

NEW EARLY CRETACEOUS EMBOLEMIDAE (VESPIDA = HYMENOPTERA: CHRYSIDOIDEA)

ALEXANDR P. RASNITSYN

Paleontological Institute, Russian Academy of Sciences, Russia 117647 Moscow.

Abstract.—*Baissobius carolianus* and *Baissobius minimus* are described as new from the Early Cretaceous of Transbaikalian Russia and Central Mongolia, respectively, and the genus *Baissobius* is transferred to the family Embolemidae.

Key Words: Embolemidae, Early Cretaceous

Embolemidae is a small but widespread family of the chrysidoid wasps related to Dryinidae (Carpenter 1986, Wharton 1989). It is comprised of two extant genera with some 20 species (Valentine and Walker 1983, Belokobylsky 1990, Rasnitsyn and Matveev 1990).

The fossil record of the family is modest as well. Both extant genera, *Embolemus* Westwood and *Ampulicomorpha* Ashmead, are represented, each by one species, in the Baltic amber of the Late Eocene age (Brues 1933, Rasnitsyn and Matveev 1990). Two specimens of unknown generic position are present in the collection of the amber from the Dominican Republic kept at the Smithsonian Institution (personal observation, 1989, blocks #5500, 8393). Three more specimens were found in the Early Cretaceous deposits of Transbaikalia and Mongolia. The first of them, named *Baissobius parvus* Rasnitsyn, is poorly preserved and was initially described as *Apocrita incertae sedis* (Rasnitsyn 1975). Later it was transferred to Dryinidae (Rasnitsyn 1980), but two additional specimens indicate that all three belong to Embolemidae.

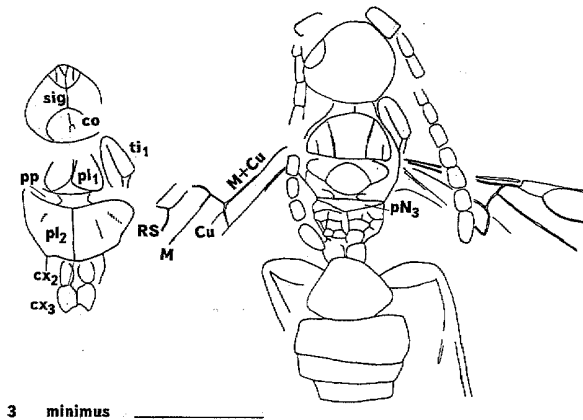
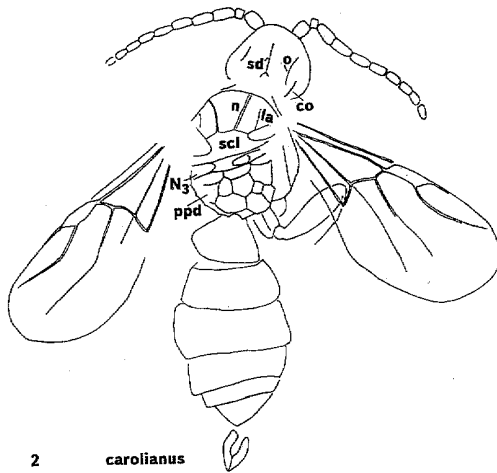
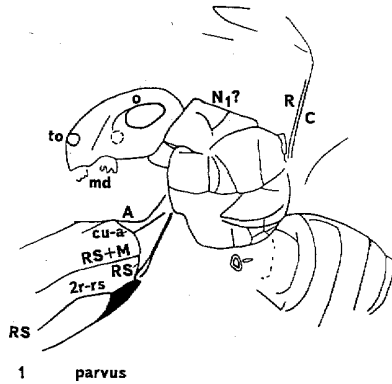
The type material is kept in the Paleontological Institute, Russian Academy of Sciences, Moscow, Russia, abbreviated herein as PIN.

Baissobius A. Rasnitsyn, 1975

Baissobius: Rasnitsyn, 1975: 128. Type species.—*Baissobius parvus* A. Rasnitsyn, 1975; Transbaikalia, Neocomian (early Early Cretaceous) (by monotypy and original designation).

Generic diagnosis: Head (Fig. 1) wide, with toruli distant, not elevated on cranial prominence, situated below eyes; occipital carina in at least one species (Fig. 3) forming narrow circle distant from mouth cavity; antenna (Figs. 2, 3) more or less geniculate, hardly reaching abdominal base, with scape only moderately elongate; (Figs. 2, 3) short, with notauli strong, complete, prepectus forming wide band before mesopleuron; propodeum areolate; forewing (Figs. 1, 2, 3) lacking Cu and A beyond crossvein cu-a as tubular veins and without crossveins except 2r-rs (as a part of marginal vein RS&2r-rs) and cu-a; hind femur (Figs. 2, 3) without attenuate apex, hind tibia (at least in one species, Fig. 3) with long, thick spur.

Taxonomic position: Among the apocritans (suborder Vespina), 10-segmented antennae are known mostly in various Parasitica which rarely have the mesonotum with adlateral lines (parapsides auct., for terminological discussion see Rasnitsyn, 1993, and references therein) and probably never



Figs. 1-3. Line drawing of *Baissobius* spp. (1—modified from Rasnitsyn, 1975); co—occipital carina, cx—coxa, la—adlateral line, md—mandible, N—notum, n—notaulus, o—eye, pl—pleuron, pN—postnotum, pp—fused prepecti, ppd—propodeum, scl—scutellum, sd—dorsal cranial furrow, sig—intergenal suture, ti—tibia, to—torulus. Scale bar 1 mm.

so in combination with RS+M stronger than Cu. Among the aculeate wasps, 10-segmented antennae are known, besides in Embolemidae and Dryinidae, in a few ants which are dissimilar in having a long antennal scape and petiolate first metasomal segment, and seemingly so (due to the pedicel hidden in scape apex) in some Tiphidae and Vespidae, which possess different wing venation.

Concerning the alternative of placement in Embolemidae or Dryinidae, the former family is possibly the only one among the hymenopterans which is similar to *Baissobius* in having the combined vein (RS+M)&M tubular for a long distance, while Cu beyond cu-a, as well as 1m-cu, are mostly or entirely nebulous, spectral, or lost. This unique putative synapomorphy seems to be more important than the antenna showing a degree of geniculation, which is an alternative putative synapomorphy of *Baissobius* and Dryinidae (non-geniculate antenna, that is the one with aligned basal segments, is considered as plesiomorphy of Embolemidae, because it is characteristic also for the majority of non-aculeate hymenopterans including Ichneumonoidea, the sister group of Aculeata). Transformation of the straight antenna into a more or less geniculate one is rather common among aculeate wasps and thus prone to homoplasial development, as compared with the unique desclerotisation which concerns Cu and not (RS+M)&M. Hence the similarity between *Baissobius* and Dryinidae in structure of their antennal base is considered as homoplasy, while the similarity between *Baissobius* and Embolemidae is taken here as synapomorphy.

I regard symplesiomorphy as taxonomically significant (the position is explained in Rasnitsyn 1992 and, in lesser details but in English, in Rasnitsyn 1987). However, the known list of symplesiomorphies of *Baissobius* and Dryinidae (as opposed to the autapomorphies of Embolemidae), which includes the moderately long antenna inserted low on head, normal (not triangular

in side view) head, strong, complete notauli, wide prepectal band, and areolated propodeum, is not sufficient to outweigh the unique synapomorphy of *Baissobius* with Embolemidae mentioned above. This is the reason why *Baissobius* is here transferred to Embolemidae.

Within Embolemidae, *Baissobius* differs enough from both *Embolemus* Westwood and *Ampulicomorpha* Ashmead to warrant full generic state. The differences are listed above as the homoplasy and symplesiomorphies of *Baissobius* and Dryinidae.

Note: All three specimens of *Baissobius* have a short, small metasoma which is characteristic of males, but not females of extant Embolemidae. One specimen displays male genitalia (fig. 2), indicating that all three fossils are males. A bias toward males is a very unusual feature in hymenopteran fossil assemblages, where sexes are sometimes subequal in number, but females are usually more common. I am aware of one other male-dominated assemblage, the impressions of ants. This is evidently a case of populational bias, for mating swarms of ants really consist almost exclusively of males. Unlike ants, Embolemidae are solitary insects, so their source population would seem unlikely to be strongly dominated by males. A reason for the bias is rather of a taphonomical nature. Indeed, it is well known (Zherikhin 1980) that assemblages of impression fossils are composed almost exclusively of the insects which either lived in water (or water surface), or spent much time flying and hence had a good chance of falling into water. Female *Baissobius* are absent or rare among the impression fossils probably because they lack both of the above advantages of turning into an impression fossil. Like in the extant genera, they were probably terrestrial (not aquatic) insects, and additionally I hypothesize that in comparison to the male, they spent little time flying, if at all. Possibly they were even wingless, like *Embolemus* females.

Species included: Type species and two

species described below, all from the Early Cretaceous of Siberia and Mongolia.

***Baissobius carolianus* A. Rasnitsyn, sp.n.**

Fig. 2

Holotype male: Head narrowed anterad, with strongly impressed medial longitudinal line dorsally, with eye possibly half as long as head. Pedicel transverse, flagellomeres about twice as long as broad, becoming gradually shorter and narrower apically. Forewing with pterostigma relatively long, issuing 2r-rs within its apical third, RS leaving R next to pterostigmal base, cu-a interstitial (lined up with M as a part of basal vein). Genital capsule spindle-shaped in closed state. Surface sculpture as figured, head and mesonotum punctate, with interspace one to several times of puncture diameter. General color dark, legs except coxae light. Length of body (as preserved, without genitalia) 4.6 mm, length of antennal flagellum 1.65 mm, length of forewing 2.9 mm, length of hind femur 0.95 mm.

Material available: Holotype, PIN 3559/4523, collected 5 to 8 km North of Bon Tsagan Nuur Lake, outcrop 87, bed 8, in Bayanhongor Aimag (Region) in Central Mongolia, impressed in marl of the Khurilt rock unit probably of Aptian (later Early Cretaceous) age.

Discussion: In the characters known well enough to compare, this species is similar to *parvus* in measurements and in most of the venational characters, but differs in the distal position of 2r-rs on the pterostigma. Additionally, *parvus* has the head and mesonotal dorsum appearing opaque, possibly due to a strong microsculpture. For comparison to *minimus*, see below.

Etymology: The species is dedicated to Dr. Karl V. Krombein, the name being the latin version of the name "Karl."

***Baissobius minimus* A. Rasnitsyn, sp.n.**

Fig. 2

Holotype male (?): Head narrowed anterad, without impressed medial line dorsally, with eye at most one third as long as

head. Pedicel elongate, almost as long as flagellomere I, flagellomeres from about twice to one time and a half as long as broad, becoming gradually shorter and wider apically, except the longest (ca. 2.5 times as long as broad) and widest last segment. Forewing with pterostigma relatively short, issuing 2r-rs within its apical third, RS leaving R far from pterostigmal base, cu-a postfurcal. Hind tibial spur almost one third as long as tibia. Surface sculpture as figured, head and mesonotum probably impunctate but with moderately dense microsculpture (less dense than in *parvus*). Head, body, scape, and coxae dark (mesonotum less so), rest of antenna and legs light, pedicel and apical flagellomeres slightly infusate. Length of body as preserved 3.0 mm, length of flagellum 1.5 mm, length of forewing probably within 2.0–2.3 mm.

Material available: Holotype, PIN 4210/1195, collected at the left bank of Vitim River in Transbaikalian Russia, 3 km downstream from the former lodge Baissa, 45 air km upstream from Romanovka Village, impressed in marl of bed 6, Zaza Formation of Neocomian Stage (lower Lower Cretaceous).

Discussion: In spite of being of the same age and provenance as *B. parvus*, *minimus* is equally distant from it and *B. carolianus* morphologically. It differs from them in small size, light flagellum, short pterostigma, and postfurcal cu-a. Additionally it differs from *B. carolianus* in having the flagellar apex thick (unknown in *B. parvus*).

Etymology: The species epithet means the smallest in Latin.

ACKNOWLEDGMENT

I am thankful to Beth B. Norden and Arnold S. Menke for inviting me to take part in the Karl V. Krombein Festschrift, and to two anonymous reviewers for their very useful comments on the scientific and linguistic features of the manuscript.

LITERATURE CITED

Belokobylsky, S. A. 1990. Embolemidae—the family of bethylid wasps new to fauna of the Soviet Far

- East (Hymenoptera, Bethyloidea), pp. 64–70. In Leley, A. S. ed., News of Insect Systematics of Soviet Far East. Institute of Biology and Pedology, Vladivostok. (In Russian.)
- Brues, Ch. T. 1933. The parasitic Hymenoptera of the Baltic amber, pp. 4–178. In Andrée, K. ed., Bernstein-Forschungen 3. Walter de Gruyter & Company, Berlin und Leipzig.
- Carpenter, J. M. 1986. Cladistics of the Chrysidoidea (Hymenoptera). Journal of the New York Entomological Society 94: 303–330.
- Rasnitsyn, A. P. 1975. Hymenoptera Apocrita of Mesozoic. Transactions of the Paleontological Institute, Academy of Sciences of the USSR 147. Nauka Press, Moscow. 134 pp. (In Russian.)
- . 1980. Origin and Evolution of Hymenoptera. Transactions of the Paleontological Institute, Academy of Sciences of the USSR 174. Nauka Press, Moscow. 192 pp. (In Russian.)
- . 1987. The importance of [not] being a cladist. Sphecos 14: 23–25.
- . 1992. Principles of phylogenetics and taxonomy. Zhurnal Obshchei Biologii 53: 172–185 (In Russian.)
- . 1993. Notauli and parapsidal lines—A comment. Sphecos 25: 5–6.
- Rasnitsyn, A. P. and D. G. Matveev. 1990. First Palearctic representative of the genus *Ampulicomorpha* Ashmead. Entomologicheskoye Obozreniye 68: 657–661 (In Russian.)
- Valentine, E. W. and A. K. Walker. 1983. Three families of Hymenoptera new to New Zealand. New Zealand Entomologist 7: 397–401.
- Wharton, R. A. 1989. Final instar larva of the embolomid wasp, *Ampulicomorpha confusa* (Hymenoptera). Proceedings of the Entomological Society of Washington 91: 509–512.
- Zherikhin, V. V. 1980. Pattern of the insect burial, pp. 7–18. In Rohdendorf, B. B. and A. P. Rasnitsyn, eds., Historical Development of the Class Insecta. Transactions of the Paleontological Institute, Academy of Sciences of the USSR. Vol. 175. Moscow, Nauka Press. (In Russian.)