

**Descriptions of new fossil taxa of Dryinidae
(Hymenoptera: Chrysidoidea)
from Burmese amber (Myanmar)**

Massimo OLMI^{1,4}, Zaifu XU² & Adalgisa GUGLIELMINO³)

¹) Tropical Entomology Research Center, Via De Gasperi 10, I-01100 Viterbo, Italy; e-mail: olmi@unitus.it

²) College of Natural Resources and Environment, South China Agricultural University, Guangzhou, Guangdong 510640, P. R. China; e-mail: xuzaifu@scau.edu.cn

³) Department of Agriculture, Forests, Nature and Energy, University of Tuscia, Via San Camillo de Lellis, I-01100 Viterbo, Italy; e-mail: guglielm@unitus.it

⁴) corresponding author

Abstract. *Burmadryinus cenomanianus* gen. & sp. nov. and *Pseudodryinus burmensis* sp. nov. (Hymenoptera: Dryinidae) are described from Upper Cretaceous (Lower Cenomanian) Burmese amber (Myanmar). A new subfamily, Burmadryininae subfam. nov., is described to include the new genus *Burmadryinus* gen. nov. The new taxa are compared with other extant and fossil Dryinidae.

Key words. Hymenoptera, Dryinidae, Burmadryininae, new subfamily, new genus, new species, taxonomy, Upper Cretaceous, Lower Cenomanian, Myanmar

Introduction

The family Dryinidae (Hymenoptera: Chrysidoidea) includes over 1700 species, spread in all zoogeographical regions and belonging to 49 genera and 14 subfamilies (OLMI & VIRLA 2014). The known fossil species are only 45 (GUGLIELMINO & OLMI 2011, 2012; OLMI et al. 2010, 2011; OLMI & GUGLIELMINO 2011) (see the complete list in Discussion).

Chrysidoidea is definitely a holophyletic group including Plumariidae as its most basal taxon, Scolebythidae the next most basal, and Bethylidae + Chrysididae as the sister group of Sclerogibbidae + (Dryinidae + Embolemidae) (BROTHERS & CARPENTER 1993, CARPENTER 1999, RASNITSYN & QUICKE 2002). From a phylogenetic point of view, Dryinidae and Embolemidae

are characterized by ten antennomeres, hindwing with veins C and SC + RS + S long and fused, and larval host being Auchenorrhyncha.

Extant Dryinidae are parasitoids of the hemipteran group Auchenorrhyncha (GUGLIELMINO & BÜCKLE 2003, 2010; GUGLIELMINO et al. 2006, 2013; GUGLIELMINO & VIRLA 1998). In addition, hosts parasitized by dryinids and showing the characteristic external cyst are known in amber from the Dominican Republic (OLMI 1995, POINAR 1992); therefore, although the records are scarce, it is possible to presume that fossil dryinids had the same hosts as the extant species.

In the recent monograph of the Oriental Dryinidae by XU et al. (2013), only the following three fossil species were listed: *Burmanteon olmii* Engel, 2003 (Anteoninae), *Hybristodryinus resinicolus* Engel, 2005 (Dryininae), and *Ponomarenkoa ellenbergeri* Olmi, Xu & He, 2013 in XU et al. (2013) (Ponomarenkoinae). All the above species were found in Upper Cretaceous Burmese amber (Lower Cenomanian; ca. 99 Ma; GRIMALDI et al. 2002 [based on insect inclusions], SHI et al. 2012 [based on zircon analyses]).

In 2012, Mr. Jens-Wilhelm Janzen (Seevetal, Germany) sent two very nice inclusions in amber from Myanmar for identification. The study of these two specimens resulted in the discovery of two new species, one of them belonging to a new genus and a new subfamily. The new taxa are described below.

Material and methods

The descriptions follow the morphological terminology of OLMI (1984), OLMI & GUGLIELMINO (2010) and XU et al. (2011, 2012a,b, 2013). The measurements reported are relative, except for the total length (head to metasomal tip, without antennae). Antennal and leg proportions refer to the lengths of the relevant segments or subsegments as proportions to each other, the values adjusted to eliminate fractions.

The following abbreviations are used:

POL	distance between the inner edges of the two lateral ocelli;
OL	shortest distance between the edges of the lateral ocellus and the median ocellus;
OOL	distance from the outer edge of the lateral ocellus to the compound eye;
OPL	distance from the posterior edge of the lateral ocellus to the occipital carina;
TL	distance from the posterior edge of the eye to the occipital carina;
†	extinct subfamily.

Because of the nature of the fossils and distortions sometimes caused by artifacts, the word ‘apparently’ is used when describing characters for which there is slight uncertainty about the true condition or where a false impression is obtained at first sight.

The specimens studied in this paper are deposited in the collection of the Staatliches Museum für Naturkunde Stuttgart, Abt. Paläontologie-Sektion Bernstein, Stuttgart, Germany (SMNS).

Systematic palaeontology

Subfamily Dryininae

Pseudodryinus Olmi, 1991

Pseudodryinus burmensis sp. nov.

(Fig. 1)

Type material. HOLOTYPE: ♂ (SMNS Bu-106); MYANMAR: specimen in Lower Cenomanian Burmese amber.

Diagnosis. Temple very long (longer than half length of eye (Fig. 1D)); occipital carina complete; epicnemium exposed; notauli complete, posteriorly separated; minimum distance between notauli shorter than greatest breadth of posterior ocellus (1.5 : 2); forewing with costal, median and submedian cells clearly enclosed by pigmented veins; tibial spurs 1/1/2.

Description. Male (Fig. 1). Fully winged; length 1.8 mm. Forewing longer than mesosoma + metasoma (60 : 54). Length of mesosoma + metasoma: 1.3 mm. Colour brown-testaceous, except legs testaceous. Antenna filiform, about three times as long as head (55 : 19). Antennal hairs very short, much shorter than breadth of antennal segments. Antennal segments in following proportions: 5 : 4.5 : 6 : 6 : 6 : 6 : 5.5 : 5 : 5 : 6. Head dull, apparently reticulate rugose, about twice as long as eye (19 : 9). Clypeus very long, ovoid. Mandible very long, with teeth not distinct. Eye normally protruding, covered with very short hairs. Occipital carina complete. Posterior ocelli touching occipital carina. Temple distinct, very long. POL = 3; OL = 2; OOL = 3; TL = 4; greatest breadth of posterior ocelli about as long as OL; frontal line not visible. Propleuron short, forming a neck between head and pronotum, deeply inserted in occiput. Pronotum short, much shorter than head (3 : 19) and scutum (3 : 9); pronotal tubercle reaching tegula. Scutum apparently bare, apparently unsculptured. Notauli complete, posteriorly separated; minimum distance between notauli shorter than greatest breadth of posterior ocellus (1.5 : 2). Scutellum apparently unsculptured, shorter than scutum (6 : 9). Metanotum shorter than scutellum (3 : 6), apparently unsculptured. Epicnemium exposed. Shape of pronotum, scutum, scutellum and metanotum similar to that of extant males of *Pseudodryinus*. Propodeum longer than scutum (12 : 9), with dorsal surface reticulate rugose, with very large areolae; posterior surface with two complete longitudinal keels and median area apparently unsculptured. Forewing hyaline, without dark transverse bands, with normal venation of extant *Pseudodryinus*, with three basal cells (costal, median, submedian) clearly enclosed by pigmented veins. Pterostigma narrow, much longer than broad (10 : 2); marginal cell open; distal part of stigmal vein much longer than proximal part (11 : 6), almost reaching wing's border; distal part of stigmal vein not S-shaped; shape of forewing similar to that of extant *Pseudodryinus*. Petiole distinct, much shorter than propodeum (2 : 12). Shape, length and breadth of wings similar to those of extant *Pseudodryinus*. Shape and morphology of body similar to those of extant *Pseudodryinus*. Foreleg segments in following proportions: 8 (coxa) : 6 (trochanter) : 13 (femur) : 10 (tibia) : 8 (tarsal segment 1) : 3 (tarsal segment 2) : 3 (tarsal segment 3) : 3 (tarsal segment 4) : 4 (tarsal segment 5). Midleg segments in following proportions: coxa and trochanter not visible : 16 (femur) : 12 (tibia) : 22

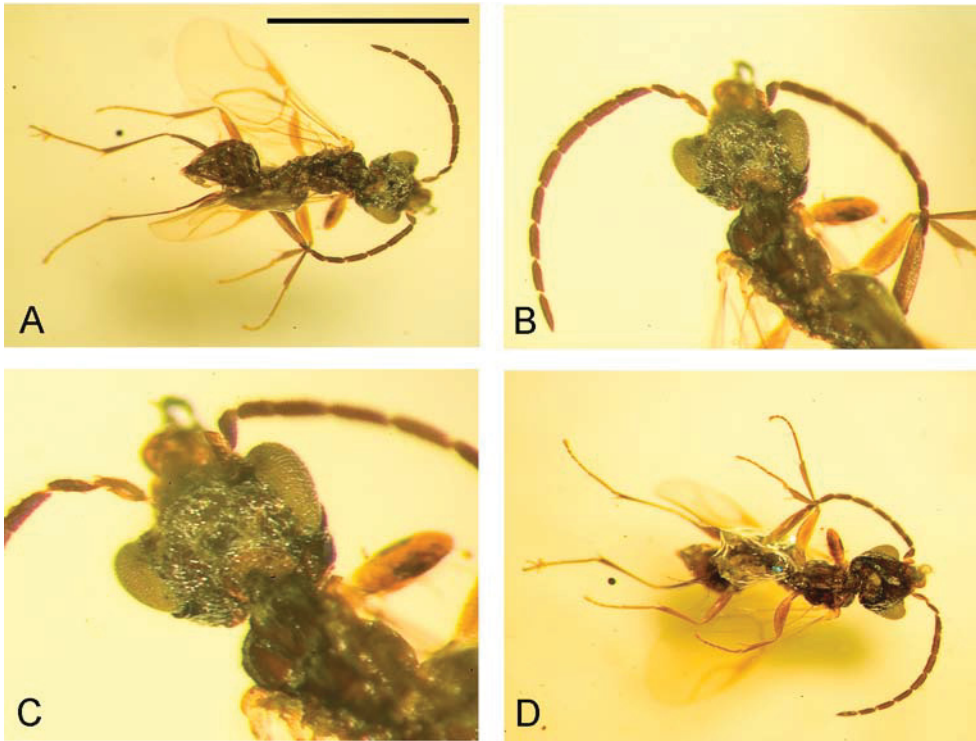


Fig. 1. *Pseudodryinus burmensis* sp. nov. A – habitus in dorsal lateral view. B, C – head and mesosoma in dorsal view. D – habitus in ventral lateral view. Scale bar: A = 1.51 mm; B = 0.65 mm; C = 0.36 mm; D = 1.2 mm.

(tarsus). Hindleg segments in following proportions: coxa and trochanter not visible: 15 (femur) : 19 (tibia) : 22.5 (tarsus). Maxillary and labial palpi not visible. Tibial spurs 1/1/2.

Female. Unknown.

Etymology. *Burmensis*, *-is*, *-e* (adjective); the species is named after Burma, the former name of Myanmar.

Hosts. Unknown.

Remarks. The new species is the second known fossil of *Pseudodryinus* Olmi, 1991. The other species is *P. parisiensis* Peinado, Nel & Waller, 2006, described from the Earliest Eocene French amber. A comparison of the new species with *P. parisiensis* is impossible, because the French species has been described on the basis of a female specimen. The sexual dimorphism in *Pseudodryinus* (and in all Dryinidae) is so large that female and male are completely different and morphologically not comparable.

Though the mandible teeth are not distinct through the amber (this character is very important to distinguish males of different dryinid subfamilies), the new species has been assigned to the subfamily Dryininae and the genus *Pseudodryinus* because of the general aspect and the following characters: temple very long (longer than half length of eye (Fig. 1D)); occipital carina complete; epicnemium exposed; notauli complete; minimum distance between notauli shorter than greatest breadth of posterior ocellus; forewing with three basal

cells (costal, median, submedian) clearly enclosed by pigmented veins; tibial spurs 1/1/2. The above combination of characters cannot be found in other Dryinidae.

Burmadryininae subfam. nov.

Type genus. *Burmadryinus* gen. nov., present designation.

Diagnosis. Male (Fig. 2). Fully winged; occipital carina complete; forewing with two cells enclosed by pigmented veins (costal and median + submedian); median and submedian cells of forewing fused; tibial spurs 1/1/2.

Female. Unknown.

Distribution. Only known from the Burmese amber.

Hosts. Unknown.

Genera and species included. *Burmadryinus* gen. nov. with a single species *B. cenomani-anus* sp. nov.

Remarks. Because of the fused median and submedian cells of forewing, the new species requires erection of a new genus (*Burmadryinus* gen. nov.) and a new subfamily (Burmadryininae subfam. nov.). The above character is an apomorphy never found in the family Dryinidae. In fact, in both sexes of other fully winged Dryinidae the forewing can have the following basal cells completely enclosed by pigmented vein: only costal (in most Aphelopinae); costal + median (in Conganteoninae and in part of the genus *Crovettia* Olmi, 1984 (Aphelopinae)); costal + median + submedian (+ rarely first cubital) in the rest of Dryinidae.

After the description of Burmadryininae, the following new key to the males of the world Dryinidae subfamilies is presented (the following five subfamilies are not included in the below key to the males, because their males are unknown: Erwiniinae Olmi & Guglielmino, 2010, †Palaeoanteoninae Olmi & Bechly, 2001, Plesiodyrininae Olmi, 1987, †Protodyrininae Olmi & Guglielmino, 2012, and Transdryininae Olmi, 1984):

- 1 Fully winged; forewing with only costal cell enclosed by pigmented veins (Fig. 25 in OLMÍ, 1984; Figs 32, 33 in OLMÍ 2007); occipital carina complete. 2
- Fully winged, or micropterous, or brachypterous, or apterous; forewing of fully winged forms with costal and 1–2 basal cells clearly enclosed by pigmented veins (Figs 26, 27 in OLMÍ 1984); occasionally forewing with only costal cell clearly enclosed by pigmented veins, but in this case occipital carina absent (in some males of Gonatopodinae). 3
- 2 Forewing with stigmal vein and pterostigma present (Fig. 7E in XU et al. 2013); other veins (except those surrounding costal cell) absent, their course not being marked by dark stripes; hindwing (Fig. 7E in XU et al. 2013) hyaline, with costal cell, without dark medial longitudinal stripe; basivolsella completely situated down distivolsella distal apex (Fig. 36 in OLMÍ 2007). **Aphelopinae** Perkins, 1912
- Forewing with stigmal vein present (Figs 32, 33 in OLMÍ 2007); pterostigma absent (Figs 32, 33 in OLMÍ 2007); other veins (except those surrounding costal cell) absent, the course of M and Cu veins being marked by dark stripes (Figs 32, 33 in OLMÍ 2007); hindwing (Figs 32, 33 in OLMÍ 2007) without costal cell, with one dark medial longitudinal stripe; basivolsella with lateral distal process parallel to distivolsella and reaching at least same level of distivolsella distal apex (Figs 34, 35 in OLMÍ 2007). **Apophelopinae** Olmi, 2007

- 3 Always fully winged; forewing with costal and median cells clearly enclosed by pigmented veins (Fig. 26 in OLMÍ 1984); occipital carina complete. 4
- Fully winged, or rarely micropterous, or brachypterous, or apterous; forewing of fully winged forms with costal, median and submedian cells clearly enclosed by pigmented veins (Fig. 27 in OLMÍ 1984); occasionally only costal cell clearly enclosed by pigmented veins, then occipital carina absent (in some males of Gonatopodinae); occasionally median and submedian cells fused and forming one cell only (Fig. 2B). 5
- 4 Antennal segment 3 more than three times as long as broad (Fig. 12E in XU et al. 2013). **Conganteoninae** Olmi, 1984
- Antennal segment 3 less than three times as long as broad (Fig. 11B in XU et al. 2013). **Aphelopinae** Perkins, 1912 (only few males of *Crovettia* Olmi, 1984)
- 5 Tibial spurs 1/2/2. †**Ponomarenkoinae** Olmi, 2010
- Tibial spurs 1/1/2. 6
- 6 Fully winged; forewing with median and submedian cells fused and forming only one cell (Fig. 2B). †**Burmadyrininae subfam. nov.**
- Fully winged, or rarely micropterous, or brachypterous, or apterous; forewing of fully winged forms with costal, median and submedian cells clearly enclosed by pigmented veins (Fig. 27 in OLMÍ 1984); occasionally only costal cell clearly enclosed by pigmented veins, then occipital carina absent (in some males of Gonatopodinae). 7
- 7 Mandible never with intermediate rudimentary tooth; usually with four teeth getting larger from anterior to posterior one (Fig. 5 in OLMÍ 1984), or with four teeth of different length. 8
- Mandible with 1–4 teeth (Fig. 2 in OLMÍ 1984); quadridentate mandibles always with intermediate rudimentary tooth (Fig. 22 B in OLMÍ 1984). 9
- 8 Forewing with metacarpus as long as, or longer than pterostigma (Fig. 28 in OLMÍ 1984). **Dryininae** Haliday, 1833 (only *Thaumatotdryinus* Perkins, 1905)
- Forewing with metacarpus shorter than pterostigma (Fig. 29 in OLMÍ 1984). **Anteoninae** Perkins, 1912
- 9 Lateral regions of prothorax continuous with mesopleura; epicnemium concealed (Fig. 121 in OLMÍ 1999). **Bocchinae** Richards, 1939
- Lateral regions of prothorax not continuous with mesopleura; epicnemium exposed (Fig. 120 in OLMÍ 1999). 10
- 10 Mesosternum distinct, not fused with mesopleura (Plate 6F in OLMÍ & VIRLA 2014). **Apodryinininae** Olmi, 1984
- Mesosternum fused with mesopleura and not distinct (Plate 6G in OLMÍ & VIRLA 2014). 11
- 11 Occipital carina present, complete or incomplete (Fig. 181 in OLMÍ 1999); dorsal process of paramere absent (Fig. 146 in OLMÍ 1999). **Dryininae** Haliday, 1833
- Occipital carina absent; occasionally present and complete, then dorsal process of paramere present (Fig. 1206 in OLMÍ 1984). **Gonatopodinae** Kieffer, 1906 (in KIEFFER & MARSHALL 1906).

***Burmadryinus* gen. nov.**

Type species. *Burmadryinus cenomanianus* sp. nov., present designation.

Diagnosis. Male (Fig. 2). As for the subfamily (see above).

Female. Unknown.

Etymology. *Burmadryinus* is a compound noun formed from Burma (the former name of Myanmar, where Burmese amber is collected) and *Dryinus* (type genus of the family Dryinidae); gender is masculine.

Distribution. Only known from Burmese amber.

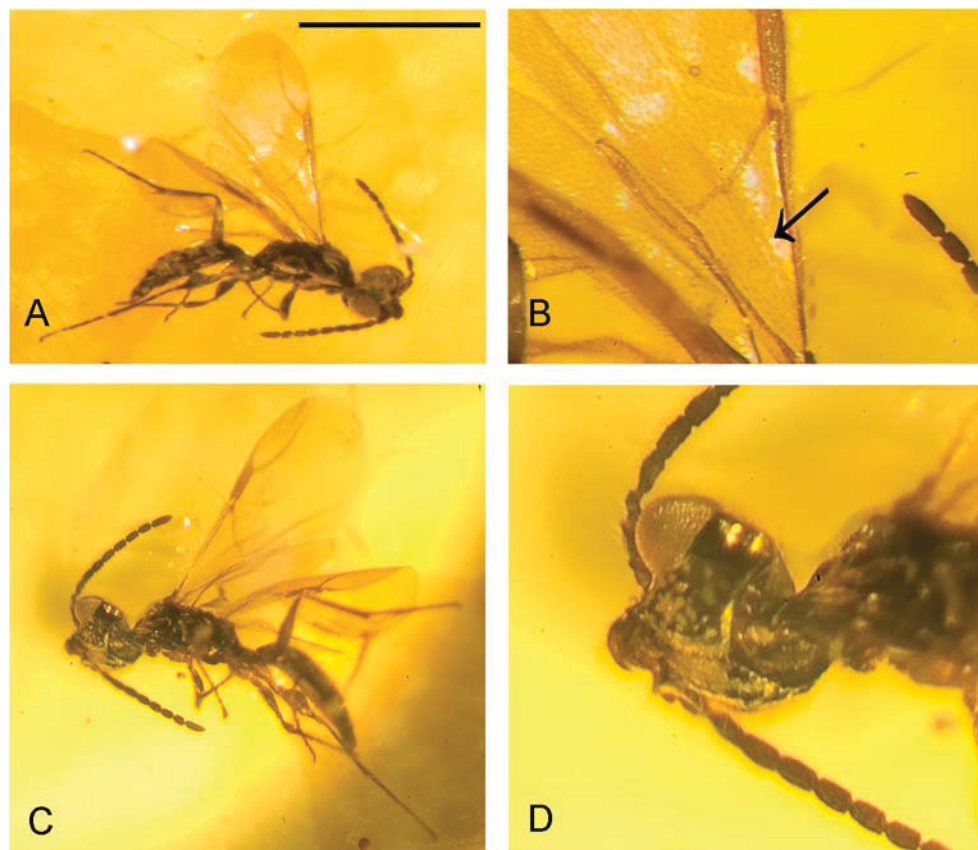


Fig. 2. *Burmadryinus cenomanianus* gen. & sp. nov. A – habitus in dorsal lateral view. B – fused median and submedian cells of forewing (indicated by an arrow). C – habitus in ventral lateral view. D – head in ventral lateral view. Scale bar: A = 1.0 mm; B = 0.3 mm; C = 0.77 mm; D = 0.28 mm.

***Burmadryinus cenomanianus* sp. nov.**

(Fig. 2)

Type material. HOLOTYPE: ♂ (SMNS (Bu-105), MYANMAR: specimen in Lower Cenomanian Burmese amber. Obtained from a mine situated in Northern Myanmar, Kachin State, Tanai Township, Hukawang Valley, SW of Tanai City.

Description. Male (Fig. 2). Fully winged; length 1.5 mm. Forewing as long as mesosoma + metasoma (50 : 50). Length of mesosoma + metasoma: 1.2 mm. Colour black, except antenna and legs brown. Antenna filiform, less than three times as long as head (32 : 12). Antennal hairs long, slightly shorter than breadth of antennal segments. Antennal segments in following proportions: 5 : 2 : 3 : 3 : 3 : 3 : 3 : 3 : 3 : 4. Head dull, apparently smooth, not rugose, less than twice as long as eye (12 : 8). Clypeus very long, ovoid. Mandible very long, with teeth not distinct. Eye apparently bare. Occipital carina complete. Posterior ocelli touching occipital carina. Temple distinct, very short. POL = 1.5; OL = 0.5; OOL = 2; TL = 1; greatest breadth of posterior ocelli about as long as POL; frontal line not visible. Propleuron short, forming a neck between head and pronotum, deeply inserted in occiput. Pronotum short, much shorter than head (2 : 12) and scutum (2 : 7); pronotal tubercle reaching tegula. Scutum apparently bare, apparently unsculptured. Notauli incomplete, reaching about 0.7 length of scutum. Scutellum apparently unsculptured, shorter than scutum (4 : 7). Metanotum shorter than scutellum (2 : 4), apparently unsculptured. Propodeum longer than scutum (8 : 7), with dorsal surface reticulate rugose, with very large areolae; posterior surface not completely visible. Forewing hyaline, without dark transverse bands, with two basal cells (costal and median + submedian) clearly enclosed by pigmented veins; median and submedian cells fused (M+Cu vein, usually separating median and submedian cells, only shortly present near M vein (Fig. 2C)). Pterostigma narrow, much longer than broad (10 : 2); marginal cell open; stigmal vein regularly curved, without distinct proximal and distal parts, almost reaching wing's border, similar to that of *Aphelopus* Dalman, 1823 species. Petiole little distinct, much shorter than propodeum (1 : 27). Foreleg segments in following proportions: 5 (coxa): 3 (trochanter): 10 (femur): 6 (tibia): 15 (tarsus). Midleg segments in following proportions: 6 (coxa): 2 (trochanter): 8 (femur): 8 (tibia): 14 (tarsus). Hindleg segments in following proportions: 5 (coxa): 3 (trochanter): 12 (femur): 14 (tibia): 17 (tarsus). Maxillary and labial palpi only partly visible; palpal formula apparently 6/3. Tibial spurs 1/1/2.

Female. Unknown.

Etymology. *Cenomanianus*, -a, -um (adjective); the species is named after Cenomanian age.

Hosts. Unknown.

Discussion

Following the descriptions of *Pseudodryinus burmensis* sp. nov. and *Burmadryinus cenomanianus* sp. nov., the complete list of the known fossil species of Dryinidae is as follows:

Lebanese amber (Lebanon) (120–136 Ma): *Aphelopus palaeophoenicius* Olmi, 2000 (Aphelopinae);

- Bon Tsagan marl (Mongolia) (110–115 Ma):** *Deinodryinus aptianus* Olmi, Rasnitsyn & Guglielmino, 2010 (Anteoninae);
- Taimyr amber (Siberia) (78–115 Ma):** Dryininae: *Cretodryinus zherichini* Ponomarenko, 1975; *Dryinus antiquus* (Ponomarenko, 1981);
- Burmese amber (Myanmar) (about 99 Ma):** Anteoninae: *Burmanteon olmii* Engel, 2003; †Burmadyrininae subfam. nov.: *Burmadyrinus cenomanianus* gen. & sp. nov.; Dryininae: *Hybristodryinus resinicolus* Engel, 2005; *Pseudodryinus burmensis* sp. nov.; †Ponomarenkoinae: *Ponomarenkoa ellenbergeri* Olmi, Xu & He, 2013;
- Obeshchayushchii marl (Siberia) (90–95 Ma):** *Anteonopsis antiquus* Olmi, Rasnitsyn & Guglielmino, 2010 (Anteoninae); *Gonatopus cretacicus* Olmi, Rasnitsyn & Guglielmino, 2010 (Gonatopodinae);
- Medicine Hat amber (Canada) (70–75 Ma):** *Dryinus canadensis* (Ponomarenko, 1981) (Dryininae);
- Baltic amber (40–45 Ma):** Dryininae: *Dryinus balticus* (Olmi, 1984); *D. bruesi* (Olmi, 1984); *D. janzeni* Olmi, 2000; *D. mortuorum* (Brues, 1933); *D. muenchi* Olmi & Bechly, 2001; *D. reifti* Olmi & Bechly, 2001; *D. vetus* (Brues, 1933); *D. wunderlichi* Olmi & Bechly 2001; *Palaeodryinus groehni* Olmi & Bechly, 2001; *Harpactosphēcion deletum* (Brues, 1933); *H. filicorne* (Brues, 1933); *H. gracile* (Brues, 1933); Anteoninae: *Deinodryinus areolatus* (Ponomarenko, 1975); *D. velteni* Guglielmino & Olmi, 2011; *Janzeniola baltica* (Olmi, 2000); †Palaeoanteoninae: *Palaeoanteon janzeni* Olmi, 2000; Gonatopodinae: *Neodryinus somniatus* Brues, 1933; †Ponomarenkoinae: *Ponomarenkoa polonica* (Ponomarenko, 1988); †Protodryininae: *Protodryinus eocenicus* Guglielmino & Olmi, 2012;
- Oise amber (France) (about 50 Ma):** *Pseudodryinus parisiensis* Peinado, Nel & Waller, 2006 (Dryininae);
- Mexican amber (Mexico) (22–26 Ma):** *Dryinus palaeomexicanus* Olmi, 1995 (Dryininae);
- Velikaya Kema marl (Maritime Province, Russia) (about 16 Ma):** unidentified *Deinodryinus* or *Dryinus* sp. (see OLMi et al. 2010) (Anteoninae or Dryininae);
- Dominican Republic amber (about 16 Ma):** Aphelopinae: *Aphelopus poinari* Olmi, 1998; Bocchinae: *Bocchus vetustus* Olmi, 1991; Dryininae: *Dryinus alamellatus* Olmi & Guglielmino, 2011 in OLMi et al. (2011); *D. grimaldii* Olmi, 1995; *D. hymenaeophilus* Olmi, 1995; *D. palaeodomnicanus* Currado & Olmi, 1983; *D. poinari* Olmi, 1998; *D. priscus* Olmi, 1998; *D. pristinus* Olmi, 1998; *D. rasnitsyni* Olmi & Guglielmino, 2011; *D. vetustus* Olmi, 1995; *Harpactosphēcion scheveni* Olmi, 2005; *H. sucinum* (Olmi, 1987); *Thaumadryinus miocenicus* Olmi, 1995.

Though many fossil species date to more than a hundred million years ago, one of the most important characters of Dryinidae fossil fauna is that the majority of species belong to extant subfamilies (Aphelopinae, Anteoninae, Bocchinae, Dryininae, Gonatopodinae). Only a small part of the fossil species belong to extinct subfamilies: Burmadyrininae, Palaeoanteoninae, Ponomarenkoinae and Protodryininae. On the contrary, most fossil genera are already extinct: Anteoninae: *Anteonopsis* Olmi, Rasnitsyn & Guglielmino, 2010; *Burmanteon* Engel, 2003; *Janzeniola* Olmi, 2011; Palaeoanteoninae: *Palaeoanteon* Olmi, 2000; Dryininae: *Cretodryinus*

Ponomarenko, 1975; *Harpactosphēcion* Haupt, 1944; *Hibristodryinus* Engel, 2005; *Palaeodryinus* Olmi & Bechly, 2001; Protodryininae: *Protodryinus* Guglielmino & Olmi, 2012; Ponomarenkoinae: *Ponomarenkoa* Olmi, 2010; Burmadryininae: *Burmadryinus* gen. nov. The extant genera, of which fossils are known, are the following: Aphelopinae: *Aphelopus* Dalman, 1823; Anteoninae: *Deinodryinus* Perkins, 1907; Bocchinae: *Bocchus* Ashmead, 1893; Dryininae: *Dryinus* Latreille, 1804, *Pseudodryinus* Olmi, 1991, *Thaumatodryinus* Perkins, 1905; Gonatopodinae: *Neodryinus* Perkins, 1905, *Gonatopus* Ljungh, 1810.

It is interesting to note that extant genera are found not only in very young fossils, but also in very ancient amber and marl: for example, *Aphelopus palaeophoenicius*, the oldest dryinid fossil, belongs to a genus currently present in all zoogeographical regions. This means that the actual characters were preserved through different and long geological ages, from the Upper Cretaceous to the Tertiary and the present age.

The new subfamily Burmadryininae is based on a male. Contrary to the females, males of Dryinidae are very uniform and do not show the variety of characters present in the opposite sex. The general aspect of the holotype of *Burmadryinus cenomanianus* is similar to that of other males belonging to different genera and subfamilies. The main distinctive character is present in the forewing: only two cells enclosed by pigmented veins and the fusion of the median and submedian cells, a clear apomorphy in a family where five cells completely enclosed by pigmented veins are recognized as the typical plesiomorphic character (BROTHERS & CARPENTER 1993). The rest of the body does not suggest anything in comparison with other males of the family.

Acknowledgements

We are grateful to Mr Jens-Wilhelm Janzen (Seevetal, Germany) for loan of the specimens studied in this paper and for donating them to the Staatliches Museum für Naturkunde Stuttgart. Many thanks to the anonymous reviewers for their valuable suggestions and comments that substantially improved this manuscript.

References

- ASHMEAD W. H. 1893: Monograph of the North American Proctotrypidae. *Bulletin of the United States National Museum* **45**: 1–472.
- BROTHERS D. J. & CARPENTER J. M. 1993: Phylogeny of Aculeata: Chryridoidea and Vespoidea (Hymenoptera). *Journal of Hymenoptera Research* **2**: 227–304.
- BRUES C. T. 1933: The Parasitic Hymenoptera of the Baltic Amber. Part I. Pp. 145–178. In: ANDRÉE K. (ed.): *Bernstein-forschungen (Amber Studies)*, 3. De Gruyter, Berlin und Leipzig, 178 pp.
- CARPENTER J. M. 1999: What do we know about chrysidoid (Hymenoptera) relationships? *Zoologica Scripta* **28**: 215–231.
- CURRADO I. & OLMÍ M. 1983: Primo reperto di Driinide fossile in ambra della Repubblica Dominicana (Hymenoptera Dryinidae). *Bollettino del Museo Regionale di Scienze Naturali di Torino* **1**: 329–334.
- DALMAN J. W. 1823: *Analecta entomologica*. Typis Lindhianis, Holmiae, 104 pp.
- ENGEL M. S. 2003: An anteonine wasp in Cenomanian-Albian amber from Myanmar (Hymenoptera: Dryinidae). *Journal of the Kansas Entomological Society* **76**: 616–621.
- ENGEL M. S. 2005: A dryinine wasp in Burmese amber (Hymenoptera: Dryinidae). *Polskie Pismo Entomologiczne* **74**: 485–494.

- GRIMALDI D., ENGEL M. S. & NASCIMBENE P. C. 2002: Fossiliferous Cretaceous amber from Myanmar (Burma): its rediscovery, biotic diversity, and paleontological significance. *American Museum Novitates* **3361**: 1–72.
- GUGLIELMINO A. & BÜCKLE C. 2003: Description of larval instars of Neodyrinus typhlocybae (Ashmead, 1893) (Hymenoptera Dryinidae), with remarks on its biology. *Mitteilungen aus dem Museum für Naturkunde in Berlin – Deutsche Entomologische Zeitschrift* **50**: 143–150.
- GUGLIELMINO A. & BÜCKLE C. 2010: Description of larval instars of Mystrophorus formicaeformis Ruthe (Hymenoptera: Dryinidae). *Zootaxa* **2602**: 57–66.
- GUGLIELMINO A., BÜCKLE C. & MOYA-RAYGOZA G. 2006: Description of the larval instars of Gonatopus bartletti Olmi, 1984 (Hymenoptera: Dryinidae). *Zootaxa* **1226**: 51–60.
- GUGLIELMINO A. & OLMÍ M. 2011: Revision of fossil species of Deinodryinus, with description of a new species (Hymenoptera, Dryinidae). *ZooKeys* **130**: 495–504.
- GUGLIELMINO A. & OLMÍ M. 2012: A contribution to the knowledge of Dryinidae from Late Eocene Baltic amber (Hymenoptera: Chrysidoidea), with description of new subfamily, Protodryininae subfam. nov. *Zootaxa* **3351**: 15–26.
- GUGLIELMINO A., OLMÍ M. & BÜCKLE C. 2013: An updated host-parasite catalogue of world Dryinidae (Hymenoptera: Chrysidoidea). *Zootaxa* **3740**: 1–113.
- GUGLIELMINO A. & VIRLA E. G. 1998: Postembryonic development of Gonatopus lunatus Klug (Hymenoptera: Dryinidae: Gonatopodinae), with remarks on its biology. *Annales de la Société Entomologique de France (Nouvelle Série)* **34**: 321–333.
- HALIDAY A. H. 1833: An essay on the classification of the parasitic Hymenoptera of Britain, which correspond with the Ichneumonones minuti of Linnaeus. *Entomological Magazine* **1**: 259–273.
- HAUPT H. 1944: Zur Kenntnis der Dryinidae III (Hymenoptera-Sphecoidea). *Stettiner Entomologische Zeitung* **105**: 90–94.
- LATREILLE P. A. 1804: Tableau méthodique des insectes. Pp. 129–200. In: SOCIÉTÉ DE NATURALISTES ET D'AGRICULTEURS (ed.): *Nouveau dictionnaire d'Histoire naturelle*, 24. Deterville, Paris, 463 pp.
- LINNAEUS C. 1758: *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I, Editio decima, reformata*. Salvius, Holmiae, 824 pp.
- LJUNGH S. J. 1810: Gonatopus, novum insectorum genus. *Beiträge zur Naturkunde* **2**: 161–163.
- OLMI M. 1984: A revision of the Dryinidae (Hymenoptera). *Memoirs of the American Entomological Institute* **37**: i–xii + 1–1913.
- OLMI M. 1987: New species of Dryinidae, with description of a new subfamily from Florida and a new species from Dominican amber (Hymenoptera, Chrysidoidea). *Bollettino del Museo Regionale di Scienze Naturali di Torino* **5**: 211–238.
- OLMI M. 1991: Supplement to the revision of the world Dryinidae (Hymenoptera Chrysidoidea). *Frustula Entomologica (Nuova Serie)* **12** (1989): 109–395.
- OLMI M. 1995: Dryinids and Embolemids in amber (Hymenoptera Dryinidae et Embolemidae). *Redia* **78**: 253–271.
- OLMI M. 1998: New Embolemidae and Dryinidae (Hymenoptera Chrysidoidea). *Frustula Entomologica (Nuova Serie)* **20** (1997): 30–118.
- OLMI M. 1999: *Hymenoptera Dryinidae-Embolemidae. Fauna d'Italia*, 37. Edizioni Calderini, Bologna, Italy, 425 pp.
- OLMI M. 2000: New fossil Dryinidae from Baltic and Lebanese amber (Hymenoptera Chrysidoidea). *Frustula Entomologica (Nuova Serie)* **21** (1998): 48–67.
- OLMI M. 2005: A new fossil dryinid in amber from the Dominican Republic: Harpactosphecon scheveni n. sp. (Hymenoptera Dryinidae). *Frustula Entomologica (Nuova Serie)* **26–27**: 15–19.
- OLMI M. 2007: New species of Afrotropical Dryinidae (Hymenoptera: Chrysidoidea), with description of a new genus and a new subfamily. *African Invertebrates* **48**: 199–232.
- OLMI M. 2010: A contribution to the knowledge of Dryinidae from the Oriental, Nearctic, Neotropical and Australian regions (Hymenoptera Chrysidoidea). *Frustula Entomologica (Nuova Serie)* **31** (2008): 11–34.
- OLMI M. 2011: A contribution to the knowledge of world Dryinidae (Hymenoptera Chrysidoidea). *Frustula Entomologica (Nuova Serie)* **32** (2009): 43–76.
- OLMI M. & BECHLY G. 2001: New parasitic wasps from Baltic amber (Insecta: Hymenoptera: Dryinidae). *Stuttgarter Beiträge zur Naturkunde, Serie B* **306**: 1–58.

- OLMI M. & GUGLIELMINO A. 2010: Description of Erwiniinae, new subfamily of Dryinidae from Ecuador (Hymenoptera: Chrysidoidea). *Zootaxa* **2605**: 56–62.
- OLMI M. & GUGLIELMINO A. 2011: Revision of fossil species of Dryinus belonging to lamellatus group, with description of a new species (Hymenoptera, Dryinidae). *ZooKeys* **130**: 505–514.
- OLMI M. & GUGLIELMINO A. 2012: A contribution to the knowledge of Dryinidae from Late Eocene Baltic amber (Hymenoptera: Chrysidoidea), with description of a new subfamily, Protodryiniinae subfam. nov. *Zootaxa* **3351**: 15–26.
- OLMI M., GUGLIELMINO A. & VOLLARO M. 2011: Revision of fossil species of Dryinus belonging to constans group, with description of a new species (Hymenoptera: Dryinidae). *Zootaxa* **2981**: 43–55.
- OLMI M., RASNITSYN A. P. & GUGLIELMINO A. 2010: Revision of rock fossils of Dryinidae and Embolemidae (Hymenoptera: Chrysidoidea). *Zootaxa* **2499**: 21–38.
- OLMI M. & VIRLA E. G. 2014: Dryinidae of the Neotropical region (Hymenoptera: Chrysidoidea). *Zootaxa* **3792**: 1–534.
- PEINADO J., NEL A. & WALLER A. 2006: A dryinid wasp in Early Eocene amber from the Paris basin (Hymenoptera: Dryinidae). *Zootaxa* **1168**: 31–41.
- PERKINS R. C. L. 1905: Leafhoppers and their natural enemies (Pt. I. Dryinidae). *Report of Work of the Experiment Station of the Hawaiian Sugar Planters' Association, Division of Entomology, Bulletin* **1**: 1–69.
- PERKINS R. C. L. 1907: Parasites of leaf-hoppers. *Report of Work of the Experiment Station of the Hawaiian Sugar Planters' Association, Division of Entomology, Bulletin* **4**: 5–59.
- PERKINS R. C. L. 1912: Parasites of the family Dryinidae. *Report of Work of the Experiment Station of the Hawaiian Sugar Planters' Association, Division of Entomology, Bulletin* **11**: 5–20.
- POINAR G. O. 1992: *Life in amber*. Stanford University Press, Redwood City, 360 pp.
- PONOMARENKO N. G. 1975: (A new hymenopteran species from Baltic amber). *Paleontologicheskij Zhurnal* **1**: 126–128 (in Russian, with English summary). [English translation: *Paleontological Journal* **9**: 124–126].
- PONOMARENKO N. G. 1981: (New Dryinidae (Hymenoptera) from the Late Cretaceous of the Taimyr and Canada). *Paleontologicheskij Zhurnal* **1**: 139–143 (in Russian, with English summary). [English translation: *Paleontological Journal* **15**: 115–120].
- PONOMARENKO N. G. 1988: (The first discovery of a male dryinid (Insecta) from Baltic amber). *Paleontologicheskij Zhurnal* **4**: 107–108 (in Russian, with English summary). [English translation: *Paleontological Journal* **22**: 105–107].
- RASNITSYN A. P. & QUICKE D. L. 2002: *History of Insects*. Kluwer Academic Publishers, Dordrecht, 517 pp.
- RICHARDS O. W. 1939: The British Bethyliidae (s. l.) (Hymenoptera). *Transactions of the Royal Entomological Society of London* **89**: 185–344.
- SHI G., GRIMALDI D. A., HARLOW G. E., WANG J., WANG J., YANG M., LEI W., LI Q. & LI X. 2012: Age constraint on Burmese amber based on U–Pb dating of zircons. *Cretaceous Research* **37**: 155–163.
- XU Z., OLM I M., GUGLIELMINO A. & CHEN H. 2011: A new species of Dryinidae (Hymenoptera: Chrysidoidea) from China. *Florida Entomologist* **94**: 848–852 + Supplement, 23 pp.
- XU Z., OLM I M., GUGLIELMINO A. & CHEN H. 2012a: Checklist of Dryinidae (Hymenoptera: Chrysidoidea) from Shaanxi Province, China, with descriptions of two new species. *Zootaxa* **3164**: 1–16.
- XU Z., OLM I M., GUGLIELMINO A. & CHEN H. 2012b: Checklist of Dryinidae (Hymenoptera) from Guangdong Province, China, with descriptions of two new species. *Zootaxa* **3231**: 1–28.
- XU Z., OLM I M. & HE J. 2013: Dryinidae of the Oriental region (Hymenoptera: Chrysidoidea). *Zootaxa* **3614**: 1–460.