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The *Heterothrips* species of Argentina, with two new species and biological notes (Thysanoptera, Heterothripidae)

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Abstract

Two new species of *Heterothrips* are described from Mendoza, Argentina: *H. pilarae* from flowers of *Tricomaria usillo* (*Malpighiaceae*), and *H. stellae* from *Prosopis alpataco* (*Fabaceae*). These species share several morphological characters with *H. araucaniae* and *H. johanseni* from Chile. A key is provided to species of *Heterothrips* from Argentina, with notes on the biology of some species.

Key words: Taxonomy, thrips, *Heterothrips* key

Introduction

A total of 65 valid species are currently listed in *Heterothrips* genus (Mound, 2010), all from the American continent. The most recent review of the genus (Mound & Marullo, 1996) provided a key for almost all known species at that time. In Argentina, seven species are mentioned by De Santis *et al.* (1980), these being *cacti* Hood, *flavitibia* Moulton, *marginatus* Hood, *myrceugenellae* Gallego, *moestus* De Santis, *pastranai* Tapia, and *sensibilis* De Santis. Hoswever, *sensibilis* is considered a synonym of *cacti* by Mound & Marullo (1996), and *myrceugenellae* is not distinguished satisfactorily from *clusiae*, although these are possibly different species.

The aim of this work is to describe two new species of *Heterothrips* together with information on the biology of one of these, and to provide a key to distinguish the species present in Argentina. Previous studies on this genus that were consulted include Bailey & Cott (1954); De Santis (1953, 1963, 1969, 1980); Mound & Marullo (1996) and Moulton (1932). Specimens from the De Santis collection at La Plata Museum were also studied.

Collecting and preparation. Flowers of *Tricomaria usillo* (*Malpighiaceae*) (Fig. 38) and *Prosopis alpataco* (*Fabaceae*) were shaken over a white plate and thrips were picked up with a fine brush. The insects were preserved in a mixture of ethyl alcohol 10%, acetic acid 5%, Triton X - 100 0.1 % (J.S. Bhatti, personal communication). Thrips were macerated in a 5% solution of NaOH to remove the body contents, and dehydrated progressively in a series of alcohols, finally being cleared in clove oil and mounted in Canada Balsam (Mound & Marullo, 1996). In order to identify correctly the species of *Prosopis*, samples were taken of branches with leaves and mature fruits (Fig. 39), two months after flowering at the same site where samples of thrips had been taken.

Life history studies. Flowers of *Tricomaria usillo* containing second instar larvae were placed into vials (100 mm of height by 40 mm of diameter) with about 60 mm depth of dry soil. Pieces of paper were placed between the soil and the flowers to simulate litter as a pupation site. The vials were closed with Parafilm and were maintained in a growth chamber at 25 $\pm$ 2 ºC, 16 hrs of light. After one week, the flowers were removed from the vials with soil, and a week later the pieces of paper were removed. These were examined under a stereo microscope for the presence of pupae, and were then maintained in a Petri dish closed with adhesive film to retain humidity until adults hatch from the cocoons. Thirty flowers were taken weekly from

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Tricomaria usillo shrubs between 21.xi.2009 and 2.i.2010. The flowers were preserved in 70% alcohol, and subsequently the thrips were separated by instar and sex and counted under a stereo microscope. Flowers of *Prosopis alpataco* were sampled twice (5&15.xi.2009) at two sites, one near Gustavo André and the second at a distance of 10.8 km.

Larvae of the first species described below, *H. pilarae* (Fig. 42), produced a silken cocoon on the pieces paper placed under flowers in the vials, where they then developed into pupae and then into adults (Fig. 40). The adults emerged from their cocoons (Fig. 41) and diapause was not observed under conditions of 25ª C +/- 2ªC and 16 hours light. These conditions approximate to summer conditions in Mendoza. Some larvae apparently remained buried in the soil without developing into adults, but this could be accidental. Adults and larvae of this species were found together in weekly samples for about two months, but there were no pupae in the flowers. In contrast, in the second species described below, *H. stellae*, larvae were not found on the first sampling date, but ten days later at the same place, large numbers of larvae were found but only one adult.

There is strong evidence that the plants on which these two species were found are their true hosts, because many specimens were observed of both sexes together with larvae, and neither species was found on any other plant in the sampling area. Moreover, the larvae of *pilarae* were reared until adult. The silken cocoons produced by larvae of this species presumably occur naturally in the top soil or in leaf litter, as has been observed by Bailey & Cott (1954) in *H. vitifloridus*. In contrast to that species, *H. pilarae* has at least two generations per year, and this corresponds with the absence of diapause under summer temperature and photoperiod observed in the laboratry assay. More than one generation is possible in this species because *Tricomaria usillo* produces flowers for more than two months under the climatic conditions of Mendoza, and larvae were found with adults throughout this period. In contrast, the flowering period of *Prosopis alpataco* seems to be more restricted, and larvae of *H. stellae* were found ten day after adults, suggesting that there is only one generation in this species, during the spring.

Heterothrips Hood

Heterothrips Hood, 1908. Type-species *H. arisaemae* Hood.

The species of this genus have nine antennal segments (Fig.2), with one or more rows of sensory pores around the apex of segments III and IV (Figs 28–30). In the head, the tentorial bridge is not developed, and the head and thorax bear only short setae (Figs 1, 13). The metanotal sculpture consists of concentric lines bearing microtrichia (Fig 3). Moulton (1942) recognised two groups within the genus: group I with free or independent microtrichia on the posterior margins of the abdominal segments, and group II with these microtrichia arising from lobes, plaques or craspeda. These two groups were also recognised in the key to species by Mound & Marullo (1996).

Key of species of *Heterothrips* from Argentina

[Excluding *H. pastranai* because no material was available]

1. Posterior margin of abdominal tergites with microtrichia arising from craspeda (Figs 24–25) 2
-. Posterior margin of abdominal tergites with independent microtrichia, without craspeda (Figs 4, 8, 9, 15, 19, 20) ... 3
2. Craspedum entire across tergites, margin not lobed (Fig. 24) ..... *marginatus*
-. Craspedum with short discontinuous lobes, bearing microtrichia (Fig. 25) ..... *moestus*
3. Sternites with stout discal setae (Fig. 27); antennal segments III and IV with broad sensorial band, apparently with three rows of pores (Fig. 28) ..... c*acti*
-. Sternites without discal setae (Fig. 26); antennal segments III and IV with narrow sensorial band, apparently with only one or two rows of small pores (Figs 29–30) 4
4. Antennal segments III and IV apparently with double row of sensorial pores (Fig. 29); males yellow to light brown ..... *myrceugenellae*
-. Antennal segments III and IV apparently with one row of sensorial pores (Fig. 30); males often as brown as female 5

5. Mid and hind tibiae yellowish, paler than femora; basal quarter of forewing with a clear band in contrast to the brown of rest of wing (Fig. 37) ..... *?flavitibia*
-. Mid and hind tibiae as dark brown as femor 6
6. Forewing greyish brown with diffuse pale area in basal 2/5 (Fig. 31); tergites II–V with microtrichia at middle of posterior margin (Fig. 8), tergites IX and X sub-equal in length (Fig 11–12) ; males with pore plates on sternites III–VIII (Fig. 6) ..... *pilarae* **sp.n.**
-. Forewing uniformly brown except a subasal small white fleck (Fig. 32); tergites II–V without microtrichia at middle of posterior margin (Figs19–20); tergite X much shorter than tergite IX (Figs 22–23); males with pore plates only on sternites VI–VIII (Fig. 17) ..... *stellae* **sp.n.**

Heterothrips cacti, Hood 1954

Described originally from Argentina, Formosa Province, on an unidentified cactus, this species was subsequently reported from *Opuntia sulphurea* (*Cactaceae*) in Mendoza (de Borbón, 2005).

Material examined. ARGENTINA, Potrerillos, Mendoza, 23.ix.2002, 3 females and 3 males; El Carrizal (S33 17.194 W68 43.327), Mendoza, 16 females, 4 males, 21.xi.2009 on *Opuntia sulphurea* (de Borbón), in Laboratorio de virología, EEA, Mendoza.

Heterothrips flavitibia Moulton 1932

Described from Brazil, this species was recorded from Argentina by De Santis (1963). Re-examination of these Argentinean specimens indicated that although they share many characters with *flavitibia* they differ in the colour of antennal segments I–V. According to the original description of *flavitibia* these segments should be clear, but in the specimens identified as *flavitibia* by De Santis only segment III is clear. Although, colour might vary between samples of the same species, it seems more likely that the De Santis specimens belong to an undescribed species. Considering that there is no host information and insufficient material for an appropriate description of this species, it is included in the key above as ?*flavitibia*.

Material examined. ARGENTINA, Cuesta de Chancani, Córdoba to 1000 m, 8.xi.1961, 1 female collected by Mallo, in Museo de Ciencias Naturales de La Plata, identified by De Santis.

Heterothrips marginatus Hood 1954

Described from Brazil, this species was recorded form Argentina by De Santis (1959).

This species is characterized for the presence of a continuous tergal craspedum that bears microtrichia.

Material examined. ARGENTINA, Valle de Tigre, La Pampa 1.ii.1958, 1 female, in Museo de Ciencias Naturales de La Plata, identified by De Santis

Heterothrips moestus De Santis 1966

Described from Argentina on five females and one male collected on an unidentified host, this species was distinguished from *quercicola* and *vernus* on forewing colour. Other relevant characters are the small craspedal lobes compared with the length of the microtrichia they bear.

Material examined. ARGENTINA, Gualeyguaychú, Entre Ríos, 23.ii.1962, 1 female and 1 male paratypes, collected by Iriart, in Museo de Ciencias Naturales de La Plata.

***Heterothrips myrceugenellae* Gallego 1973**

Described from Argentina on 11 females and 12 males that were collected from *Luma apiculata* (= *Myrceugenella apiculata*) (*Myrtaceae*), a native plant of the southwest forests of Argentina and Chile. It is similar to *clusiae* from Surinam, and both species are light brown in colour, with ocellar setae III close together behind the first ocellus.

Material examined. ARGENTINA, Bariloche, Río Negro, on flowers of "arrayán", ii.1967, 2 female and 2 male paratypes, collected by Arona, in Museo de Ciencias Naturales de La Plata.

***Heterothrips pilarae* sp. n.**

Female macropterous (Fig. 33): *Color*: Body uniformly brown., fore tibiae, apex of fore femur and all tarsi yellowish, antennal segments I and II dark brown, apex of II, segment III and IV yellowish brown, V–IX brown (Fig. 2); forewing shaded greyish brown with basal 2/5 clearer (Fig. 31).

Structure: Head (Fig.1) wider than long and broader at base, with three pairs of ocellar setae, pair III arising between the lines that connect fore and hind ocelli; with five pairs of postocular setae, three arising near to hind ocelli and two near to cheek. Antennal segment III tripartite with short pedicel; segments III and IV with a sensorial band, apparently a simple row of pores at apex (Fig. 2, 30). Pronotum with transverse sculpture lines and about 34 discal setae (Fig.1). Mesonotum with transverse lines and with pair of more developed setae placed at posterior third of sclerite (Fig. 3). Metanotum with concentric lines of structure covered with microtrichia, with two pairs of setae, the external pair located at anterior margin and the inner pair at posterior margin, campaniform sensilla present (Fig. 3). Tergites (Figs 4, 5, 8, 9, 10, 11 and 12) II–VII with one pair of well developed setae medially, with reticulation at middle zone and more strongly on lateral third, with several discal setae laterally. Tergites II–VIII with microtrichia at posterior margin, forming a complete comb on tergites VI–VIII, the rest of these tergites with microtrichia at middle and laterally on posterior margin; tergites VIII–IX with discal microtrichia. Sternites (Figs 7, 26) with weak reticulation, I with minute setae at anterior ridge, II–VI with spaced setae and microtrichia on posterior margin, VII with few short microtrichia arising at posterior margin. Pleurites II–VII with posteromaginal microtrichia. Some specimens presented anomalies, such as the first tergite with only one seta medially; the comb of microtrichia on tergite VI is variable, sometimes incomplete.

Measurements in microns Holotype female: Length 1290. Head length (width) 102 (173). Pronotum length (width) 129 (244). Forewing length 650. Tergite lengths, IX 73, X 73. Antennal segments I–IX length (width) 22 (24), 34 (22), 46 (20), 27 (20), 24 (17), 24 (15), 22 (11), 17 (10), 11 (5).

Male macropterous (Fig. 34)): Similar to female in colour and structure, but smaller and more slender. Sternites III–VIII with irregular pore plate at centre of anterior third (Fig. 6).

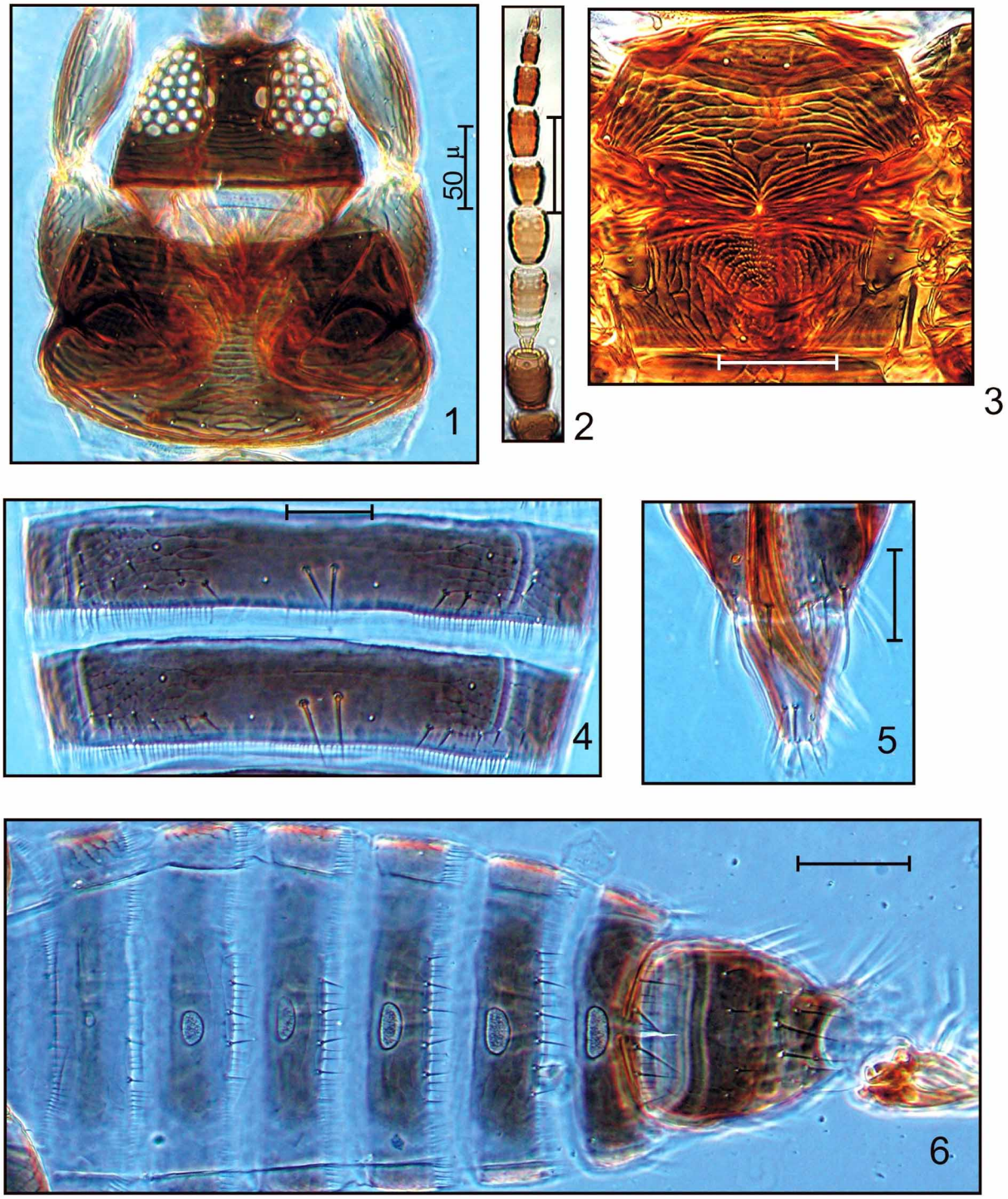
Measurements in microns Paratype male: Length 1050. Head length (width) 90 (146). Forewing length 570. Sternite VIII width of pore plate 34.

Material examined. Female holotype, **ARGENTINA**, El Carrizal, Mendoza (S 33°17'; W 68°43'), 18.xi.2007, on flowers of *Tricomaria usillo* (*Malpighiaceae*), collected by de Borbón, in Museo de Ciencias Naturales de La Plata.

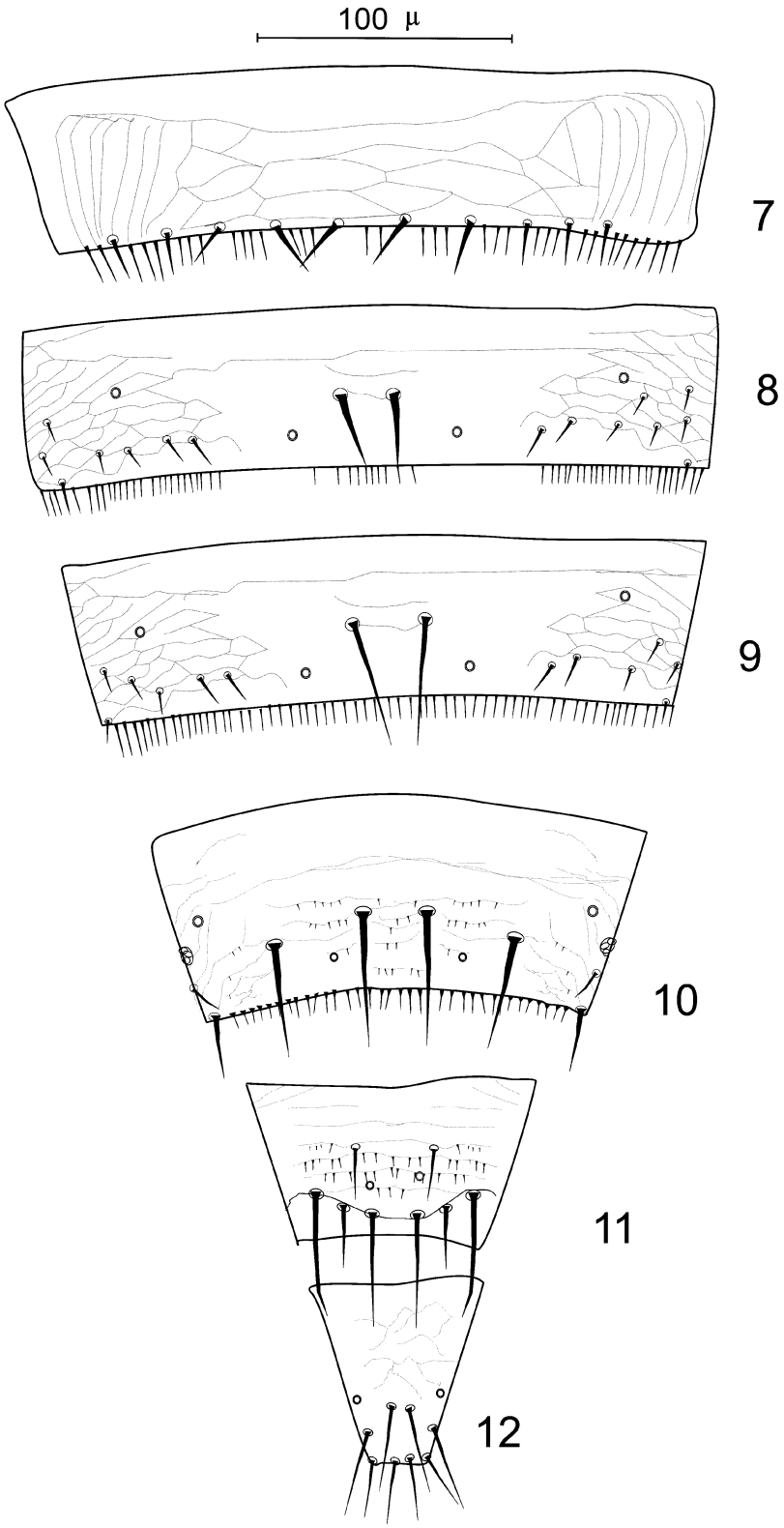
Paratypes, 13 females, 2 males collected with holotype, 27 females, 6 males with similar data but 11.xi.2007; 15 females, 1 male with similar data but 14.xi.2007, collected by de Borbón, in Museo de La Plata and Laboratorio de Fitovirología EEA Mendoza INTA.

Comments. Using the key by Mound & Marullo (1996), several species can be discounted such as all species with craspeda, lobes or plaques, also several species with different colour of body, antennal segments, legs and wings, also presence of discal setae on sternites, sculpture of pronotum absent, length ratio of antennal segments, antennal segment III partitions, length ratio of abdominal segments IX/X. Using the key, this species runs to *H. vitis*, with which it has several characters in common. Judging from the original description of *H. vitis* given by Hood (1916), *pilarae* differs because it has antennal segment III length/width ratio around 2.3 whereas in *vitis* this ratio is about 2.8. Also it differs in the presence of microtrichia medially on the posterior ridge of tergites II–V, whereas in *vitis* microtrichia are present laterally but absent medially on

these tergites. Moreover, *vitis* is found on native *Vitis* species in the Eastern United States, whereas *pilarae* occurs on a *Malpighiaceae* in South America. *H. pilarae* has the same disposition of tergal marginal microtrichia that is recorded in *H. johanseni* Berzosa & Maroto, but *pilarae* has only one row of sensorial pores on antennal segments III–IV, whereas *johanseni* has two rows. These two species also differ in forewing colour. Another similar species is *H. araucaniae* Berzosa et Maroto (1999), collected on *Quinchamalium chilense* (*Santalaceae*), but tergites II–V of that species have no microtrichia medially on the posterior ridge. Two further species recorded from Malpighiaceae, *H. peixotoa* Del Claro *et al.* (1997) and *H. nouragnensis* Ulitzka (2004), also have a double row of pores on antennal segments III–IV, in contrast to the single row found in *pilarae*.



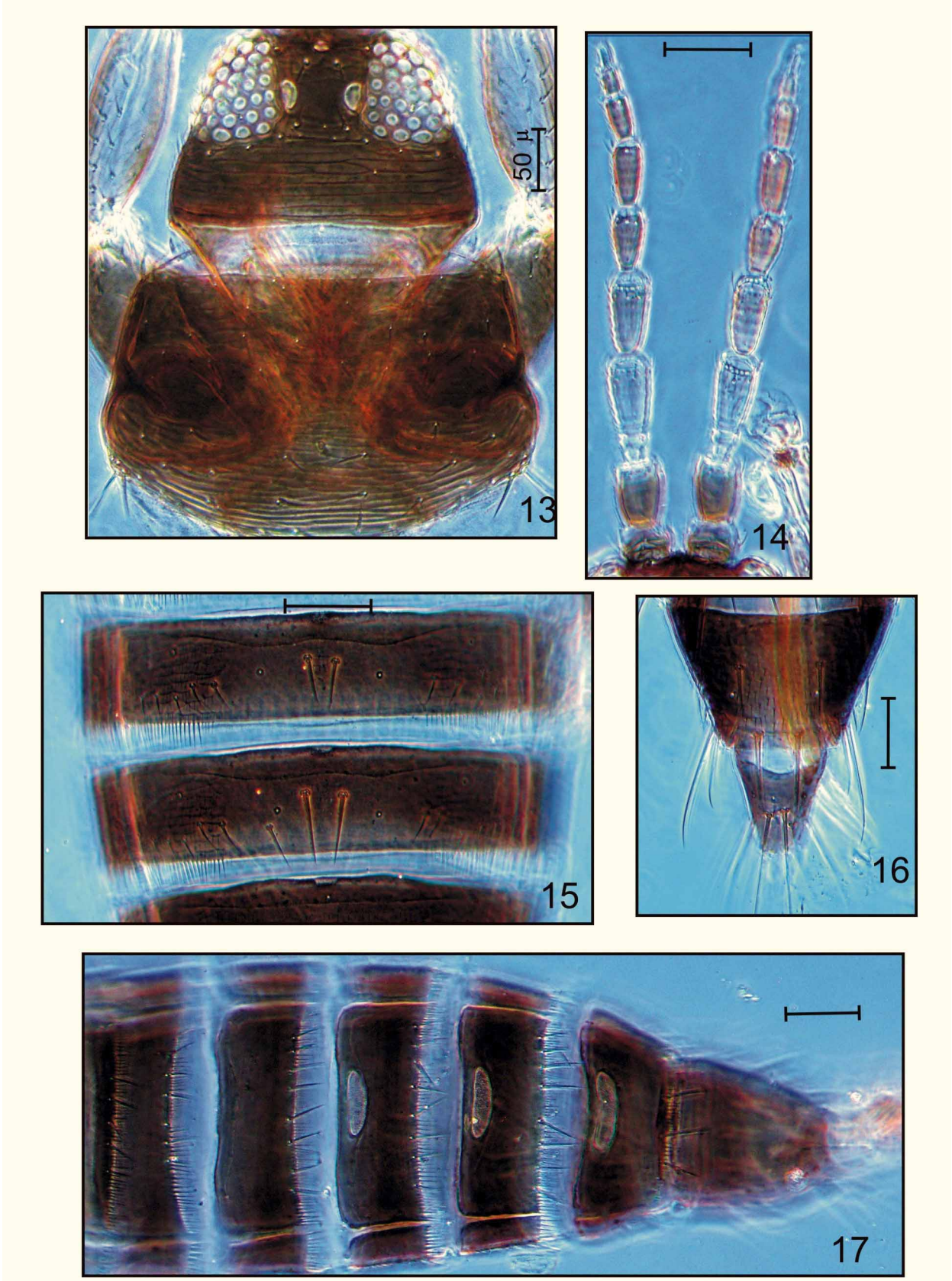
FIGURES 1–6. *H. pilarae*: 1 Head and Pronotum; 2Antenna; 3 Meso and Metanotum; 4 Tergites V–VI; 5 Tergites IX–X; 6 Sternites male.



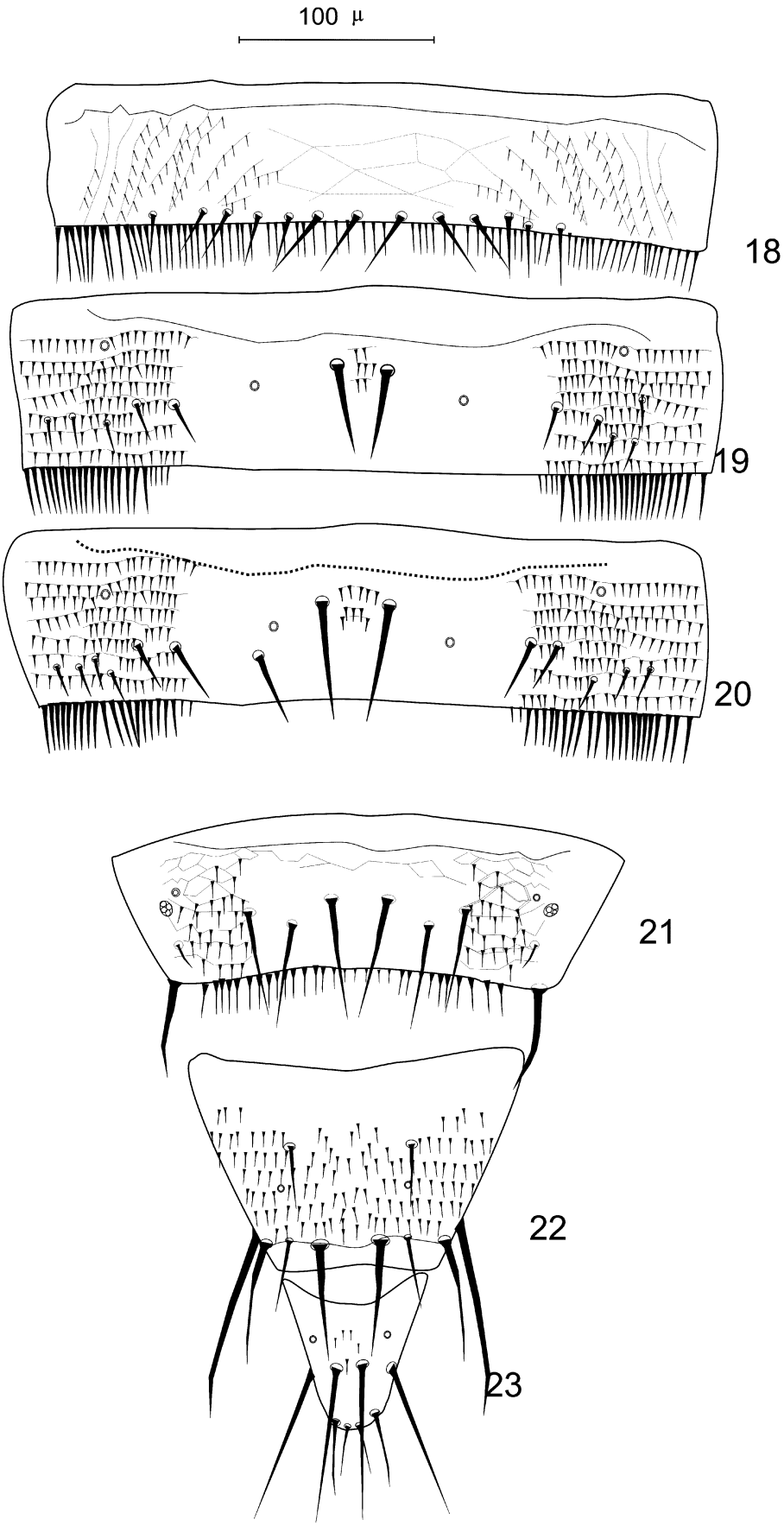
FIGURES 7–12. *H. pilarae*: 7 Sternite V; 8 Tergite V; 9 Tergite VI; 10 Tergite VIII; 11 Tergite IX; 12 Tergite X.

***Heterothrips stellae* sp. n.**

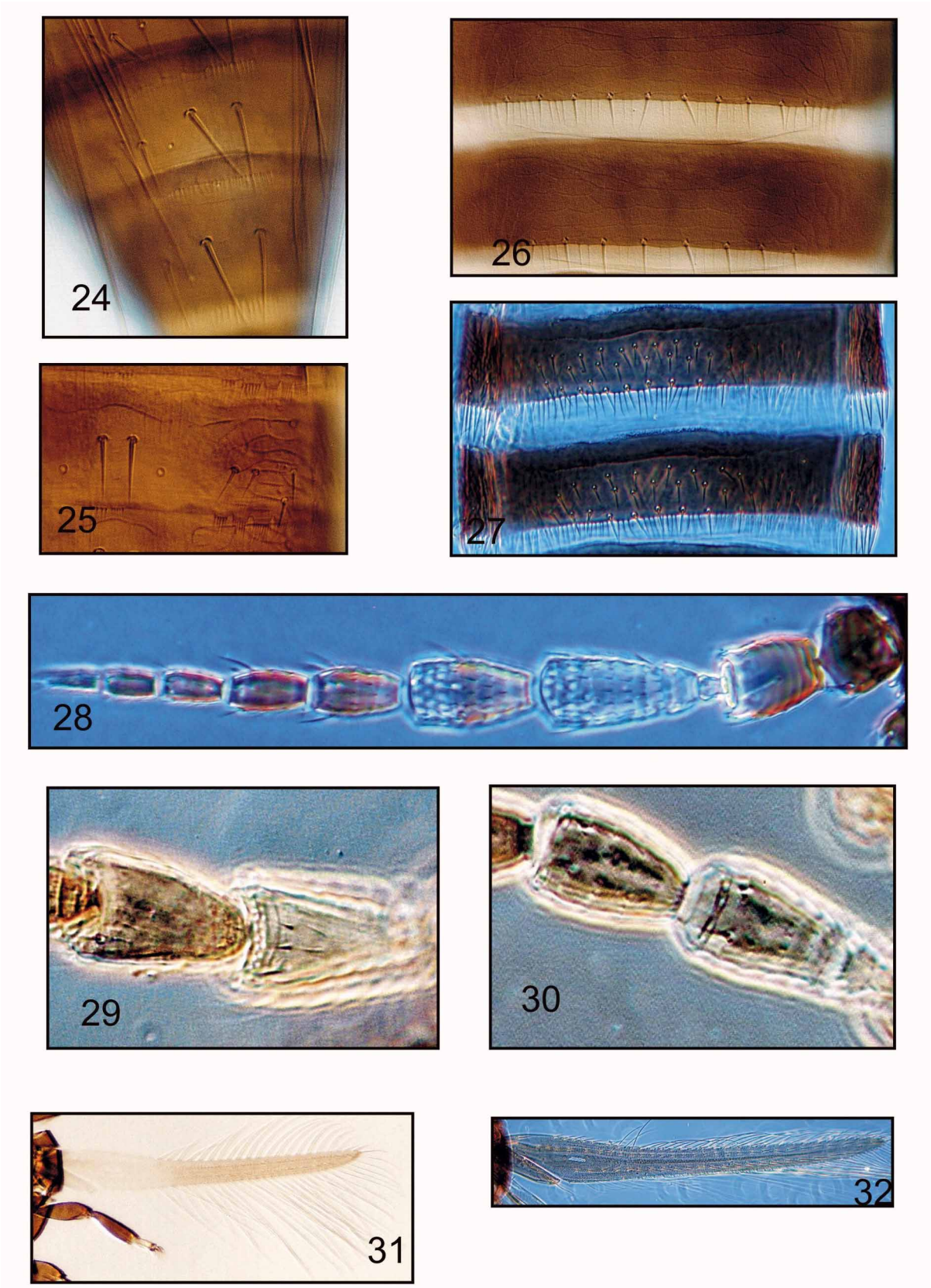
Female macropterous (Fig. 35): *Color*: Body uniformly brown, fore tibiae and all tarsi yellowish, antennal segment I and II and V–IX brown, III yellowish brown and IV light brown (Fig. 14); forewing brown with small sub-basal white fleck (Fig. 32).



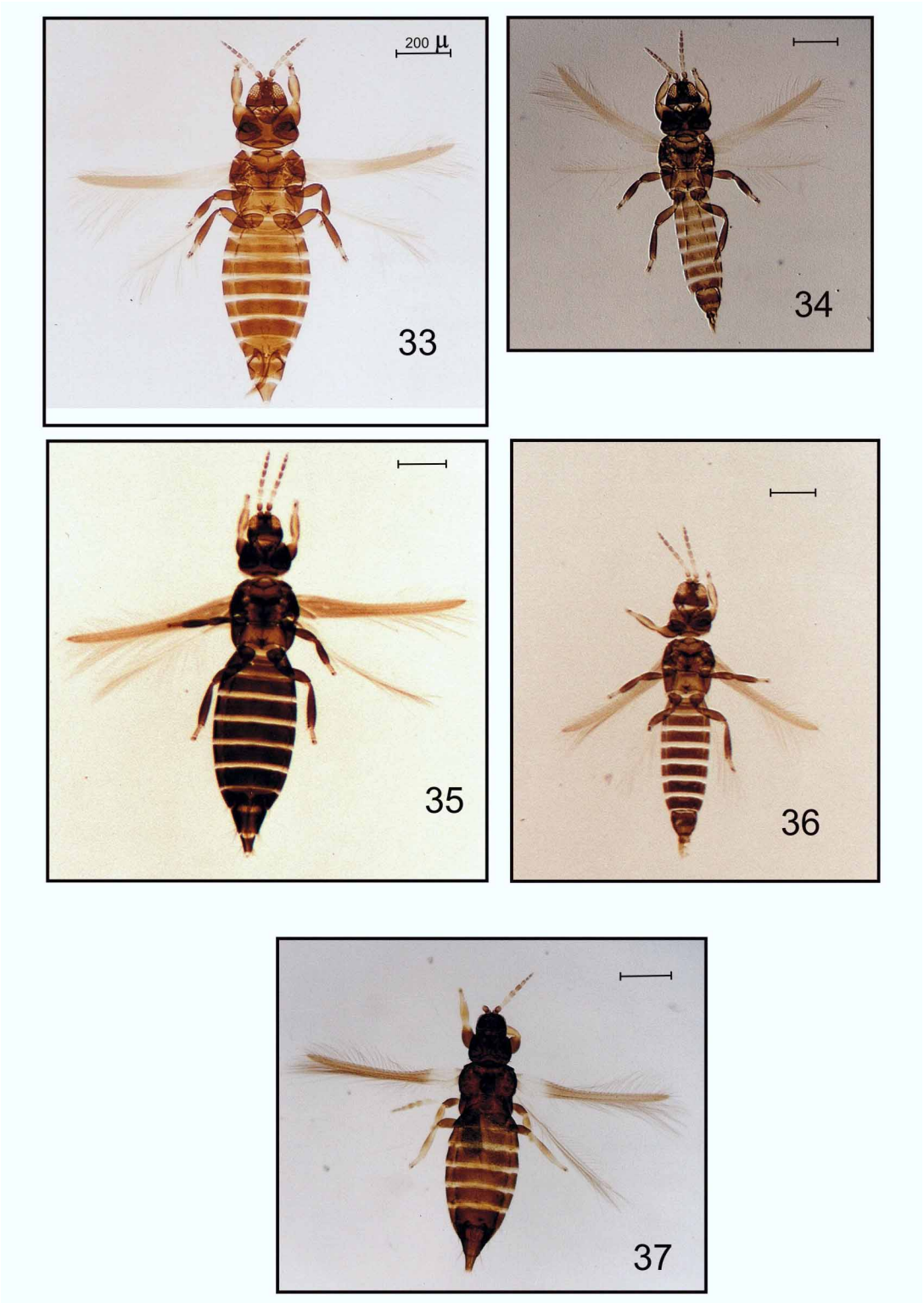
FIGURES 13–17. *H. stellae*: 13 Head and pronotum; 14 Antenna; 15 Tergites V–VI; 16 Tergites IX–X; 17 Sternites male.



FIGURES 18–23. *H. stellae*: 18 Sternite V; 19 Tergite V; 20 Tergite VI; 21 Tergite VIII; 22 Tergite IX; 23 Tergite X.



FIGURES 24–32. *H. marginatus*: 24 tergite. *H. moestus*: 25 tergite. *H. pilarae*: 26 Sternites. *H. cacti*: 27 Sternites; 28 Antenna. *H. myrceugenellae*: 29.Antennal segment III–IV. *H. pilarae*: 30 Antennal segments III–IV; 31 Right forewing. *H. stellae*: 32 Right forewing.



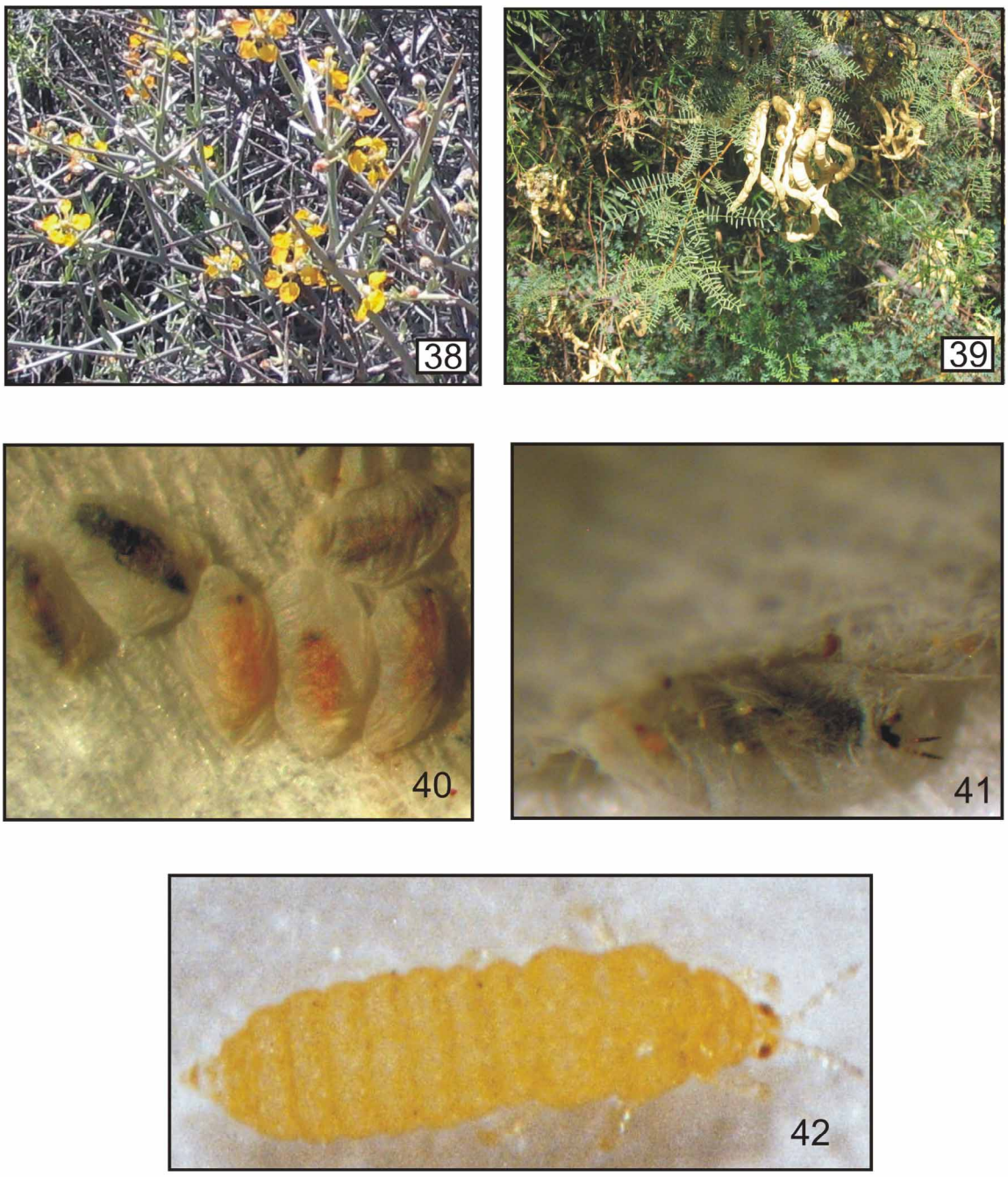
FIGURES 33–37. *H. pilarae*: 33 Female; 34 Male. *H. stellae*: 35 Female; 36 Male. 37 *H. ?flavitibia*

Structure: Head (Fig. 13) wider than long and broader at base, with three pairs of ocellar setae, pair III arising between the lines that connect fore and hind ocelli; with six pairs of equidistant postocular setae. Antennal segment III 4-partite with short pedicel, sensorial band on III and IV apparently with one row of pores. Pronotum with transverse sculpture lines, about 30 discal setae and two pairs of rather prominent posteroangular setae. Mesonotum with transverse lines, one pair of more developed setae at posterior third of sclerite. Metanotum with concentric lines bearing many microtrichia on posterior third, with two pairs of setae, external pair at anterior margin inner pair at posterior margin, campaniform sensilla present. Tergites

(Figs 15, 16, 19–23) II–VII with one pair of well developed setae medially, with microtrichia at middle but more abundant on lateral thirds, with several discal setae. Tergites I–VIII with posteromarginal comb of microtrichia, complete medially only on tergites VII–VIII; tergites VIII–X with discal microtrichia. Sternites (Fig. 18) with weak reticulation bearing microtrichia, I with minute setae at anterior ridge, II–VI with microtrichia on posterior margin, VII with few short microtrichia on posterior margin. Pleurites II–VII with posteromaginal microtrichia.

Measurements in microns Holotype female: Length 1500. Head length (width) 90 (159). Pronotum length (width) 117 (234). Forewing length 770. Tergite lengths, IX 98, X 61. Antennal segments I–IX length (width), 24 (27), 37 (24), 61 (22), 44 (22), 34 (20), 34 (18), 22 (12), 15 (12), 12 (7).

Male macropterous (Fig. 36): Similar to female in colour and structure, but smaller and more slender. Sternites VI–VIII with irregular pore plate medially on anterior third (Fig. 17).



FIGURES 38– 42. 38 *Tricomaria usillo* Branches with flowers. 39 *Prosopis alpataco* Branches with fruits. *H. pilarae*: 40 Pupae and adults into cocoon; 41 Adults escaping from cocoon; 42 larva.

Measurements in microns Paratype male: Length 1160. Head length (width) 122 (144). Forewing length 690. Sternite VIII pore plate width 59.

Material examined. Female holotype, **ARGENTINA**, Gustavo André, Mendoza (S32 37.766 W68 20.200), 5.xi.2009, on flowers of *Prosopis alpataco* (*Fabaceae*), collected by de Borbón, in Museo de Ciencias Naturales de La Plata.

Paratypes, collected with holotype ARGENTINA, Gustavo André, Mendoza, on flowers of *Prosopis alpataco*, collected by de Borbón, 5.xi.2009 (S32 34.303 W68 14.648), 44 females and 2 males. A second series collected 10,8 km distant from the first series (S32 37.766 W68 20.200), 16 females and 2 males in Museo de La Plata and Laboratorio de Fitovirología EEA Mendoza INTA.

Comments. *H. stellae* differs from the other species of Group I, that is, the species without craspeda on the posterior margin of the abdominal tergites, because it has tergite X much shorter than tergite IX. Despite this, it is similar in several characters to *H. spinosus* Moulton, *H. pithecolobiumaffinis* Johansen and *H. auracaniae* Berzosa & Maroto. In contrast to *H. prosopidis* Crawford that also occurs on *Prosopis* (Hoddle *et al.*, 2008), *stellae* does not have tergal craspeda.

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