



## Taxonomic notes on *Caraphractus* (Hymenoptera: Mymaridae)

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Taxonomic notes on the Holarctic fairyfly genus *Caraphractus* Walker, 1846 (Hymenoptera: Chalcidoidea: Mymaridae) and its only recognized species *C. cinctus* Walker, 1846 are given. *Caraphractus flavicollis* Hellén, 1974 (Finland) is synonymized under *C. cinctus*. A lectotype is designated for *C. reductus* Rimsky-Korsakov, 1920, also a synonym of *C. cinctus*. *Caraphractus hazomanitrae* Risbec, 1952 (Madagascar), for which a lectotype is designated, is transferred to *Acmopolynema* Ogloblin, 1946 as *A. hazomanitrae* (Risbec), syn. n. *Camptoptera perineti* (Risbec, 1952) (Madagascar, originally described as *Stichothrix perineti*) is synonymized under *A. hazomanitrae*.

Key words. Hymenoptera, Mymaridae, *Caraphractus cinctus*, *Acmopolynema hazomanitrae*, synonymy.

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### Introduction

The fairyfly wasp genus *Caraphractus* Walker, 1846 (Hymenoptera: Mymaridae) includes three nominal species (Noyes 2003) as follows: the Holarctic *C. cinctus* Walker, 1846, *C. flavicollis* Hellén, 1974 (Finland, known only from the holotype female), and *C. hazomanitrae* Risbec, 1952 (Madagascar, known from three female syntypes). The latter taxon was erroneously described in *Caraphractus*; it is transferred here to *Acmopolynema* Ogloblin, 1946. *Caraphractus* is thus defined as a strictly Holarctic genus [also according to Huber & Baquero (2007)] with a single known species, *C. cinctus*: *C. flavicollis* is recognized here as its junior synonym because the body color, length of antenna, and other variations used by Hellén (1974) to separate his species from *C. cinctus* are well known within *C. cinctus* (Jackson 1959; also according to my own investigations). A brief diagnosis of *C. cinctus* is provided.

Terms for morphological features follow Gibson (1997). Abbreviations for depositories of specimens are as follows: CNCI, Canadian National Collection of Insects, Ottawa, Ontario, Canada; MNHN, Muséum national d'Histoire naturelle, Paris, France; MZH, Zoological Museum, Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland; NHMW, Naturhistorisches Museum Wien, Vienna, Austria; UCRC, Entomology Research Museum, University of California, Riverside, California, USA; USNM, National Museum of Natural History, Washington, District of Columbia, USA; ZIN, Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia.

## Taxonomy

### *Caraphractus* Walker, 1846

*Caraphractus* Walker 1846: 49 (key), 50 (diagnosis), 52. Type species: *Caraphractus cinctus* Walker, by monotypy.

*Valkerella* Westwood 1879: 584 (footnote). Type species: *Polynema natans* Lubbock, by monotypy. Effectively synonymized under *Polynema* Haliday by Dalla Torre 1898: 425 (as *Walkerella* Dalla Torre) [and also incorrectly listed as a synonym of *Polynema* by Annecke & Doult (1961: 36)] and under *Caraphractus* by Kryger 1950: 47.

*Walkerella* Dalla Torre 1898: 425 (unjustified emendation of *Valkerella* Westwood, catalog).

*Caraphractus* Walker [or as (Haliday) Walker]: Kirchner 1867: 202 (catalog); Dalla Torre 1898: 424 (catalog); Rimsky-Korsakov 1940: 227 (key), 231 (overview); Debauche 1948: 127 (key); Kryger 1950: 47-49 (references, diagnosis); Nikol'skaya 1952: 542-543 (key); Ison 1958: 71; Annecke & Doult 1961: 7 (key), 32-33 (redescription); Peck 1963: 49-50 (catalog); Hellén 1974: 20-21 (diagnosis, key); Graham 1982: 217-218 (comments); Schauff 1984: 51-52 (diagnosis, distribution); Huber 1986: 218 (hosts); Yoshimoto 1990: 14, 21 (key), 70 (distribution, diagnosis); Huber 1997: 506, 510 (key); Triapitsyn & Huber 2000: 604, 609, 612 (key), 613 (comments); Huber & Baquero 2007: 18 (compared with *Eustochus* Haliday).

Diagnosis. See Kryger (1950), Annecke & Doult (1961), Hellén (1974), Schauff (1984), and Yoshimoto (1990), and also the diagnosis of *C. cinctus* below.

*Caraphractus* is an easily recognized genus, so any appropriate generic key to the Mymaridae may be used for its recognition: Annecke & Doult (1961) for the world genera, Schauff (1984) for the Holarctic genera, Yoshimoto (1990) for the New World genera, Huber (1997) for the Nearctic genera, and Triapitsyn & Huber (2000) for the Palaearctic genera. *Caraphractus* is most closely related to *Eustochus* (Schauff 1984) of which the former might be a derived offshoot (Huber & Baquero 2007); it differs from *Eustochus* in having the clava of the female antenna entire whereas in the latter genus it is 2- or 3-segmented (Huber & Baquero 2007).

### *Caraphractus cinctus* Walker, 1846

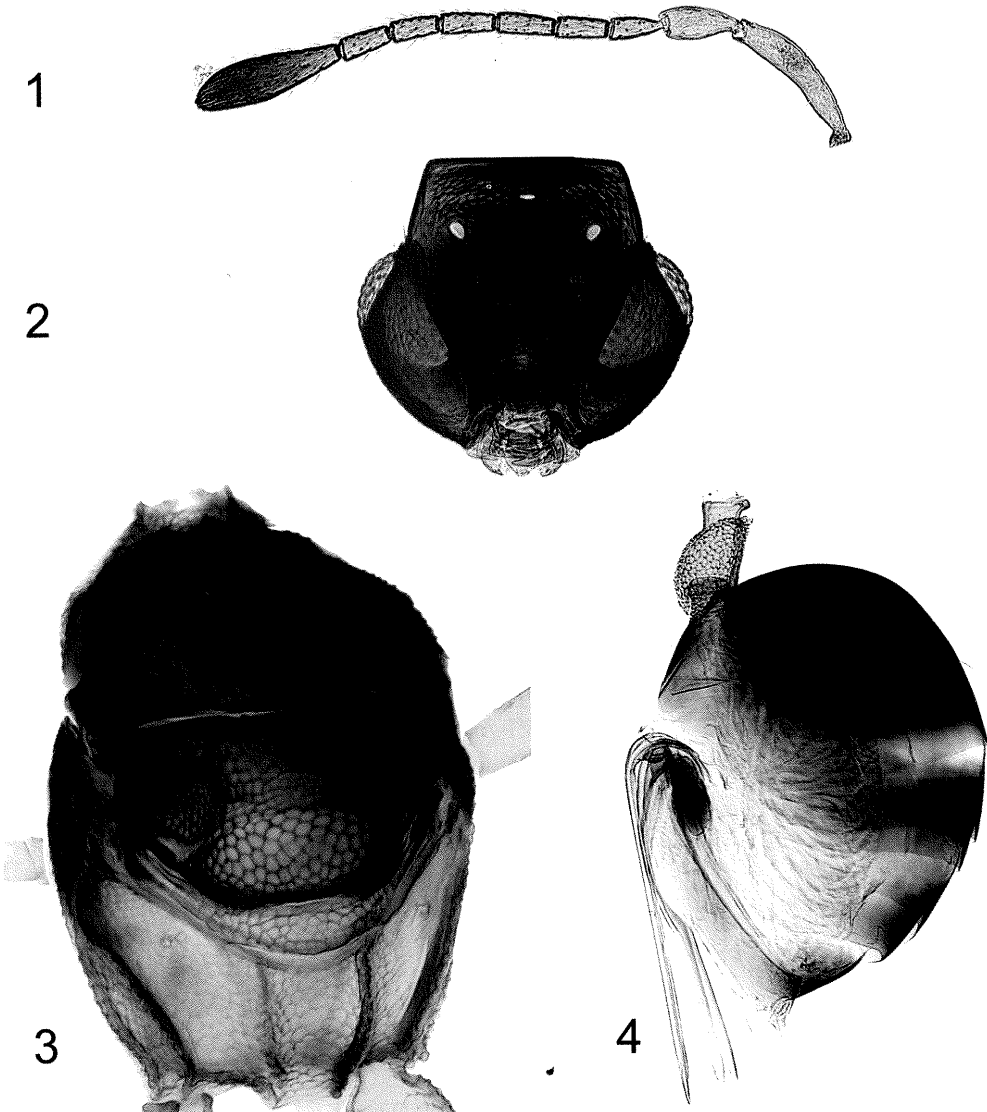
(Figs 1-6)

*Caraphractus cinctus* Walker 1846: 52. Type(s) not specified and lost (Graham 1982; Schauff 1984). Type locality: unspecified in the original description ("Found by Mr. Haliday on long grass in drains"); Great Britain.

*Polynema natans* Lubbock 1864: 138-140, 142 + Plate XXIII (illustrations). Lectotype female [BMNH], designated by Graham 1982: 218-219. Type locality: High Elms, Farnborough, London Borough of Bromley, England, UK (Graham 1982). Synonymized under *C. cinctus* by Schmiedeknecht 1909: 497 and also listed as its synonym by Graham 1982: 218-219.

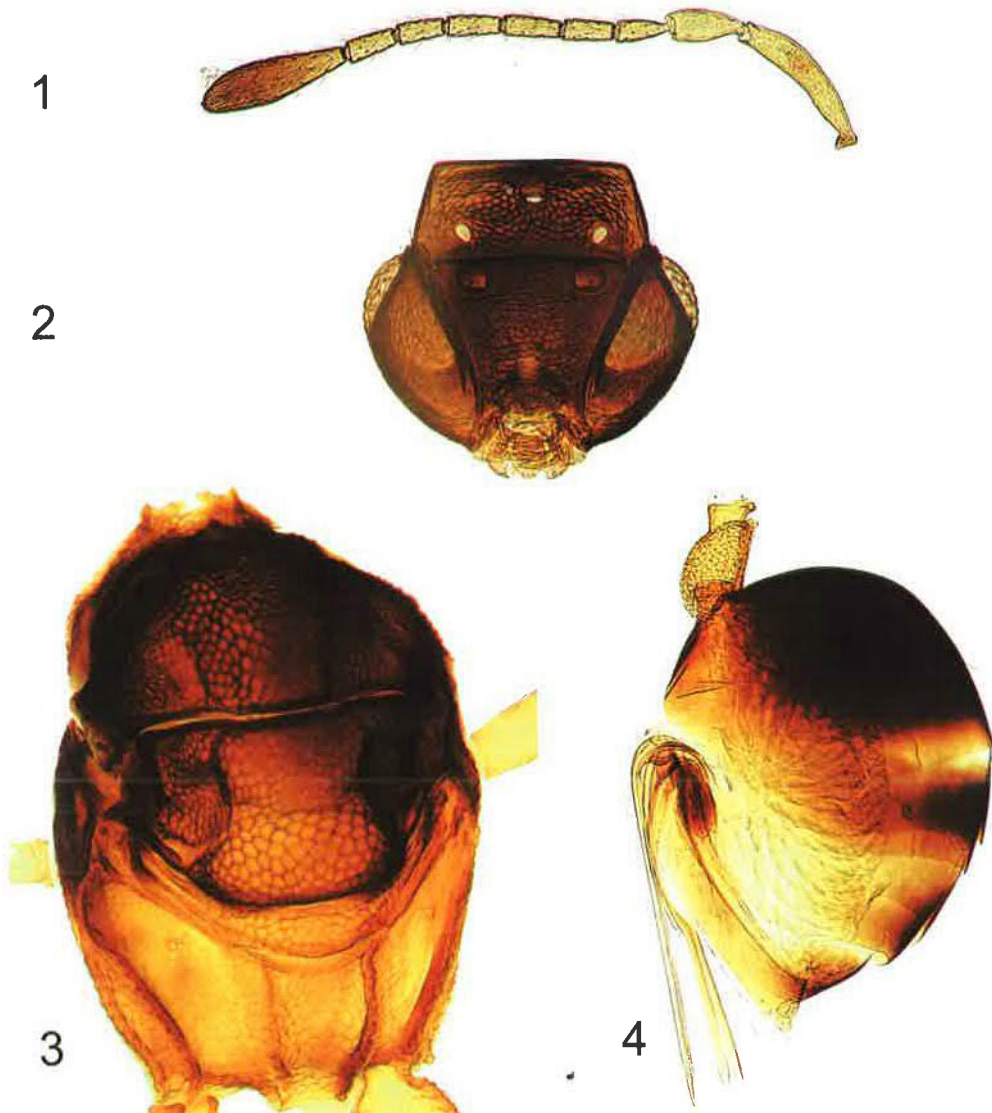
*Caraphractus cinctus* Walker [or as (Haliday) Walker]: Kirchner 1867: 202 (catalog); Dalla Torre 1898: 424 (catalog); Matheson & Crosby 1912: 68-70 (biology, illustra-

tions); Rimsky-Korsakov 1917b: LXVII (host associations); Rimsky-Korsakov 1925a: 68-69 (reared from *Dytiscus* sp. eggs near Lake Seliger in Tver region, Russia); Rimsky-Korsakov 1925b: 103-111 (biology, morphology of preimaginal stages, as *C. cinctus* Haliday); Rimsky-Korsakov 1940: 230-231 (illustrations, distribution); Kryger 1950: 48-50 (illustrations, references, diagnosis, host associations); Nikol'skaya 1952: 542-543 (in key); Ison 1958: 71-72 (notes on biology and morphology); Peck 1963: 49-50 (catalog, hosts); Jackson 1959: 198-202 (morphology, variation, gynandromorphs); Jackson 1969: 59-81 (morphology); Viggiani 1973: 276 (illustration of male genitalia); Hellén 1974: 21 (key, diagnosis, distribution); Trjapitzin 1978: 532 (synonymy, distribution); Graham 1982: 218-219 (type information, comments); Viggiani 1989: 146 (illustration of male



Figs 1-4. *Caraphractus cinctus* Walker (macropterous female): 1, antenna; 2, head; 3, mesosoma; 4, metasoma (lateral view).

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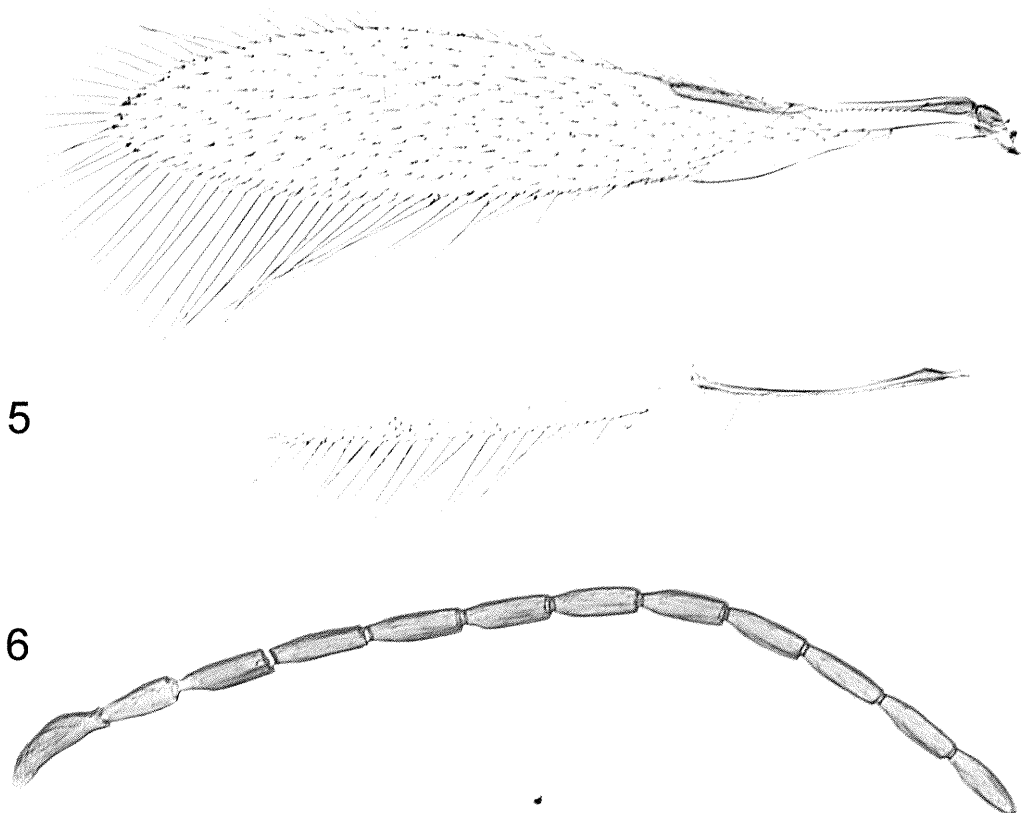
genitalia); Yoshimoto 1990: 70 (list); Huber 1997: 506 (distribution in the Nearctic region); Triapitsyn & Huber 2000: 613 (list, distribution, comments). See Kryger (1950) and Noyes (2003) for other references.

*Cosmocoma natans* (Lubbock): Marshall 1873: 24.

*Walkerella natans* (Lubbock): Westwood 1879: 584 (indirectly in the footnote), 593 (in the explanation to Plate LXXIII), Plate LXXIII (illustrations).

*Polynema natans* Lubbock: Dalla Torre 1898: 426 (catalog, also listed under *P. natans* as *Walkerella (Polynema) natans*).

*Anaphes cinctus* Haliday [sic]: Rimsky-Korsakov 1917a: 220-222 (taxonomic and biological notes). See Kryger (1950) for other references of *C. cinctus* as *Anaphes cinctus*



Figs 5, 6. *Caraphractus cinctus* Walker: 5, wings (macropterous female); 6, antenna (macropterous male).

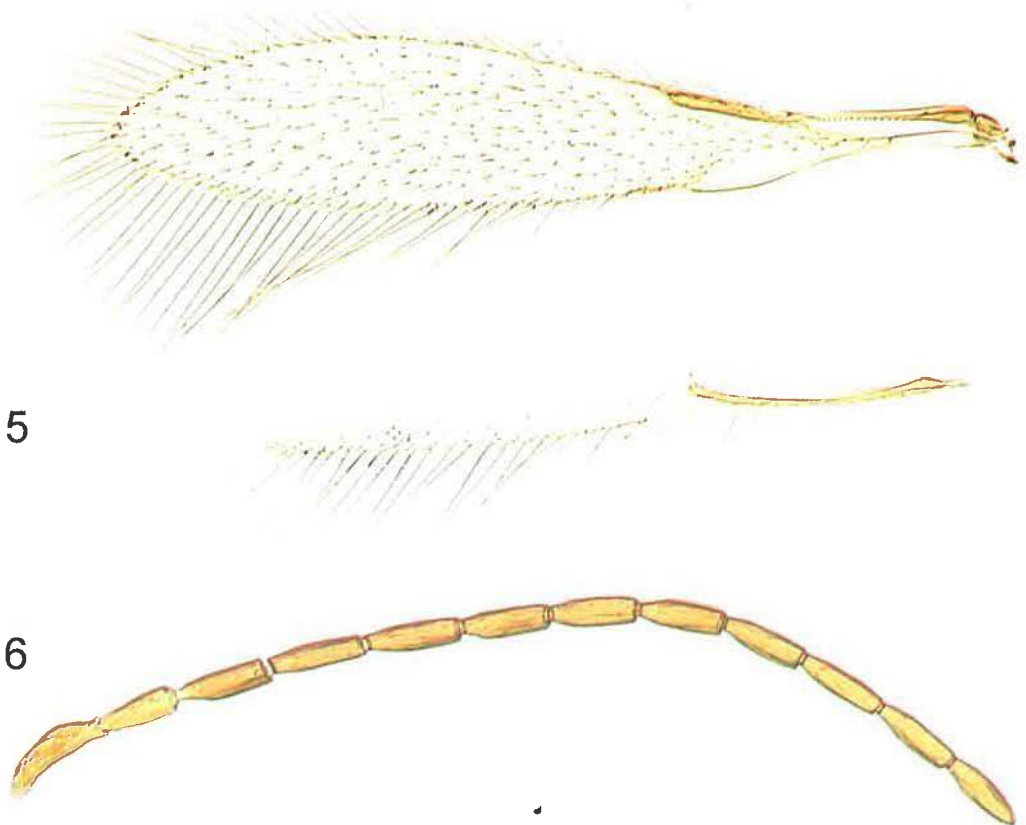
genitalia); Yoshimoto 1990: 70 (list); Huber 1997: 506 (distribution in the Nearctic region); Triapitsyn & Huber 2000: 613 (list, distribution, comments). See Kryger (1950) and Noyes (2003) for other references.

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*Polynema natans* Lubbock: Dalla Torre 1898: 426 (catalog, also listed under *P. natans* as *Walkerella* (*Polynema*) *natans*).

*Anaphes cinctus* Haliday [sic]: Rimsky-Korsakov 1917a: 220-222 (taxonomic and biological notes). See Kryger (1950) for other references of *C. cinctus* as *Anaphes cinctus*



**Figs 5, 6.** *Caraphractus cinctus* Walker: 5, wings (macropterous female); 6, antenna (macropterous male).

(Walker).

*Caraphractus reductus* Rimsky-Korsakov 1920: 7. Lectotype female, here designated (see "Type material examined"). Original type localities (types were not specified, I found 3 female and 1 male syntype specimens in ZIN): an unspecified location or locations at Lake Ladoga and the ponds in "Tsarkosel'skiy park" (now Aleksandrovskiy and Ekaterininskiy parks of the State Museum-Reserve "Tsarskoye Selo" in Pushkin), Leningrad[skaya] Oblast', Russia; of the lectotype designated here: an unspecified location at Lake Ladoga, Leningrad[skaya] Oblast', Russia. Synonymized under *C. cinctus* by Trjapitzin 1978: 532.

*Caraphractus reductus* Rimsky-Korsakov: Rimsky-Korsakov 1925b: 98-103 (second, detailed, description, illustrations, distribution, biology, host associations); Rimsky-Korsakov 1940: 230-231 (illustration, distribution); Ivanova-Kazas 1952: 160 (from eggs of *Dytiscus (Macrodytes) marginalis* Linnaeus, 1758 [as *Macrodytes marginatus* L.] in the environs of Saint Petersburg [as Leningrad]); Nikol'skaya 1952: 542 (in key, probably a synonym of *C. cinctus*); Ivanova-Kazas 1961: 124-135 (embryology, host associations).

*Caraphractus flavicollis* Hellén 1974: 21-22. Holotype female [MZH, but currently it could not be located there (Pekka Malinen via Lauri Kaila, personal communication)], examined (but the label data not recorded; it is not marked as holotype) during my visit to Kőszeg, Hungary, in September 2002 where and when it was on loan from MZH to Csaba Thuróczy. Type locality: Lohja (as Lojo), Finland. **Syn. n.**

*Caraphractus flavicollis* Hellén: Triapitsyn & Huber 2000: 613 (list, a possible variant of *C. cinctus*).

Type material examined. Lectotype female [ZIN] of *Caraphractus reductus* Rimsky-Korsakov, here designated to avoid the existing confusion regarding the status of the type specimens of this nominal species, on slide labeled (in Russian, collected by M. N. Rimsky-Korsakov): "*Caraphractus reductus* Lake Ladoga II.1917 M. Rkors". Paralectotypes: 1 female [ZIN] on slide labeled (in Russian, collected by M. N. Rimsky-Korsakov): "*Caraphractus reductus* ♀ Lake Ladoga"; 1 female, 1 males [ZIN] on slide labeled (in Russian, collected by M. Rimsky-Korsakov; mounted together with 1 female and 1 male of *C. cinctus*, both macropterous individuals): 1. "83"; 2. "*Caraphractus cinctus* ♀ and ♂ *Caraphractus reductus* ♀ and ♂ Lake Ladoga".

Material examined. **AUSTRIA**. UPPER AUSTRIA, Mauerkirchen [2 females, NHMW]. **CANADA**. ONTARIO, Mer Bleu, 29-30.v.1982, H. Gould [1 macropterous female, UCRC (donated from CNCI)]. **GERMANY**. NORTH RHINE-WESTPHALIA, Münster, Thienemann (ex. *Dytiscus* sp. eggs) [1 female, NHMW]. **RUSSIA**. LENINGRAD[skaya] OBLAST': Lake Ladoga [1 macropterous female, 1 macropterous male, ZIN] (mounted together with 1 female and 1 male paralectotypes of *C. reductus*). Poselok Gor'kovskoye (as Mustamyaki), 14.ii.1916, M. N. Rimsky-Korsakov [1 pupa, ZIN]. Repino (as Kuokkala), vi.1916, M. N. Rimsky-Korsakov [2 female, 2 males, USNM] (both macropterous individuals). Saint Petersburg, Peterhof (identified by M. N. Rimsky-Korsakov as *C. reductus*): vi.1928, M. N. Rimsky-Korsakov [4 females, 2 males, USNM]; no date indicated, M. N. Rimsky-Korsakov (ex. dytiscid eggs) [2 females, 1 males, USNM]. **MOSCOW**[skaya] OBLAST', Glubokoye Lake, 26.viii.1982, N. N. Šmirnov [1 female, ZIN] (det. by V. A. Trjapitzin). **TVER**[skaya] OBLAST': Kimry, 11.vi.1920 [3 females, 1 male, ZIN] (all macropterous individuals). Seliger Lake, 1914, M. N. Rimsky-Korsakov [3 pupae, ZIN]. Locality(-ies) unknown

(Russia) [ZIN]: Wings on slide labeled : “*Caraphractus cinctus* *Caraphractus reductus* wings” (in Russian, collected by M. N. Rimsky-Korsakov); pupae on slide labeled: “*Caraphractus cinctus* pupae” (in Russian, collected by M. N. Rimsky-Korsakov). **UK.** SCOTLAND, Fife, St Andrews, Noich Cliff, 19.ii.1962, D. J. Jackson (“ex eggs of *Agabus bipustulatus* reared in laboratory”) [2 females, 2 males, UCRC]. Country and locality unknown (probably **USA.** NEW YORK, Ithaca): 17-24.xii.1912 (“reared from eggs of *Notonecta*”) [7 females, NHMW] (possibly associated with the study of Matheson & Crosby (1912) although specimens were collected after their article was published).

Brief diagnosis. BOTH SEXES. Head (as in Fig. 2), mesosoma (as in Fig. 3), all coxae and femora, and petiole strongly reticulate. Mandible with 3 teeth. Macropterous (as in Fig. 5) or brachypterous (length of wings variable); in fully winged individuals venation a little more than one third of fore wing length. Propodeum with complete submedian longitudinal keels (as in Fig. 3). Tarsi 4-segmented. Petiole well-developed, 1.3-1.5x as long as wide.

FEMALE. Body color quite variable, often correlating with body size: from mostly light brown to reddish brown or brown to dark brown or black, legs reddish-brown but sometimes with brown or dark brown patches, and antenna from light reddish-brown with dark clava to more uniformly dark apically. Antenna (Fig. 1) 9-segmented and of variable length relative to body length; funicle normally 6-segmented (occasionally two neighboring segments may be partially fused), funicle segments subequal in length, shorter than pedicel, without longitudinal sensilla; clava entire, with 7 longitudinal sensilla (all except 1 subapical). Fore wing (Fig. 5) of fully winged individuals 4.5-4.9x as long as wide; longest marginal seta from a little less to slightly more than maximum wing width. Metasoma (Fig. 4) longer than mesosoma; ovipositor occupying 0.7-0.9x length of gaster, exerted slightly beyond its apex.

MALE. Body and appendages more or less dark, usually from dark brown to brownish black with a paler petiole and some leg segments sometimes brown or reddish fuscous (Jackson 1959). Antenna (Fig. 6) normally 12-segmented (flagellum 10-segmented) although occasionally in very small individuals flagellum 9- or even 8-segmented (Jackson 1959). Genitalia as illustrated by Viggiani (1973, 1989).

PREIMAGINAL STAGES. See Rimsky-Korsakov (1925b), Ivanova-Kazas (1961), and Jackson (1961). The larva of *C. cinctus* was also studied by Jackson (1958b).

Distribution. Austria [new record], Belgium (Kryger 1950), Canada (Yoshimoto 1990; Huber 1997), Denmark (Kryger 1950), Finland (Hellén 1974 [also as *C. flavicollis*]), Germany (Kryger 1950), Ireland (Fursov 2010), Russia: Leningrad, Moscow, Pskov, and Tver regions, Republic of Karelia, Moscow, and Saint Petersburg (Rimsky-Korsakov 1917a, 1925a,b; Trjapitzin 1978), Sweden (Noyes 2003), UK: England (Lubbock 1864) and Scotland (Jackson 1956), Ukraine (Fursov 2010), and USA (Matheson & Crosby 1912; Peck 1963; Yoshimoto 1990; Huber 1997).

Hosts and biology. Egg parasitoids of various Dytiscidae (Coleoptera) as well as *Gerris remigis* Say, 1832 (Hemiptera: Gerridae) and *Notonecta* sp. (Hemiptera: Notonectidae) (Matheson & Crosby 1912; Rimsky-Korsakov 1917a,b,c, 1925a,b, 1940; Peck 1963; Huber 1986; Fursov 1995; Noyes 2003). Biology of *C. cinctus* was studied in detail by Rimsky-Korsakov (1917a, 1925b) and Jackson (1958a, 1961, 1963, 1966); adults can swim under the water using their wings, walk on surface of the water, and [at least macropterous individuals] can freely fly in the air (Fursov 1995,



2010).

Comments. As mentioned by Graham (1982), the type material of *C. cinctus* is lost; he intended to designate a neotype (Schauff 1984) but never did. A neotype is not designated here because there is no ambiguity whatsoever about proper recognition of this species and thus an objective definition of it is not necessary.

*Caraphractus reductus* was first very briefly and most likely unintentionally described (diagnosed) by Rimsky-Korsakov (1920: 7), as translated from Russian: “4) *Caraphractus reductus*, sp. n. Differs from the previous [i.e., the previous species mentioned on the same page – *C. cinctus* (as “*Caraphractus cinctus* Haliday”)] by somewhat (up to certain degree) shortened wings and a number of other morphological characters. Parasite of predaceous diving beetles. Found in Lake Ladoga and in the ponds of Tsarkosel’skiy park”. Noyes (2003) thus incorrectly listed *C. reductus* as being described in 1925 by Rimsky-Korsakov (1925b); that was in fact the second (unnecessary but far more detailed), intentional description of this nominal species.

However, *Anaphes dytiscidarum* Rimsky-Korsakov, mentioned by Rimsky-Korsakov (1920: 7) on the same page with *C. reductus*, is a nomen nudum because not even a brief diagnosis of it is present in the following sentence (as translated from Russian): “5) *Anaphes dytiscidarum*, sp. n. belongs to the genus that has a large number of species – parasites of eggs of various insects. Parasite of predaceous diving beetles”. Later, Rimsky-Korsakov’s (1940: 232) mentioning of *A. dytiscidarum* is also that of a nomen nudum, as translated from Russian: “Genus **Anaphes**. Here a large number of oophagous wasps, parasitizing at the expense of various terrestrial insects. *A. dytiscidarum* R.-Kors. parasitizes eggs of small Dytiscidae (*Ilybius*, *Agabus*), mainly laid in those parts of the aquatic plants that are outside of water, but females also can go down into water, where they do not swim but only keep themselves as floating with the wings open. Found in Leningrad region”.

*Acmopolynema hazomanitrae* (Risbec, 1952), **comb. n.**

*Caraphractus hazomanitrae* Risbec 1952: 433-436.

*Stichothrix perineti* Risbec 1952: 434 (illustration), 436-438. **Syn. n.**

*Camptoptera perineti* (Risbec): Huber & Lin 1999: 31 (list).

Type material examined. Lectotype female [MNHN] of *Caraphractus hazomanitrae*, here designated to avoid any possible confusion about the status of the type specimens of this species, on card labeled: 1. “MADAGASCAR: Périnet, ex. galle de feuille d’hazomanitra (Rosaceae) (remonté de lame)”; 2. “elevation: 9.9.1950 sortie: 18.9.1950, No. G118, R. Paulian”; 3. (red) “*Caraphractus hazomanitrae* Risbec Syntype ♀”. This is one of three syntype females remounted by J. T. Huber in 2005 from the original depression slide; one of the two female paralectotypes lacks the head.

Holotype male of *Stichothrix perineti* [MNHN], dry-mounted under a raised quadrat coverslip sealed by wax on a slide labeled: 1. “Elevation du 9-9-1950 Eclou 18-9-1950, No. G118, P. galle á

feuille d'Hazemanitra [sic] de Périnet (Rosaceae) (A.R.)"; 2. (on the underside of the slide) "Mymaridae 4 *Stichothrix perineti* Risbec". The holotype specimen is in good condition (head with the antennae are detached).

Distribution. Madagascar.

Hosts. Unknown. Reared from galls on the leaves of hazomanitra (Risbec 1952) or clove nutmeg, *Ravensara aromatica* (Lauraceae).

Comments. The holotype of *Stichothrix perineti* is a male, not a female as erroneously indicated by Risbec (1952). It was reared in the course of the same collecting event as the three original female syntypes of *Caraphractus hazomanitrae*; there is no doubt whatsoever that these are conspecific, hence the synonymy. A detailed redescription and diagnosis of *A. hazomanitrae* will be given in the forthcoming review of the Afrotropical species of *Acmopolynema* (S. V. Triapitsyn and V. V. Berezovskiy, in preparation) based on the recently collected, well-mounted specimens from Madagascar.

## Acknowledgements

I thank Csaba Thuróczy (Köszeg, Hungary) for hospitality during my brief visit to his laboratory in 2002, where I had the opportunity to examine the borrowed holotype of *Caraphractus flavicollis*. Claire Villement (MNHN) kindly loaned me the types of Risbec's species. My father Vladimir Alexandrovich Trjapitzin (Moscow, Russia) compiled and made available to me a very useful synopsis of the Russian literature on Mymaridae and Trichogrammatidae.

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