

# The southern Palaearctic genus *Neoheegeria* (Thysanoptera: Phlaeothripidae): redefinition and key to species

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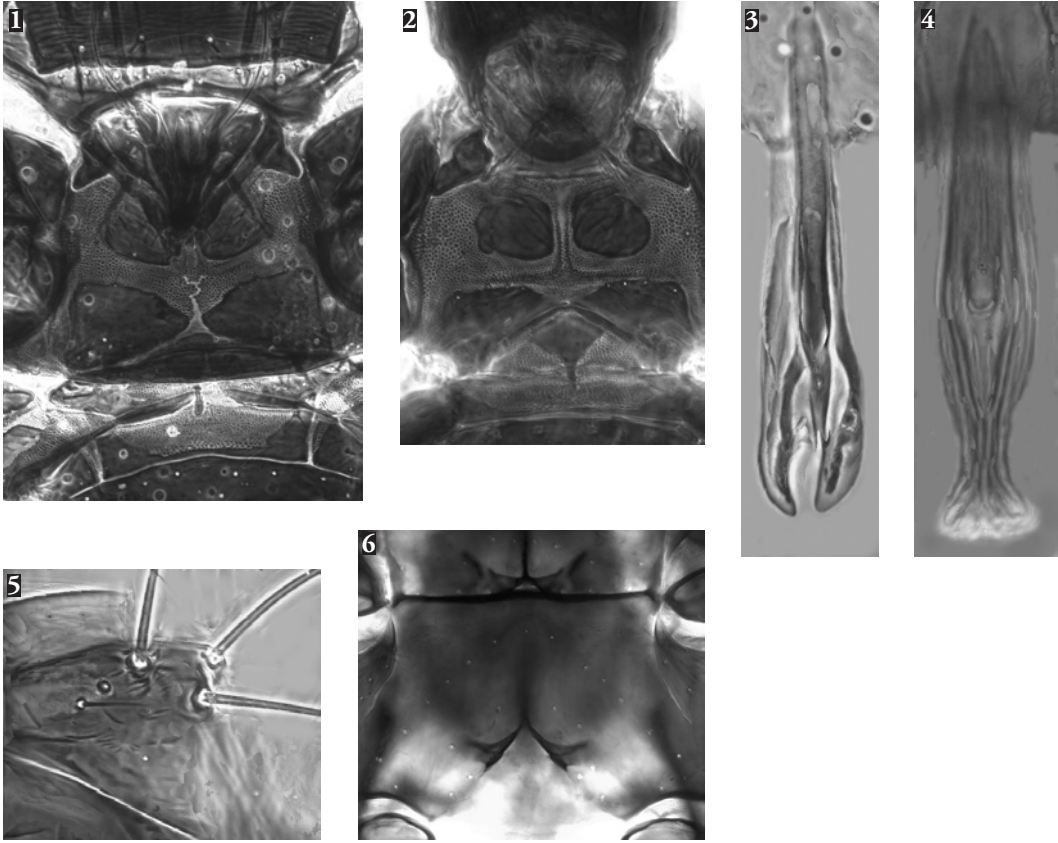
Problems in character state definition and interpretation in the *Haplothrips*-group are discussed, together with their implications for species identification and systematics. As a result, *Neoheegeria* Schmutz, 1909 is redefined to include only those species in this group that have three sensoria on the third antennal segment. The subgenus *Haplothrips* (*Gigaplothrips*) Priesner, 1949 is synonymised with *Neoheegeria*, and four species are recognized as valid; *N. dalmatica* Schmutz, 1909, *N. gigantea* (Priesner, 1934) comb.n., *N. persica* Priesner, 1954, and *N. sinaitica* Priesner, 1934. Three new synonyms are recognized under *N. dalmatica*; *N. ballotae* Priesner, 1951, *N. hamanni* Priesner, 1961 and *N. nevskyi* Moulton, 1946, and this species is widely distributed in the southern Palaearctic. In contrast, *N. persica* and *N. sinaitica* are known only from Iran and Egypt respectively, and *N. gigantea* from Egypt to Morocco. The following six new combinations involve species with less than three sensoria on the third antennal segment: *Haplothrips biroi* (Priesner, 1928), *H. faurei* (Zur Strassen, 1966), *H. brasvamukha* (Ramakrishna, 1928), *H. johni* (Priesner, 1925), *H. lederi* (Priesner, 1924), and *H. verbasci* (Osborn, 1897). One new combination involves an unrelated species from India, *Xylaplothrips montanus* (Ananthakrishnan & Jagadish, 1970). The available biological data suggest that species of *Neoheegeria* are associated particularly with the flowers of Lamiaceae.

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## Introduction

The generic name *Neoheegeria* Schmutz, 1909 in the Thysanoptera family Phlaeothripidae has been interpreted in a variety of ways by subsequent authors. The original species placed in this genus, *N. dalmatica* Schmutz, 1909, is phytophagous, feeding and breeding in the flowers of various Lamiaceae in countries of the southern Palaearctic region. In contrast, Moulton & Steinweden (1933), and Moulton (1944), described species in *Neoheegeria* that are now recognised as spore-feeding thrips in the subfamily Idolothripinae, and several other

species that were placed originally in this genus are now removed to other genera (Table 1). Mound (1968) suggested that *Neoheegeria* should be restricted to a particular group of species, but subsequently (Mound 2005) placed all *Neoheegeria* species in the genus *Haplothrips* Amyot & Serville, 1843. This type of confusion in the taxonomy of the Thysanoptera arises from three sources: lack of precision in defining taxonomic character-states and their variation within and between populations, inadequate field sampling resulting in limited knowledge of the biology of so many species, and description of new



**Figs 1–6.** *Neoegeeria* species. 1, *N. dalmatica* mouth cone crushed; 2, *N. dalmatica*, mouth cone normal; 3, *N. dalmatica*, male pseudovirga (extended); 4, *N. persica* male pseudovirga (viewed internally); 5, *N. dalmatica* sub-basal wing setae; 6, *N. gigantea* metasternum with elongate sternopleural sutures extending from mid-coxal cavities.

species on very few specimens. This paper is based on extensive recent collections in Iran from named host-plants, followed by analysis of the structural variation exhibited by these specimens. Based on these data, the variation in the character states used by previous workers is re-evaluated, the genus re-defined, and a key to species provided. This paper was prepared as part of the 80<sup>th</sup> birthday celebrations of the distinguished thrips specialist, Jaroslav Pelikan, at Brno in April 2006.

## Character state evaluation

### Sensoria on antennal segment III

Species of the genus *Haplothrips* have either one or two sensoria (rarely none) on the third antennal segment. In contrast, in this paper, the genus *Neoegeeria* is restricted to a group of species with three

sensoria on this segment, two on the outer apical margin, and one on the inner. Only one species has been found to cause problems with this decision. *N. faurei* zur Strassen, 1966 was described on two males as having two major sensoria on the third segment together with a very small third sensorium. Examination of both sexes of this species has subsequently indicated that although this sensorial arrangement is sometimes true in males, the females have only the two major sensoria.

### Mouth cone

The shape of the mouth cone, whether rounded or pointed, has commonly been used by authors in classifying taxa in the *Haplothrips* group. It has even been implied (Priesner 1934; 1965) that the only difference between *Haplothrips* and *Neoegeeria* is that the mouth cone is pointed in *Neoegeeria*. Unfortunately, the apparent shape of the mouth cone

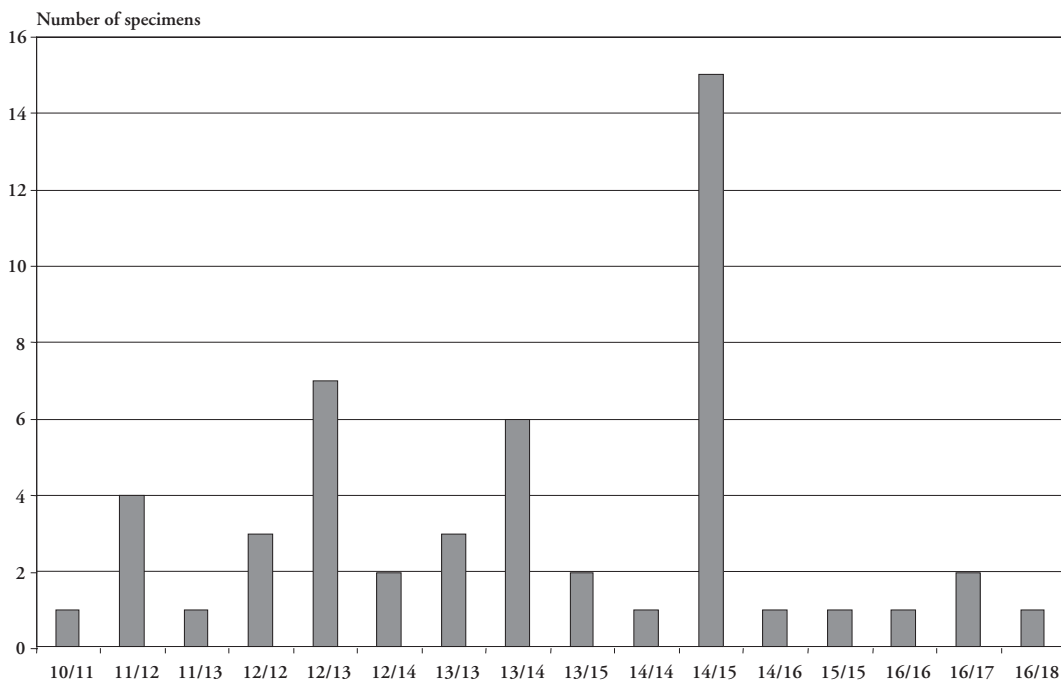


Fig. 7. Number of forewing duplicated cilia in *Neoheegeria dalmatica* from Iran, Mazandaran Province. [10/11 indicates 10 cilia on one wing but 11 cilia on the other wing]

is affected by coverslip pressure in slide mounted specimens. In life, the mouth cone is directed ventrally, but on slides it can be compressed so that it is directed posteriorly (Figs 1, 2). Although in species of some genera, such as the Oriental *Dolichothrips* Karny, 1912, the mouth cone is long and directed posteriorly in life, in the species of *Haplothrips* and *Neoheegeria* the apparent length of this structure in slide mounted specimens is too frequently an artefact to be used in defining genera.

#### Setae curved

The character state 'major setae curved' has been employed by some authors in the definition of *Neoheegeria* (Moulton 1946, Priesner 1965). However, setae when very long are likely to be curved, and this curvature can also be influenced by the slide mounting procedures. The length of such setae is particularly difficult to measure accurately. Despite this, truly curved setae occur in a few unrelated groups of Phlaeothripidae.

#### Apices of setae

Setae are commonly described as 'pointed' or 'blunt', but with no precise definition of these terms. However, a major seta that appears to be pointed under a

bright-field microscope may have a translucent blunt apex under phase contrast illumination. Moreover, the apparent form of such apices depends on the magnification under which observations are made. The major setae of *Neoheegeria* species can be considered 'pointed', but they are not usually 'acuminate' (needle sharp) when examined critically.

#### Measurements

Precise measurements of thrips specimens, particularly their setae and antennal segments, are given in the descriptions of many Thysanoptera species. These measurements are often given to an accuracy of 1 micron (or even 0.1 micron), but such a degree of precision exceeds the limits of accuracy obtained with a light microscope and a standard  $\times 40$  objective lens. Moreover, if multiple measurements of the length of the same seta on one specimen are taken over a period of days, then the variation in these measurements can exceed 5% (unpublished data). Spurious precision in published measurements also often fails to consider intra- and inter-population variation (Table 2). In one sample of *N. dalmatica* from Kojoor, Iran, the length of antennal segment III ranged from 60 to 72 microns, whereas the length of this segment has been used

(Priesner 1964) to distinguish *N. hamanni* (60–62) from *N. ballotae* (64–66).

### Forewing duplicated cilia

The number of duplicated cilia was considered by Priesner (1951; 1961; 1964) to be a reliable character for distinguishing species, the number of duplicated cilia in three species being given as: *N. dalmatica* 14–18; *N. hamanni* 10–14; *N. ballotae* 10–13. Specimens of *N. dalmatica* from Iran usually have 14 or 15 duplicated cilia (Fig. 7), although 12 or 13 is common, and within one sample from Kojoor the full range was from 10 to 18. Moreover, in most individuals the left and right wings do not bear the same number of cilia (Fig. 7), but this variation has not been found to be correlated with sex.

### Foretarsal tooth

The presence or absence of a minute fore tarsal tooth in females has often been used to distinguish species in this group (Priesner 1951; 1961; 1964). Priesner (1951) distinguished *N. ballotae*, in part, by the presence of a minute fore tarsal tooth whereas he considered this structure to be absent in *N. dalmatica*. Subsequently Priesner (1961) described *N. hamanni* as lacking a fore tarsal tooth. Among four paratypes of *N. ballotae* that have been re-examined, two apparently have no fore tarsal tooth whereas a minute tooth is present in the other two. Also among five specimens examined that were identified as *N. hamanni* by Priesner, one non-paratype has a minute fore tarsal tooth visible. Moreover we have examined at least three females of *N. persica* with a very small fore tarsal tooth, whereas Priesner (1954) described this species from a single specimen lacking any tooth and he subsequently used this character in his key (Priesner 1964). This structure is not only variable in size, it can be very difficult to observe in slide mounted specimens unless the fore tarsus is viewed laterally and slightly compressed.

### Species removed from *Neoheegeria*

A total of 21 species of Phlaeothripidae have been described in the genus *Neoheegeria* by previous authors (Table 1). In addition, Priesner (1964) included *H. verbasci* in this genus because of the presence of long setae and a long mouth cone, and *Haplothrips giganteus* is also here transferred to *Neoheegeria*. Two species originally described in the genus are now recognised as fungal spore-feeding species of the subfamily Idolothripinae (Mound & Palmer 1983), but the remaining 21 are all species of Phlaeothripinae.

Examination of specimens or descriptions of each of these 21 species indicates that four of them have only two sense cones on the third antennal segment, and these are here considered to be species of the genus *Haplothrips* (*H. biroi*, *johni*, *lederi* and *verbasci*). Moreover, as discussed below, *N. faurei* is here transferred to *Haplothrips*, and *N. brasvemukha* described from India on two damaged specimens without antennae is also transferred to this genus. The remaining 15 species are all known to have three sense cones on the third antennal segment, a character state that they share with the type species of *Neoheegeria*. One of these species was described from India and appears to be related to a group of Oriental species currently placed (Pitkin 1976) in the genus *Xylaplothrips*; there is no evidence that this species is closely related to the species here recognised as members of the genus *Neoheegeria*. Five of the 15 species are now placed in *Dolichothrips*, and one is placed in *Mesothrips*, species in both of these genera have additional pairs of weakly sigmoid wing-retaining setae on the abdominal tergites, unlike *Neoheegeria* species. Finally, one Oriental species, in which the major pronotal and abdominal setae are all blunt or weakly expanded their apices, is now placed in the genus *Membrothrips*. The remaining seven nominal species, three of which are here placed as synonyms, are considered below within the genus *Neoheegeria*.

### *Haplothrips biroi* (Priesner) **comb.n.**

*Neoheegeria biroi* Priesner, 1928: 324.

This was described on one female from Hungary, Budapest, but with no host data.

### *Haplothrips faurei* (zur Strassen) **comb.n.**

*Neoheegeria faurei* zur Strassen, 1966: 28–30.

This species was described from the Canary Islands on two males, and was illustrated as having a third, very small, sensorium on the third antennal segment. Presence of this sensorium could be confirmed on only one of four antennae of two subsequently collected males examined for the present study, but a similar sensorium could not be seen on two females collected with these males. In view of this, the species is here transferred to *Haplothrips*. It apparently lives in the flowers of Asteraceae, in contrast to the species of *Neoheegeria*.

**Material examined.** Spain, Canary Islands, Hierro, Mirador La Pena, 1 ♀ 1 ♂ from *Sonchus hierensis*, 14.iv.1970; Tenerife, Ruigomez, 1 ♀ 1 ♂ from *Andryala pinnatifida*, 15.v.1970.

**Table 1.** Species described originally in *Neoheegeria*.

Current genus	Current name	Author	Date	Type locality	Subsequent reference
<i>Ethirothrips</i>	<i>hibisci</i> (= <i>angusticornis</i> )	Moulton & Steinweden	1933	USA, Hawaii	Mound & Palmer 1983
<i>Ethirothrips</i>	<i>longus</i> (= <i>angusticornis</i> )	Moulton	1944	Fiji	Mound & Palmer 1983
<i>Dolichothrips</i>	<i>citripes</i>	Bagnall	1921	India	Ananthakrishnan & Sen 1980
<i>Dolichothrips</i>	<i>fumipennis</i>	Bagnall	1921	India	Ananthakrishnan & Sen 1980
<i>Dolichothrips</i>	<i>zyzphi</i>	Bagnall	1923	India	Mound 1968; Bhatti 1978
<i>Dolichothrips</i>	<i>macarangai</i>	Moulton	1928	Taiwan	Reyes 1994
<i>Dolichothrips</i>	<i>flavipes</i>	Moulton	1928	Taiwan	Reyes 1994
<i>Haplothrips</i>	<i>biroi</i>	Priesner	1928	Hungary	Priesner 1964
<i>Haplothrips</i>	<i>faurei</i>	zur Strassen	1966	Canary Islands	Zur Strassen 1966
<i>Haplothrips</i>	<i>brasvamukha</i>	Ramakrishna	1928	India	Ananthakrishnan & Sen 1980
<i>Haplothrips</i>	<i>johni</i>	Priesner	1925	Russia	Priesner 1964
<i>Haplothrips</i>	<i>lederi</i>	Priesner	1924	Uzbekistan	Priesner 1964
<i>Neoheegeria</i>	<i>dalmatica</i>	Schmutz	1909	Croatia	Priesner 1964
<i>Neoheegeria</i>	<i>ballotae</i> = <i>dalmatica</i>	Priesner	1951	Algeria	Priesner 1964
<i>Neoheegeria</i>	<i>hamanni</i> = <i>dalmatica</i>	Priesner	1961	Croatia	Priesner 1961
<i>Neoheegeria</i>	<i>nevskiyi</i> = <i>dalmatica</i>	Moulton	1946	Uzbekistan	Moulton 1946
<i>Neoheegeria</i>	<i>persica</i>	Priesner	1954	Iran	Priesner 1954
<i>Neoheegeria</i>	<i>sinaítica</i>	Priesner	1934	Egypt, Sinai	Priesner 1934
<i>Membrothrips</i>	<i>indicus</i>	Hood	1919	India	Bhatti 1978
<i>Mesothrips</i>	<i>mendax</i>	Karny	1912	Indonesia, Java	Reyes 1994
<i>Xylaplothrips</i>	<i>montanus</i>	Ananthakrishnan & Jagadish	1970	India	Ananthakrishnan & Sen 1980

***Haplothrips brasvamukha* (Ramakrishna) comb.n.**

*Neoheegeria brasvamukha* Ramakrishna, 1928: 288–289.

This Indian species is known only from the original description based on two specimens, both of which lack their antennae. No character states were given in the description that would exclude it from *Haplothrips*.

***Haplothrips johni* (Priesner) comb. n.**

*Neoheegeria johni* Priesner, 1925: 20.

This was described from one female and one male from ‘Russland’ with no further details.

***Haplothrips lederi* (Priesner) comb. n.**

*Neoheegeria lederi* Priesner, 1924: 2–3.

This was described from two females from ‘Turkmenien’ (Turkmenistan) without host data.

***Haplothrips verbasci* (Osborn) comb. rev.**

*Phloeothrips verbasci* Osborn, 1897: 228

This species has been treated under the name *Neoheegeria* by several authors (Morison 1949; Priesner 1964; Schliephake & Klimt 1979; Heming 1993), primarily because of the long setae on the head and pronotum. However, Heming (1970) and Mound & Marullo (1996) treated the species as a member of *Haplothrips*, and Stannard (1968) treated the species as *Haplothrips* (*Neoheegeria*) *verbasci*.

***Xylaplothrips montanus* (Ananthakrishnan & Jagadish) comb. n.**

*Neoheegeria montanus* Ananthakrishnan & Jagadish, 1970: 262.

Collected from the curled leaves of a species of *Amaranthus*, this species was described from several specimens as having blunt setae. Judging from the description, and also from its habitat in a leaf gall, this species is likely to belong to the group of Oriental species discussed by Pitkin (1976) under the genus *Xylaplothrips*.

## *Neoheegeria* Schmutz

*Neoheegeria* Schmutz, 1909: 344. Type species *N. dalmatica* Schmutz.

*Haplothrips* (*Gigaplothrips*) Priesner, 1949: 79. Type species *H. giganteus* Priesner. Syn. n.

Medium to large Phlaeothripinae species. Body colour brown, forewings pale except for basal area. Head a little longer than wide; maxillary stylets long and slender, deeply retracted into head capsule, more than one third of head width apart, maxillary bridge well developed. One pair of pointed post-ocular setae, extending beyond hind margin of eye. Antennae 8-segmented, segment III with 3 sensoria, IV with 4 sensoria; antennal segment VIII short and broad at base. Pronotum with 5 pairs of well developed, pointed, major setae (anteromarginals, anteroangulars, midlaterals, epimerals, and posteroangulars). Epimeral sutures complete. Prosternal basantra present, always wider than long; ferna and propinasternum developed. Mesopraesternum eroded medially, divided into two lateral triangles but sometimes weakly joined medially. Metanotum weakly sculptured, median setae usually arising on anterior half of sclerite. Metathoracic sternopleural sutures usually absent. Fore tarsal tooth variable, sometimes minute or apparently absent. Forewings present, constricted medially, with three sub-basal setae situated in a triangle (Fig. 5); 10 to 18 duplicated cilia present. Pelta triangular; abdominal tergites II–VII with two pairs of wing-retaining setae; segment IX with seta S1 and S2 acute, sometimes longer than tube; tube two to three times as long as basal width, shorter than head; anal setae about as long as tube or a little longer. Male similar to female but smaller; sternite VIII without glandular area; seta S2 on tergite IX short and stout; pseudovirga slender (Figs 3, 4).

### Comments

In describing *H. giganteus*, a species that he designated subsequently as the type species of *Haplothrips* (*Gigaplothrips*), Priesner (1934) compared it only to two species that he had described in *Neoheegeria*. Moreover, he distinguished this species from the other two by its 'much shorter and broader mouth-cone, and the somewhat shorter bristles'. As discussed above under character states, these are too variable to be useful for separating genera. The genus *Neoheegeria* has been used by several authors in an undefined sense to include species with a long mouth cone and long major setae, and often with only one or two sensoria on the third antennal segment. The most well-known of these species is the common Mullein thrips, *Haplothrips verbasci* (Osborn), that

has been the subject of detailed morphological studies by Heming (1970, 1993). Current work by the authors suggests that *Neoheegeria* is best regarded as one of a group of six genera of Haplothripini in which the third antennal segment bears three sense cones (Mound & Minaei 2007). These genera are *Androthrips* Karny, 1911, *Dolichothrips* Karny, 1912, *Euoplothrips* Hood, 1918, *Mesothrips* Zimmermann, 1900, *Neoheegeria*, and *Xylaplothrips* Priesner, 1925 (in part).

### Key to species of *Neoheegeria*

(\* species not studied)

1. Female with prominent fore tarsal tooth . . . . . *sinaitica* \*
- Female without fore tarsal tooth or with a very minute foretarsal tooth . . . . . 2
2. Fustis unusually long, at least 1.3 times as long as basal width of tube; antennal segments III–VI yellow, sometimes shaded brown . . . . . *persica*
- Fustis normal, about as long as basal width of tube; antennal segments dark-brown or with segments IV – VI yellow only at base . . . . . 3
3. Metathoracic sternopleural sutures not developed; mid and hind tarsi dark, scarcely paler than apex of tibiae . . . . . *dalmatica*
- Metathoracic sternopleural sutures well developed (Fig. 6); mid and hind tarsi yellow, much paler than apex of tibiae . . . . . *gigantea*

### *Neoheegeria dalmatica* (Schmutz)

*Neoheegeria dalmatica* Schmutz, 1909: 344–345.

*Neoheegeria nevskyi* Moulton, 1946: 57. Syn. n.

*Neoheegeria ballotae* Priesner, 1951: 365–366. Syn. n.

*Neoheegeria hamanni* Priesner, 1961: 59. Syn. n.

In the material studied listed below there is very considerable variation in body size, both within and between samples and within and between sexes. Larger individuals usually have more robust microtrichia on the body surface, particularly laterally on the tergites. The antennal segments are always extensively brown, never yellow as in *N. persica*, but the bases of some segments are commonly paler than the distal parts. Moreover, there appears to be a difference in the form of the apex of the male pseudovirga between these two species (Figs 3, 4), although this requires further study. The species listed above as synonyms of *N. dalmatica* were previously distinguished as follows:

*N. nevskyi* was described from 13 females and 3 males taken in flowers of *Phlomis vegel* (Lamiaceae)

**Table 2.** Variation of some characters (in microns) in three samples of *Neohoegeeria dalmatica* from Iran, Mazandaran Province.

[Ann. III L – antennal segment III length; p-o.s – post ocular setae length; P.L. – pronotum length; am – antero-marginal setae length; ep. – epimeral setae length; S1 – forewing sub-basal setae S1 length; S3 – forewing sub-basal setae S3 length; T.L. – tube length]

Locality	Sex	Ann. III L.	p-o.s.	P. L.	am.	ep.	S1	S3	T. L.
Chachkam	♀	60	80	166	50	98	60	90	194
Chachkam	♀	64	100	180	60	100	72	102	196
Chachkam	♀	66	94	180	58	100	72	?	200
Chachkam	♀	66	98	176	?	108	74	100	194
Chachkam	♂	60	98	186	?	?	?	88	204
Chachkam	♂	60	?	198	?	?	64	92	200
Chachkam	♂	60	82	186	54	92	64	102	192
Kojoor	♀	64	86	164	46	94	74	100	186
Kojoor	♀	60	78	144	40	90	62	104	162
Kojoor	♀	70	96	176	46	96	72	126	188
Kojoor	♀	68	100	188	54	114	68	114	196
Kojoor	♀	62	82	166	44	90	64	104	180
Kojoor	♀	62	82	160	?	86	58	110	174
Kojoor	♀	72	?	194	?	114	78	120	190
Kojoor	♂	70	76	186	40	90	64	98	196
Kojoor	♂	60	84	162	48	80	66	84	186
Kojoor	♂	68	76	152	42	76	62	80	192
Neka	♀	65	80	180	62	94	74	106	200
Neka	♀	60	95	180	66	110	78	108	192
Neka	♀	62	86	176	?	80	60	112	190
Neka	♀	62	83	172	?	100	64	96	196
Neka	♀	64	84	176	60	90	64	98	186
Neka	♀	62	90	178	56	110	68	100	194
Neka	♀	66	92	174	60	100	66	120	192
Neka	♂	62	84	178	54	86	60	80	204
Range	♀	60–72	78–100	144–188	40–66	80–114	58–78	90–126	162–200
Range	♂	60–70	76–98	152–198	40–54	76–92	60–66	80–102	186–204

as well as an unidentified plant. The type locality was Tashkent, Turkestan (Tashkent is now the capital of Uzbekistan). Ten paratypes have been studied, but most are not good slide mounts. Moulton considered this species closely related to *N. dalmatica* and distinguished it on the following character states:

1. *Setae almost pale*; but the setae of *N. dalmatica* specimens from Iran are often more or less pale, and Priesner (1965) stated of *N. dalmatica* that the setae on the head and prothorax are slightly darkened.
2. *Pronotal setae not noticeably bent*; as discussed above, this is not considered a valid difference.
3. *Pronotal setae shorter*; the data in the original description and that derived from the ten paratypes examined fall within the range found in Iranian samples (Table 2).

*N. ballotae* was described from Dider, Algeria, taken on flowers of *Ballota* (Lamiaceae), and four female paratypes have been studied. Comparing this species to *N. dalmatica*, Priesner indicated that it was smaller with shorter body bristles, and fewer forewing duplicated cilia. In all of these character states *N. ballotae* falls within the range of variation found in Iranian populations of *N. dalmatica* (Table 2, Fig. 7).

*N. hamanni* was described from Split, Yugoslavia [now Croatia], from inflorescences of *Stachys germanica* (Lamiaceae), but with no data on the number of specimens. A holotype was indicated in the description; two specimens from Turkey that were identified as this species by Priesner, together with three paratypes, have been studied. Priesner considered this species to be closely related to *N. dalmatica*, but associated with a different host plant, noting

that *N. dalmatica* occurs regularly on *Phlomis fruticososa*. He indicated that his new species differed from *N. dalmatica* as follows:

1. Body form. Less stoutly built, with wings more slender and antennae shorter.
2. Duplicated cilia. Fewer cilia (10–14 in comparison to 14–18).
3. Tube length. Shorter (164–176 microns in comparison to 183–208).

The range of variation within populations of *N. dalmatica* from Iran includes much of the apparent differences indicated above (Table 2, Fig. 7).

**Material examined.** Iran: Mazandaran province: Neka, 8 ♀ 2 ♂ from *Stachys inflata*, 6.vi.2005; Sari, 3 ♀ 4 ♂ from *S. inflata*, 27.iv.2005; Chachkam (Sari), 11 ♀ 6 ♂ from *S. inflata*, 5.vi.2005; Kojoor (Noshahr), 12 ♀ 4 ♂ from *S. inflata*, 10.v.2005; Sinchal, Neka (Sari), 5 ♀ 2 ♂ from *S. inflata*, 27. iv. 2005; Esfandan (Sari), 1 ♀ from *S. inflata*, 6. vi. 2005. Tehran province: Talian (Karaj), 1 ♀ 2 ♂ from *Stachys* sp., 3.v.2003. Fars province: Dashtarzan, 2 ♀ from *Amygdalus* sp., 23.iv.1999. Croatia: Split, 2 ♀ 1 ♂ from *Stachys germanica*, 25.VII. 1953 (in SMF). Turkey: Sultandagh, 2 ♀ from Lamiaceae, 5.vi. 1960 (in SMF). Algeria: 4 ♀, Central Sahara, Dider, on *Ballota* sp., 24.iv.1949 (in SMF). Uzbekistan: (as Turkestan): Tashkent, 2 ♀ from ?*Lamium* (Lamiaceae), 29.v.1928; 6 ♀ from *Phlomis vegei*, 15.v.1928 (in CASF).

### *Neoheegeria gigantea* (Priesner) comb. n.

*Haplothrips giganteus* Priesner, 1934: 279.

*Haplothrips* (*Gigaplothrips*) *giganteus* Priesner; Priesner 1949: 79.

Despite having been described in *Haplothrips*, this species is closely similar to the other members of *Neoheegeria*, apart from the well-developed metathoracic sternopleural sutures (Fig. 6). It was described from Egypt from an unspecified number of both sexes and larvae on *Cistanche lutea* (Orobanchaceae), and a series of both sexes have been studied from Morocco.

Material examined. – Morocco, Abouda, 3 ♀ 3 ♂ from *Cistanche phelypaea* (in BMNH).

### *Neoheegeria persica* Priesner

*Neoheegeria persica* Priesner, 1954: 54–55.

This species was described from a single female taken in Shiraz (Fars province), Iran, from *Prangos ferulacea* (Apiaceae). It is similar in structure to *N. dalmatica* but can be distinguished by the yellow colour of antennal segments III–VI and the unusually elongate fustis in the ninth abdominal segment. Moreover,

the antennal segments are slightly more elongate, but the number of forewing duplicated cilia given by Priesner (1954) to distinguish this species is not useful. Many specimens of *N. dalmatica* have only 12 duplicated cilia, and the number on the left and right wings sometimes differs by two in the same specimen. (Fig. 7).

In populations from Fars Province, Iran, from both the southern part (Evaz) and the north western part (Dashtarzan, and Khanzenian), the lengths of the antennal segments are slightly longer than in most specimens of *N. dalmatica* collected in Mazandaran Province. However, the length of the tube differs between the available specimens from the south and the north of Fars Province, being slightly shorter in the southern specimens. This difference may be related to the apparent host association (*Astragalus*) (see Kirk 1992) or to the weather conditions. These southern samples were collected at the end of winter, although by the end of April most flowers have gone in this area.

**Material examined.** Iran: Fars province: Evaz, 10 ♀ 3 ♂ from *Astragalus* sp., 13.iii.2001; Dashtarzan, 1 ♀ 1 ♂ from *Phlomis* sp., 23.iv.1999; Dashtarzan, 2 ♀ from *Amygdalus* sp., 23.iv.1999; Dashtarzan, 1 ♀ from *Cercis siliquastrum*, 23.iv.1999; Khanzenian, 1 ♂ from *Pyrus* sp., 23.iv.1998.

### *Neoheegeria sinaitica* Priesner

*Neoheegeria sinaitica* Priesner, 1934: 278

No material of this species has been studied. Although considered very similar to *N. dalmatica*, it was distinguished by the presence of a ‘conspicuous’ or ‘rather prominent, slender’ fore tarsal tooth in females (Priesner 1934; 1965). The type specimens were apparently collected on *Verbascum* sp., but a subsequent series was collected at the same locality on *Phlomis floccosa*; Priesner concluded that the identification of *Verbascum* might be incorrect (Priesner 1965).

## Discussion

The four species recognised in this genus are similar in general body form to the species in the large genus *Haplothrips*. However, unlike the members of *Haplothrips* there are three sensoria on the third antennal segment. Moreover, two species have been found consistently in Iran in the flowers of the Lamiaceae plants, *Phlomis* and *Stachys* species, although a few isolated adults have been taken from other plants, including *Amygdalus* sp. and *Cercis siliquastrum*, in



which the most common thrips was *Thrips meridionalis* (Priesner, 1926). The association with Lamiaceae is not strict, because one series of *N. persica* was taken from the flowers of *Astragalus* (Fabaceae). However, the species here synonymised with *N. dalmatica* were all collected from the flowers of Lamiaceae, and none of the *Neoheegeria* species seem to be associated with the two plant families frequented by *Haplothrips* species, the Asteraceae and Poaceae. Previously, the only published reports of *Neoheegeria* species in Iran (Priesner 1954) referred to two specimens taken in Fars province: one female of *N. dalmatica* in a yellow flower of *Phlomis*, and the holotype of *N. persica* from *Prangos ferulacea*. The large numbers of specimens available from the recent collecting programme in Iran has enabled this re-evaluation of the biology of these thrips, and of several character states previously considered of taxonomic significance in this genus.

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