

# Neotype designation for *Anaphes brevis* Walker (Hymenoptera, Mymaridae)

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## Abstract

A neotype for *Anaphes brevis* Walker (Hymenoptera: Mymaridae) is designated from among specimens reared in a laboratory culture on *Lygus* sp. (Hemiptera: Miridae). Based on specimens examined, the distribution of *A. brevis* extends west-east from UK (Wales) apparently as far as China and north-south from Germany to Morocco. The species also apparently occurs in North America.

## Keywords

France, *Anaphes brevis*, neotype, species description

## Introduction

Walker (1846) described *Anaphes brevis* as “*A. fuscipenni* affinis, alis limpidis latioribus”. This was one of seven species he described or redescribed and placed under *Anaphes* Haliday, and the only one mentioned as having been collected in France, in this case from the Forest of Fontainebleau (about 55 km south-south-east of Paris). Graham (1982) briefly discussed the species but could not locate any type material. Walker’s short description included only the fore wing feature, i.e., the clear, wider [than in *fuscipennis*] wings. This distinctive feature fits few species of *Anaphes*, as mentioned by Graham who determined that Walker’s specimen(s?) had been collected in late July, 1830 and noted that the species fits rather well the speci-

mens misidentified by Debauche (1948) as *A. fuscipennis* Haliday. Consequently Graham listed *A. fuscipennis sensu* Debauche under *A. ?brevis*. Huber and Thuróczy (2018) illustrated specimens they identified as *A. brevis* that had been reared from *Lygus* sp. (Hemiptera: Miridae) in Spain, and placed 8 other nominal species in synonymy under it. One of them was described originally from California, USA, and the remainder from four countries in Europe (Austria, Germany, Italy and Romania). *Anaphes brevis* clearly belongs to subgenus *Patasson* Walker on the basis of the 2-segmented clava. As understood by Huber and Thuróczy (2018) and assuming their synonymy is correct the species is evidently quite widespread in Europe and is almost certainly an accidental introduction into North America. Because specimens of *A. brevis* have definitely been reared from at least one species of *Lygus* Hahn, which contains economically important pests in many crops (Schwartz and Footitt 1998), it is potentially important for biological control. Despite this, relatively few references mentioning the species name *brevis* exist because no one knew how to recognize the species. Because of its potential importance, a neotype is designated below to fix the name *A. brevis* objectively and with the express purpose of clarifying the taxonomic status of the species. If the original material is ever discovered, which is unlikely given Graham's (1982) inability to find it despite his meticulous study of the Haliday (and Walker) collections, Article 75.8 of the International Code of Zoological Nomenclature applies.

Several corrections to Huber and Thuróczy (2018) are given here: P. 4, line 13 add a colon after “the names under 3 valid genera”; P. 4, line 23 should read “The great majority of *Anaphes* species were described from Europe”; P. 8, caption to Figure 2 should read “European type localities of *Anaphes*. See Tables ...”; P. 12, lines 8, 9, and 10, and P. 16, lines 11, 12 and 13, delete parentheses around Soyka and replace *Synanaphes*, *Mymar* and *Ferrierella* with *Anaphes*; P. 25, line 6, should read *crassipennis* Soyka, 1946a: 41 (*Anaphes*); P. 26, line 3 from bottom should read *medius* Soyka, 1946a: 40 (*Anaphes*); P. 27, line 13 should read *ovipositor* Soyka, 1946a: 41 (*Anaphes*); P. 27, lines 37 and 38 should be moved to just after line 19; P. 27, lines 39 and 40 should be moved to just after line 33; P. 68, caption to figure 33 should read “arrow indicates occipital groove”.

## Methods

Specimens preserved in ethanol were obtained from the European Parasite Laboratory, ARS, USDA, Orgerus-Béhoust, Yvelines, France. The specimens, including the neotype, had been reared from *Lygus* sp. in a laboratory culture. The original host and host plant, based on label data, apparently was *Lygus* sp. on stems of *Matricaria* sp. Several specimens were cleared and slide mounted in Canada balsam for photography. The remainder were card mounted after critical point drying. Slide-mounted specimens were photographed with a ProgRes C14<sup>plus</sup> digital camera attached to a Nikon Eclipse E800 compound microscope, and the resulting layers were combined electronically using Zerene Stacker and the images enhanced as needed with Adobe Photoshop (no re-

touching of the neotype was done). The neotype was measured at 100× magnification using a Leitz stereoscope fitted with an ocular micrometer. Measurements are given in micrometers. The specimens examined are deposited in two institutions:

**BMNH** Natural History Museum, London, England;

**CNC** Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario, Canada.

## Taxonomy

### *Anaphes brevis* Walker, 1846

Figs 1–11

*Anaphes brevis* Walker, 1846: 52 (original description); Graham 1982: 214 (diagnosis, discussion [as *Anaphes ?brevis*]); Huber and Thuróczy 2018: 28 (catalogue), 46 (key).

**Type material.** Neotype ♀ (BMNH) here designated to avoid ambiguity about the identity of this species, whose type material is lost (Graham 1982). The neotype (Fig. 1) is card mounted and in good condition but faded to brown, with 4 labels: 1. “FRANCE Yvelines Behoust vi.1987”. 2. “D. Coutinot Vial 2. F3 lab. culture”. 3. “ex Lygus eggs. CIE A19211”. 4. “NEOTYPE ♀ *Anaphes brevis* Walker”.

**Type locality.** France, Yvelines, Béhoust, which is about 100 km from Walker’s original collecting locality (Fontainebleau Forest). The neotype is designated from among specimens near the type locality rather than from among specimens reared in Spain (illustrated in Huber and Thuróczy 2018, figs 32–49), relatively far from the type locality. It is deposited in the institution (BMNH) where many of Walker’s primary types of Chalcidoidea are located. The slide mounted specimens illustrated (Figs 2–11) came from the same laboratory culture as the neotype.

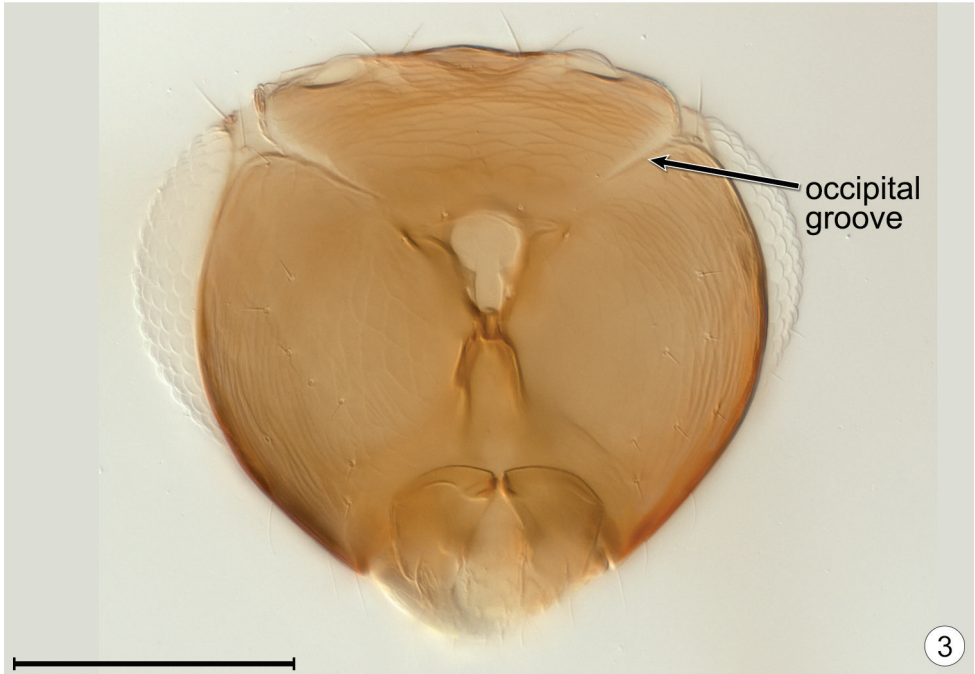
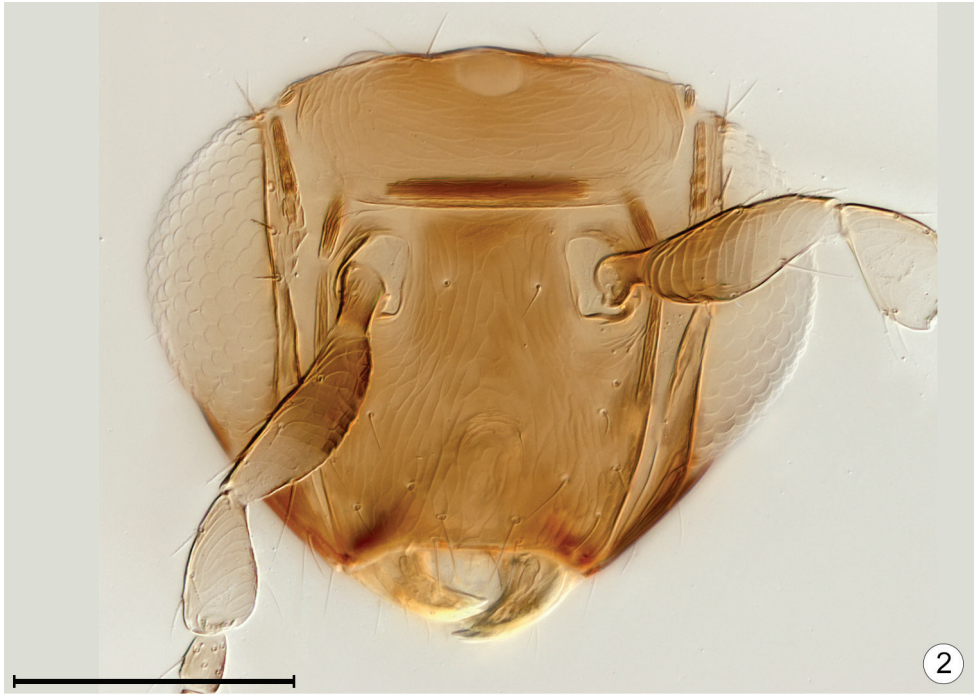
**Species diagnosis.** In Europe, *A. (Patasson) brevis* belongs to a small group of species with occipital groove directed medially towards occipital foramen, thus forming an angle with supraorbital trabecula and strongly diverging away from posterior margin of eye (Fig. 3), and with fore wing hyaline (Fig. 7, top arrow), its posterior margin with a short hyaline section subapically separating distal dark margin from proximal slightly darker margin (Fig. 7, left arrow), and cubital line of seta distinctly separated by a gap from posterior margin of fore wing (Fig. 7, bottom arrow). It is distinguished from the most similar species, *A. collinus* Walker, 1846 (type locality: Northern Ireland, Belfast, Cavehill) and *A. inexpectatus* Huber & Prinsloo, 1990 (introduced from Australia into Portugal and established there) by the following combination of features: length/width of  $fl_2$ – $fl_5$  each at least 3.1 in most specimens (Fig. 5) and with 2 mps (Figs 1, 5), though sometimes  $fl_4$  with 1 or 0 mps (Fig. 6), the segments without or with 1 mps usually shorter and slightly narrower than remaining funicle segments (rarely, the same specimen may have different numbers of mps on  $fl_4$ ); fore wing relatively wide (length/width 3.66–4.61) cubital row of setae separated from posterior margin of fore



**Figure 1.** *Anaphes brevis*, neotype, habitus. Scale bar: 500  $\mu\text{m}$ .

wing by a noticeable gap (Figs 1, 7); ovipositor at most about 1.5 as long as metatibia, extending anteriorly under mesosoma at most to level of mesocoxa (Fig. 11).

Female (neotype). Body length 645  $\mu\text{m}$ . Antenna brown, with apex of scape and pedicel except narrowly along their dorsal surfaces lighter brown; body and legs dark brown (presumably black if neotype were fresh) except trochantellus and apex of femora, base and apex of tibia, and tarsomeres 1–3 white. Antenna with length measurements



**Figures 2, 3.** *Anaphes brevis*, head. **2** anterior **3** posterior. Scale bars: 100  $\mu$ m.

as follows: scape (not measurable, its base hidden by collapsed face), pedicel 50, fl<sub>1</sub> 20, fl<sub>2</sub> 50, fl<sub>3</sub> 70, fl<sub>4</sub> 60, fl<sub>5</sub> 60, fl<sub>6</sub> 50, clava 110. Fore wing length/width 3.95 (790/200); ovipositor/metatibia length 1.49 (395/265), the ovipositor sac extending to base of mesocoxa. Metatarsomere 1 distinctly shorter than metatarsomere 2.

**Additional material examined.** CHINA. **Hebei.** Beijing, Mentougou, 1140–1250m, 19.v.2002, Zhu C.-d. (1 ♀ on slide, CNC). **Shaanxi.** Zhouzhi, 25.vi.1999, Zhu C.-d. (1 ♀, 1 ♂ on points, 1 ♀ on slide, CNC); Foping, 1750–2150m, 28.vi.1999, Zhu C.-d. (1 ♀ on slide, CNC). **Tibet.** Riwoqê, 3920 m, 17.viii.2001, Zhu C.-d. (1 ♂ on slide, CNC). FRANCE. **Yvelines.** Béhoust, 30.vii.1986, ex *Lygus* sp. in stems of *Matricaria* and in laboratory culture on *Lygus*, F1 and F3 generations, vi.1987, D. Coutinot, CIE A19211 (5 ♀, 3 ♂ on cards; 9 ♀, 4 ♂ on slides, CNC). MOROCCO. **Marrakech.** Ouirgane, 1000 m, 4–10.ix, 10–22.ix, 29.x–4.xi.1996, C. Kassebeer (2 ♀, 1 ♂, CNC). SPAIN. **Gerona.** Navata, emerged 21.ix.2000 ex. *Lygus* eggs on *Chenopodium* in cages, 14–21.ix.2000, D. Coutinot & J. Lopez (17 ♀, 6 ♂ on cards; 3 ♀, 2 ♂ on slides, CNC). UNITED KINGDOM. **England.** Berkshire, Ascot, Silwood Park, 11 & 12.vi.1994, J.S. Noyes (4 ♀ on cards, CNC). **Wales.** Wrexham, 10 km SW Llangollen, Llamon Dyffryn Ceiriog, 31.vii.1999, J.S Noyes (1 ♀, CNC).

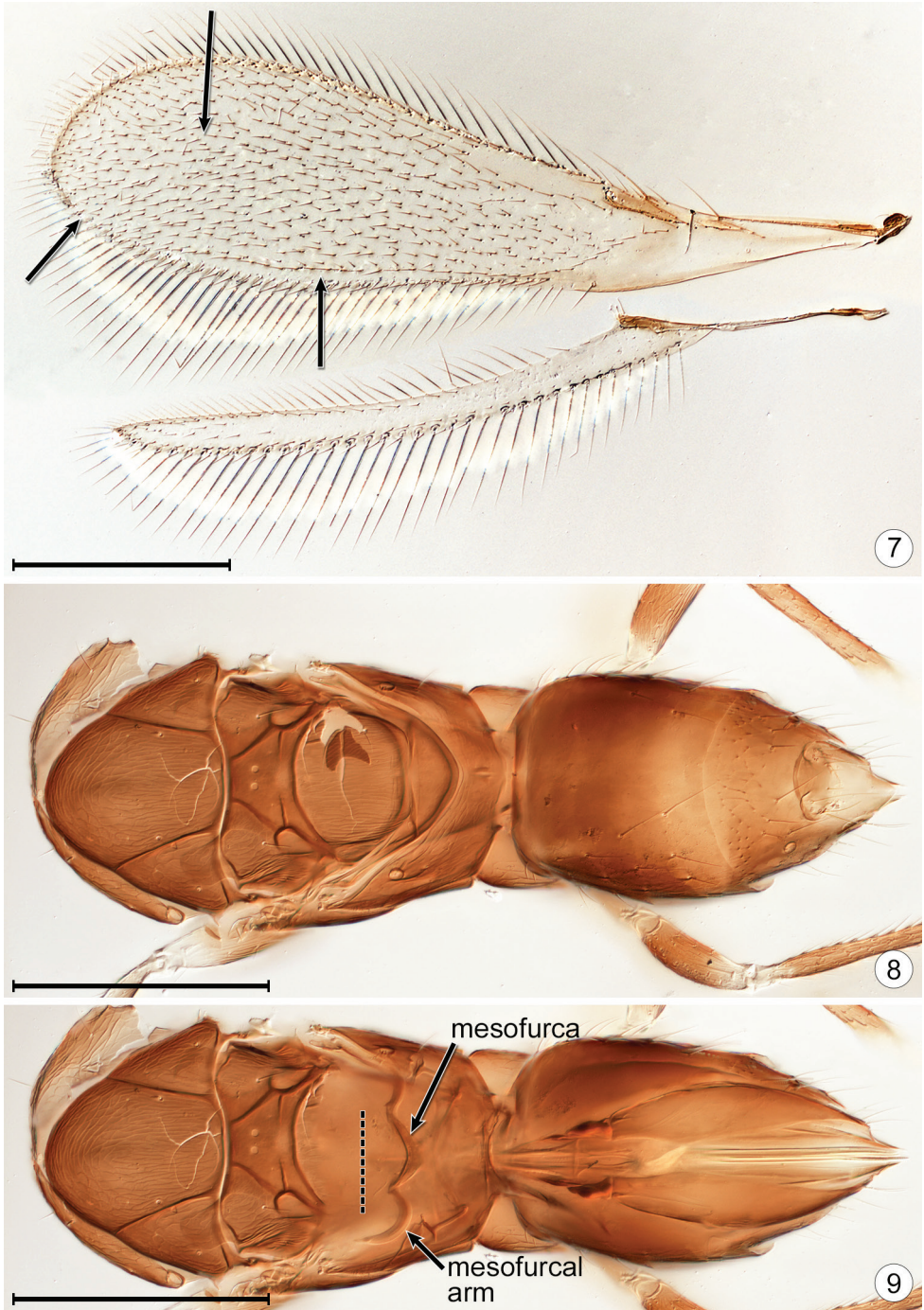
**Discussion.** *Anaphes (Patasson) collinus* Walker, described on the same page but before *A. brevis*, presents an interesting problem. It is very similar to *A. brevis* in wing colour and antennal features, but fl<sub>4</sub> almost always has no mps (Huber & Thuróczy 2018, figs 90b, c). Otherwise, *A. collinus* is smaller, with a longer, trombone-shaped ovipositor extending as far as base of procoxa.

In Europe, specimens of *A. collinus* were reared from stems of *Cardraria draba* containing eggs of *Ceutorhynchus cardraria* Korotyaev (Coleoptera: Curculionidae) from Romania, Valea Lupului, with various collecting/emergence dates in iv & v.2010, A. Diaconu (16 ♀ & 15 ♂ on cards, 2 ♀ on slides, CNC) and a similar, possibly undescribed species with generally longer funicle segments has been reared from *Rhinocyllus conicus* (Frölich) (Curculionidae) on *Carduus nutans* and *Silybum marianum* from France, Bouches-du-Rhône, St. Martin de Crau, 10.v.1988, J.-P. Aeschlimann (2 ♀, CNC) and Hérault, La Vacquerie-et-Saint-Martin-de-Castries, 19.vii.1985, J.-P. Aeschlimann (1 ♀, CNC). Whether these specimens actually represent *A. brevis* (or are indeed *A. collinus*, if priority of position on page is accepted) or yet another species, with the variation due to rearing from a different host order or different species is unknown. Since both named species parasitize hosts that are economically important or potentially so it might be worth determining their species status and host range.

In North America, *A. conotracheli* (Girault, 1905) is also extremely similar to *A. brevis*. Huber (2006) compared and contrasted *A. conotracheli* with *A. pallipes* (Ashmead, 1887) that Huber and Thuróczy (2018) placed in synonymy under *A. collinus*. The neotype fits very well Walker's (1846) short description of *brevis* quoted above but depending on the specimen it also more or less fits his equally short description of *collinus*: “Fem. Antennarum articulis a 4° inde alternis minoribus” and could also fit specimens of *A. conotracheli*. Because the relative size of fl<sub>4</sub> may vary, even between the antennae of the same specimen, and all three species have very similar fore wings, the

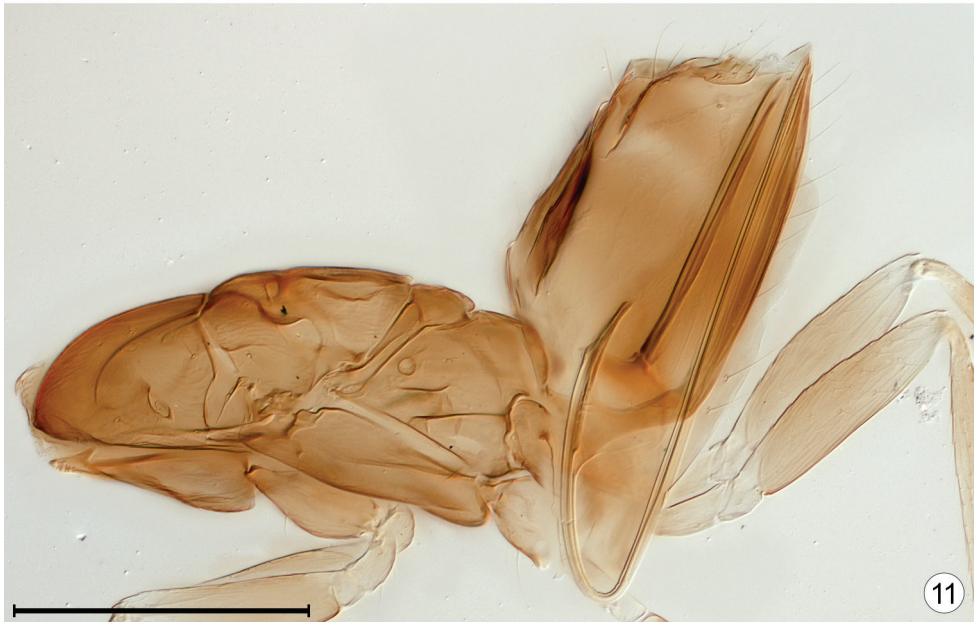


**Figures 4–6.** *Anaphes brevis*. **4** head + base of antennae **5** antenna, outer surface **6** antenna, inner surface. Note difference in fl<sub>4</sub> and cross striations on inner surface of scape (striations very faint and more longitudinal on outer surface). Scale bars: 200  $\mu$ m.



**Figures 7–9.** *Anaphes brevis*. **7** wings (see text for discussion) **8** body, dorsal **9** with frenum-gaster internal (more ventral) to show mesofurca and ovipositor through gaster; dashed line indicates anterior extension of ovipositor. Scale bars: 200  $\mu$ m.





**Figures 10, 11.** *Anaphes brevis*, body, lateral. **10** outer surface **11** median view of gaster showing ovipositor. Scale bars: 200  $\mu$ m.

neotype designation for *A. brevis* is even more important. Body length and, possibly, relative length of ovipositor (compared to metatibia length) may also vary depending on host though this needs to be verified. Breeding experiments among individuals and their progeny reared on different hosts (*Lygus* spp. versus various Curculionidae) and rearing F1 progeny on the alternate host to their parents, as was done with *Anaphes iole* Girault, 1911 (Huber and Rajakulendran 1988) or several species of *Anaphes* reared from carrot weevil, *Listronotus oregonensis* (LeConte) (Curculionidae) (Huber et al. 1997), might elucidate whether only one or several biological species are involved.

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