The exotic Chinese wasp *Perilitus erratus* discovered in the centre of Amsterdam (Hymenoptera: Braconidae: Euphorinae)

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The Asian species *Perilitus erratus* (Hymenoptera: Braconidae: Euphorinae) was discovered for the first time in Europe in the centre of Amsterdam (Vondelpark). This wasp was described from China, and later reported from Korea. Most likely, the presence of this parasitoid in the city park in the Netherlands concerns a recent accidental introduction.

Introduction

During the first Amsterdam Taxon Expedition (Van Achterberg 2020) in the oldest park of Amsterdam (Vondelpark) by the team of the third author, a remarkable and unknown endoparasitoid of the genus *Perilitus* was found.

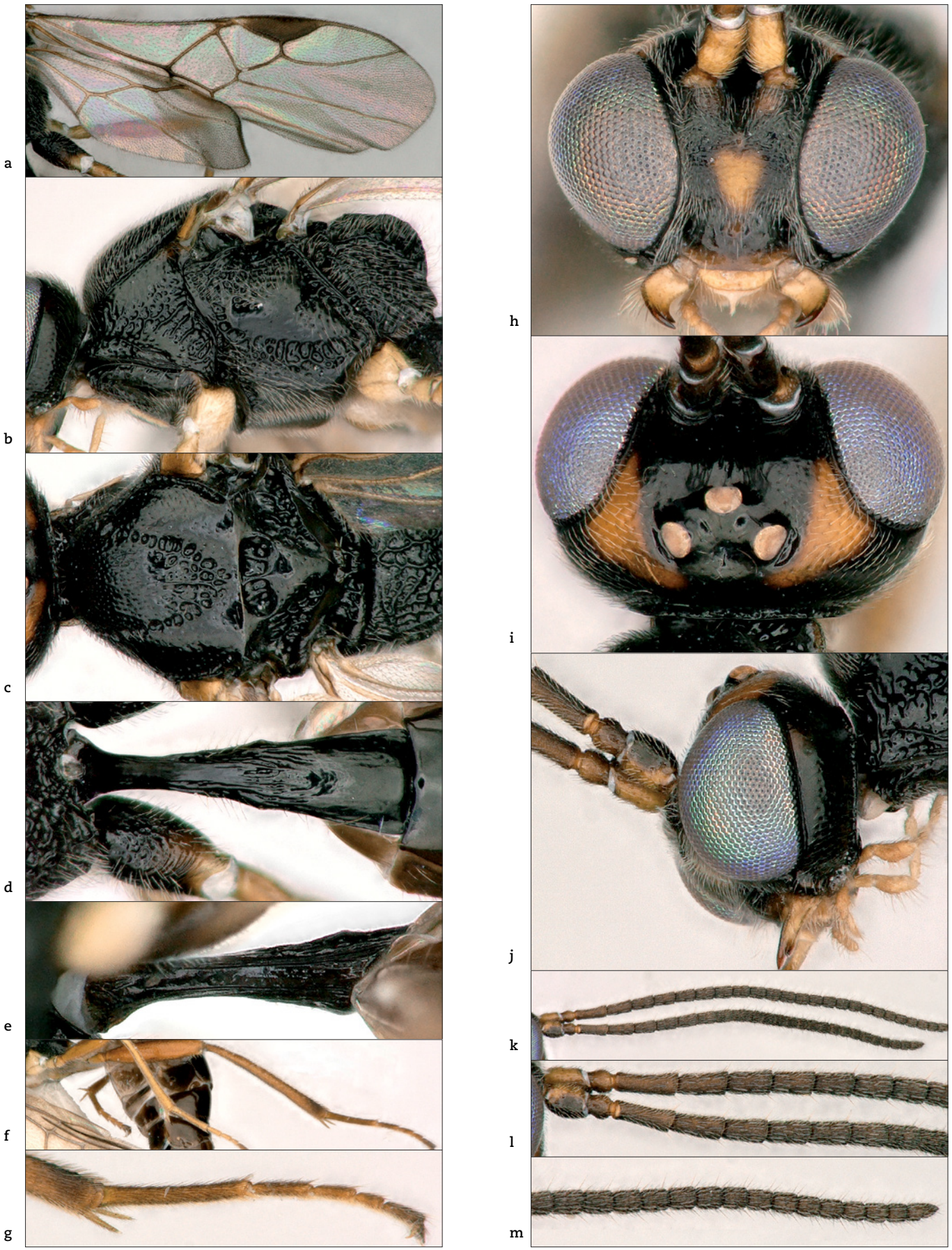
The genus *Perilitus* belongs to the medium-sized subfamily Euphorinae (Hymenoptera: Braconidae) and contains endoparasitoids of adult beetles belonging to the families Chrysomelidae, Curculionidae and Tenebrionidae (Haeselbarth 1999). The genus has a cosmopolitan distribution and contains 143 valid species (Yu *et al.* 2016). One species, *P. rutilus* (Nees, 1811), has been introduced in Canada and USA to control *Sitona* weevils (Bartlett *et al.* 1978, Loan 1961). *Sitona* weevils are represented by nineteen species in the Netherlands (www.nederlandsesoorten.nl).

After comparison with Chinese specimens in the collections of Zhejiang University (Hangzhou) and Northwest University (Xi'an), it became obvious that the collected specimen in the Vondelpark concerns an East Palaearctic and Northwest Oriental species, *P. erratus* (Chen & van Achterberg 1997). The biology of *P. erratus* is unknown, but most likely it is also a parasitoid of adult beetles as its congeners are.

Collecting and methods

The selected collection site for the first Amsterdam Taxon Expedition was the Koeienweide ('cow pasture', 52°21'21"N 4°51'28"E, 2 m below sea level) in the 155 years old Vondelpark because it has been maintained as an ecological enclave in the park. It is a small wet meadow largely bordered by a canal and includes a pond with marsh vegetation. The park is situated in the centre of Amsterdam and attracts about ten million visitors per year, but the studied area is closed for regular visitors. Collecting was done with a Malaise trap designed in China (Taiwan) with curved sides. Specimens were collected and stored in 70%

1. *Perilitus erratus* (Chen & van Achterberg), ♀, the Netherlands, Amsterdam (province of Noord-Holland), habitus, lateral aspect. Photo: C. van Achterberg
1. *Perilitus erratus* (Chen & van Achterberg), ♀, Nederland, Amsterdam (Noord-Holland), habitus, zijaanzicht.



2. *Perilitus erratus* (Chen & van Achterberg), ♀, the Netherlands, Amsterdam (province of Noord-Holland). (a) Wings, (b) mesosoma, lateral aspect, (c) mesosoma, dorsal aspect, (d) first metasomal tergite, dorsal aspect, (e) id., ventral aspect, (f) hind leg, (g) hind tarsus, lateral aspect, (h) head, anterior aspect, (i) head, dorsal aspect, (j) head, lateral aspect, (k) antennae, (l) base of antennae, lateral aspect, (m) apex of antenna. Photos: C. van Achterberg

2. *Perilitus erratus* (Chen & van Achterberg), ♀, Nederland, Amsterdam (Noord-Holland). (a) Vleugels, (b) mesosoma, zijaanzicht, (c) mesosoma, bovenaanzicht, (d) eerste metasomale tergiet, bovenaanzicht, (e) id., onderaanzicht, (f) achterpoot, (g) achtertarsus, zijaanzicht, (h) kop, vooraanzicht, (i) kop, bovenaanzicht, (j) kop, zijaanzicht, (k) antennes, (l) basis van antennes, zijaanzicht, (m) uiteinde van antenne.

ethanol, and subsequently prepared according to the AXA method (Van Achterberg 2009, Van Achterberg *et al.* 2010), and glued on card points. Images were acquired by using a Keyence VHX-5000 Digital Microscope imaging system and they were processed with Photoshop CS5 software. Morphological terminology follows Van Achterberg (1988). RMNH stands for Naturalis Biodiversity Center, Leiden.

The collected specimen was compared to eight Chinese specimens from Shaanxi, Yunnan and Liaoning, including the holotype. The specimens from Shaanxi that were used for comparison represent the first record of *P. erratus* from Shaanxi. Outside China *P. erratus* is known from [North] Korea (Papp 2003).

Results

The collecting resulted in the discovery of the following species not encountered before in Europe or in the West Palaearctic region.
Material: *Perilitus erratus* (Chen & van Achterberg, 1997) 1 ♀ (figures 1-2), 'Netherlands: NH, Amsterdam, Vondelpark, Koeienweide, Mal[aise] trap, 2-12.vii.2019, Taxon Exped[itions], RMNH'.

Differentiating diagnosis

Perilitus erratus belongs to a small group of aberrant *Perilitus* species occurring in the East Palaearctic and Northeast Oriental regions having vein 1-M of the hind wing much shorter than vein 1r-m (about half as long, figure 2a) and the first metasomal tergite narrow subbasally (figure 2d). *Perilitus erratus* differs from similar species by having the anterior tentorial pits nearly touching the eyes (figure 2h), the dorsal face of propodeum perpendicular with its posterior surface (figure 2b), the first metasomal tergite 2.9-3.1 times longer than its posterior width and largely smooth (figure 2d), the mandible with a fine longitudinal carina and stemmaticum with small depression between the posterior ocelli (figure 2i). In Europe, it shares the elongate and slender first tergite and the weakly curved vein 3-SR+SR1 of the fore wing with the Palaearctic and NE Oriental *P. kokujevi* Tobias, 1986, known in Europe from northwestern Russia and Norway. The latter species differs by having the anterior tentorial pits far removed from the eyes (Chen & Van Achterberg 1997, as *P. liui* and *P. lateropus*), the laterope of the first tergite present (absent in *P. erratus*, figure 1, 2d, 2e) and surface of the tergite distinctly striate (largely smooth in *P. erratus*), the propodeum rather rounded posteriorly in profile (nearly truncate in *P. erratus*, figure 2b) and the hind coxa only punctate (posteriorly with curved striae in *P. erratus*, figure 2d).

When comparing the female from Amsterdam to the holotype of *P. erratus*, it is very similar and differs mainly in the placement of the vein m-cu of the fore wing. The vein is distinctly postfurcal in the female from Amsterdam (figure 2a), but this character is variable among the examined Asian specimens.

Variation of examined specimens

Length of body 4.5-5.4 mm; vein 1-R1 of fore wing 0.8-0.9 times as long as the pterostigma; setose part of ovipositor sheath 0.4-0.5 times as long as fore wing; vein m-cu of fore wing subinterstitial to distinctly postfurcal; first metasomal tergite 2.9-3.1 times longer than its apical width; hind coxa either largely black with rather strong sculpture (figure 2d) and hind femur brownish or (in specimens from Yunnan) hind coxa and femur brownish yellow and sculpture of hind coxa less developed; face dark brown or partly pale brown medially; clypeus brownish or largely dark brown.

Distribution

China (Oriental: Guizhou, Yunnan; Palaearctic: Liaoning, Shaanxi), Korea, the Netherlands.

Discussion

Accidental introductions of parasitoids are rarely reported because the requirement of suitable host(s) already present in the new habitat lowers the chance of a successful introduction. The scarcity of parasitoid researchers with a focus on taxonomy or natural history is another factor causing an introduction to remain unnoticed. *Perilitus erratus* was not found during the latest revision of the genus by Haeselbarth (1999) for which all major collections of West Palaearctic Braconidae were examined. Therefore, most likely, the record of this parasitoid concerns a recent accidental introduction in Europe. Until more specimens of this probably non-native species are found, and the host is known, little can be stated about origin and fate of this species in Europe. The habitat in China is different from the wet lowland habitat of the Koeienweide; the examined Chinese specimens come from open montane forest, but this may be the result of cultivation of the neighbouring lowland.

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Samenvatting

De exotische Chinese parasitoïde wesp *Perilitus erratus* in het centrum van Amsterdam (Hymenoptera: Braconidae: Euphorinae)

De Aziatische soort *Perilitus erratus* (Hymenoptera: Braconidae: Euphorinae) werd ontdekt in het centrum van Amsterdam (Vondelpark, Koeienweide). De soort is beschreven uit China en later uit Korea gemeld. De biologie is onbekend, maar verwante soorten zijn endoparasitoïden van volwassen kevers (Chrysomelidae, Curculionidae en Tenebrionidae). Toevallige introducties van parasitoïden worden zelden waargenomen, omdat het succes van de introductie afhangt van het al dan niet aanwezig zijn van een geschikte gastheer in de nieuwe habitat. Het geringe aantal onderzoekers dat zich bezighoudt met de taxonomie van parasitoïden is een andere factor die waarnemingen minder waarschijnlijk maakt. Het is waarschijnlijk dat de waarneming van *P. erratus* in Amsterdam een recente toevallige introductie in Europa betreft omdat het genus niet gevonden is tijdens een recente revisie. Zolang de gastheer van deze soort onbekend is kan er weinig gezegd worden over de herkomst en toekomst van deze soort in Europa.

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