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ONLY A HALF OF SPECIES OF HYMENOPTERA IN ROVNO AMBER IS COMMON WITH BALTIC AMBER

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Only half of Rovno Amber Hymenopteran Fauna is Common with Baltic Amber. Perkovsky, E. E. — A list of all 117 hymenopteran species recorded from Rovno amber is presented for the first time. This list includes 50 named species (43 %) known only in Rovno amber fauna. Of the remaining species, 59 (50 %) are recorded also from Baltic amber, 37 (32 %) from Bitterfeld amber, 26 (22 %) from Scandinavian amber as well. Half of the species (50 %) are known on both sides of the Subparathetys (that is, recorded in Baltic amber as well), and another half is recorded only to south of the Subparathetys (from the Rovno, Bitterfeld and Scandinavian amber only). One subfamily, Eucoilinae Thomson, one tribe, Protomicroidini Antropov, and 19 genera (*Archaeocercus* Simutnik, *Archaeogryon* Kononova & Simutnik, *Astigmaton* Kasparyan, *Boltonidris* Radchenko & Dlussky, *Dipriocampe* Bouček, *Disogmus* Főrster, *Fallomyrma* Dlussky & Radchenko, *Foveorisus* Martynova, *Lissonota* Khalaim, *Pristomyrmex* Mayr, *Protomicroides* Antropov, *Pseudidris* Kononova, *Pseudotelea* Kononova, *Rovenosa* Khalaim, *Rovnoecus* Antropov, *Rovnoeucoila* Buffington & Perkovsky, *Rovnosoma* Simutnik, *Sierola* Cameron, *Trjapitzion* Simutnik) are recorded only from south of the Subparathetys. These data provide evidence supporting the previously proposed suggestion on the different origin of four main European sources of succinite. The data mentioned above confirm that the source area of the Rovno amber, contrary to the Baltic amber, had been situated southwards from Subparathetys. *Platystasius gracilis* Kononova & Simutnik and *Oxyserphus obsolescens* (Brues) are recorded for the first time respectively from Baltic and Scandinavian amber.
Key words: Rovno amber, Baltic amber, Scandinavian amber, Subparathetys, *Platystasius gracilis*, *Oxyserphus obsolescens*, Platygastridae, Proctotrupidae.

Hymenoptera are the best studied megadiverse order of Rovno amber insects (Perkovsky, 2008). According to Perkovsky et al. (2010), Perkovsky & Rasnitsyn (2013) and Perkovsky & Olmi (2018), 33 families of Hymenoptera are known from Rovno amber.

For the first time, a list of all hymenopteran species from Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine (SIZK) found in Rovno amber is here presented (table 1). This list records 117 species from 17 families of which 50 (43 %) are unknown in other faunas and this does not include the 9 ant species that remain to be described, with two undescribed species distributed also in Bitterfeld amber, one — in Bitterfeld and Scandinavian amber (Perkovsky, 2016). Information about some other families

(for example Scelionidae) is insufficient yet to evaluate their importance relative to other faunas. Nevertheless there are some calculations that it is possible to draw now: 59 (50 Rovno amber hymenopteran species are recorded also from Baltic amber, 37 (32 %) from Bitterfeld (Saxonian) amber (32 % with unpublished ant and encyrtid species), 25 (22 %) in Scandinavian amber (21 % with unpublished ant and encyrtid species); 1 (0.9 %) species of Rovno amber Hymenoptera is known in all three late Eocene European amber faunas other than the Baltic one (1.8 % with unpublished ant species), and 21 (19 %) species are recorded in all four Late Eocene European amber faunas (17 % with unpublished ant and encyrtid species). Half of the 112 species (45 %, if the unpublished ant and encyrtid are included) are known on both sides of the Subparathetys (i. e. also recorded in Baltic amber), and another half (51 %) is recorded only from south of the Subparathetys (i. e., from the Rovno, Bitterfeld and Scandinavian ambers only).

Among the higher taxa, one subfamily, Eucoilinae Thomson, 1862, one tribe, Protomicroidini Antropov, 2010, and 19 from 70 genera (*Archaeocercus* Simutnik, 2018, *Archaeogryon* Kononova & Simutnik, 2015, *Astigmaton* Kasparyan, 2001, *Boltonidris* Radchenko & Dlussky, 2012, *Dipriocampe* Bouček, 1957, *Disogmus* Főrster, 1856, *Fallomyrma* Dlussky & Radchenko, 2006, *Foveorisus* Martynova, 2017, *Lissonota* Khalaim, 2011, *Pristomyrmex* Mayr, 1866, *Protomicroides* Antropov, 2010, *Pseudidris* Kononova, 2010, *Pseudotelea* Kononova, 2010, *Rovenosa* Khalaim, 2011, *Rovnoecus* Antropov, 2009, *Rovnoeucoila* Buffington & Perkovsky, 2014, *Rovnosoma* Simutnik, *Sierola* Cameron, 1881, *Trjapitzion* Simutnik, 2018) are recorded only from south of the Subparathetys. Genus *Ukrainosa* Perrichot & Perkovsky, 2009, established for *Ukrainosa prolata* Perrichot & Perkovsky, 2009 (table 1) synonymized with *Prodinapsis* Brues, 1923 (Vilhelmsen et al., 2010). In addition, all the above taxa except *Astigmaton, Pristomyrmex, Sierola* and *Fallomyrma* are unknown from Bitterfeld and Scandinavian ambers as well.

The fauna of Baltic amber forest is a mix of extant temperate and tropical elements, and temperate elements strongly prevail (Archibald & Farrell, 2003; Perkovsky, 2011, 2013, 2016, 2017; Ivanov et al., 2016), so the climate of Baltic amber forest was probably not favorable for the extant tropical genera like *Pristomyrmex* (40 Oriental and New Guinea species, other 20 species Afrotropical, Australian and Oceanian) now known from all late Eocene ambers, except Baltic (Radchenko, Dlussky, 2018 b). The same distribution is known for *Fallomyrma* with type species in Rovno, Bitterfeld and Scandinavian ambers and three additional species in southernmost Rovno amber (table 1). Bethylid genus *Sierola* Cameron is mostly from Australian region (Fullaway, 1920, 1935), only three of the 206 are non Australian species, two are from Eastern Asia, and from U.S.A., probably introduced (Evans, 1978; Ramos, 2017). This can be true possibly also to single Chinese species and species from Russian Far East (Ramos, 2017). Genus known from Danish and Rovno ambers (Ramos et al., 2014; Bitterfeld material was not studied).

Baltic amber paratype 964/2104 of platygastrid *Platystasius gracilis* Kononova et Simutnik, 2013 (deposited in Paleontological Institute, Moscow) was recorded from Rovno amber (Kononova & Simutnik, 2013 a) by mistake. Proctotrupid *Oxyserphus obsolescens* (Brues, 1940) specimens from Museum of Comparative Zoology, Cambrige, USA with labels "Borge Martensen/ 12-10 1960" (1 ex.), "Proctotrupidae G.V. Henningsen/ 8-7 1965" (1 ex.), "Proctotrupidae A.K. Andersen/ 28-3 1968" (2 ex.) listed in Kolyada & Mostovski, 2007 as Baltic, belong to Scandinavian amber. *Platystasius gracilis* (Platygastridae) and *Oxyserphus obsolescens* (Proctotrupidae) are recorded for the first time respectively from Baltic and Scandinavian amber.

In summary, the above numbers concerning all Hymenoptera confirm the previously proposed suggestion on the different origins of the four main European sources of succinite (Dlussky & Rasnitsyn, 2009; Perkovsky, 2011, 2016; Ivanov et al., 2016; Wolfe et al., 2016; Sokoloff et al., 2018). Considering that there is no reliable evidence of succinites being of inequal ages, the differences in origin should be considered geographically determined, a

theory supported by several studies (Wolfe et al., 2016; Nadein et al., 2016; Jałoszyński & Perkovsky, 2016; Perkovsky, 2016, 2017; Mänd et al., 2018). The data mentioned above confirm that the source area of Rovno amber, contrary to Baltic amber, was situated south of the Subparathetys.

Table 1. Rovno amber hymenopterans species and their distribution

No.	Rovno amber taxa	Reference	Other ambers	Reference
	Bethylidae			
1.	*Eupsenella aulax* Ramos & Azevedo	Ramos et al., 2014		
2.	*Eupsenella klesoviana* Ramos & Azevedo	Ramos et al., 2014		
3.	*Laelius preteritus* Barbosa & Azevedo	Barbosa et al., 2013		
4.	*Laelius rovnensis* Barbosa & Azevedo	Barbosa et al., 2013		
5.	*Lytopsenella kerneggeri* Ohl	Ramos et al., 2014	Baltic	Ramos et al., 2014
6.	*Sierola rovniana* Ramos & Azevedo	Ramos et al., 2014		
	Chrysididae			
7.	*Foveorisus kilimniki* Martynova	Martynova & Perkovsky, 2017		
8.	*Palaeobethylus politus* Brues	Perkovsky & Rasnitsyn, 2013	Baltic	Brues, 1923
	Crabronidae			
9.	*Protomicroides sororius* Antropov	Antropov, 2010		
10.	*Rovnoecus klesovicus* Antropov	Antropov & Perkovsky, 2009		
	Dryinidae			
11.	*Dryinus janzeni* Olmi	Perkovsky & Olmi, 2018	Baltic	Olmi, 2000
	Embolemidae			
12.	*Ampulicomorpha succinalis* Brues	Olmi et al., 2011	Baltic	Olmi et al., 2011
	Encyrtidae			
13.	*Archaeocercus schuvachinae* Simutnik	Simutnik & Perkovsky, 2018 a		
14.	*Eocencnemus sugonjaevi* Simutnik	Simutnik et al., 2014		
15.	*Eocencnemus vichrenkoi* Simutnik	Simutnik et al., 2014		
16.	*Eocencyrtus zerovae* Simutnik	Simutnik et al., 2014	Baltic	Simutnik et al., 2014
17.	*Rovnosoma gracile* Simutnik	Simutnik & Perkovsky, 2015		
18.	*Trjapitzion cylindrocerus* Simutnik	Simutnik & Perkovsky, 2018 b		
	Figitidae			
19.	*Rovnoeucoila tympanomorpha* Buffington & Perkovsky	Buffington et al., 2014		
	Formicidae			
20.	*Asymphylomyrmex balticus* Wheeler	Dlussky & Rasnitsyn, 2009	Baltic	Dlussky & Rasnitsyn, 2009
21.	*Aphaenogaster antiqua* Dlussky	Dlussky & Perkovsky, 2002		
22.	*Aphaenogaster mersa* Wheeler	Perkovsky, 2016	Baltic	Dlussky & Rasnitsyn, 2009
23.	*Bilobomyrma ukrainica* Radchenko & Dlussky	Perkovsky, 2016		
24.	*Boltonidris mirabilis* Radchenko & Dlussky	Perkovsky, 2016		
25.	*Camponotus mengei* Mayr	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
26.	*Carebara antiqua* (Mayr)	Perkovsky, 2016	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
27.	*Carebara nitida* (Dlussky)	Dlussky & Perkovsky, 2002		
28.	*Carebara ucrainica* (Dlussky)	Dlussky & Perkovsky, 2002		
29.	*Ctenobethylus goepperti* (Mayr)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
30.	*Dolichoderus balticus* (Mayr)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
31.	*Dolichoderus lucidus* Dlussky	Dlussky & Rasnitsyn, 2009		
32.	*Dolichoderus passaloma* Wheeler	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009

33.	*Dolichoderus perkovskyi* Dlussky	Dlussky & Rasnitsyn, 2009	Scandinavian	Dlussky & Rasnitsyn, 2009
34.	*Dolichoderus pilipes* Dlussky	Dlussky & Rasnitsyn, 2009	Scandinavian	Dlussky & Rasnitsyn, 2009
35.	*Dolichoderus polessus* Dlussky	Dlussky & Rasnitsyn, 2009	Baltic	Dlussky & Rasnitsyn, 2009
36.	*Dolichoderus robustus* Dlussky	Dlussky & Rasnitsyn, 2009	Baltic, Scandinavian	Dlussky & Rasnitsyn, 2009
37.	*Dolichoderus tertiarius* (Mayr)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
38.	*Dolichoderus vlaskini* Dlussky	Dlussky & Rasnitsyn, 2009		
39.	*Dolichoderus zherichini* Dlussky	Dlussky & Perkovsky, 2002		
40.	*Ennaemerus reticulatus* Mayr	Perkovsky, 2016	Baltic	Dlussky & Rasnitsyn, 2009
41.	*Eocenomyrma breviscapa* Radchenko & Dlussky	Radchenko & Dlussky 2016		
42.	*Eocenomyrma orthospina* Dlussky & Radchenko	Dlussky & Rasnitsyn, 2009	Baltic	Dlussky & Rasnitsyn, 2009
43.	*Eocenomyrma rugosostriata* (Mayr)	Radchenko & Perkovsky 2018	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
44.	*Eocenomyrma ukrainica* Radchenko & Dlussky	Radchenko & Dlussky 2016		
45.	*Fallomyrma anodonta* Radchenko & Dlussky	Radchenko & Dlussky 2018 a		
46.	*Fallomyrma marginata* Radchenko & Dlussky	Radchenko & Dlussky 2018 a		
47.	*Fallomyrma robusta* Radchenko & Dlussky	Radchenko & Dlussky 2018 a		
48.	*Fallomyrma transversa* Dlussky et Radchenko	Dlussky & Rasnitsyn, 2009	Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
49.	*Formica flori* Mayr	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
50.	*Formica gustawi* Dlussky	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld, Scandinavian	Perkovsky, 2016
51.	*Formica paleopolonica* Dlussky	Perkovsky 2015	Baltic	Dlussky & Rasnitsyn, 2009
52.	*Formica phaethusa* Wheeler	Perkovsky, 2016	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
53.	*Formica radchenkoi* Dlussky	Dlussky & Rasnitsyn, 2009		
54.	*Gesomyrmex hoernesi* Mayr	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
55.	*Glaphyromyrmex oligocenicus* Wheeler	Perkovsky, 2016	Baltic	Dlussky & Rasnitsyn, 2009
56.	*Gnamptogenys europaea* (Mayr)	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld, Scandinavian	Perkovsky, 2016
57.	*Hypoponera atavia* (Mayr)	Perkovsky, 2016	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
58.	*Lasius schiefferdckeri* Mayr	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
59.	*Monomorium mayrianum* Wheeler	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
60.	*Monomorium pilipes* Mayr	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
61.	*Monomorium kugleri* Radchenko & Perkovsky	Radchenko & Perkovsky 2009		
62.	*Nylanderia pygmaea* (Mayr)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
63.	*Pachycondyla conservata* Dlussky	Dlussky & Rasnitsyn, 2009		
64.	*Pachycondyla succinea* (Mayr)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
65.	*Plagiolepis klinsmanni* Mayr	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
66.	*Plagiolepis kuenowi* Mayr	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
67.	*Plagiolepis minutissima* Dlussky	Dlussky & Perkovsky, 2002		

68.	*Plagiolepis solitaria* Mayr	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
69.	*Plagiolepis squamifera* Mayr	Perkovsky, 2016	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
70.	*Ponera lobulifera* Dlussky	Perkovsky, 2016	Baltic	Dlussky & Rasnitsyn, 2009
71.	*Ponera mayri* Dlussky	Dlussky & Rasnitsyn, 2009	Baltic	Dlussky & Rasnitsyn, 2009
72.	*Prenolepis henschei* Mayr	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
73.	*Pristomyrmex elmesi* Radchenko & Dlussky	Radchenko & Dlussky, 2018 b		
74.	*Proceratium eocenicum* Dlussky	Perkovsky, 2016	Baltic	Dlussky & Rasnitsyn, 2009
75.	*Pseudolasius boreus* Wheeler	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
76.	*Tapinoma aberrans* Dlussky	Dlussky & Perkovsky, 2002		
77.	*Tapinoma electrina* Dlussky	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
78.	*Temnothorax gracilis* (Mayr)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
79.	*Temnothorax longaevus* (Wheeler)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
80.	*Tetraponera europaea* Dlussky	Dlussky & Rasnitsyn, 2009	Bitterfeld	Dlussky & Rasnitsyn, 2009
81.	*Tetraponera ocellata* (Mayr)	Dlussky & Rasnitsyn, 2009	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
82.	*Tetraponera simplex* (Mayr)	Dlussky & Perkovsky, 2002	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
83.	*Vollenhovia kipyatkovi* Radchenko & Dlussky	Perkovsky, 2016		
84.	*Yantaromyrmex constrictus* (Mayr)	Perkovsky, 2016	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
85.	*Yantaromyrmex geinitzi* (Mayr)	Perkovsky, 2016	Baltic, Bitterfeld, Scandinavian	Dlussky & Rasnitsyn, 2009
86.	*Yantaromyrmex mayrianum* Dlussky & Dubovikoff	Perkovsky, 2016	Baltic	Dlussky & Rasnitsyn, 2009
87.	*Yantaromyrmex samlandicus* (Wheeler)	Perkovsky, 2016	Baltic, Bitterfeld	Dlussky & Rasnitsyn, 2009
	Ichneumonidae			
88.	*Astigmaton ichneumonoides* Kasparyan	Tolkanitz et al., 2005 a	Bitterfeld	Narolsky et al., 2005
89.	*Lissonota perkovskyi* Khalaim	Khalaim, 2011		
90.	*Pherhombus antennalis* Kasparyan	Tolkanitz & Perkovsky 2007	Baltic	Tolkanitz & Perkovsky, 2007
91.	*Pherhombus dolini* Tolkanitz & Narolsky	Tolkanitz et al., 2005 a	Bitterfeld	Tolkanitz et al., 2005 b
92.	*Rasnitsynites tarsalis* Kasparyan	Tolkanitz & Perkovsky, 2018	Baltic	Tolkanitz & Perkovsky, 2018
93.	*Rovenosa rasnitsyni* Khalaim	Khalaim, 2011		
	Megachilidae			
94.	*Ctenoplectrella zherikhini* Engel & Perkovsky	Engel & Perkovsky, 2006		
	Megalyridae			
95.	*Prodinapsis janzeni* Perrichot	Perrichot, 2009	Baltic	Perrichot, 2009
96.	*Prodinapsis prolata* (Perrichot & Perkovsky)	Perrichot, 2009		
97.	*Prodinapsis pumilio* Perrichot & Perkovsky	Perrichot, 2009		
98.	*Prodinapsis succinalis* Brues	Perrichot, 2009	Baltic, Bitterfeld	Perrichot, 2009
	Platygastridae			
99.	*Platystasius gracilis* Kononova & Simutnik	Kononova & Simutnik, 2013 a	Baltic	this paper

	Pompilidae		
100. *Pompilus sclerosus* Meunier	Engel & Grimaldi, 2006	Baltic	Engel & Grimaldi, 2006
	Proctotrupidae		
101. *Oxyserphus obsolescens* (Brues)	Kolyada & Mostovski, 2007	Baltic, Scandinavian	this paper
102. *Disogmus rasnitsyni* Kolyada & Perkovsky	Kolyada & Perkovsky, 2011		
	Scelionidae		
103. *Archaeogryon floridus* Kononova & Simutnik	Kononova & Simutnik, 2015		
104. *Brachyscelio grandiculus* Kononova & Simutnik	Kononova & Simutnik, 2015		
105. *Ceratobaeoides cornutus* Kononova	Kononova & Simutnik, 2010		
106. *Electroteleia stigmatica* Brues	Perkovsky et al., 2010	Baltic, Scandinavian	Johnson et al., 2008 a
107. *Idris affinis* Kononova	Kononova, 2003		
108. *Idris exilis* Kononova	Kononova, 2003		
109. *Idris gracilis* Kononova	Kononova, 2003		
110. *Parabaeus pusillus* Brues	Perkovsky et al., 2010	Baltic	Johnson et al., 2008 b
111. *Pseudotelea gracilis* Kononova	Kononova & Simutnik, 2010		
112. *Pseudidris striatus* Kononova	Kononova & Simutnik, 2010		
113. *Sembilanocera clavata* Brues	Perkovsky et al., 2010	Baltic	Johnson et al., 2008 b
114. *Telenomus oculus* Kononova & Simutnik	Kononova & Simutnik, 2013 b		
115. *Telenomus tetragonus* Kononova & Simutnik	Kononova & Simutnik, 2013 b		
	Scolebythidae		
116. *Pristapenesia primaeva* Brues	Perkovsky & Rasnitsyn, 2013	Baltic	Brues, 1933
	Tetracampidae		
117. *Dipriocampe bouceki* Gumovsky & Perkovsky	Gumovsky & Perkovsky, 2005		

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