



First New Zealand record of the genus *Macrolophus* Fieber, 1858 (Hemiptera: Miridae: Bryocorinae: Dicyphini): *Macrolophus pygmaeus* (Rambur, 1839), a beneficial predacious insect

A. C. EYLES¹, T. MARAIS², & S. GEORGE³

¹ 30 Mahana Rd, Paraparaumu Beach, New Zealand. alan.pat@xtra.co.nz

² Zonda Resources Ltd, PO Box 756, Pukekohe, Auckland, New Zealand. terril@zonda.net.nz

³ Plant Health and Environment Laboratory, MAF Biosecurity New Zealand, Ministry of Agriculture and Forestry, PO Box 2095, Auckland 1140, New Zealand.

Abstract

Macrolophus pygmaeus (Rambur, 1839) is recorded for the first time in New Zealand. Viable adult *M. pygmaeus* were collected in the field in Auckland, in 2007, indicating that the species had already established itself in this country. The biology of *M. pygmaeus* is briefly discussed in the light of its potential economic benefits to growers of vegetable crops affected by whitefly (Aleyrodidae). The adults and nymphs are described and illustrated. An updated key to the genera and species of Bryocorinae in New Zealand is provided.

Key words: established; economic importance; description; diagnosis; biology; key to genera and species

Introduction

The mirid species *Macrolophus pygmaeus* (Rambur, 1839) was first collected in Auckland Botanic Gardens in February 2007. Further specimens were collected in August and September 2007 from the same site, indicating that a breeding population is present. Based on the length of time that *M. pygmaeus* is known to have been present and the abundance of suitable prey (whitefly), it is likely that the species will establish well in other parts of New Zealand with climates similar to Auckland's.

There are now three members of the subfamily Bryocorinae in New Zealand, all in the tribe Dicyphini. The two previously recorded are *Felisacus elegantulus* (Reuter, 1904) and the introduced *Engytatus nicotiana* (Koningsberger, 1903), which has been in New Zealand for at least 60 years (Eyles & Schuh 2003).

Biology

M. pygmaeus is a predator of whitefly in Spain, Russia, and Greece, and of green peach aphid, *Myzus persicae* (Sulzer, 1776), in Armenia and Greece (Wheeler, 2001). In New Zealand it has been collected along with *E. nicotiana* on whitefly-infested vegetables and other plants. While confined in rearing cages, adults and nymphs of *M. pygmaeus* were observed feeding directly on the adult and immature greenhouse whitefly *Trialeurodes vaporariorum* (Westwood, 1856). Martinez-Cascales *et al.* (2006) reviewed the economic importance of the closely related *Macrolophus melanotoma* (Costa, 1853) and *M. pygmaeus*. Both are well-known

predators of small arthropod pests in vegetable crops in Europe. The former species has been commercialised worldwide, mainly for the biological control of whitefly.

The incursion into New Zealand of *M. pygmaeus* may prove to be a fortuitous arrival of a beneficial insect, as this species is known to be very successful in the biocontrol of whitefly on vegetable crops.

Tracking down the species

The genus *Macrolophus* is distinguished by the eyes being placed well up on the sides of the head (Fig. 1) at or near level of middle of head, and usually by the pink, red, or dark longitudinal stripe behind each eye (Carvalho & Gagné 1968; Southwood & Leston 1959).

The New Zealand species (Fig. 6) looks very much like Southwood & Leston's (1959) colour figure of *Macrolophus pygmaeus* (Rambur, 1839) under the synonym *M. nubilis* (Herrich-Schaeffer, 1835). The left paramere (Fig. 3) is different from those in two Galápagos species figured by Carvalho and Gagné (1968). To our knowledge, the only drawings of the male genitalia of *M. pygmaeus* are those of Wagner (1957), and his figure of the left paramere (under the name *Macrolophus brevicornis*, a synonym), reproduced here in Fig. 4, points to our specimens being *M. pygmaeus*.

Martinez-Cascales *et al.* (2006) show that the male genitalia of two species, *M. pygmaeus* and *M. melanotoma*, appear to be identical, but their mtDNA confirms their identity as two distinct species. They further show that the shape of the [dorsal] longitudinal dark stripe behind the eye can distinguish between the two species with a high degree of confidence (compare Fig. 2 with Fig. 5). Using this character we concluded that the species now in New Zealand is *M. pygmaeus*, but sent a male and a female to G. Cassis, who, using the same morphological character, confirmed the identification.

Macrolophus pygmaeus (Rambur, 1839) (Fig. 1–4, 6–7)

Measurements of male (in mm): Length 3.08 (female 3.38); width 0.90 (female 1.02). Head: width 0.46; length of face 0.43; vertex width 0.23; postocular length 0.10. Antennae: length of segments 0.31: 1.10: 0.83: 0.45. Labium: length 1.20. Pronotum: length 0.42; width at posterior 0.63. Scutellum: length 0.34; width 0.33. Corium: length 1.42. Cuneus: length 0.47; width 0.22.

Pygophore without projections. Left paramere as in Fig. 3.

Colour of live specimens (Fig. 6): Green. Head with pink or red dorsal longitudinal stripe behind each eye. Often with a second pink or red longitudinal stripe behind lower edge of each eye. First antennal segment usually completely black (occasionally paler in middle); in males base and extreme apex of second segment, and middle of third segment, sometimes brown. First labial segment in males orange.

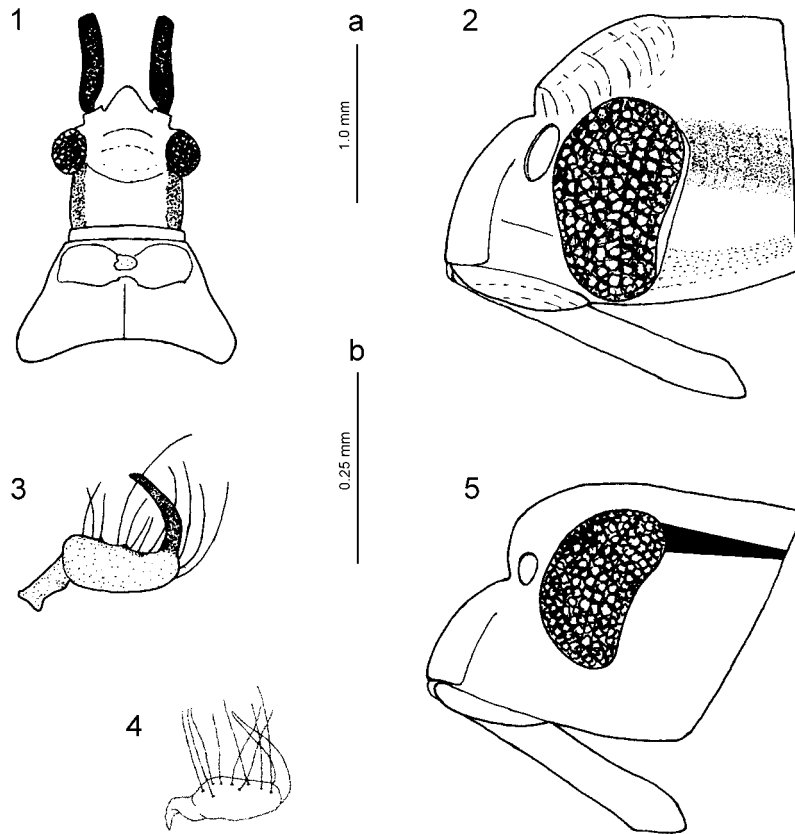
NYMPH (fifth instar): Measurements from two nymphs: Length 1.84–2.10; width 0.80–0.90. Head: width 0.41; length of face 0.50; vertex width 0.31; postocular length 0.10. Antennae: length of segments 0.25: 0.60: 0.59: 0.40. Labium: length 1.02. Pronotum: length 0.35; width at posterior 0.56. Wing pad: length (from pronotum) 0.94.

Colour of live specimens (Fig. 7): Green. Antennae and legs pale yellow. Eyes (from above) small and red; set well forward from base of head and just behind antennal insertions.

Longer, more slender, and paler than nymphs of *E. nicotianae* (Fig. 9–10) in which the eyes are larger and placed at or near base of head, and the nymph appears broader, shorter and darker.

DIAGNOSIS (on morphological character found to be reliable by Martinez-Cascales *et al.*, 2006): *Macrolophus pygmaeus* may be distinguished from *M. melanotoma* by the dorsal longitudinal red stripe behind each eye being usually broad, and having upper and lower edges almost always parallel, fuzzy and not well-defined or sharply in focus (Fig. 2). In *M. melanotoma* the stripe behind the eye has the upper and lower edges

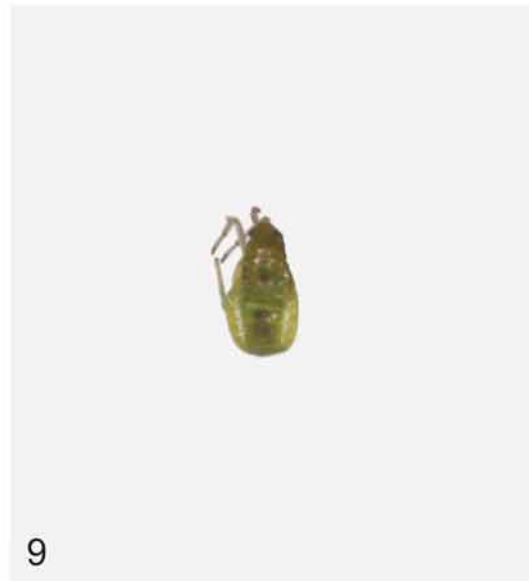
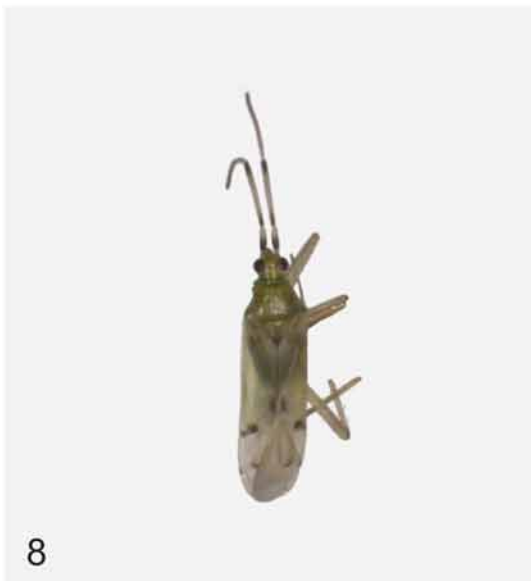
well-defined and sharply in focus, and almost always converging from anterior to posterior (Fig. 5). *M. pygmaeus* is distinguished from the other Bryocorinae in New Zealand (Fig. 8, 11) by the characters used in the key below.



FIGURES 1–5. 1–4 *Macrolophus pygmaeus* (1–3 of male, Auckland): 1, Head and pronotum, dorsal view, to show shape of head, small eyes, position of eyes on head, dorsal longitudinal red stripe behind each eye, and black first antennal segment; 2, head, lateral view, to show dorsal longitudinal red stripe behind eye, with upper and lower edges parallel, fuzzy and not well-defined or sharply in focus; 3, left paramere; 4, left paramere [from Wagner (1957)]. 5, *Macrolophus melanotoma* head, lateral view, to show stripe behind eye with upper and lower edges converging from anterior to posterior, well-defined, and sharply in focus [head and stripe outline copied from Martinez-Cascales *et al.* (2006)]. Fig. 1 to scale a; Fig. 2–5 to scale b.

REMARKS: A second character (not as reliable) which may be useful as supporting evidence in conjunction with the longitudinal stripe is the colour of the first antennal segment. Martinez-Cascales *et al.* (2006) found that in *M. melanotoma* a higher proportion of specimens have the first segment pale in the middle. In our material, 10 males and 12 females of *M. pygmaeus*, only two females have the first antennal segment pale in the middle. In three others (one male and two females) that segment is mostly black, whereas it is completely black in all the others. Apart from two slide-mounted specimens (with mostly black first antennal segment) in which the stripe behind the eye could not be clearly seen, all the other specimens have the stripe behind the eye broad, with upper and lower edges parallel and not well-defined.

Material examined: 10 males, 12 females, 2 fifth instars reared September 2007 from adults collected in Auckland Botanic Gardens by T. Marais. Deposited in New Zealand Arthropod Collection, Landcare Research, Auckland, New Zealand, and Plant Health and Environment Laboratory, MAF Biosecurity New Zealand, Ministry of Agriculture and Forestry, Auckland, New Zealand.



FIGURES 6–11 Bryocorinae now in New Zealand. 6–7 *Macrolophus pygmaeus* (Auckland): 6, male; 7, fifth instar. 8–10 *Engytatus nicotianae* (Auckland): 8, male; 9, fourth instar; 10, fifth instar. 11, *Felisacus elegantulus* male (Auckland).

Key to the genera and species of Bryocorinae in New Zealand

1. Head square across the front, with eyes very close to anterior (Fig. 11); first antennal segment much longer than width of head; forewings transparent (1 sp. in New Zealand) *Felisacus elegantulus*
- Head not square across the front, but pointed, with eyes either at level of middle of head or closer to posterior (Fig. 1, 6, 8); first antennal segment shorter than width of head; forewings opaque 2
2. Eyes smaller (Fig. 1, 6), removed from pronotum by a distance noticeably greater than width of first antennal segment; pygophore without projections; first antennal segment usually completely black (Introduced; 1 sp. in New Zealand) *Macrolophus pygmaeus*
- Eyes larger (Fig. 8), removed from pronotum by a distance approximately equal to (sometimes appearing a little less than) width of first antennal segment; pygophore with two very long hooked projections; first antennal segment pale in about apical third to half (Introduced; 1 sp. in New Zealand)
..... *Engytatus nicotianae*

Acknowledgments

Special acknowledgment is made to Peter McKenzie for the colour photographs of the insects, courtesy Nga Manu Images, Waikanae; and to Professor G. Cassis, School of Biological, Earth and Environmental Sciences, University of New South Wales for identification of *M. pygmaeus*. Our thanks to Birgit Rhode, Landcare Research, Auckland for assembling the colour plate; and to R. L. Palma, Curator of Insects, Museum of New Zealand Te Papa Tongarewa, for facilities (to A. C. E.).

References

- Carvalho, J.C.M. & Gagné, W.C. (1968) Miridae of the Galapagos Islands (Heteroptera). *Proceedings of the California Academy of Sciences (fourth series)*, 36(7), 147–219.
- Eyles, A.C. & Schuh, R.T. (2003) Revision of New Zealand Bryocorinae and Phylinae (Insecta: Hemiptera: Miridae). *New Zealand Journal of Zoology*, 30, 263–325.
- Martinez-Cascales, J.I., Cenis, J.L., Cassis, G. & Sanchez, J.A. (2006) Species identity of *Macrolophus melanotoma* (Costa, 1853) and *Macrolophus pygmaeus* (Rambur, 1839) (Insecta: Heteroptera: Miridae) based on morphological and molecular data and bionomic implications. *Insect Systematics & Evolution*, 37(4), 385–404.
- Southwood, T.R.E. & Leston, D. (1959) *Land and water bugs of the British Isles*. Warne, London, 463 pp.
- Wagner, E. (1957) *Macrolophus brevicornis* nov. spec. (Hem. Het. Miridae). *Entomologisches Nachrichtenblatt Österreichischer und Schweizer Entomologen*, 9, 14–15.
- Wheeler, A.G. (2001) *Biology of the plant bugs (Hemiptera: Miridae): pests, predators, opportunists*. Cornell University Press, New York, 506 pp.