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New synonymy in the wheat thrips, *Haplothrips tritici* (Thysanoptera: Phlaeothripidae)

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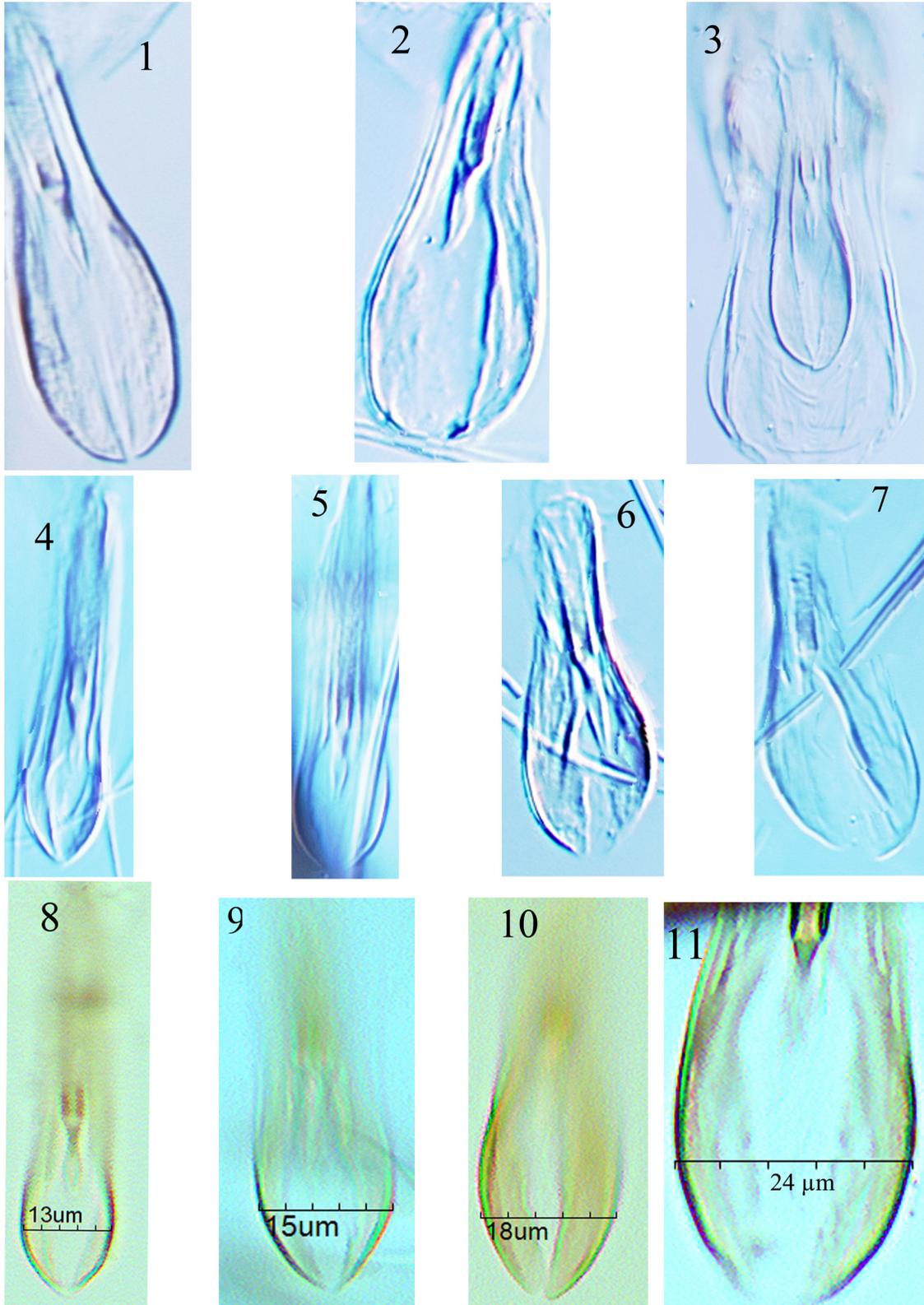
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The wheat thrips, *Haplothrips tritici*, is known from across eastern Europe and adjoining areas of Asia into western Europe and north Africa, and is widely regarded as a pest of cultivated cereal crops, particularly of *Triticum* but also of *Hordeum* (Özsüslü 2011). The identity of this thrips species is not in doubt, but a closely similar species, *Haplothrips cerealis*, was described from Egypt (Priesner 1939), and subsequently recorded between southeastern Europe and Iran (see Minaei & Mound 2008). Priesner based this species on an unspecified number of specimens of both sexes, collected from the ears of cultivated wheat at “Wadi Gederât, Sinai”, and did not designate a holotype. Minaei and Mound (2010) indicated that they considered the records of *cerealis* from Iran to be based on misidentifications of *tritici*, but they suggested that further studies were required to determine if there is any evidence that these names represent different species in other countries. The problems arise because the published descriptions of, and comparisons between, the two species are confusing and sometimes contradictory. The objective of this report is to examine the published literature, and to consider this in relation to observed structural variation in recently collected samples as well as specimens in museums that are variously labeled as one or other of these two species.

Literature references to females

The original description (Priesner 1939) states that *cerealis* differs from *tritici* in having shorter postocular, prothoracic and abdominal setae that are sharply pointed, whereas those of *tritici* are rounded at the tip, and that *cerealis* also differs in the shape of the male aedeagus. Subsequently, Priesner (1950) provided a key to the world species of *Haplothrips*, but the choices involved in this are confusing with *cerealis* emerging at one couplet only, but *tritici* emerging at five different couplets. At couplet 60(85) the choice is “Major bristles blunt, at least basal wing bristles 1 and 2 blunt or knobbed”, with the contrasting choice “Epimeral and basal wing bristles (at least b.2 and 3) sharply pointed”. The first choice will lead to *tritici* (plus some other species), and this agrees with Priesner’s 1939 statement above. The second choice at couplet 60(85) will lead to 15 species, of which the final pair is *tritici* and *cerealis* (couplet 113/114) with *tritici* stated to have “Prothoracic and basal wing bristles nearly knobbed”, but *cerealis* to have “Major bristles slightly blunt”. Thus the choice leading to *cerealis* at couplets 60(85) (sharply pointed) contradicts that leading to this species at 113(114) (slightly blunt). Later couplets in this key indicate that *tritici* has the major setae “not quite sharp” or “narrowed toward blunt tip, not distinctly knobbed”. Thus this key does not function to distinguish *cerealis* females from those of *tritici*.

Despite the problems indicated with the 1950 comparison, in a subsequent key to the *Haplothrips* species of Egypt, Priesner (1965) distinguished the two species at couplet 47(52) by “Major bristles blunt, at least bristles 1 and 2 of wing base knobbed or blunt” leading to *tritici*, in contrast to “Epimeral and basal wing bristles nearly sharply pointed” leading to *cerealis*. This distinction is repeated by Priesner (1964) in the key to European species of *Haplothrips*. The only other identification system that includes these two species is a key to *Haplothrips* species of Germany by Schliephake and Klimt (1979). However, these authors concluded that it is not possible to distinguish the females of *cerealis* from those of *tritici*, and added that these species can be distinguished only by the male genitalia. In contrast, Zawirska (1993) sorted 70 individuals from four sites in Poland, and recognised as *cerealis* all those individuals with antennal segments III and IV “viel dunkler” (i.e. much darker), and the remainder as *tritici*. As indicated by Minaei and Mound (2010), this study is unconvincing, both in its design and in its lack of statistical rigour.



FIGURES 1–11. *Haplothrips tritici pseudovirga* apex. (1) *Haplothrips cerealis*, syntype from Egypt; (2) male from Turkey identified as *cerealis*; (3) male from Rumania identified as *cerealis*; (4) male from Noorabad, Fars Province, Iran; (5) male from Polemoon, Mazandarn Province, Iran; (6) male from Mahdasht, Alborz Province, Iran; (7) male from Varamin, Tehran Province, Iran. *Haplothrips tritici pseudovirga* apex, males from Iran. (8) Karaj, Alborz Province, from *Triticum*; (9) Polemoon, Mazandaran Province, from *Bromus*; (10) Noorabad, Fars Province, from *Hordeum*; (11) Isfahan, Isfahan Province, from *Triticum*.

Minaei and Mound (2010) examined several morphological characters of various populations of *Haplothrips tritici* in Iran. The data provided in that paper demonstrated that both sexes of *tritici* exhibit far more variation in various structural characters, both within and between populations, than had previously been recorded by any earlier authors. As a result, it was concluded that there is no evidence that *cerealis* occurs in Iran.

Literature references to males

Minaei and Mound (2008, 2010) showed clearly that for males as well as females the lengths of the major setae and the form of their apices, also the lengths of the third and fourth antennal segments as well as some other characters, are highly variable with no evidence of bimodality that would facilitate discrimination between *tritici* and *cerealis*. In 2006, whilst working on the Haplothripini of Australia and Iran, the present authors asked the late Richard zur Strassen for advice. He indicated that in the female sex the two species are difficult to distinguish, but he expressed the opinion that the shape of the spoon-like tip of the pseudovirga, the male genitalia, differs as follows: 20–23 microns broad in *cerealis* in contrast to 11–14 microns in *tritici*.

Male genitalia variation in *Haplothrips tritici*

Given the consensus amongst specialists indicated above, that the only available character state to distinguish between *cerealis* and *tritici* is in the form of the male genitalia, we decided to study the apical width of the pseudovirga among males of *Haplothrips tritici* collected in Iran. In addition, variation in this width among these specimens was compared with the pseudovirga of males from other countries in the Senckenberg Museum, Frankfurt, that had been identified as *cerealis* by zur Strassen. This included syntype specimens of this species from Egypt.

The apical width of the pseudovirga of one syntype male of *H. cerealis* (Fig. 1) is less than that of a male identified as *tritici* from Varamin, Iran (Fig. 7). Moreover, the pseudovirga of the male from Rumania labelled as *cerealis* (Fig. 3) is narrower than either of these specimens. The illustrations of the pseudovirga from four males identified as *tritici* from different sites in Iran are arranged in the ascending order of their width (Figs 8–11), with the range from 13 to 24 microns. Measuring this structure involves technical problems because the pseudovirga of male *Haplothrips* is not a rigid structure. It is therefore difficult to display this structure in a suitable position, in statistically significant numbers, for accurate measuring. Given the absence of any biological evidence that two similar looking species of *Haplothrips* exist on the cereal crops of western Asia and southeastern Europe, and in the absence of any consistent morphological differences enabling the recognition of two segregates, we conclude that *Haplothrips cerealis* Priesner should be regarded as a **new synonym** of *Haplothrips tritici* (Kurdjumov).

Male genitalia of other Haplothripini

The use of male genitalia in the recognition of species in the tribe Haplothripini was considered briefly by Minaei and Mound (2008, 2010). They indicated that the males of several closely related species in the genus *Haplothrips* (*andresi*, *globiceps*, *phyllophilus* and *subtillissimus*) all have male genitalia that are very similar in size and shape. Indeed, some species that are considered unrelated, such as *H. leucanthemi* and *H. tritici*, also have very similar spoon-shaped genitalia. Moreover, this is even true of *Haplothrips herajius* and *Neoheegeria dalmatica* despite these being generically distinct (for *herajius* see Minaei & Aleosfoor 2013). In the genus *Neoheegeria*, Priesner (1961: 61) distinguished *hamanni* from *dalmatica* as follows: “pseudovirga parallel-sided as in *N. dalmatica* Schm., but broader”. Despite this, Minaei *et al.* (2007) regarded *N. hamanni* as a junior synonym of *N. dalmatica*, having been described from slightly smaller individuals. A similar problem occurs with *Dolicholepta proximius* Priesner (1965: 420). This was distinguished from *D. micrura* solely because the apical width of the pseudovirga was stated to be 14 microns, in contrast to the apical width in *micrura* that was stated to be 10 microns. Again, these two species are very probably synonymous.

Depositories and acknowledgements

Bibliographic references to these species are available in ThripsWiki (2014). Most of the specimens considered in this

paper are deposited in Department of Plant Protection, College of Agriculture, Shiraz University, Shiraz, with a few in the Australian National Insect Collection, Canberra. Many specimens were studied at, and loaned from the Senckenberg Museum, Frankfurt, and the authors are deeply grateful to Andrea Hastenpflug-Vesmanis for her collaboration. The paper is dedicated to the late Richard zur Strassen in recognition of the many years of help and advice he provided to us both.

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