

Topsy-turvy world – southern hemisphere thrips at home in the north (Insecta: Thysanoptera)

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ABSTRACT

In this work we present two southern hemisphere thrips – *Apterothrips apteris* (Daniel) and *Merothrips brunneus* Ward – which were found in Guernsey and in Hastings. Both are well established and present in permanent populations. A key to the identification of the two *Merothrips* species known from Europe is provided.

Keywords: *Apterothrips apteris*, invasive species, *Merothrips brunneus*, Guernsey, Hastings, United Kingdom

INTRODUCTION

Thrips (Thysanoptera) are widespread and occur almost everywhere on Earth. They are found in temperate and tropical zones as well as in cold regions such as Eastern Siberia. They are present in dry deserts as well as in wetlands, and only the polar regions lack suitable habitats for these insects (see among others Batthi 1998; Lewis 1997; Mound & Marullo 1996; Priesner 1965; Ulitzka, Evdokarova & Moritz 2020). Most thysanopteran species inhabit contiguous – sometimes extensive – areas. Insular distribution patterns, however, are also known, particularly for specialised species (Ulitzka 2020; Ulitzka & Graczyk 2022). Dispersal of thrips is commonly as part of the aerial plankton or transportation with plants and trade goods (Mound 1983; Mound & Walker 1987). The latter has led to cosmopolitan distribution in some species, and sometimes even their origin remains unknown (zur Strassen 2003). As a result of this transfer we frequently find surprising and, regarding pest thrips, worrying species, which often become established and continue to spread: *e.g.*, *Frankliniella occidentalis* (Pergande, 1895) was introduced in the 1980s from Western USA to Europe (zur Strassen 2003); *Thrips setosus* Moulton, 1928, was introduced in 2014 with *Hydrangea* plants from Japan to Europe (Netherlands) (Pijnakker & Mouratidis 2023); *Scirtothrips aurantii* Faure, 1929, was introduced in 2021 from Africa to Europe (Spain) (EPPO 2022); and the fungivorous and thus not economically important species *Tylothrips osborni* (Hinds, 1902) was introduced in 1993 from the Americas to Europe (Spain) and has been reported later from many different countries as far as Asia (Iran) (*cf.* Goldarazena & Mound 1998; de Marzo & Ravazzi 2007; Ulitzka 2013, 2020; Kobro & Ulitzka 2021; Yiğit *et al.* 2021; Mirab-balou, Minaei & Ulitzka 2022).

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The two species discussed below – *Merothrips brunneus* Ward, 1969, and *Apterothrips apteris* (Daniel, 1904) – have been repeatedly collected in Hastings, Great Britain, and on the Channel Island of Guernsey, respectively. Most probably they have been introduced with trade goods. Originating from the southern hemisphere, both are common in Australia and New Zealand. The objective of the present study is to document their occurrence in the north.

MATERIAL AND METHODS

Several specimens of the discussed species had been collected by the second and third authors, either in yellow pan traps or by direct beating of plants. Both authors provided microscopic photos on X (formerly Twitter), which caught the attention of the first author. Later, specimens in alcohol were sent to the first author and these were macerated in KOH and slide mounted in Canada balsam according to Ulitzka (2017). These samples are part of the first author's Thysanoptera collection except for one specimen of *A. apteris*, which is kept by A. Marquis. Numbers following 'MU-GB-' refer to collection numbers.

The specimens were examined and measured using a Zeiss Stemi SV-11 Apo stereomicroscope and a Zeiss standard microscope with the following objectives: Zeiss Neofluar 6.3/0.20 160/-, Zeiss Plan 10/0.22 160/-, Zeiss Plan 16/0.35 Ph2 160/0.17 and Zeiss Plan 40/0.65 160/0.17 Ph2. Images were taken with a digital camera (Canon EOS 70d) attached to the microscope, and these were produced using Helicon Focus software. Adobe Photoshop and Topaz Photo AI were used for final colour adjustment and sharpening.

RESULTS

MEROTHRIPIDAE

Merothrips brunneus Ward, 1969 (Figs 1–3)

Merothrips brunneus was described from Whakarewarewa, New Zealand from a dying Five Finger *Neopanax arboreus* (L.f.) Allan (Araliaceae) and later recorded from various regions of the North and South Island (Mound & O'Neill 1974; Mound & Walker 1982). It has also been reported from Australia (Brisbane and Canberra) and New Caledonia, and is known elsewhere from Costa Rica as well as from the Amsterdam and St Paul Islands (southern Indian Ocean). It probably originates from somewhere in South America (Cavalleri, Linder & O'Donnell 2019; Mound, Nielsen & Hastings 2017).

Both sexes of this species are wingless (Fig. 1). It can be distinguished from other members of *Merothrips* by the following character states. Females: mesonotum, metanotum and tergites without lines of sculpture (Fig. 2); tergite IX median setae shorter than sub-median pair; tergite X with trichobothria smaller than spiracle on tergite VIII (Fig. 3); axial seta short or absent. Males (Fig. 1): similar to females, but vertex developed as an extensive pore plate; fore legs enlarged with a pointed tubercle at inner apex of tibia; mesonotum, metanotum and tergites with several transverse lines of sculpture (Mound & O'Neill 1974; Mound, Nielsen & Hastings 2017).

Merothrips brunneus breeds on dead leaves and dead branches and presumably feeds on fungal hyphae.

Material examined

1♀, GUERNSEY: (*M. cf. brunneus*, examined with a stereo microscope and identified only by a photo, see Marquis 2020), St Sampson, Camp du Roi, 49°28'46.3"N 2°33'25.1"W, 01.IV.2020, A. Marquis leg. (from lichen scraped from a fence post, soaked in water whilst searching for small invertebrates), M.R. Ulitzka det; 1♀ (MU-GB-35/1), GUERNSEY: St Peter Port, Ivy Castle



Figs 1–4. — *Merothrips brunneus* Ward: 1, ♂ dorsal view; 2, ♀ head and pronotum; 3, ♀ abdominal tergites VIII–X (s = spiracle, t = trichobothrium); 4, habitat: Battle Great Wood, Hastings (with MRU & DB collecting thrips).
 Photo: Fig. 4, Y. Bernet

Woods, 49°28'17.76"N 2°32'24.00"W, 1.VI.2022, A. Marquis leg. (from dead twigs and leaf litter using a Tullgren funnel), M.R. Ulitzka det.

1♀ (MU-GB-34/1), ENGLAND: East Sussex, Hastings, Brede High Woods, 50°57'32.57"N 0°33'24.35"E, 15.V.2022; 1♂ (MU-GB-44/3) & 4♀♀ (MU-GB-44/1, MU-GB-44/2, MU-GB-44/4, MU-GB-44/5), 21.VIII.2023, D. Binns leg. (from *Betula-Cystus*-scrub), M.R. Ulitzka det.; 1♀ (MU-GB-43/1), ENGLAND: East Sussex, Hastings, 21 Barnfield Close, 50°51'40.60"N 0°34'6.13"E, 14. VII.2023, D. Binns leg. (yellow pan trap), M.R. Ulitzka det.; 2♀♀ (MU-GB-34/2, MU-GB-34/3), ENGLAND: East Sussex, Hastings, Battle Great Wood, 50°54'48.61"N 0°30'32.05"E, 22.VII.2022, D. Binns leg. (forest edge with *Juncus*, *Carex*, *Hypericum* and *Rubus*, Fig. 4), M.R. Ulitzka det., and 1♂ (MU-GB-37/12) same location, 21.VIII.2023, Y. Bernet leg., M.R. Ulitzka det.

THRIPIDAE

Apterothrips apteris (Daniel, 1904) (Figs 5–7)

Apterothrips apteris was described from Berkeley, California, USA from grasses (Daniel 1904). It has been reported southward from California through Mexico and the west coast of South America to the Falkland Islands and is also known from Hawaii. Probably distributed by the whaling industry, this species is found today in Western Australia, Tasmania, Norfolk Island and it is widespread and common throughout New Zealand (Mound, Nielsen & Hastings 2017). Moreover, *A. apteris* has been recorded twice in Scotland, at Ayr and Fair Isle (Morison 1973), and twice in England, in West Yorkshire and Devon (Collins 2000, 2010), but otherwise it is not known from Europe (Mound, Collins & Hastings 2018).

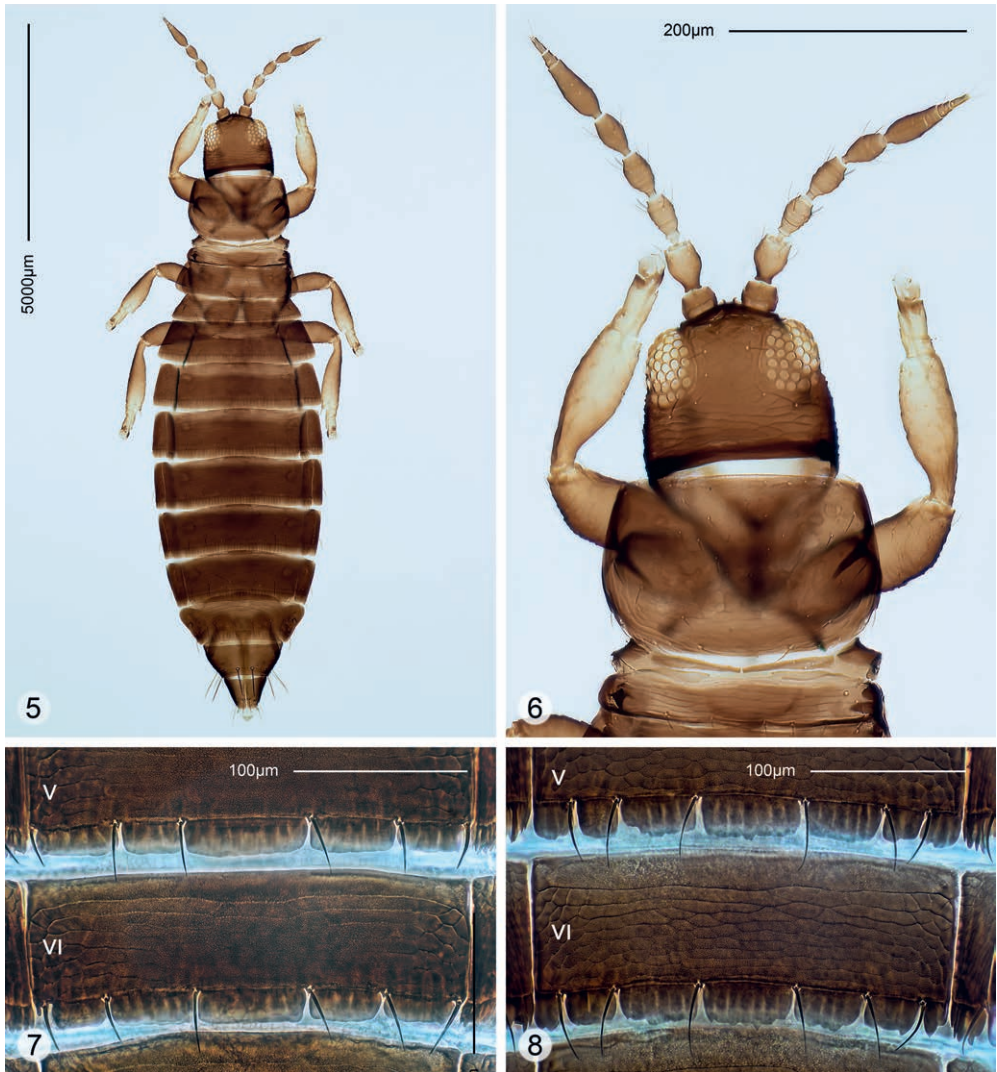
Only two species are recognised in *Apterothrips*, of which *A. apteris* is – as mentioned above – essentially a southern hemisphere species, whereas the second species, *A. secticornis* Williams, 1913, is found essentially in the northern hemisphere (Mound & Marullo 1996). The New Zealand record of *A. secticornis* in Mound & Walker (1982) was a misidentification of *A. apteris* (Nakahara 1988). Both species are very similar and distinguished by the number of lobes on their sternal craspeda: *A. apteris* has sternites III–VI with a well-developed five-lobed craspedum (Fig. 7) whereas these craspeda in *A. secticornis* have seven lobes (Fig. 8). Both sexes of *A. apteris* are uniformly dark brown and wingless (Fig. 5). Their head and pronotum are similar to those found in *Anaphothrips* species. The antennae are 8-segmented, but segment VI bears an incomplete oblique suture producing an apparently 9-segmented condition (Fig. 6); the sense cones on III–IV are simple (Fig. 6). Males are smaller and paler than females and have a single glandular area on the anterior margin of the third abdominal sternite; tergite IX has two pairs of short stout and thorn-like setae.

Apterothrips apteris feeds and breeds on leaves. It is commonly found on grasses (Poaceae), *Erigeron* L. (Asteraceae), and is known to cause leaf deformation on *Medicago* L. (Fabaceae) and garlic (*Allium* L., Amaryllidaceae).

Material examined

2♀♀ (MU-GB-32/1, MU-GB-32/2), GUERNSEY: St Peter Port, St John's Church Cemetery, 49°27'45.97"N 2°32'17.55"W, 14.V.2022, A. Marquis leg. (from grasses), M.R. Ulitzka det.; 1♀ (photo, see Marquis 2023), GUERNSEY: Vale, l'Islet, 49°29'29.9"N 2°32'31.2"W, 18.V.2023, A. Marquis leg., det. and col. (swept from short coastal grasses and plants).

5♀♀ (MU-GB-46/1, MU-GB-46/2, MU-GB-46/3, MU-GB-46/4, MU-GB-46/5), GUERNSEY: Bordeaux Harbour, 49°29'26.96"N 2°30'24.26"W, 21.V.2024, A. Marquis leg. (swept from flowering *Foeniculum vulgare* Mill.; mass catch; see Marquis (2024)), M.R. Ulitzka det.



Figs 5–7. — *Apterothrips apteris* (Daniel): 5, ♀ dorsal view; 6, ♀ head and pronotum; 7, ♀ abdominal sterna V–VI (craspeda with five lobes).

Fig. 8. — *Apterothrips secticornis* Williams ♀ (from Norway): abdominal sterna V–VI (craspeda with seven lobes).

DISCUSSION

Records of newly adventive species easily raise the questions of how they have been introduced, and from where. In both cases of the thrips described above, these questions cannot really be answered. However, it seems obvious that they must have arrived some time ago. Both have been collected repeatedly in different years and in different locations, suggesting that they are reproducing continuously and have become resident. Furthermore, they appear to have been introduced by anthropogenic impact, *e.g.*, ship traffic (see Mound 1983), rather than by natural

dispersal. Both produce exclusively apterous forms and have not been found anywhere nearby, *e.g.*, on the European mainland. In view of the lack of wings, a natural migration from the southern to the northern hemisphere of these species seems improbable. The suggestion that it is behaviour, rather than the mere presence of wings, which is important for an aerial transport (Mound 1972) seems not applicable for this large distance.

Regarding the occurrence of *Apterothrips* on Guernsey and in Scotland and England (Collins 2000, 2010) it seems strange to find these southern hemisphere species while the European species *A. secticornis* is not known from there. Perhaps the temperate maritime climate is too mild for *A. secticornis*, as this species tends to occur in borealpine cool areas rather than temperate climate zones (zur Strassen 2003). It has been reported from many northern surrounding countries such as Norway (Kobro 2003), Finland (Kettunen 2008), Sweden (Gertsson 2015) or Iceland (Maltbæk 1938). Across the English Channel it is found as far south as Italy (Vierbergen, Kucharczyk & Kirk 2010), however there it is known primarily from mountainous regions (see Senckenberg Aquila 2024). Perhaps *A. secticornis* might be expected in the Scottish Highlands or in the mountains of Wales, but data on thrips faunistics from these locations is poor. *Apterothrips apteris*, however, is well established; larvae have been recorded in Britain (Mound *et al.* 1976 [note: incorrectly designated as *A. secticornis*]).

Regarding the finds of *M. brunneus*, it seems interesting to note that merothripids actually do not occur naturally in Europe. Most species of *Merothrips* are from the Americas, particularly the Neotropics. Originally, they never seem to have lived in colder, temperate regions. On the European continent these thrips were widespread during the warmer epochs of the Eocene, as various fossils from Baltic amber show today (Priesner 1924; Ulitzka 2015, Ulitzka & Mound 2017). But then, with the latest cold periods during the Quaternary they have disappeared. The first extant *Merothrips* found in Europe was *M. priesneri*, described by Bournier (1960) from leaf litter of *Quercus ilex* L. close to Montpellier, France. Later this species was synonymised with *M. floridensis* Watson, 1927 (Mound & O'Neill 1974), which is known today to be widespread around the world. Possibly originating from a Caribbean area (Hoddle, Mound & Paris 2012), it has been introduced into many different regions worldwide, including France and Spain in southern Europe (Mound & O'Neill 1974). On persimmons (*Diospyros* sp.) as well as on wood imported from Spain, *M. floridensis* was found as a 'quarantine intercept' in the United Kingdom (Collins 2010, and pers. comm. 2020). It was obvious, however, that the specimens collected on Guernsey and in Hastings did not match with *M. floridensis*. The pronotum of the females and the tergites are much smoother than in *M. floridensis*, without lines of sculpture (Fig. 2), and the trichobothria on tergite X are smaller: as small as the spiracles on VIII (Fig. 3). Comparing the specimens with various slides from the Senckenberg Museum, Frankfurt (see Senckenberg Aquila 2024) and with a slide mount including a male and a female from Norfolk Island (Australia) confirmed them to be *M. brunneus*. As *M. brunneus* is found in the southern hemisphere in locations with temperate rather than tropical climates, such as the Saint Paul and Amsterdam Islands, it has probably adapted easily to the similar – albeit in winter colder – conditions in the south of the United Kingdom, and quickly has found suitable habitats. On Guernsey and in Hastings, *M. brunneus* thus established the first permanent populations of a merothripid species in northern Europe.

Key to the *Merothrips* species found in Europe

- Tergite X with sensoria reduced (Fig. 3), as large as or smaller than spiracle on VIII (or absent); antennal segments III and IV with small and lens-shaped sensoria; pronotum in females smooth (Fig. 2), tergites without sculpture or with two or three faint lines only (sculpture present in males!); both sexes apterous (Fig. 1); from the United Kingdom
 *M. brunneus*
- Tergite X with sensoria about twice as large as spiracle on VIII; antennal segments III and IV with broadly transverse oval sensoria; both sexes with pronotum sculptured in about posterior fourth, pteronota and tergites entirely sculptured; males wingless, females apterous or fully winged; from Southern Europe *M. floridensis*

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