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FOUR ARMOURED SCALE INSECTS FROM AUSTRALIA, SOUTH AFRICA, AND MEXICO: QUARANTINE INTERCEPTIONS IN JAPAN (STERNORRHYNCHA: COCCOIDEA: DIASPIDIDAE)

By SADAO TAKAGI

Abstract

TAKAGI, S. 2016. Four armoured scale insects from Australia, South Africa, and Mexico: Quarantine interceptions in Japan (Sternorrhyncha: Coccoidea: Diaspididae). *Ins. matsum. n. s.* 72: 77–94, 8 figs.

Four species of armoured scale insects intercepted at quarantine inspection in Japan are recorded, and remarks are made about some taxonomic questions they arouse. One of the species, found on *Xanthorrhoea* sp. imported from Australia, is identified with *Chionaspis xanthorrhoeae* Fuller and transferred to *Poliaspis*. Another species, on *Chamelaucium* from Australia, is very close to *Poliaspis ceraflora* Hardy and Henderson. A third species was collected on cut flowers of *Paranomus*, *Serruria*, and *Berzelia* from South Africa, and is identified with *Rolaspis lounsburyi* (Cooley). The fourth species, *Opuntiaspis* sp., was found on cactus fruits from Mexico, and is apparently different from the three known species of the genus.

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Introduction

Recently I have had the opportunity to examine some scale insects intercepted at quarantine inspection in Japan. These insects, all mounted on slide, were submitted to me for identification by Mr T. Inoue, Moji Plant Protection Station. They include four species which are notable taxonomically, and the results of my study on these species are given in the present paper.

One of the four species is identified with *Chionaspis xanthorrhoeae* on the basis of the original description; another species is very similar to the description of *Poliaspis ceraflora*, but does not exactly agree with the latter (it is called '*Poliaspis* sp.Q' in this paper, 'Q' standing for quarantine interception); a third species is identified with *Rolaspis lounsburyi*. In examining these three species, I have been impressed with the resemblance they show in some features of taxonomic importance, and I have considered the possibility that these species belong to one and the same genus. In the present paper, however, I prefer to place the form I have identified with *C. xanthorrhoeae* in *Poliaspis*, and treat *Poliaspis* and *Rolaspis* as closely related but different genera tentatively. The last of the four examined species belongs to *Opuntiaspis*, and is probably an undescribed form ('*Opuntiaspis* sp.Q' in this paper). The quarantine records suggest that *Rolaspis lounsburyi* is not rare on cut flowers imported from South Africa; *Opuntiaspis* sp.Q may also be worthy of attention from the viewpoint of its potential economic importance.

In this paper, the term 'trullae' is adopted in place of 'pygidial lobes' in authors. In the description of *Poliaspis xanthorrhoeae,* the abbreviations 'abd I', 'abd II', and so on are used for the corresponding abdominal segments.

I would like to make my acknowledgement to Mr. T. Inoue for his giving me the opportunity to study these interesting scale insects.

Records and Remarks

Poliaspis xanthorrhoeae, n.comb.
=*Chionaspis xanthorrhoeae* Fuller, 1899
(Figs 1, 2)

Citations from Fuller (1899)

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The following Notes and Descriptions are the outcome of some months' residence at Perth, on the Swan River, Western Australia, where in the immediate vicinity of the city I collected the majority of the specimens.

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94. *Chionaspis xanthorrhoeae*, sp. n.

Scale of ♀ shining white, pyriform; exuviae light yellow.

Adult ♀ yellow. Last segment with a slight, wedge-shaped depression, on either side of which is a short, conical lobule; beyond the lobules at a short interval occur the second lobes, represented by two lobules, the inner being the longer and the larger, the outer short, wide and rounded at the apex. Beyond the second lobes the margin is slightly prolonged and thickened three times. Two very small spines between the median lobules, the others adjacent to the plates which are simple, tapering and very long, and situated subsequent to the lobes and prolongations of the margins. Five groups of circumgenital pores, median usually of 4 orifices, anterior laterals 19 to 20, posterior

laterals 25 to 30.

♂ puparium white, not carinated; larva skin yellow.

On *Xanthorrhoea*, sp.

Material examined

Four adult females, from Australia, on *Xanthorrhoea* sp. (Xanthorrhoeaceae, Liliales); intercepted at the port of Yokohama, 17.IV.2001, N. Jojima.

Identification of the specimens

The original description is almost limited to the pygidium and especially to the marginal features on the sixth and succeeding abdominal segments. In these features, the four specimens examined in the present study agree well with the description, which even mentions the occurrence of 'Two very small spines between the median lobules' (the 'mesobasal processes of the median trullae' as interpreted in the present study: see *Remarks*). However, the lateral lobule of the second trulla is somewhat variable in size and shape in the examined specimens: it is conical, with the apex blunt, in three specimens (Fig. 1, J; 2, A, B), while it is rather rounded along the free margin in the other one (Fig. 2, C), thus probably approaching the state mentioned in the original description. What Fuller's description depicts is a pattern of characters which is rather special in the Diaspidini, so that the agreement of the specimens with the description suggests that they are correctly referable to *C. xanthorrhoeae* unless more than one species which has such a pattern occurs on *Xanthorrhoea* around Perth. The type series is presumed to have been lost (Miller and Gimpel, 2009). In the present circumstances, there may be no alternative but to regard the specimens as belonging to *C. xanthorrhoeae*. However, this identification is no more than a tentative treatment, either. I therefore give below a description based on the four specimens in order to accept criticism on my identification. Needless to say, material from the type locality is essential to a critical study and for a definite settling of the matter. *C. xanthorrhoeae* as understood in this study is not retainable in *Chionaspis*. I once considered the possibility that it belongs to the African genus *Rolaspis* but in the present study it is transferred to *Poliaspis*, which is well represented in Australasia.

Description based on the four specimens

Fully grown adult female elongate, widest across metathorax or abd I, about 2.2 to 2.4 times as long as wide; prosoma much longer than postsoma, head narrowing anteriorly, prothorax gradually and mesothorax slightly widening posteriorly; metathorax and abd I–III lobed laterally; pygidium much wider than long, roundish along free margin.

Head strewn with about 25–33 microducts dorsally. Antennae each with a single seta of moderate length. Anterior spiracles each with 2–5 disc pores, which tend to form a short row; posterior spiracles with no disc pores or each with 1 or 2. Leg vestiges present: meso- and metathoracic legs each represented by 1 or 2 small sclerotized conical spines, at times much reduced.

Conical gland spines on ventral surface of thoracic and prepygidial abdominal segments: 1 or 2 anterolaterally, and 1–4 posterolaterally, to anterior spiracle; 6–9 on mesothorax, forming a loose group in intermediate area; 3–9 on metathorax, posterolaterally to posterior spiracle; 5–8 on abd I, on base of lateral lobe; 4–6 on II, on lateral lobe; 4 or 5 on III, along margin of lateral lobe; 1–3 on IV marginally. Slender

marginal gland spines 1 on abd V–VIII each (the last being situated just laterally to median trulla).

Small ducts on meso- and metathorax, strewn on body side dorsally to ventrally, 17–21 on mesothorax and 15–23 on metathorax. Lateral macroducts on abd I–III, confluent with submarginal dorsal macroducts, which occur not only along the posterior margin (segmentally) but also on the inner area (infrasegmentally) on each segment; lateral and submarginal macroducts combined: 15–22 on I, 15–20 on II, and 15–19 on III. Submarginal macroducts 6 segmentally and 3 or 4 infrasegmentally, 9 or 10 in total, on abd IV; 4–6 segmentally and 0, 1, or 2 infrasegmentally, 4–6 in total, on V. Small submedian ducts on abd I and II along posterior margin of each segment, 1–4 on I, and 2–6 on II. Submedian macroducts on abd III–VI: 3–7 segmentally and 1–4 infrasegmentally, total 4–10, on III; 3–7 and 2–5, total 8 or 9, on IV; 2–5 and 1–4, total 5–7, on V; VI with 1–3 in a row (in 1 case, also with 1 submarginally). Marginal macroducts 2 on abd IV, each with a robust pore prominence; 2 on V and also on VI, mesal one with a robust pore prominence on each segment; 1 on VII (just mesally to second trulla), with a small and slender spine. Submarginal dorsal bosses one on each of abd I, III, and V, removed much mesally on I.

Perivulvar disc pores in 5 groups: 3–7 in median, 10–17 in each anterolateral, and 19–23 in each posterolateral group; total 69–85. No extra disc pores on segment anterior to perivulvar groups. Anal opening near base of pygidium.

Median trullae with mesal bases sunken into apex of pygidium on ventral surface, forming an incision in the shape of an inverted V; triangular, with mesal bases extending anteromesally but not adjoining each other to form a yoke. A pair of small slender spinous processes on mesal bases of median trullae; a pair of setae just anteriorly to the spinous processes. Second trullae bilobulate; mesal lobule well developed, stout, broadly roundish along apical margin; lateral lobule small, somewhat variable in size and shape, conical with apex blunt, or roundish along free margin. Abd VI with margin rugged with 2 conical processes laterally to pore prominence.

Remarks

Hardy and Henderson (2011) made a nearly complete revision of *Poliaspis* and recognized 22 species of the genus, only two others known at that time having been left unrevised. *P. xanthorrhoeae* as understood in my study does not agree at least in three points with the concept of *Poliaspis* presented by them. First, this species has no extra abdominal disc pores, whereas all the species examined by them are provided with extra 'perivulvar' disc pores. Secondly, this species has the median trullae apparently not confluent basally, whereas, according to them, the members of the genus except *P. ceraflora* have 'zygotic' median trullae. Thirdly, this species possesses a pair of small slender spinous processes on the mesal bases of the median trullae, whereas the presence of such processes is not clearly mentioned in all the species examined by them. The question, therefore, may arise why *Chionaspis xanthorrhoeae* should be transferred into *Poliaspis* in spite of all these disagreements. An attempt is made below to check the disagreements and to clear up the question. In the present study, two other species, *Poliaspis incisa* and the form treated as *Poliaspis* sp.Q, have been available for my examination. *P. incisa* was described in Takagi and De Faveri (2011) and accepted by Hardy and Henderson (2011) as a member of *Poliaspis*; *P*. sp.Q is probably very close to *P. ceraflora*, which was described by Hardy and Henderson as a species of *Poliaspis* in

spite of the 'non-zygotic' median trullae.

First, extra disc pores occur in *P. incisa* and *P.* sp.Q as usual in *Poliaspis*. In principle, taxa are recognized on the basis of statistically correlated characters. In the Diaspididae, the occurrence of extra abdominal disc pores is scattered in restricted parts of the family and often arbitrary with the context of taxa. This fact suggests that these disc pores represent a primitive feature, which may have been persisting (as a relic), or may have emerged abruptly and atavistically (as a recall), in the course of evolution. The taxonomic value of this feature, therefore, should depend on the manner of its appearance in taxa under study. *Lepidosaphes pini*, originally described as *Poliaspis pini* by Maskell, may afford a good example for considering the matter. This species is exceptional in having extra 'perivulvar' disc pores but otherwise not extraordinary in the genus *Lepidosaphes* and in the tribe Lepidosaphidini. In this case, the occurrence of these disc pores provides a diagnostic character useful for recognizing the species among the members of the genus and the tribe but, whether it represents a relic or a recall, it has no further taxonomic value. Occasionally, extra disc pores occur only to the extent of abnormal individual variation (apparently atavistically when occurring in diaspidids of derivative taxa) and in such a case their occurrence has no taxonomic value.

Secondly, in *P*. sp.Q, the median trullae are obviously non-zygotic as in *P. ceraflora*. In *P. incisa*, the bases of the median trullae are separated from each other by a wide space and the ventral pygidial margin in this space is deeply incised and only narrowly sclerotic. In *P. xanthorrhoeae*, the bases of the median trullae extend anteromesally, but their extensions do not adjoin each other to form a yoke. In the state around the bases of the median trullae, these three species are not the same and, accordingly, *Poliaspis* should not be uniform throughout. The median trullae in the type species of *Poliaspis*, *P. media* (or *P. cycadis* or *P. gaultheriae*, both having been synonymized with *P. media*), were described as basally 'confluent', 'yoked together', or 'zygotic' by authors, though also as 'not contiguous' by Morrison and Morrison (1922). The description of *P. cycadis* in Balachowsky (1954, p. 428) may be pertinent to the matter under consideration. He states: 'L_1 … accolées l'une à l'autre seulement par une membrane interne sclérosée; dans leur partie saillante, les palettes sont séparées à leur base par un espace médian complet'. What is stated here may be understood as follows: the median trullae are produced with their bases separated from each other by a good space, while the dorsal derm covering the bases and the space is so sclerotized as to make the trullae appear to be confluent basally. According to this interpretation, the median trullae in the type species are not united by a sclerotized yoke, nor are they combined by a zygotic sclerite. (In this connection, see *Remarks* under *Rolaspis lounsburyi* and also *Remarks* under *Poliaspis* sp.Q.)

Thirdly, *P*. sp.Q is provided with a pair of small spinous processes between the median trullae, and *P. incisa* with a pair of much reduced processes on the mesal bases of the median trullae. *P. ceraflora*, which is probably very close to *P*. sp.Q, is also provided with a pair of short spines just mesally to the median trullae so far as presumed from the figure in Hardy and Henderson (2011, fig. 5). Henderson (2011) studied the second instar females of six species and the second instar males of four species of *Poliaspis* occurring in New Zealand. Her figure (fig. 192) of the second instar female of *P. media*, the type species, shows a pair of processes on the mesal bases of the median trullae. Such processes, which may be termed 'mesobasal processes of the median trullae', are not shown in her figures of the second instar females of the other five species. Her

figures (figs 183, 187, 193, 194, 198) of the second instar males of the four species are provided on the mesal bases of the median trullae with a pair of small processes, of which the presence is mentioned by her as follows: 'median lobes bilobate with a small pointed lobule medial to each main lobe', 'a small pointed lobule' here apparently corresponding to each mesobasal process. In one of the four species, *P. floccosa* (fig. 183), a macroduct is associated with each of the mesobasal processes. The view may be adopted, therefore, that these processes are not lobules of the median trullae but represent the pore prominences of the eighth abdominal segment and that the absence of marginal macroducts on the processes in the second instar nymphs of the other species she examined is due to their evolutionary disappearance. If this view is correct, the slender spinous processes occurring on the mesal bases of the median trullae in the adult female of *P. xanthorrhoeae* should also be the pore prominences of the eighth abdominal segment originally (each of them being no longer accompanied with a marginal macroduct), because they apparently correspond to the mesobasal processes occurring in the second instar nymphs. In fact, the adult female of this species has the pore prominences of the seventh abdominal segment, too, modified into slender processes (each of them being too slender to accommodate the orifice of the marginal macroduct combined with it). It should be added that in *P. incisa* not only the adult female but also the second instar female and male are provided between the median trullae with a pair of small processes (each being accompanied with no macroduct in either sex), though these processes in the female nymph are sometimes so rudimentary that they may easily be overlooked. Furthermore, in the character pattern of the second instar male, *P. incisa* is very similar to two of the four species studied by Henderson, *P. lactea* (fig. 187) and *P. media* (figs 193, 194). (As to the spinous processes occurring between the median trullae in the adult females of *P*. sp.Q and *P. ceraflora*, see under *Poliaspis* sp.Q.)

Taking all these considerations into account, I have concluded that there is no definite reason for excluding *P. xanthorrhoeae* from *Poliaspis*. Furthermore, in checking published descriptions, I have had the impression that many species of *Poliaspis* are to be carefully re-examined for the state around the bases of the median trullae. Comparing well-stained specimens with little- or non-stained ones may be useful for elucidating the state of this part (see *Remarks* under *Rolaspis lounsburyi*).

Poliaspis sp. (*P*. 'sp.Q')
(Figs 3, 4)

Material examined

Eight adult females, from Australia, on *Chamelaucium* sp. (Myrtaceae), leaf; intercepted at Narita Airport, 26.VI.1996, M. Takada.

The mounted specimens are generally not in good condition; observations on the details of features have been restricted to a few better specimens.

Comparison with Poliapis ceraflora

Poliaspis sp.Q is probably very close to *Poliaspis ceraflora*. The latter was described by Hardy and Henderson (2011) on the basis of material collected at Perth, Western Australia, on *Chamelaucium uncinatum* (six adult females, including the holotype) and *Melaleuca* sp. (six adult females), both these plants belonging to the family Myrtaceae. *P.* sp.Q and *P. ceraflora*, therefore, may not differ in the range of host

plants.

P. sp.Q and *P. ceraflora* agree in having the median trullae small and widely separated from each other. *P*. sp.Q is provided between the median trullae with a pair of spinous processes, which are smaller than the median trullae but may not easily be overlooked; the description of *P. ceraflora* makes no mention of such processes, but the figure (fig. 5) suggests the occurrence of a small spine mesally to the median trulla. These processes in both forms occur closely to the median trullae rather than on the mesal bases of the latter, but they undoubtedly correspond to the 'mesobasal processes' discussed in *Remarks* under *Poliaspis xanthorrhoeae*.

The two forms remarkably differ in the shape of the median trullae: in *P*. sp.Q these trullae are elongate, narrowly conical, and pointed at the apex, whereas in *P. ceraflora* these trullae are short, as long as wide, and broadly rounded along the apical margin so far as based on the description ('each lobe with rounded apex') and the figure. The occurrence of the conical median trullae in *P.* sp.Q has been confirmed in six specimens (but not in the other two specimens, which are badly distorted), and the rounded ones in *P. ceraflora* should have been based on the 12 specimens. The shape of the median trullae, therefore, should be stable in either form.

P. sp.Q and *P. ceraflora* agree in having only two small marginal gland spines on each side of the pygidium, one just laterally to the median trulla and the other laterally to the second trulla. This character is rather rare in the genus, being restricted to these two forms and another species (*P. callitris*, see *Remarks* below).

P. sp.Q may be similar to *P. ceraflora* in the occurrence of ducts, but it is not easy to make a comparison with the figure (fig.5) of the latter as to the details of macro- and microducts occurring in the prepygidial region. These forms agree in having a good number of microducts scattered on the dorsal surface of the head; *P.* sp.Q, in addition, has a variable number of microducts on the ventral surface of the meso- and metathorax in a broad median area (these microducts being numerous in the specimen shown in Fig. 3 and 4), whereas the figure of *P. ceraflora* shows no such microducts. In *P*. sp.Q each antenna is provided with two setae at least usually, one of them being much smaller than the other, whereas the figure of *P. ceraflora* shows a single seta on the antenna.

The difference in the shape of median trullae is so remarkable between *P*. sp.Q and the description and figure of *P. ceraflora* that these forms seem to represent distinct species (provided that this difference is real and stable). If this view is correct, there should be noticeable differences between the two forms also in other features, especially in the occurrence of dorsal macro- and microducts and also of ventral microducts. Detailed examinations on these forms, preferably based on further samples, and especially on variation in each form, may be necessary for clearing up the relation between them.

Remarks

Poliaspis callitris was described from *Callitris* in Laing (1929), and recorded from *Callitris* and *Cupressus* in Hardy and Henderson (2011), both these plant genera belonging to the family Cupressaceae. The median trullae in this species are 'zygotic' in Hardy-Henderson's description, whereas separated by a broad space from each other, with no connecting sclerotized yoke between them, in Laing's figure (fig. 5). This difference should not be real, because the material examined by Hardy and Henderson

included specimens from the type series (in this connection, see *Remarks* under *Poliaspis xanthorrhoeae* and also *Remarks* under *Rolaspis lounsburyi*).

P. sp.Q, *P. ceraflora*, and *P. callitris* are commonly characterized in having small median trullae, which are distinctly separated from each other in the former two and probably also in the third species, and in having only two pairs of small marginal gland spines on the pygidium. They may form a close group, and are to be revised and compared from this viewpoint.

Rolaspis lounsburyi
=*Chionaspis lounsburyi* Cooley, 1898
(Figs 5, 6)

Material examined

Two adult females, from South Africa, on cut flowers of *Paranomus* sp. (Proteaceae); intercepted at Narita Airport, 3.VII.2005, H. Hayashi.

One adult female, from South Africa, on cut flower of *Serruria* sp. (Proteaceae); intercepted at Narita Airport, 15.VII.2011, K. Kaneshiro.

Three adult females, from South Africa, on cut flowers of *Berzelia* sp. (Bruniaceae); intercepted at Fukuoka Airport, 19.VIII.2012, T. Inoue.

Identification of the specimens

The specimens examined in the present study nearly agree with the description and figure of *Rolaspis lounsburyi* in Munting (1965, fig. 11). They disagree with the latter in having the body not 'heavily sclerotized across the metathorax and first abdominal segment' at full growth; in lacking small ducts along the posterior margin of the metathorax (whereas fig. 11 shows some ducts scattered there); in having one submarginal dorsal boss on each of the first and fifth abdominal segments or only on the first (whereas 'Dorsal submarginal bosses present on segments I and III' in Munting's description). I do not think that these disagreements put serious difficulties in my identification: the sclerotization of the derm is a growth phenomenon and, in general, liable to vary with specimens in degree and extent; the dorsal ducts are 'very variable in number' (Munting, 1965) in *R. lounsburyi* (somewhat variable on anterior abdominal segments even in the six specimens available for the present study), and a form having some characters of dorsal ducts and once distinguished thereby from *R. lounsburyi* is connected with the latter through 'all intermediate conditions' (Munting, 1969); the occurrence of dorsal bosses is apparently unstable in the specimens examined in the present study. *R. lounsburyi* has been recorded from various plants belonging to nine families (Miller and Gimpel, 2009); in the present study, another family and three other genera are added to the list of host plants. Being broadly distributed in southern Africa and occurring on various kinds of plants, this species should be variable in some morphological features accordingly.

Munting (1965) made no mention of the state around the bases of the median trullae in *R. lounsburyi*. In the course of the present study, I have been under the impression that the state of this part is to be re-examined carefully and critically not only in *Poliaspis* (see *Remarks* under *Poliaspis xanthorrhoeae*) but also in *Rolaspis* and some other African genera (see *Remarks* below).

Remarks

This species was originally described in *Chionaspis*, a genus named early in armoured scale taxonomy. It was transferred by authors to *Phenacaspis*, *Dinaspis*, and *Trichomytilus* but, needless to say, all in misconception. Hall (1946) in his study on the Diaspidini of the Ethiopian Region erected *Rolaspis* together with other genera closely related to it, and since that time the species has been treated as a member of *Rolaspis*. In the course of the present study, however, I have realized the necessity of re-examining the taxonomic relations not only among these African genera but also between them and *Poliaspis* (see Introduction and *Identification of the specimens* under *Poliaspis xanthorrhoeae*).

When Hall erected *Rolaspis*, he described the median trullae in the genus as 'clearly yoked together'. Three of the specimens examined in the present study are well stained, while the other three have no trace of stain. In the latter three specimens observed in phase-contrast microscopy the median trullae have their mesal bases extending anteromesally, but these extensions do not adjoin each other to form a yoke. In the well-stained specimens, the dorsal derm covering the bases of the median trullae is so sclerotized as to mask the disjoined basal extensions and to make the trullae appear confluent basally. This state around the bases of the median trullae is probably the same as that described by Balachowsky (1954) for *Poliaspis cycadis* (which was synonymized with *P. media*, the type species of *Poliaspis*) (see *Remarks* under *Poliaspis xanthorrhoeae*).

Hardy and Henderson (2011) mentioned the occurrence of extra 'perivulvar' disc pores in all the species of *Poliaspis* they examined and in some species of the African genera *Rolaspis*, *Tecaspis*, and *Dentachionaspis*, suggesting close relations among these genera. (They, however, refrained from 'taking any nomenclatural action' on these genera for a certain reason.) So far as based on published descriptions in addition to my limited observations, all these genera (and *Voraspis*, another African genus) are noticeably similar, apparently showing their close relations, in the structure of the pygidial margin and the arrangement of the dorsal macroducts, features undoubtedly of taxonomic importance. The frequent occurrence of extra 'perivulvar' disc pores certainly reflects the close relations among *Poliaspis* and the African genera. (It should have, however, no further taxonomic significance: see *Remarks* under *Poliaspis xanthorrhoeae*.) The '*Poliaspis* complex', comprised of all these forms, may afford another clue for elucidating the faunal connection between Africa and Australasia.

Opuntiaspis sp. (*O.* 'sp.Q')
(Figs 7, 8)

Material examined

One adult female, from Mexico, on Pitaya fruit (Cactaceae); intercepted at Narita Airport, 23.V.1996, G. Tokihiro.

One adult female, from Mexico, on dragon fruit *Hylocereus undatus* (Cactaceae); intercepted at Narita Airport, 9.VIII.2006, S. Sekimoto.

Remarks

Nakahara (1973) recognized three species in *Opuntiaspis*. The two specimens examined in the present study differ from published descriptions (among which Green,

1905, Ferris, 1937, and Balachowsky, 1954, may be mentioned here) of the three species mainly in having the second trullae unilobed and in having the leg vestiges restricted to the meso- and metathorax (there being no trace on the prothorax) and much more rudimentary. They are similar especially to *Opuntiaspis philococcus*, which also occurs on Cactaceae. The available specimens are too few to show whether they represent some variation or abnormality within *O. philococcus* or belong to another species, which is stable in having the characters mentioned above. Furthermore, both specimens apparently represent growing adult females, failing to show any specific characters which may be revealed or completed at full growth.

I have failed to find in literature any article or comment about this form, which may be treated as an undescribed species tentatively. The repeated quarantine records suggest that *Opuntiaspis* sp.Q is an established insect, if not a serious pest, in some districts of cactus fruit production.

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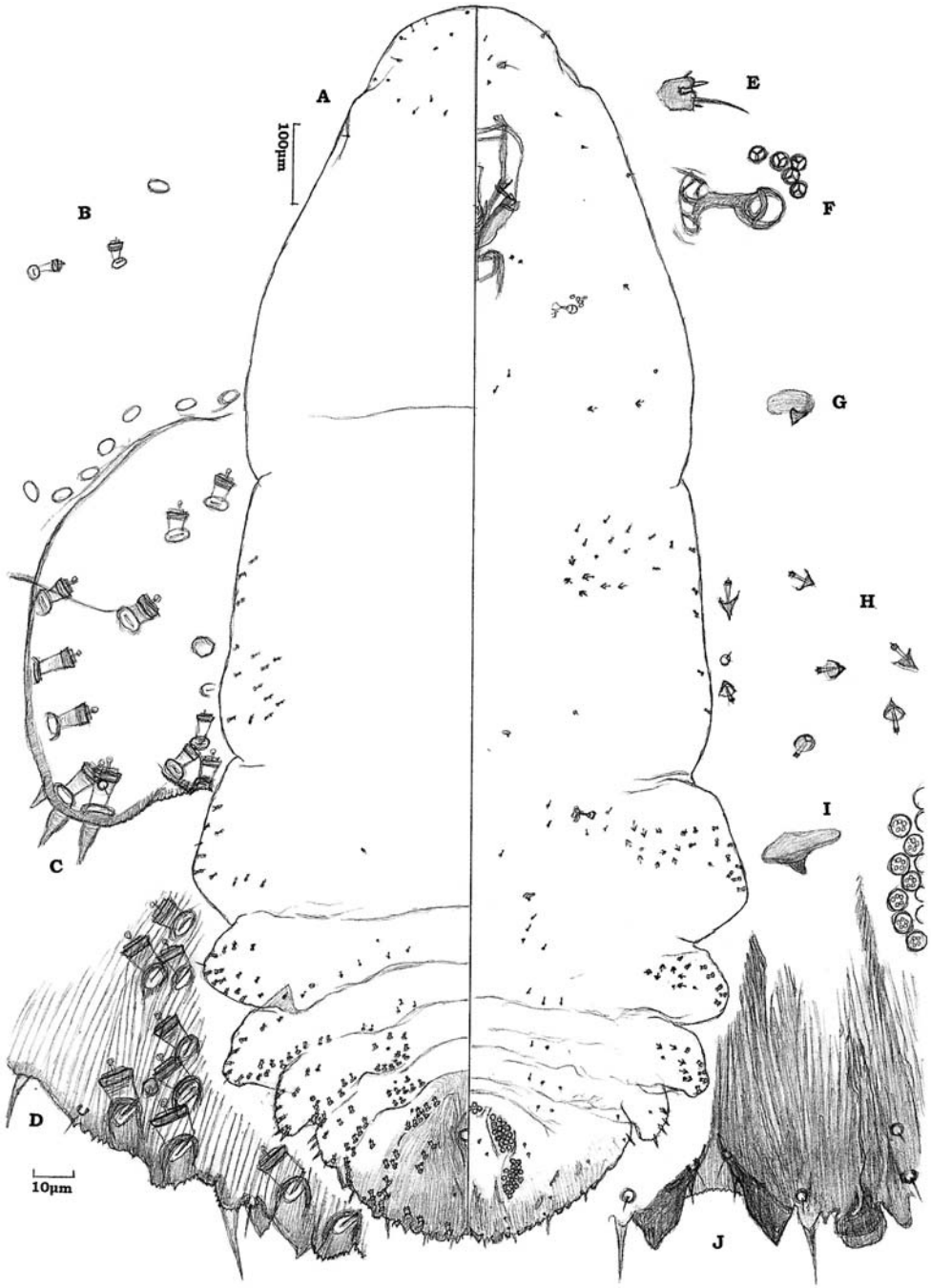

Fig. 1. *Poliaspis xanthorrhoeae*, adult female, fully grown. B, dorsal boss and ducts on abd I; C, lateral lobe of abd III, dorsal surface; D, pygidial margin, abd V and VI; E, antenna; F, anterior spiracle; G, leg vestige on mesothorax; H, conical gland spines on metathorax; I, leg vestige on metathorax; J, median and second trullae. Scale bar, 100µm: A; 10µm: B–J.

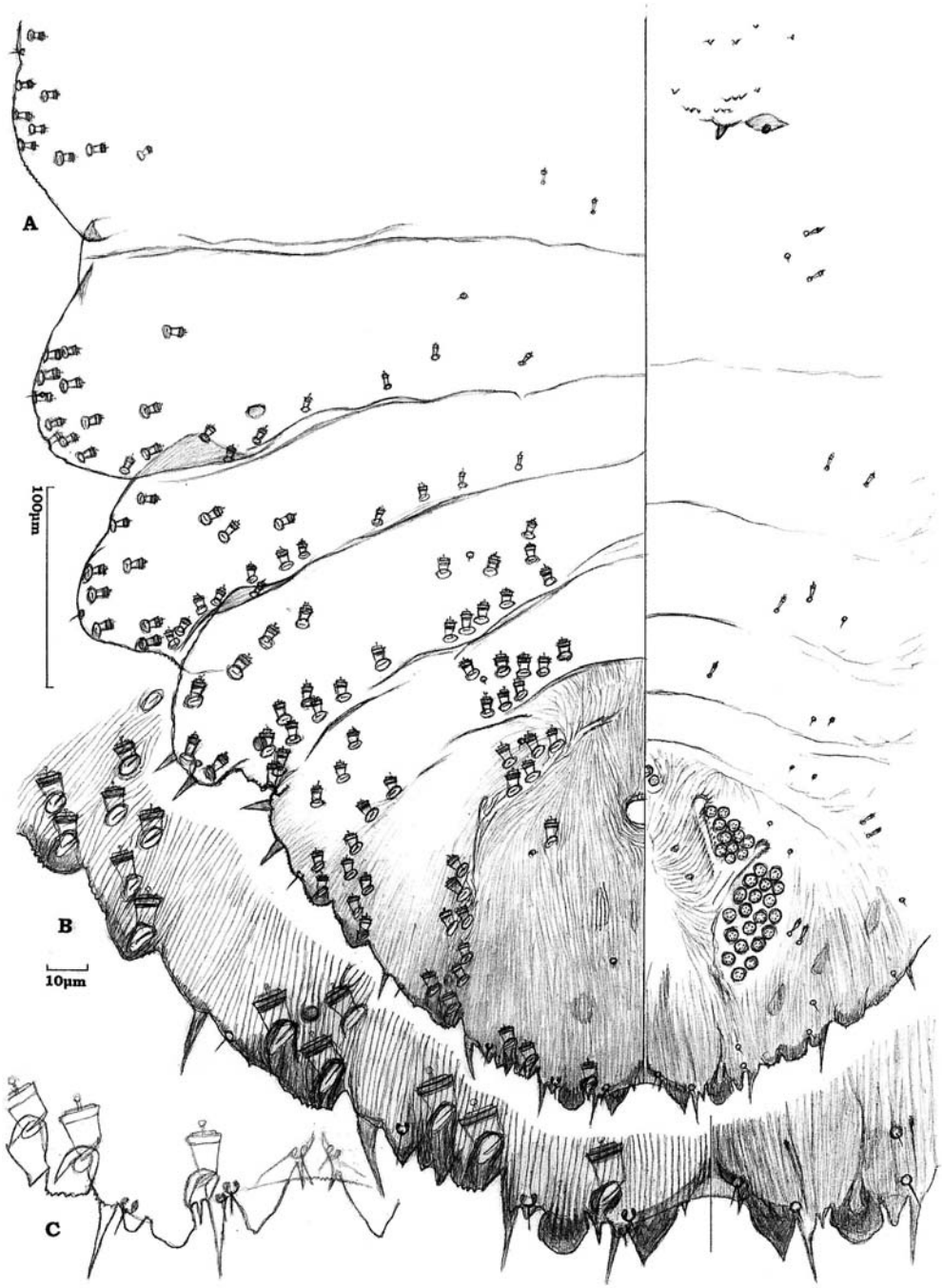

Fig. 2. *Poliaspis xanthorrhoeae*, adult female, a second specimen (A, B). A, abdomen; B, pygidial margin; C, outline of trullae in a third specimen. Scale bar, 100µm: A; 10µm: B, C.

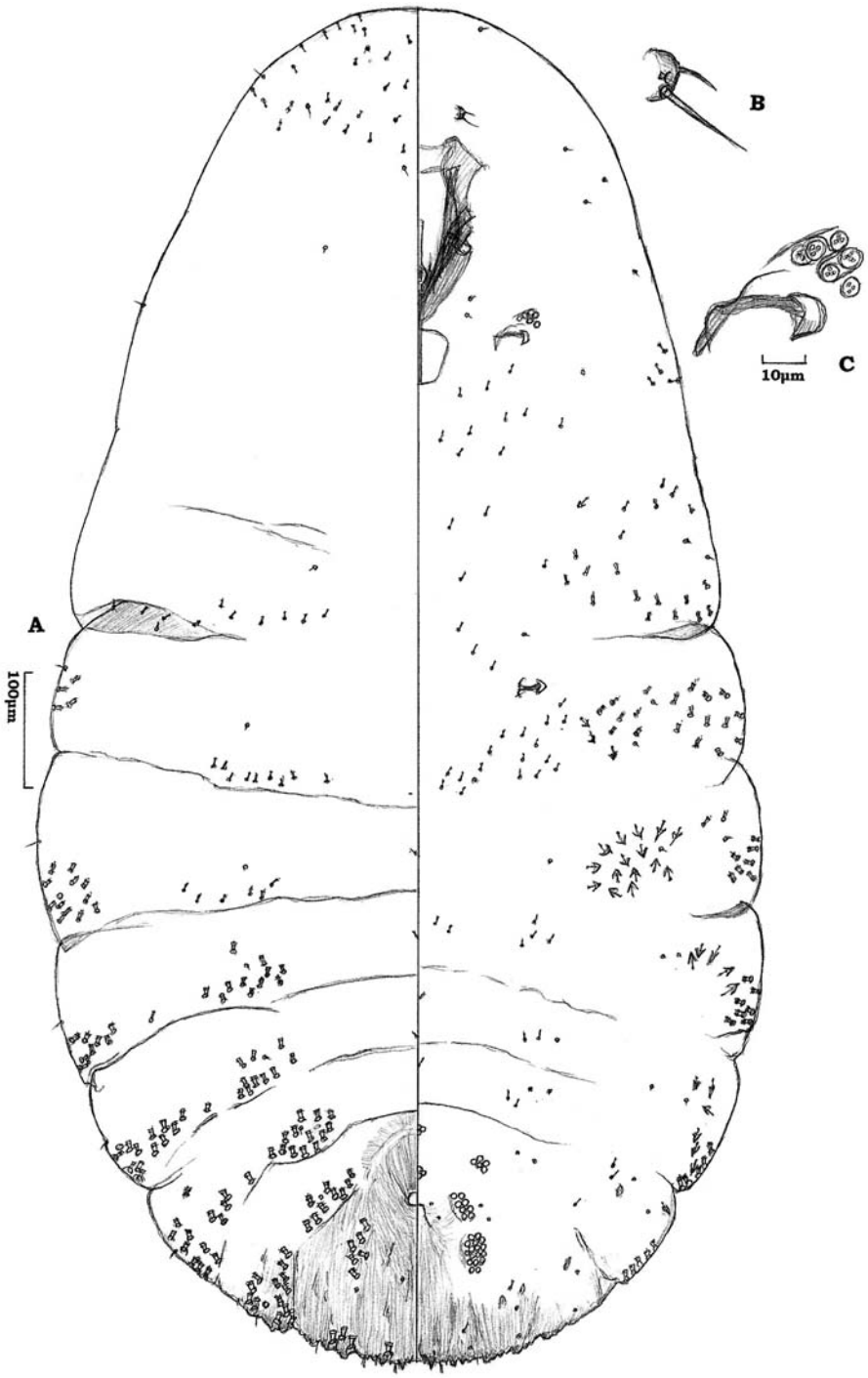

Fig. 3. *Poliaspis* sp.Q, adult female. B, antenna; C, anterior spiracle. Scale bar, 100μm: A; 10μm: B, C.

Fig. 4. *Poliaspis* sp.Q, adult female. A, abdomen; B, pygidial margin. Scale bar, 100μm: A; 10μm: B.

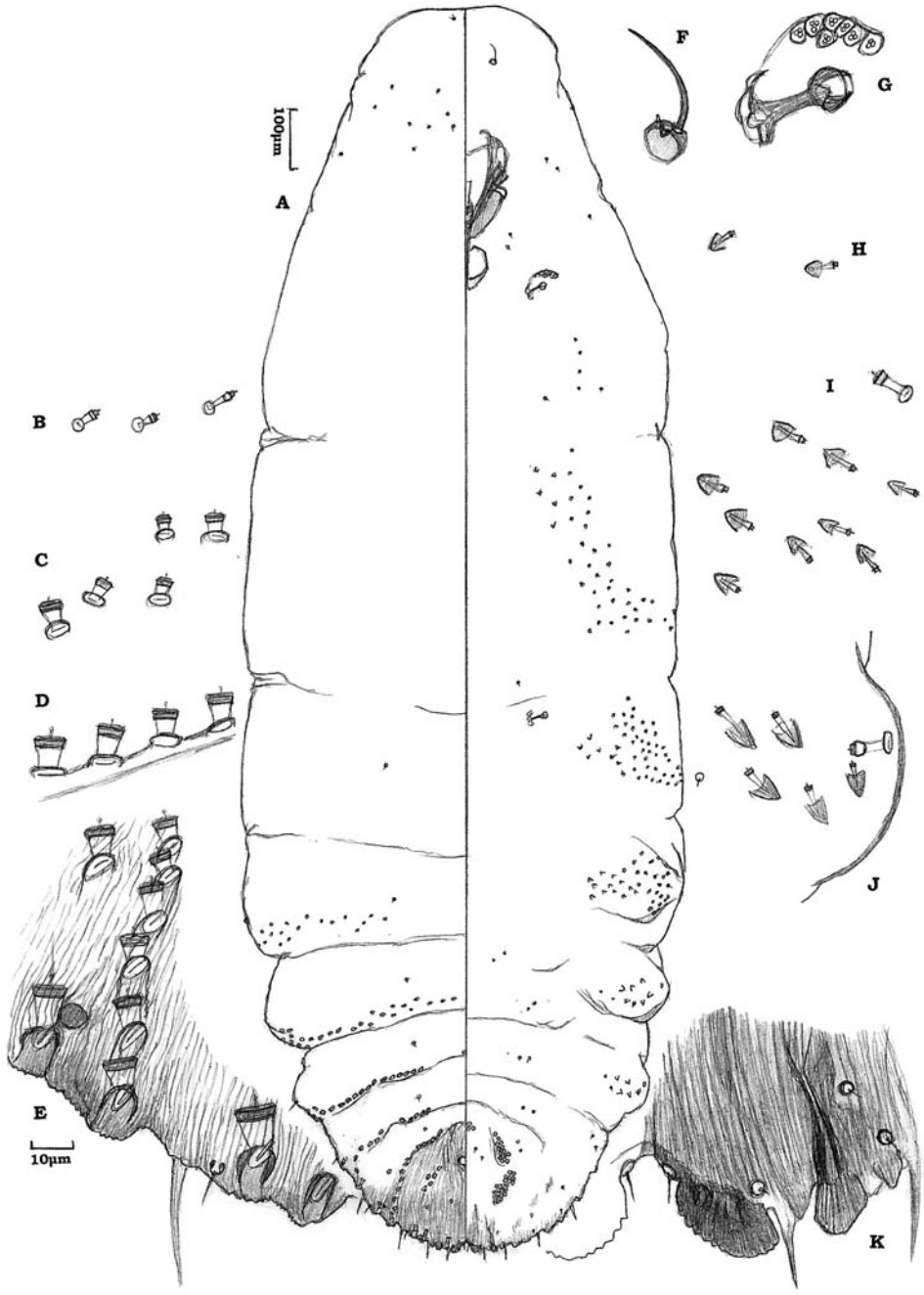

Fig. 5. *Rolaspis lounsburyi*, adult female, fully grown. On *Serruria*. B, dorsal ducts on abd I; C, dorsal macroducts on abd II; D, dorsal macroducts on abd III; E, pygidial margin, abd V and VI, dorsal surface; F, antenna; G, anterior spiracle; H, conical gland spines on mesothorax; I, conical gland spines and a duct on abd I; J, lateral lobe of abd III, ventral surface; K, median and second trullae. Scale bar, 100µm: A; 10µm: B–K.

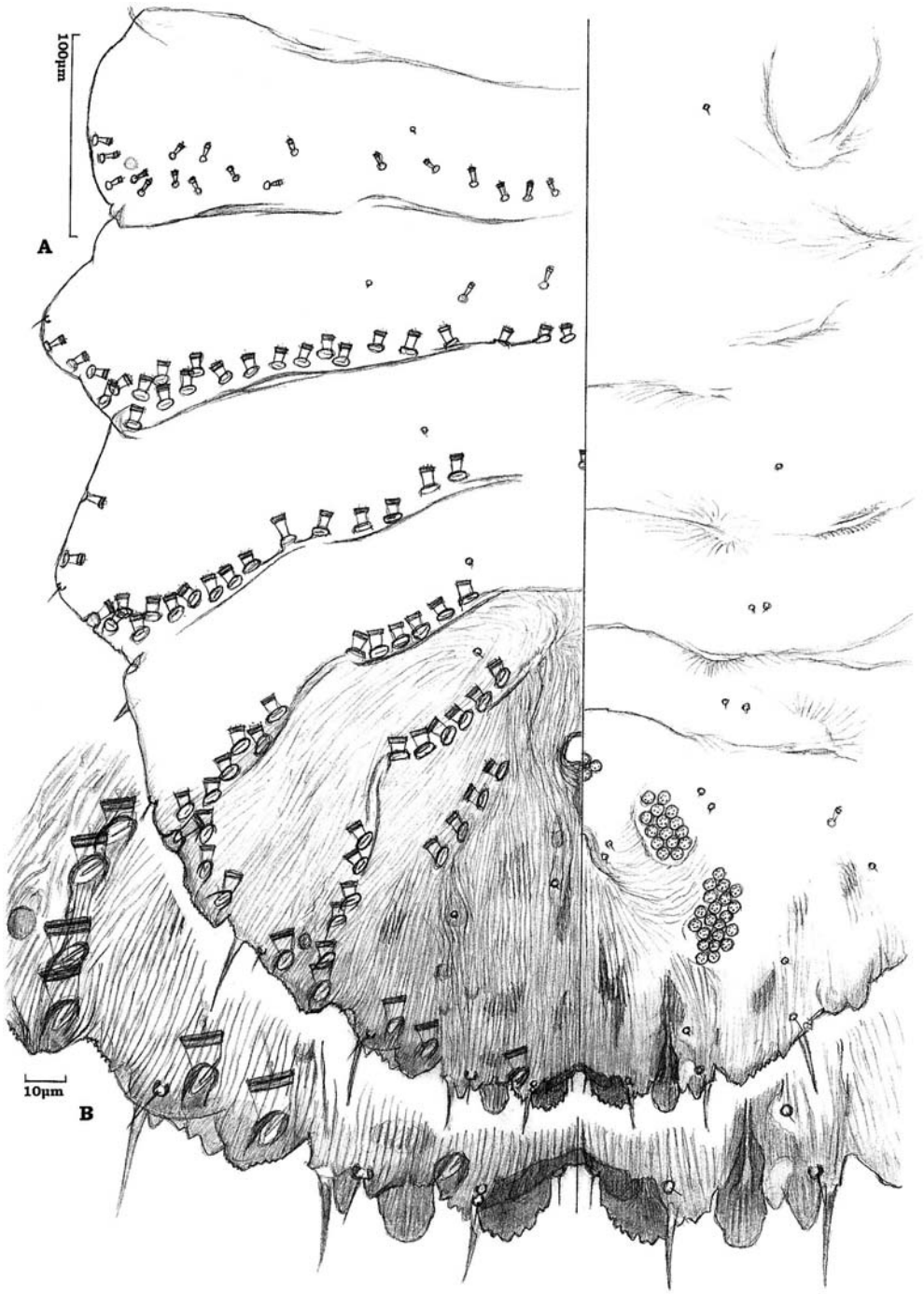

Fig. 6. *Rolaspis lounsburyi*, adult female. On *Paranomus*. A, abdomen; B, pygidial margin. Scale bar, 100µm: A; 10µm: B.

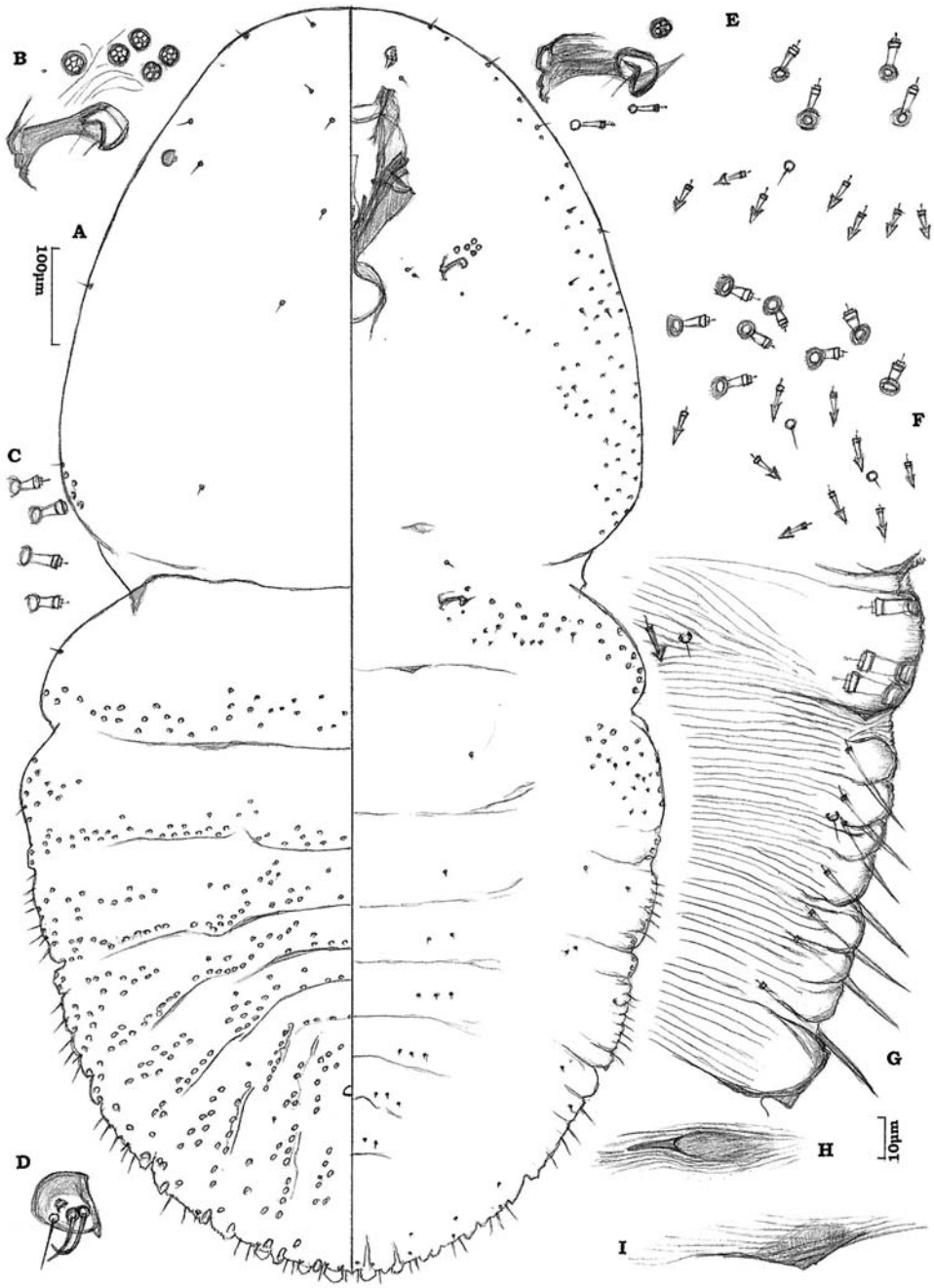

Fig. 7. *Opuntiaspis* sp.Q. Adult female, in a growing stage. On dragon fruit (except for D). B, anterior spiracle; C, ducts on mesothoracic margin; D, antenna (drawn from the specimen on Pitaya fruit); E, posterior spiracle, with ducts and conical gland spines laterally; F, ducts and conical gland spines on abd I; G, margin of abd III, ventral surface; H, leg vestige on mesothorax; I, leg vestige on metathorax. Scale bar, 100μm: A; 10μm: B–I.

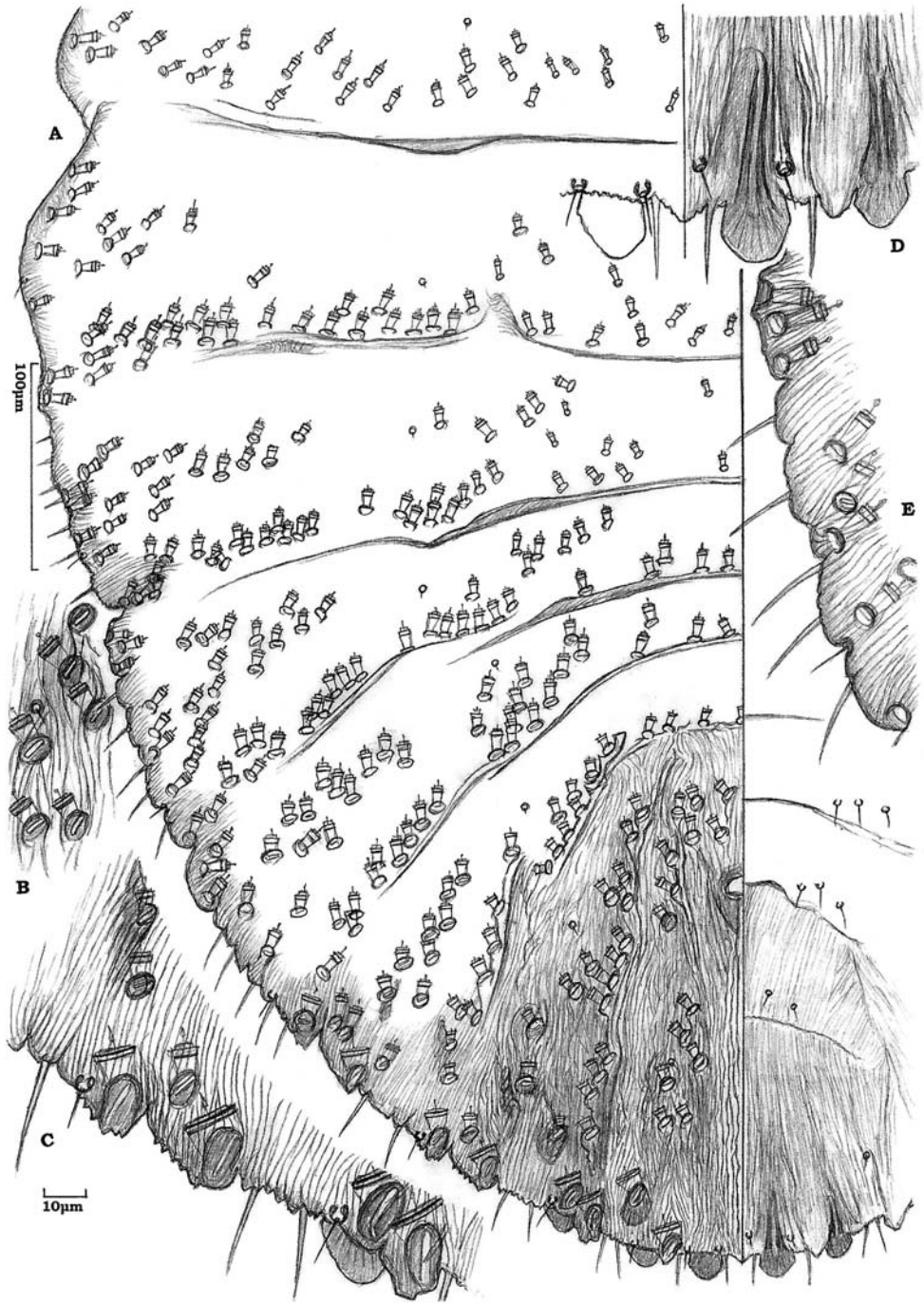

Fig. 8. *Opuntiaspis* sp.Q. Adult female, in a growing stage. On dragon fruit. A, abdomen; B, dorsal macroducts on abd VII; C, pygidial margin, abd V and VI, dorsal surface; D, median and second trullae; E, margin of abd III, dorsal surface. Scale bar, 100μm: A; 10μm: B–E.