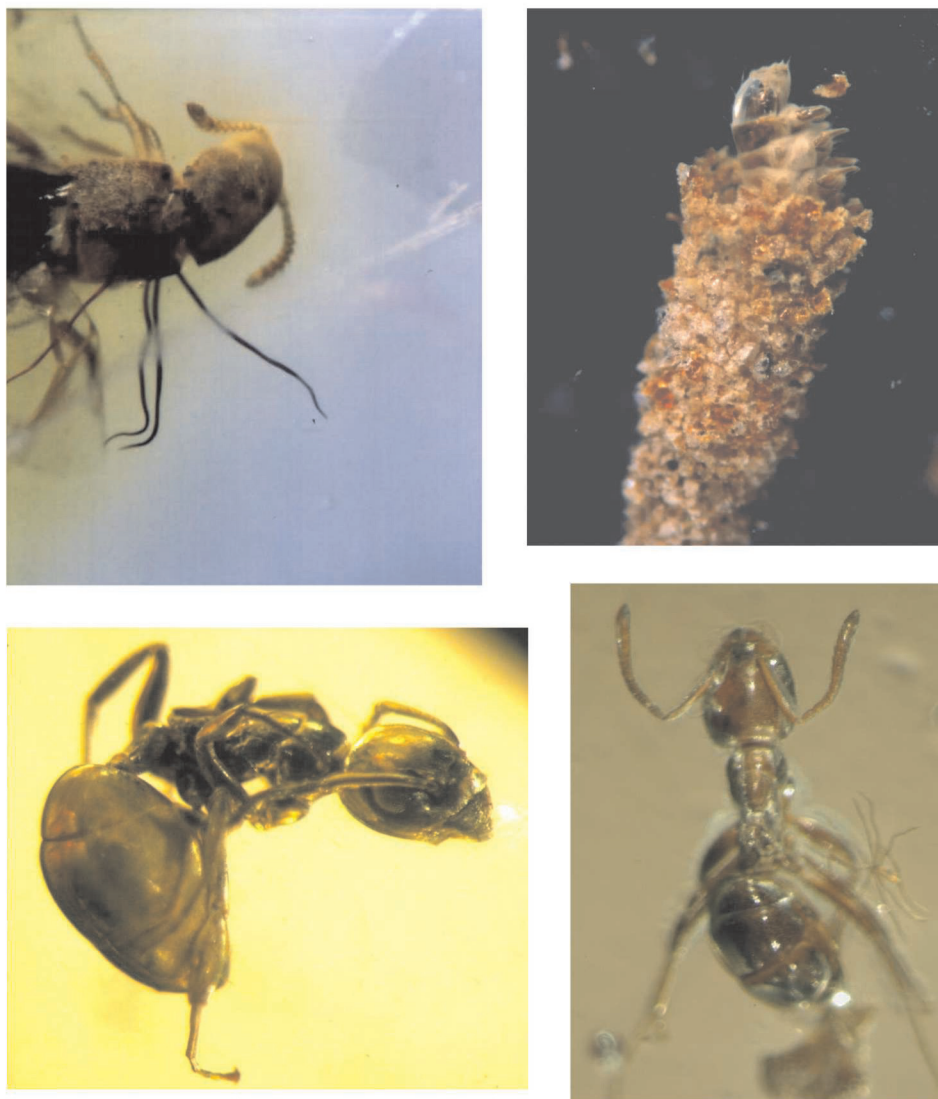
Lepidoptera in Rovno amber are not so common, mostly found in one piece of amber which contained, except for a series of adults of Tineoidea, three larvae of Psychidae (Fig. 3).

The first hymenopteran to be described from Rovno amber has been a new genus and species of the subfamily Ghilarovitinae (Paxylommatidae) with 22-23-segmented antennae (KASPARYAN 2001), i.e. *Astigmaton ichneumonoides* KASPARYAN 2001. This is the second representative of Ghilarovitinae (the first one, *Ghilarovites tarsatorius* KASPARYAN 1988, is from the Baltic amber) only known from one specimen from the IZK collection of Rovno amber (D. R. KASPARYAN erroneously indicated its origin from Baltic amber). Four species of *Idris* FÖRSTER, 1856 (Scelionidae) have also been found in Rovno amber, three of them described (KONONOVA 2003), while only one *Idris* species has been known from Baltic amber. Two new monotypic genera of Encyrtidae have been found from Rovno amber (SIMUTNIK 2001, 2002), including a highly primitive one.

The most evident difference is observed when the Rovno and Baltic amber ant faunas are compared. More than 26 % of Rovno amber ants appear to represent new genera and species not found in Baltic amber. Among the first 108 ants from all known Rovno amber collections, DLUSKY has identified the endemic *Dolichoderus robustus* DLUSKY and *D. polessus* DLUSKY (DLUSKY 2002). He has also found a three other new species of *Dolichoderus* LUND, 1831 including *D. zherikhini* DLUSKY 2002 (Fig. 4), workers (Fig. 5) and males of two new species of *Tapinoma* FÖRSTER, 1850, workers and a male of *Prenolepis* sp., workers of *Tetraponera angustata* (MAYR, 1868), workers and a female of two new species of *Oligomyrmex* MAYR, 1867, males of *Plagiolepis minutissima* DLUSKY 2002, workers of *Plagiolepis klingsmanni* MAYR 1861, *Aphaenogaster antiqua* DLUSKY 2002, *Camponotus menzei* MAYR 1868, two species of *Formica* LINNAEUS, 1758, *Lasius schiefferdeckeri* MAYR 1868, *Ctenobethylus goepperti* (MAYR, 1868) and *Iridomyrmex geinitzi* (MAYR, 1868) and a female of *Gnamptogenys europaea* (MAYR, 1868), as well as two new genera and species of Myrmicinae (DLUSKY & PERKOVSKY 2002).

A detailed comparative analysis of the Baltic and Rovno amber faunas will be published in near future.

A list of the insect orders and families currently reported from Rovno amber is given below.



Figs 2-5. Inclusions from Rovno amber (left to right and top to bottom): 2. Holotypus of *Leptusa defuncta* SEMENOV, PERKOVSKY & PETRENKO 2001 (Staphylinidae); 3. Larva of Psychidae from Rovno amber; 4. Holotypus of *Dolichoderus zherikhini* DLUSSKY 2002; 5. Holotypus of *Tapinoma electrinum* DLUSSKY 2002.

#### List of the insect orders and families known from Rovno amber

Archaeognatha: Machilidae.

Ephemeroptera: Heptageniidae.

Embioptera.

Orthoptera: Gryllidae.

Isoptera: Kalotermitidae, Rhinotermitidae

Homoptera: Cicadellidae, Drepanosiphidae, Matsucoccidae, Pemphigidae.

Heteroptera: Anthocoridae, Microphysidae, Miridae, Reduviidae.

Blattoptera.

Thysanoptera.

Psocoptera: Sphaeropsocidae.

Hymenoptera: Aphelinidae, Bethyidae, Braconidae, Ceraphronidae, Diapriidae, Encyrtidae, Formicidae, Ichneumonidae, Megalynidae, Megaspilidae, Mymaridae, Mymarommatidae, Paxylommatidae, Platygastriidae, Pompilidae, Pteromalidae, Scelionidae, Signiphoridae, Trichogrammatidae.

Coleoptera: Aderidae, Anobiidae, Armatopidae, Carabidae, Cleridae, Curculionidae (including Scolytidae), Dermestidae, Elateridae, Helodidae, Lathridiidae, Leiodidae, Melandryidae, Melyridae, Monotomidae, Mordellidae, Mycetophagidae, Nitidulidae, Ptiliidae, Scaphitidae, Scydmaenidae, Staphylinidae, Zopheridae.

Trichoptera: Hydroptilidae, Lepidostomatidae, Polycentropodidae.

Lepidoptera: Gelechioidea, Tineoidea, Psychoidea (Psychidae).

Diptera: Asilidae, Bombyliidae, Cecidomyiidae, Ceratopogonidae, Chironomidae, Dixidae, Dolichopodidae, Empididae, Keroplatidae, Limoniidae, Mycetobiidae, Mycetophilidae, Phoridae, Psychodidae, Rhagionidae, Sciariidae, Simuliidae, Tipulidae.

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