

ORIBATID MITES (ACARI, ORIBATEI) FROM THE AZORES ISLANDS. II

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ABSTRACT

This paper is the second part of a series devoted to the study of the oribatid fauna of the Azores Islands. Mr. D. Teixeira Pombo (Vila do Porto, Santa Maria Island) kindly sent the specimens to the author. A total amount of 716 specimens belonging to 46 species and subspecies have been studied. Seven species and three subspecies are new to Science, namely: *Steganacarus hirsutus azorensis* n.subsp., *Hermannia woasi* n.sp., *Hermannia evidens* n.sp., *Pilocephus azoricus* n.sp., *Melanozetes azoricus sanctaemariae* n.subsp., *Melanozetes azoricus floresianus* n.subsp., *Humerobates pomboi* n.sp., *Galumna azoreana* n.sp., *Pseudachipteria insularis* n.sp. and *Pseudachipteria floresiana* n.sp. A new genus in the family Cepheidae: *Pilocephus* n. g., has been created.

RÉSUMÉ

Ce travail est la deuxième partie d'une série dédiée à l'étude de la faune d'oribates (Acaréens) des îles Açores. Le matériel a été obtenu grâce à l'obligeance de M. D. Teixeira Pombo (Vila do Porto, Île de Santa Maria). On a étudié 716 exemplaires appartenant à 46 espèces et sous-espèces. Sept espèces et trois sous-espèces sont nouvelles pour la Science, à savoir: *Steganacarus hirsutus azorensis* n.subsp., *Hermannia woasi* n.sp., *Hermannia evidens* n.sp., *Pilocephus azoricus* n.sp., *Melanozetes azoricus sanctaemariae* n.subsp., *Melanozetes azoricus floresianus* n.subsp., *Humerobates pomboi* n.sp., *Galumna azoreana* n.sp., *Pseudachipteria insularis* n.sp. et *Pseudachipteria floresiana* n.sp. On a créé un genre nouveau de la famille Cepheidae: *Pilocephus* n. g.

RESUMO

Este trabalho é a segunda parte de uma série dedicada ao estudo da fauna de oribatídeos das ilhas Açores. O Sr. D. Teixeira Pombo (Vila do Porto, ilha de Santa Maria) gentilmente enviou os exemplares ao autor. Foram estudados 716 exemplares pertencendo a 46 espécies e subespécies. Sete espécies e três subespécies são novas para a Ciência, nomeadamente: *Steganacarus hirsutus azorensis* n.subsp., *Hermannia woasi* n.sp., *Hermannia evidens* n.sp., *Pilocephus azoricus* n.sp., *Melanozetes azoricus sanctaemariae* n.subsp., *Melanozetes azoricus floresianus* n.subsp., *Humerobates pomboi* n.sp., *Galumna azoreana* n.sp., *Pseudachipteria insularis* n.sp. et *Pseudachipteria floresiana* n.sp. Foi criado um género novo na família Cepheidae: *Pilocephus* n. g.

INTRODUCTION

I published in a previous paper (Pérez-Iñigo, 1987) the results of the study of a collection of oribatid mites from Azores that Mr. Dalberto Teixeira Pombo (Vila do Porto, Santa

Maria Island) kindly sent me in alcohol tubes. After the publication of the mentioned paper I received new alcohol tubes with oribatid mites from the Azores Islands that Mr. Pombo friendly sent me for study. I present now the results of

this study.

The samples that were studied in the first part came from the islands of Santa Maria and São Miguel. The samples studied in this second part came from the islands of Santa Maria, São Miguel, Flores, Graciosa and one sample from Terceira; so the studied area is considerably enlarged.

The material from Graciosa was taken by the Scientific Expedition to Graciosa-1988 (Expedição Científica Graciosa/88) of the Azores University and the material from Flores was obtained with the collaboration of the Forestry Service of the this Island. I wish to thank them for their invaluable cooperation, and I want to acknowledge here the collaboration of Mr. D. T. Pombo and the Young Naturalists Center (Centro dos Jovens Naturalistas) that collected a great part of the material, and that rendered possible this study.

A total amount of 716 especimens were studied belonging to 46 species, seven of which are new to Science, an three are new subspecies. A new genus has been created, 25 species were previously recorded from the Azores (Weigmann, 1976; Pérez-Iñigo, 1987). A total of 93 species of oribatid mites are known till now in this Archipelago.

MATERIALS AND METHODS

List of sampling localities:

FLORES ISLAND

FLS-1: 2-1-89. Boca da Baleia, under *Cryptomeria japonica*.

FLS-2: 2-1-89. Lajes de Flores.

FLS-3: 29-12-88. Rim of the Caldeira Funda, under *Cryptomeria* and *Selaginella*.

FLS-4: 26-08-87.

SANTA MARIA ISLAND

SMA-24: 25-11-86. Pico Alto, *Selaginella*.

SMA-25: 26-10-88. Pico Alto, in *Selaginella kraussiana*.

SMA-26: 06-02-88. Forno, in cowdung.

SÃO MIGUEL ISLAND

SMG-1: 20-02-89. Jardim José do Canto (José do Canto Garden) (Ponta Delgada) under *Quercus* leaves.

SMG-2: 15-10-88. Jardim da Universidade (University Garden), under *Ulmus* leaves.

SMG-3: 10-10-86. Mata do Frade e da Freira, Rabo de Peixe (Ribeira Grande), under *Pinus pinaster*.

GRACIOSA ISLAND

GRA-1: Carapacho, soil under *Metrosideros* leaves.

GRA-2: Feteira, under leaves of *Persea indica* and of *Pittosporum undulatum*.

GRA-3: Furna do Enxofre (Cave of the sulphur) (in the inside and the outside).

GRA-4: Pico do Timão, under *Erica azorica* and *Hedychium gardnerianum*.

GRA-5: Encosta da Caldeira (Crater slope), under *Myrica faia*.

GRA-6: 2-09-87. Pedras Brancas, under *Persea indica* on the "manta morta".

TERCEIRA ISLAND

TER-1: 03-02-88. Near Algar do Carvão, stones.

SYSTEMATIC TREATMENT

The total of specimens found in each locality is indicated by a number enclosed in brackets after the abbreviation of each sample, if there is more than one locality.

HYPOCTHONIIDAE Berlese, 1910

1. *Hypochthonius rufulus* C. L. Koch, 1836.

Number of specimens: 1.

Locality: São Miguel: SMG-1.

Length: 659 μm .

The single specimen obtained shows the characteristic features of the species. The lateral branches of the sensillus are six. Weigmann (1976) recorded this species from Faial.

PHTHIRACARIDAE Perty, 1841

2. *Steganacarus hirsutus azorensis* n. subsp. (Figs. 1-4).

Steganacarus hirsutus: Pérez-Iñigo, 1987. *Eos*, 63: 199.

Number of specimens: 56.

Localities: Santa Maria: SMA-24 (4), SMA-25 (13); São Miguel: SMG-2 (12), SMG-3 (17); Graciosa: GRA-5 (2), GRA-6 (8).

Length of aspis: 480-540 μm ; length of hysterosoma: 840-910 μm .

The new subspecies is characterized by the following combination of features:

1. *Dimensions*: Even though the body size is rather variable, on the average the subspecies *azorensis* is larger in body size than the nominate form from the Iberian Peninsula.

2. *Sensillus*: The new subspecies shows a shorter sensillus, slightly lanceolate, with a thin marginal zone (Fig. 3).

3. *Setae*: The notogastral setae, as well as the lamellar and interlamellar ones, are a little more robust, ending in a sharper point, they are smooth or slightly rough, but without short barbs in distal half.

4. *Cerotegumentary layer*: The cerotegument has a marbled aspect, with light irregular spots and veins. This character disappears when the mite is submitted to the hot lactic acid treatment. The specimens that have just finished the moulting do not show this marbled aspect. I have not seen this cerotegumentary character in the Iberian specimens.

Variability: The foveolae of the aspis and notogaster are rather variable. There are some specimens from Graciosa that only show a few foveolae on the sides of aspis and on the margin of the genital plates, being the remaining surface completely devoid of sculpture, excepting a dense punctuation.

3. *Phthiracarus* cf. *piger* (Scopoli, 1736)

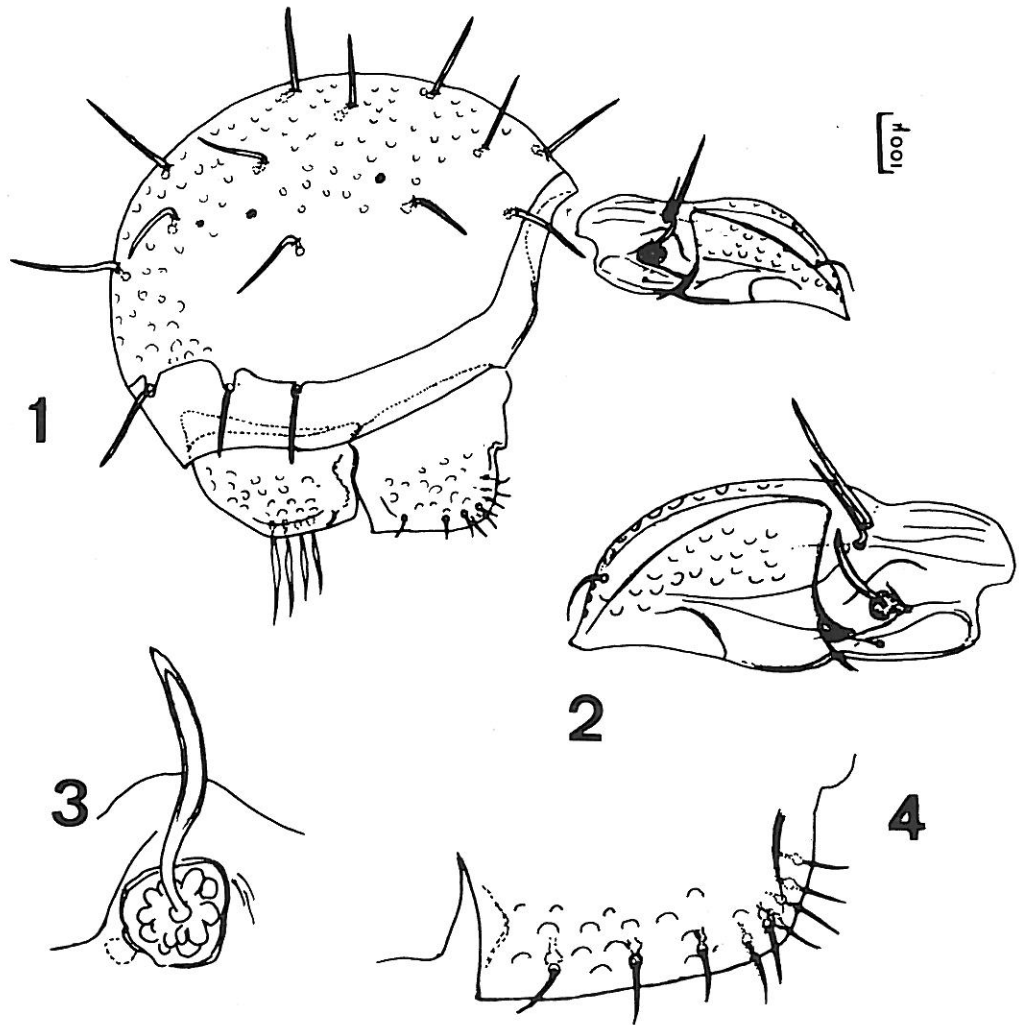
Number of specimens: 30.

Localities: Santa Maria: SMA-24 (4),

SMA-25 (15); Flores: FLS-2 (4), recorded from Santa Maria Island
 FLS-3 (5), FLS-4 (1); Graciosa: (Pérez-Iñigo, 1987)
 GRA-2 (1).

Length of aspis: 400-462 μm ; EUPHTHRACARIDAE Jacot, 1930
 length of hysterosoma: 704-836 μm . 4. *Euphthiracarus cribrarius* (Berlese, 1904).

This species has been previously Number of specimens: 1.



Figures 1-4. *Steganacarus hirsutus azorensis* n.sp. 1, lateral view of aspis and hysterosoma; 2, lateral view of aspis, more enlarged; 3, sensillus; 4, genital setae.

Locality: São Miguel: SMG-3.

Dimensions: Length of aspis 356 μm ; length of hysterosoma: 667 μm .

The single specimen from São Miguel is similar in most respects to the European ones described by Märkel & Meyer (1959) and Märkel (1964).

ORIBOTRITIIDAE Grandjean, 1954

5. *Oribotritia berlesei* (Michael, 1898)

Number of specimens: 40.

Localities: Santa Maria: SMA-24 (2), SMA-25 (1); São Miguel: SMG-1 (1), SMG-2 (1), SMG-3 (2); Flores: FLS-2 (15), FLS-3 (2); Graciosa: GRA-2 (3), GRA-5 (10), GRA-6 (3).

Dimensions: Length of aspis 572-594 μm ; length of hysterosoma: 1.100-1.116 μm .

This species has been previously recorded from Santa Maria Island (Pérez-Iñigo, 1987). It has a palaearctic distribution. It is not known from the Canary nor the Madeira archipelagoes.

NORTHTRIDAE Berlese, 1885.

6. *Nothrus palustris azorensis* Pérez-Iñigo, 1987.

Number of specimens: 19 (16 adults and 3 tritonymphs)

Localities: Santa Maria: SMA-24 (7), SMA-25 (2); São Miguel: SMG-3 (3); Flores: FLS-1 (1), FLS-4 (2); Graciosa: GRA-2 (1), GRA-4 (1), GRA-5 (2).

Dimensions: 1.166-1.210 x 726-748 μm .

These specimens are similar to those described in the first part of the present series.

3 CAMISIIDAE Oudemans, 1900

7. *Camisia segnis* (Hermann, 1804)

Number of specimens: 1.

Locality: Graciosa: GRA-5.

Dimensions: 908 x 420 μm .

This specimen is identical in most respects to the one from Strasbourg drawn by Grandjean (1936, fig. 1); but it is a little larger (Grandjean admits a length of 750-830 μm).

8. *Platynothrus peltifer* (C. L. Koch, 1839)

Number of specimens: 2.

Localities: Santa Maria: SMA-24 (1), SMA-25 (1).

Dimensions: 836 x 500 μm .

These specimens have nine pairs of genital setae and three setae on the outer surface of trochanter III. This mite has been recorded from Azores by Weigmann (1976), Pérez-Iñigo (1987) and Travé (1988). It is also known from Madeira (Travé, 1988).

NANHERMANNIIDAE Sellnick, 1928

9. *Nanhermannia nanus* (Nicolet, 1855)

Number of specimens: 1.

Locality: Graciosa: GRA-5.

Dimensions: 585 x 300 μm .

The specimen from Graciosa Island is identical with the European ones and those from Tenerife (Pérez-Iñigo, 1972).

HERMANNIIDAE Sellnick, 1928

10. *Hermannia woasi* n. sp. (Figs. 5-7).

Number of specimens: 2.

Localities: Flores: FLS-1 (1, holotype), FLS-4 (1).

Dimensions: 1.110-1.122 x 704-720 μ m.

Colour: Reddish chestnut.

Tegument: There is a well visible punctuation that covers the whole body surface, including the hypostoma and the genital plates, only the anal plates are free from punctuation; when this punctuation is seen in an oblique view it appears as a dense striation. The notogaster also shows small rounded dark tubercles. No tubercles are seen on ventral surface, including hypostoma, coxisternal region and genital and anal plates. The prodorsal surface is rather irregular but there are no dark rounded tubercles as those on the notogastral surface. A faint network pattern is discernible on prodorsum but it is altogether absent on notogaster.

Prodorsum: Rounded rostrum, rostral setae thin, straight, smooth and sharp. Lamellar setae longer and thicker than the rostral ones, but similar to them. Interlamellar setae thick, with rounded end. Sensillus relatively short, slightly enlarged on its distal half, with an irregular edge.

Notogaster: Oval in shape. There are 16 pairs of setae, that are rather long, with pointed ends. They are straight or slightly curved and devoid of barbs.

Ventral side: Coxisternal formula: 5-2-5-5, coxisternal setae short and straight. Genital and anal holes separated only by the preanal piece. There are 15 genital setae on each plate, long and rather wide; five pairs of adgenital setae, similar to the genital ones; two pairs of anal setae, very short and thin, and three pairs of adanal setae similar to the coxisternal ones.

Infracapitulum: Seta *m1* well developed, seta *m2* reduced to the alveolus.

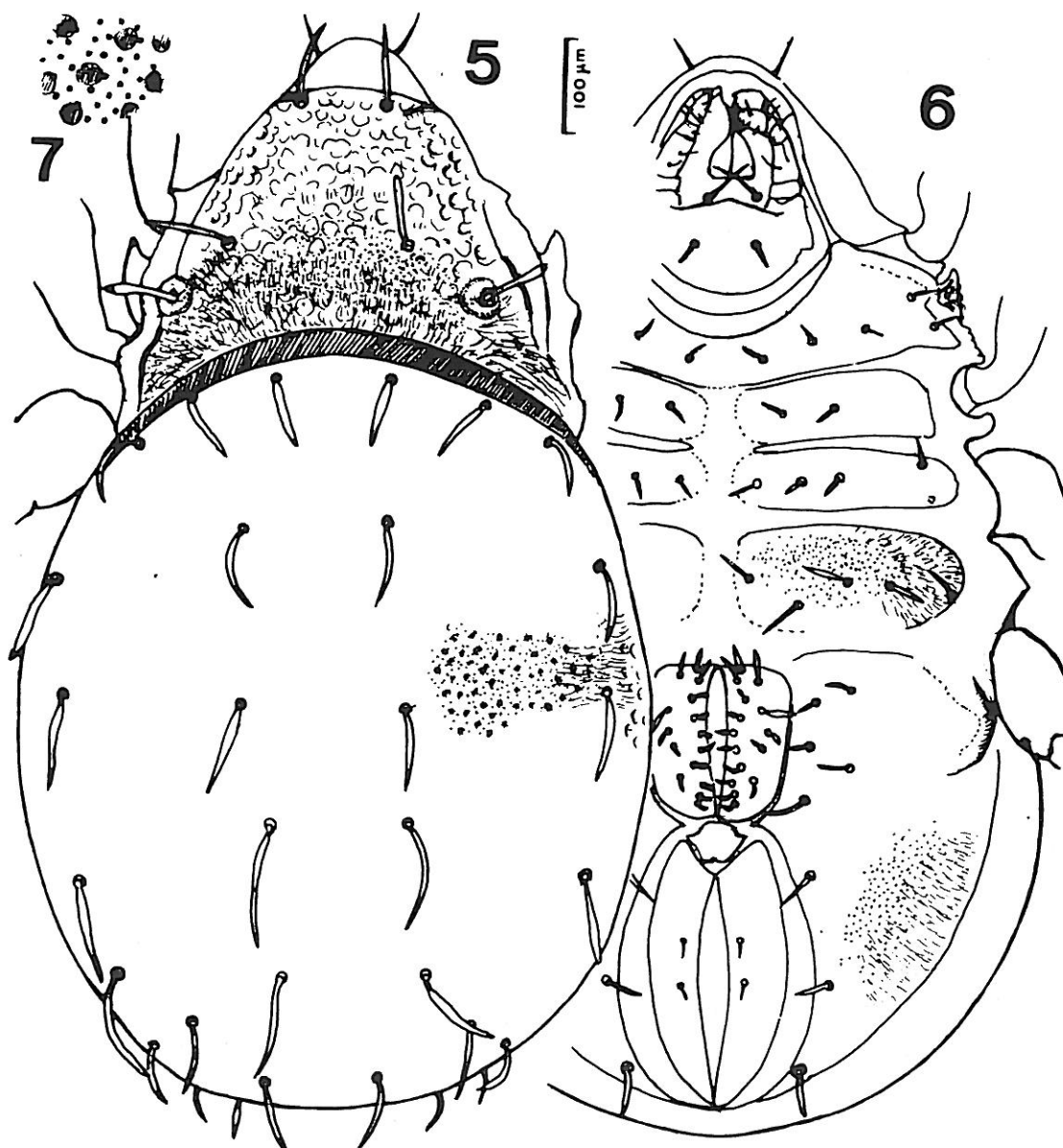
Discussion: The number of 15 pairs of genital setae is rather exceptional; according to Woas (1981) *H. convexa* (C. L. Koch, 1840) and *H. scabra* (L. Koch, 1879) show 10-11 pairs and *H. subglabra* Berlese, 1910 (= *H. pulchella* Willmann, 1952) has 11-13 pairs of genital setae. These are the species of *Hermannia* with a greater number of genital setae.

Only *H. jesti* Travé, 1977 presents more than one seta on the epimere 2 among the species of *Hermannia* known until now.

In this way, the new species is well defined by the following combination of characters:

1. Notogaster without a cuticular network pattern.
2. Coxisternal formula 5-2-5-5.
3. 15 pairs of genital setae.
4. Five pairs of adgenital setae.

Derivatio nominis: This species has been named in honour to Dr. Steffen Woas, Karlsruhe, author of very important studies on the species of *Hermannia*.



Figures 5-7. *Hermannia woasi* n.sp. 5, dorsal view; 6, ventral view; 7, detail of the notogastral sculpture.

11. *Hermannia evidens* n. sp. (Figs. 8-9).

Number of specimens: 4 (one of them labelled holotype).

Locality: Santa Maria: SMA-24.

Dimensions: 1.100-1.200 x 590-650 μ m.

Colour: Dark reddish chestnut (specimens in 70% alcohol).

Tegument: It is covered by a noticeable fine punctuation. Prodorsum, notogaster and ventral region covered with small round dark tubercles. No network pattern is visible on prodorsum, notogaster, ventral plate, or genital valves.

Prodorsum: Rostrum rounded, rostral setae rather thin, smooth, glabrous and terminating in sharp end. Lamellar and interlamellar setae rather long, thick, distally enlarged and blunt-ended. Sensillus as long as interlamellar setae and very similar to them, but not enlarged distally.

Notogaster: It bears 16 pairs of setae (holotrichous) that are rather long and thick, slightly curved, glabrous and distally pointed.

Ventral side: Epimeral setae rather long, smooth and acute, coxisternal formula: 3-1-5-5. There is a sternal line well developed uniting the hemiapodemes.

Genital and anal fields fused in the middle, separated only by the preanal organ. Genital valves bearing nine setae each one, these setae are long, nearly as long as the width of the genital valve in its middle part. There are five pairs of adgenital setae, that are so long as the

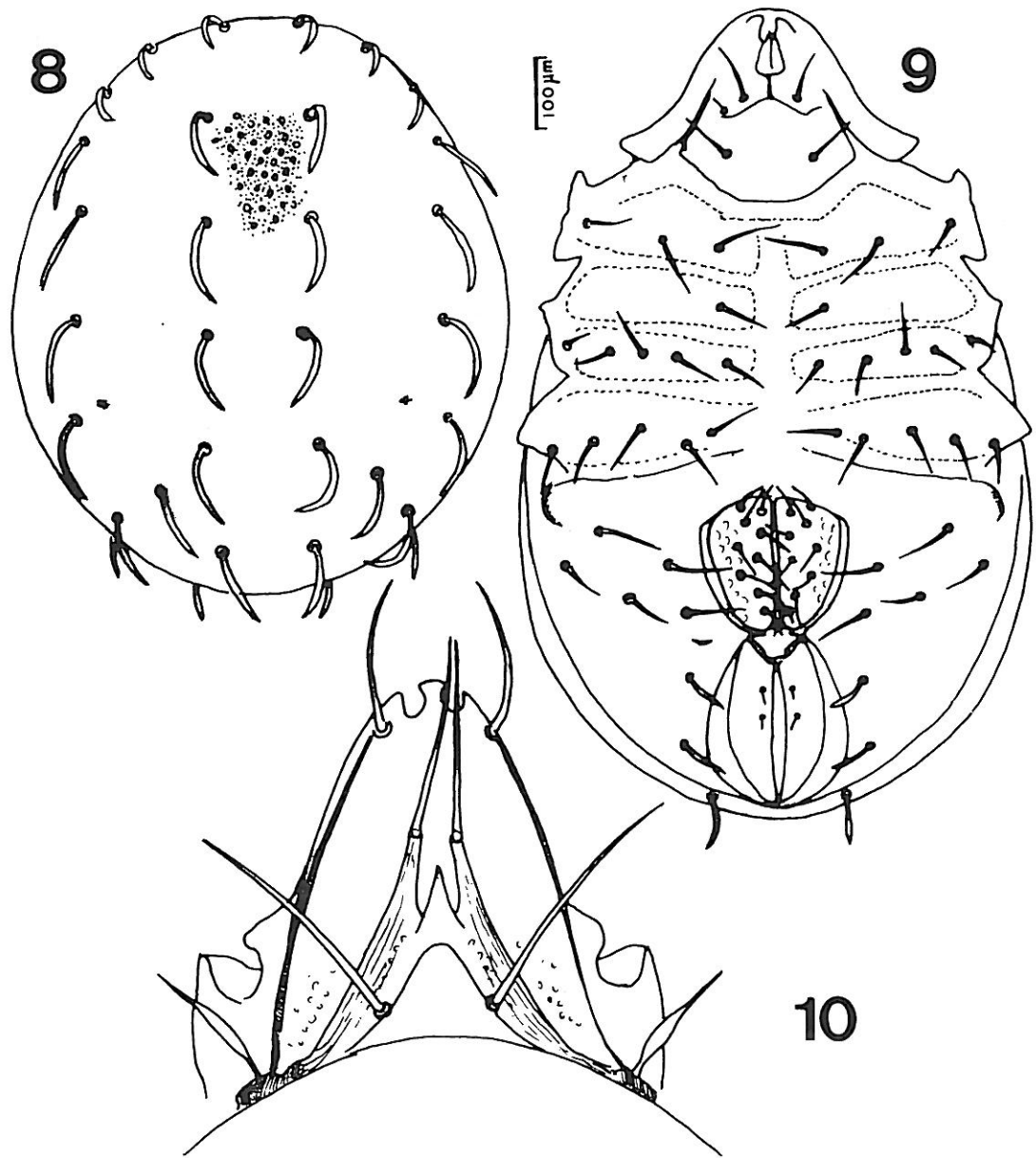
genital ones or even longer. The anal setae are two pairs, short and thin, the adanal setae are three pairs, long and lanceolate.

Infracapitulum: Setae *m1* well developed, setae *m2* very small, difficult to be seen.

Discussion: According to Woas (1981) the new species belongs to the "*Hermannia subglabra*" species-group, because of the coxisternal formula, number of genital and adgenital setae, shape of sensillus and genital-anal fusion. *Hermannia subglabra* Berlese, 1910 and *H. pulchella* Willmann, 1952 are the most similar species, but they can be easily distinguished from the new one by the following characters:

1. *Hermannia subglabra*: A cuticular network pattern is visible on prodorsum, notogaster, ventral plate and genital plates; no dark tubercles present. Coxisternal setae short. Genital setae nearly as short as the anal setae. Adgenital setae also short, much shorter than the width of the genital valve in its middle part.

2. *Hermannia pulchella* (*H. subglabra* sensu Forsslund, 1957): A remarkably network pattern is present on prodorsum, notogaster and ventral plate. No round dark tubercles present. Coxisternal setae short. Genital setae very short, excepting some setae inserted on the anterior edge. Adgenital setae larger than in *subglabra*, but they do not reach half the width of the genital plate in its middle part.



Figures 8-10. 8-9, *Hermannia evidens* n.sp. 8, notogaster; 9, ventral view. 10, prodorsum of *Liacarus madeirensis* Willmann, 1939.

HERMANNIELLIDAE Grandjean, 1934

12. *Hermanniella granulata* (Nicolet, 1855)

Number of specimens: 7.

Localities: Graciosa: GRA-2 (1), GRA-5 (2), GRA-6 (4).

Length: 682-770 μm .

The specimens show the characteristic sculpture and the other features described by Grandjean (1931). Willmann (1939) recorded this species in Madeira, but it has not been found in the Canary Islands.

13. *Hermanniella incondita* Pérez-Iñigo, 1987

Number of specimens: 8.

Localities: São Miguel: SMG-3 (6); Graciosa: GRA-2 (2).

Length: 792 and 1.020 μm

This species was described from Santa Maria Island. The new specimens from Graciosa are a little larger in body size, but they show all the characteristic features of this species.

DAMAEIDAE Berlese, 1896

14. *Damaeus (Eudamaeus) pomboi* Pérez-Iñigo, 1987

Number of specimens: 1.

Locality: Santa Maria: SMA-25.

Dimensions: 990 μm .

This species was described in 1987 from Santa Maria.

15. *Damaeus (Paradamaeus) clavipes* (Hermann, 1804)

Number of specimens: 9.

Localities: Graciosa: GRA-2 (7), GRA-6 (2).

Dimensions: 1.100 x 770 μm .

These specimens agree fairly well with the data given by Bulanova-Zachvatkina (1957) and other authors.

CEPHEIDAE Berlese, 1896

Genus *Pilocephus* g. nov.

Tridactylous tarsi with little developed heterodactyly. Lamellae lateral on prodorsum, without a true translamella. Sensillus long, seta-like, without enlarged head. Tutorium well developed without a free point. Surface of prodorsum and lamellae covered by an alveolar sculpture. Notogaster nearly circular in shape, with marked humeral processes. The whole notogastral surface covered by an alveolar sculpture, more or less neat. Ten pairs of notogastral setae; humeral setae short and thin, the others long and rather thick, smooth, arranged at each side in two files, one central of four setae and other submarginal of five setae, all of them of the same size and shape. Epimeral and ventral surfaces also covered with alveoli. Apodemes 1 and 2 fused in the middle line, sejugal hemiapodemes do not reach the middle line. Apodeme 3 as a transversal straight bar that meets centrally with the genital frame. Apodeme 4 little developed. No sternal structure present. Six pairs of genital setae.

This genus shows some similarities with *Tritegeus* Berlese, 1915, but the species belonging to this genus have a different position of the lamellae (that are less lateral), the humeral setae are of the same size

and shape of the other setae, the notogastral setae are arranged in a different way (they are disposed in two submarginal rows and three pairs in two posteromarginal rows, these ones are a little shorter than the others). And moreover, the notogaster of *Tri-tegeus* is smooth (excepting the humeral processes) instead of being covered by an alveolar sculpture.

Type species: *Pilocephus azoricus* n. sp.

16. *Pilocephus azoricus* n. sp.
(Figs. 11-12)

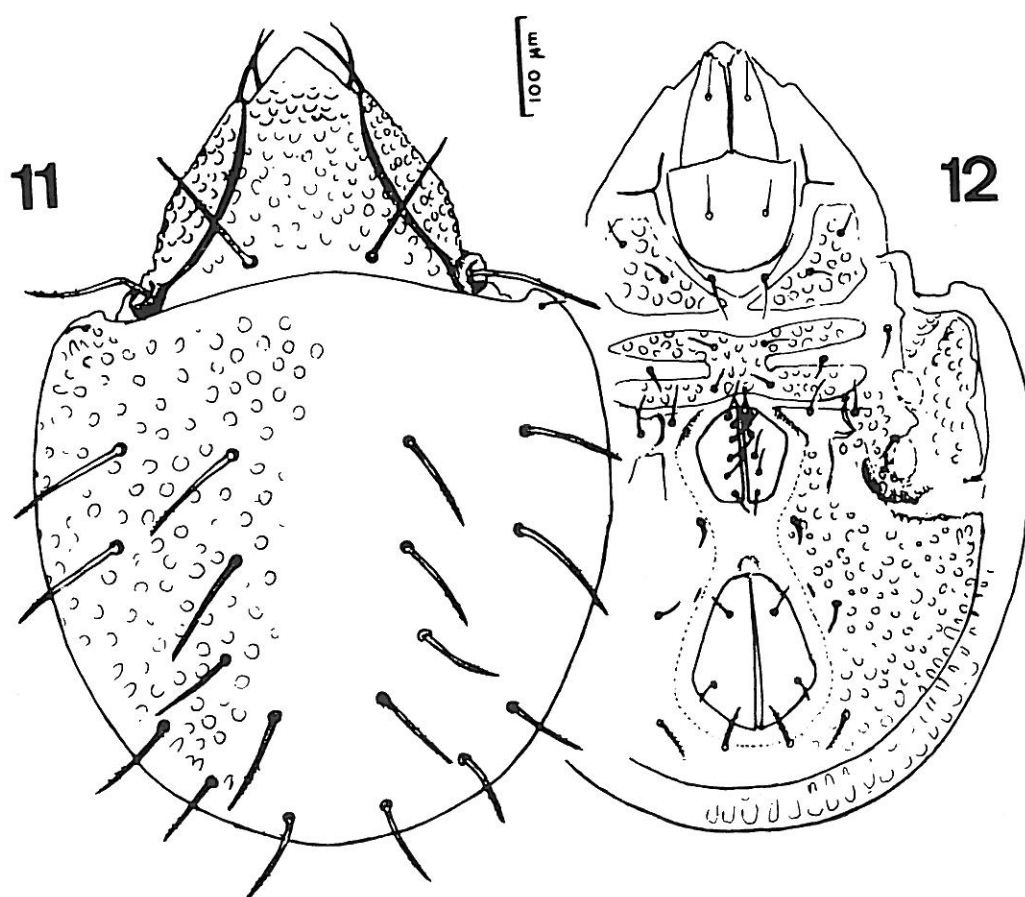
Number of specimens: 3 adults, 1 male and 2 females.

Localities: Santa Maria: SMA-25 (1 male, holotype, and 1 female, paratype); Graciosa: GRA-5 (1 female, paratype).

Dimensions: Male, 800 x 600 μm ; females, 880 x 726 μm .

Colour: Reddish chestnut.

Tegument: Lamellae, prodorsum,



Figures 11-12. *Pilocephus azoricus* n. sp. 11, dorsal view; 12, ventral view.

notogaster, epimeres and ventral region covered by a foveolate sculpture. This sculpture is less visible on the notogaster of the specimens from Santa Maria than in the one from Graciosa, but in any case this sculpture can be seen without any difficulty. The infracapitulum and the genital and anal plates are free from alveolar pattern.

Prodorsum: The lamellae are placed on lateral margins of prodorsum, they are rather long and each one has a little free point where the lamellar seta is inserted. There is no translamella, the distance between the anterior ends of both lamellae is considerable. The rostrum is rounded and entire a little acuminate. Rostral setae (62 μm) fine and smooth, a little curved inwards. Lamellar setae slightly thicker and longer (71 μm) than the rostral ones, also smooth. Interlamellar setae very long (187 μm), thick and covered with very short barbs or scales. Each bothridium is placed at the base of the lamella, it is open antiaxially. The sensillus is a long (151 μm) rod, without enlarged head, and with the distal half covered with little barbs. There is a tutorium at each side, that is a blade so long as the lamella, without a free point. Pedotectum I well developed, pedotectum II not visible.

Notogaster: The sejugal suture is slightly arched, the humeral processes are rounded, each one bears a humeral seta, that is short (24 μm) but well visible. The other notogastral setae are long and rather thick,

ending in sharp points. These setae are arranged at each side in two rows, a medial one of four setae, and a submarginal one of five setae, all of them long (140-160 μm), thick and covered, as the interlamellar ones, by very short barbs or scales.

Ventral view: Apodemes 1 and 2 fused in the middle line, apodeme *sj* incomplete (the two hemiapodemes do not reach the middle line), apodeme 3 is a straight bar fused in the middle line with the genital frame. Apodeme 4 little developed. No sternal structure is present.

The coxisternal setae are thin, the formula is the normal one (3-1-3-3). Genital and anal apertures surrounded by a chitinous frame. There are six setae on each genital plate arranged in a longitudinal row. The other setae are: one pair of adgenital, two pairs of anal and three pairs of adanal setae. *Ad1* and *Ad2* are long and rough, of postanal situation. Fissure *iad* parallel to anal margin but at a certain distance of it.

Legs: All the tarsi bear three claws, the central one a little stronger than the lateral ones.

17. *Conoppia palmicineta* (Michael, 1884)

Number of specimens: 12.

Localities: Santa Maria: SMA-24 (6), SMA-25 (6).

Dimensions: 1.116-1.162 x 1.040-1.100 μm

The specimens from Azores are identical to the Spanish ones redescribed by Subías & Iturrondobeitia (1978). This species, that is common

in southern Europe, has been found in Madeira (Willmann, 1939), Azores (Santa Maria) (Pérez-Iñigo, 1987) and Tenerife (Pérez-Iñigo, 1972) though the specimens from the Canary Island show some peculiarities.

AMEROBELBIDAE Grandjean, 1954

18. *Amerobelba decedens* Berlese, 1908.

Number of specimens: 5.

Locality: Graciosa: GRA-6.

Dimensions: 750-792 x 420-462 μm .

This species has been previously recorded from Santa Maria (Pérez-Iñigo, 1987). The specimens from Graciosa agree in most respects with the specimens from Santa Maria, the Iberian Peninsula and Tenerife (Canary Islands).

CARABODIDAE C. L. Koch, 1837

19. *Odontocephus elongatus* (Michael, 1879)

Number of specimens: 3.

Locality: Santa Maria: SMA-24 (1), SMA-25 (1); São Miguel: SMG-3 (1).

Dimensions: 726-792 x 312-330 μm .

After the data of Saloña & Iturondobeitia (1989) the specimens from Santa Maria Island belong to the typical form regarding its length. This species has been previously recorded from Santa Maria (Pérez-Iñigo, 1987).

LIACARIDAE Sellnick, 1928

20. *Liacarus mucronatus* Willmann, 1939

Number of specimens: 14.

Localities: Santa Maria: SMA-24 (2), SMA-25 (1); São Miguel: SMG-2 (1); Flores: FLS-2 (8); Graciosa: GRA-4 (1), GRA-6 (1).

Dimensions: 858-1.276 x 550-836 μm .

These specimens are identical to those previously collected on Santa Maria Island (Pérez-Iñigo, 1987).

21. *Liacarus madeirensis* Willmann, 1939 (Fig. 10)

Number of specimens: 2.

Localities: São Miguel: SMG-2 (1); SMG-3 (1).

Dimensions: 1.112-1.166 x 696-748 μm .

As I pointed out in 1987 it has a tridentate rostrum but the medial tooth is broad and blunt, the end is little enlarged. The prodorsal setae are smooth and long. The lamellae present longitudinal striae and little foveolae, the cusps are long and the intercuspidal mucro is long and sharp. The notogaster has 11 pairs of setae, the two humeral pairs are very short, almost indiscernible. Setae *h1* are very long, nearly as long as the rostral setae, the other setae are shorter but well visible (Willmann says: "am Hinterrande des Hysterosoma stehen einige lange Haare").

22. *Dorycranosus alatus* (Berlese, 1904)

Number of specimens: 1.

Locality: Graciosa: GRA-1 (1).

Length: 820 μm .

This species has been recorded under the name of *Dorycranosus*

punctulatus (Mihelcic, 1956) from Santa Maria Island (Pérez-Iñigo, 1987) and from Tenerife (Pérez-Iñigo, 1976).

23. *Dorycranosus* cf. *acutus* (Pschorn-Walcher, 1951)

Number of specimens: 1 female with eggs.

Locality: São Miguel: SMG-1 (1).

Length: 968 μm .

This specimen cannot be identified with certainty because it lacks of interlamellar setae, but the dimensions, shape of lamellar cusps and head of sensillus, rostrum, and other characters agree with the Spanish specimens of *D. acutus*.

XENILLIDAE Woolley & Higgins, 1966

24. *Xenillus discrepans azorensis* Pérez-Iñigo, 1987.

Number of specimens: 24.

Localities: Santa Maria: SMA-24 (9), SMA-25 (5); São Miguel: SMG-3 (4); Graciosa: GRA-2 (1), GRA-5 (4), GRA-6 (1).

Dimensions: 1.000-1.150 x 700-780 μm .

This subspecies is characterized by its erect intermellar setae, the sensillus provided with a short stem and a longish head that ends in a rounded extremity. As I indicated in 1987, there is a great variability in the length of the humeral setae, sometimes very short and sometimes rather long, even longer than sensillus, as it is the case of the specimens

from GRA-5.

GUSTAVIIDAE Oudemans, 1900

25. *Gustavia oceanica* Pérez-Iñigo, 1987

Number of specimens: 1.

Locality: Santa Maria: SMA-25 (1).

Dimensions: 550 x 400 μm .

This specimen is coincident in all the characters with the one found previously on Santa Maria Island and described in 1987.

PELOPIDAE Ewing, 1917

26. *Eupelops acromios* (Hermann, 1804).

Number of specimens: 2.

Locality: Graciosa Island: GRA-5 (2).

Length: 729-748 μm .

This species has been collected previously from Faial Island (Weigmann, 1976, page 21) and from Santa Maria Island (Pérez-Iñigo, 1987, page 219). There specimens are identical to the those collected from Spanish soils.

CERATOZETIDAE Jacot, 1925

27. *Ceratozetes simulator* Pérez-Iñigo, 1969

Number of specimens: 3.

Localities: Santa Maria: SMA-25 (2); São Miguel: SMG-1 (1).

Dimensions: 498-528 x 308 μm .

The locus typicus of this species is the cave of Ojo Guareña (Burgos province, Spain); it has been found on continental Spain and Portugal and on the Azores (Santa Maria Island).

28. *Melanozetes azoricus sanctaemariae* n. subsp. (Fig. 13)

Melanozetes azoricus: Pérez-Iñigo, 1987. *Eos*, 63: 219

Number of specimens: 6.

Locality: Santa Maria: SMA-24 (3, one of them labelled holotype); SMA-25 (3).

Dimensions: 569-638 x 350-384 μm (pteromorphs excluded).

In 1987 I recorded *Melanozetes azoricus* Weigmann, 1976 from Santa Maria Island pointing out that the single specimen collected had the setae longer than it was indicated by Weigmann. Among the oribatid mites now studied I found six specimens that belong to Weigmann's species but showing some features that, in my opinion, justify the creation of a new subspecies, to which belongs also the specimen recorded in 1987.

Melanozetes azoricus azoricus, from Faial Island, measures from 535 to 595 μm , it is slightly smaller than the specimens from Santa Maria. The most important differences between the specimens from both islands are the following:

1) Length of setae (Table 1.):

We realise that the lamellar setae are shorter in the new subspecies, but the other setae, and specially the

notogastral ones, are remarkably longer in the specimens from Santa Maria. Moreover the setae are completely smooth instead of being "Kräftig und deutlich beborstelt" as Weigmann says.

2) Distance between the cusps: The cusps of *M. azorensis azorensis* measure 27-44 μm and their distance is 15-24 μm ; the cusps of *M. azorensis sanctaemariae* measure 37-44 μm and the distance between them is 33-37 μm , so the cusps are nearly of the same length, but the separation between them is larger in the new subspecies.

29. *Melanozetes azoricus floresianus* n. subsp. (Fig.14)

Number of specimens: 1 (holotype).

Locality: Flores Island: FLS-3.

Dimensions: 667 x 430 μm

The single specimen from Flores is larger than the nominate form and, above all, it shows a complete trans-lamella. The setae are shorter than in *sanctaemariae* and they are about the same length than the nominate form from Faial.

30. *Humerobates pomboi* n. sp. (Figs. 15-16)

Number of specimens: 11 adults.

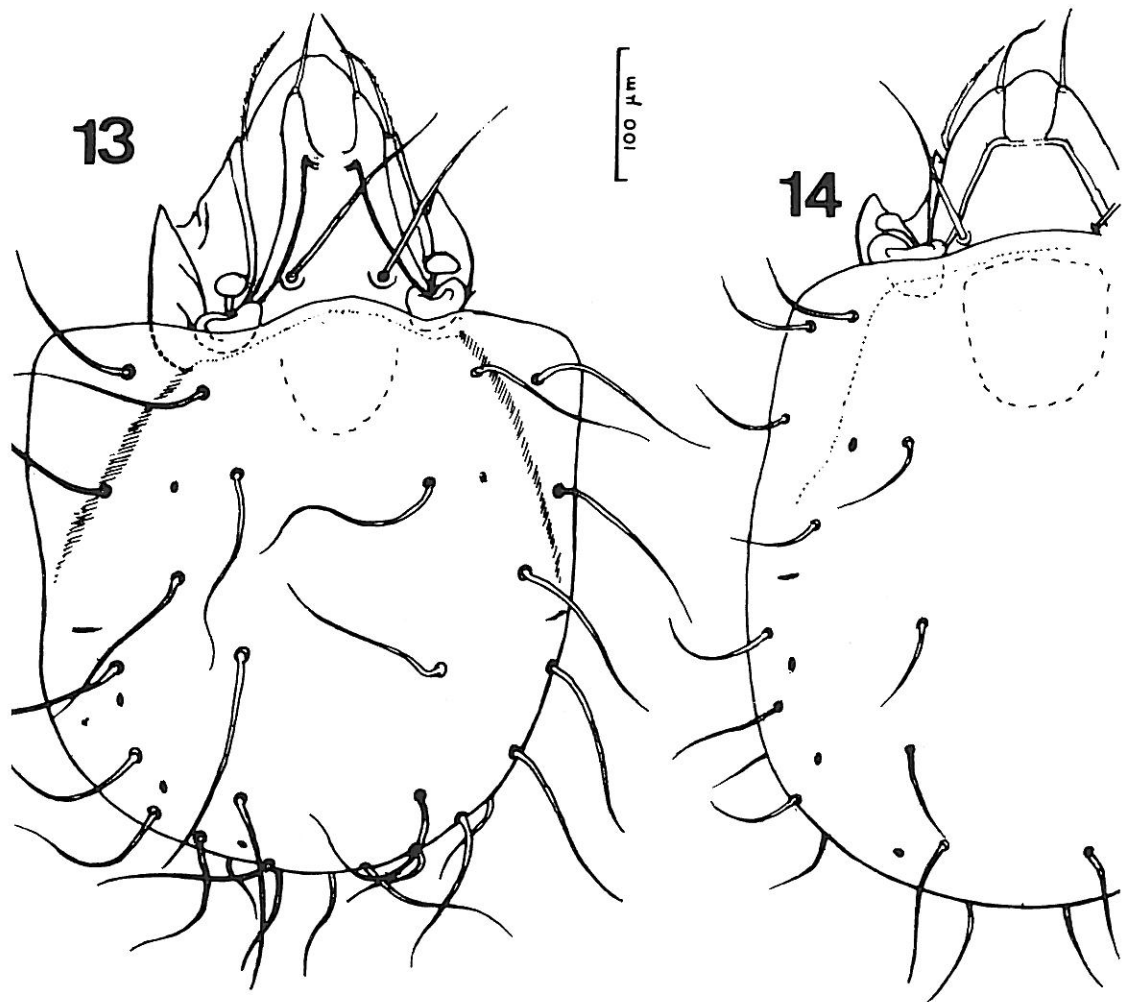
Localities: Flores: FLS-3 (4), FLS-4 (1, holotype); Graciosa: GRA-5 (6).

Dimensions: 760-880 x 560-650 μm (without pteromorphs).

Prodorsum: Rostrum rounded with a little tooth at each side that represents the projection of a ridge that runs from the base of lamellar cusp

TABLE 1. Length (μm) of setae of *Melanozetes azoricus azoricus* (Maa) and *Melanozetes azoricus sanctaemariae* (Mas).

Setae	Maa	Mas
lamellar	80	62
interlamellar	100-120	115-142
notogastral	60-90	100-155



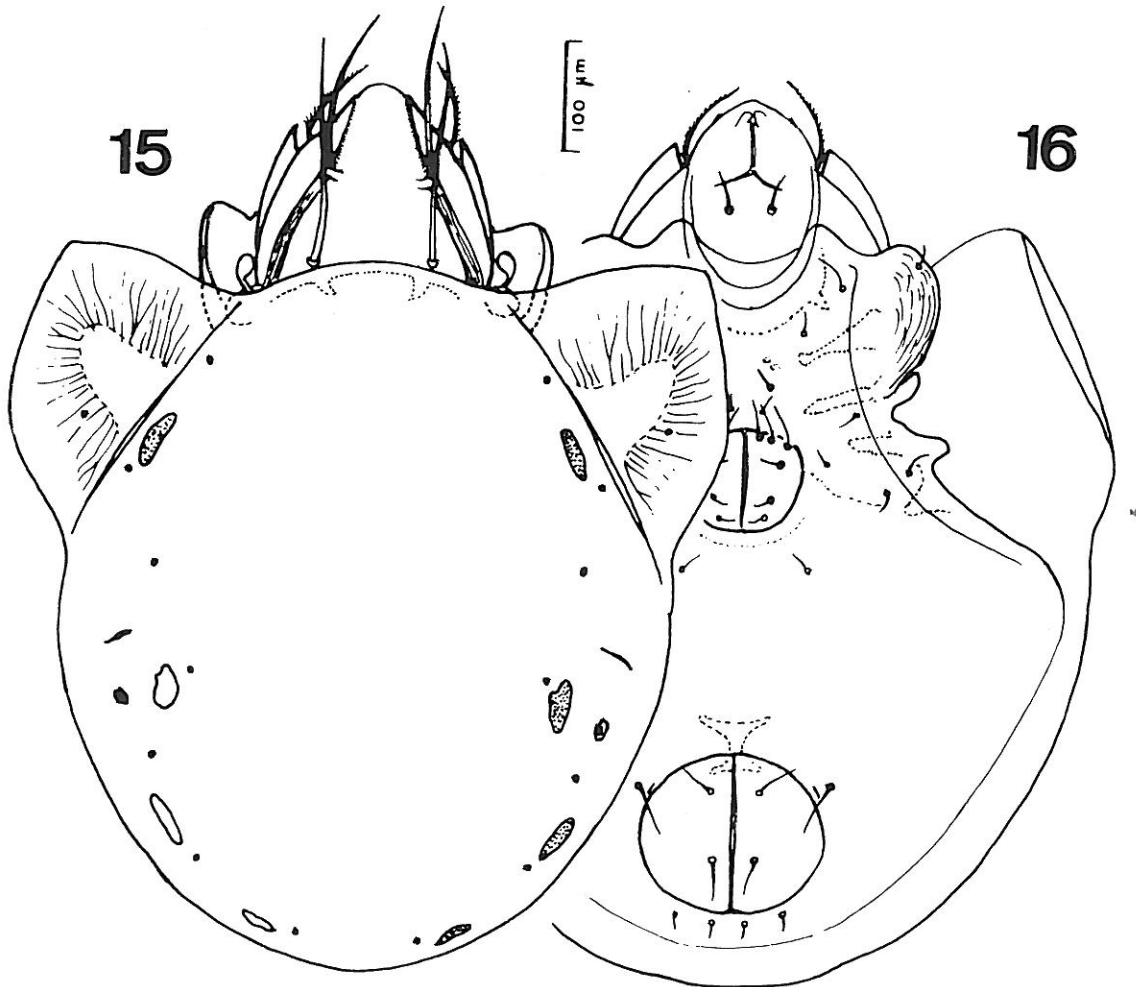
Figures 13-14. 13, dorsal view of *Melanozetes azoricus sanctaemariae* n.subsp. 14, dorsal view of *Melanozetes azoricus floresianus* n.subsp.

to the rostral edge. The lamellae are narrow and parallel-sided; they end in small free cusps. The beginning of a translamella is represented by a short ridge. The slender and arched rostral setae are inserted near the base of each tutorium; they are beset with short barbs in their outer side. The lamellar setae are longer

and thicker than the rostral ones, they are inserted on the tip of lamellar cusps. The interlamellar setae are the longest of all the prodorsal setae and arise very near the disjugal suture. Both lamellar and interlamellar setae are smooth or slightly rough near the distal end. The bothridia are hidden under the ante-

rior margin of the notogaster, the sensilli show a short stem and a pear-shaped head. The tutoria (lateral view) are large, with a free point that presents the lower edge with a conspicuous indentation. Pedotecta I well developed. The prodorsal surface is smooth.

Notogaster: The anterior margin is arched. The pteromorphs, as in other species of this genus, project laterally and anteriorly up to the level of the anterior margin of notogaster. Each pteromorph presents a middle field from which radiate irregular lines. There is a well visible



Figures 15-16. *Humerobates pomboi* n.sp. 15, dorsal view; 16, ventral view.

hinge. The notogastral surface is smooth. There are 4 pairs of porous areas. *Aa* is longish and oval in shape, *A2* and *A3* are also oval. *A1* is irregular. All of them are rather large. The length of *Aa* is equivalent to half the distance between the insertions of the interlamellar setae. The notogastral setae are 10 pairs, reduced to their alveoli; one of them on the pteromorph.

Ventral side: The surface of the coxisternal region is covered by an irregular polygonal reticulation. The coxisternal formula is 3-1-3-3; coxisternal setae are thin and smooth. The genital setae are 6 on each genital plate, the three pairs inserted in a more advanced position are the largest; all of them are thin and smooth. There are one adgenital, two anal and three adanal setae on each side.

Legs: All tarsi wear three claws of the same size and shape.

Remarks: 1) This species has been friendly dedicated to Mr. Dalberto T. Pombo.

2) *Humerobates pomboi* shows a great similarity to other species in the same genus. It can be easily distinguished from other *Humerobates* species on account of the indented anterior edge of tutorium, the interlamellar setae smooth and much longer than the lamellar setae, the large and irregular porous areae *A1*, and the alveolus of seta *1a* placed on the pteromorph.

Only three taxa, among the *Humerobates* species known up to now,

have been recorded from western Europe: *H. rostromellatus* Grandjean, 1936 (holarctic); *H. rostromellatus guadarramicus* Pérez-Iñigo, 1972 (Central Spain) and *H. rostromellatus giganteus* Willmann, 1939 (Madeira). The latter is very large (1.100-1.200 μm) and shows round areae *Aa*, the other two taxa show tutoria of different shape.

EUZETIDAE Grandjean, 1954

31. *Euzetes globulus* (Nicolet, 1855)

Number of specimens: 155.

Localities: Santa Maria: SMA-24 (3), SMA-25 (23); São Miguel: SMG-1 (39), SMG-3 (2); Flores: FLS-2 (8), FLS-3 (4), FLS-4 (7); Graciosa: GRA-2 (1), GRA-3 (4), GRA-4 (4), GRA-5 (1), GRA-6 (36); Terceira: TER-1 (23).

Length: 1.100-1.200 μm .

It is one of the most abundant and common species found on the Azores Islands.

GALUMNIDAE Jacot, 1925

32. *Galumna azoreana* n. sp. (Figs. 17-19)

Number of specimens: 58 (one of them labelled holotype).

Localities: Flores: FLS-2 (23), FLS-3 (1), FLS-4 (5); Graciosa: GRA-2 (10), GRA-4 (1), GRA-5 (1), GRA-6 (17).

Dimensions: Length of males: 864-876 μm ; length of females: 840-900 μm .

Prodorsum: Rostrum rounded and entire. Rostral setae thin and smooth, visible from above. Lamellar setae, inserted on lamellar line (L line) are thin and rough but not

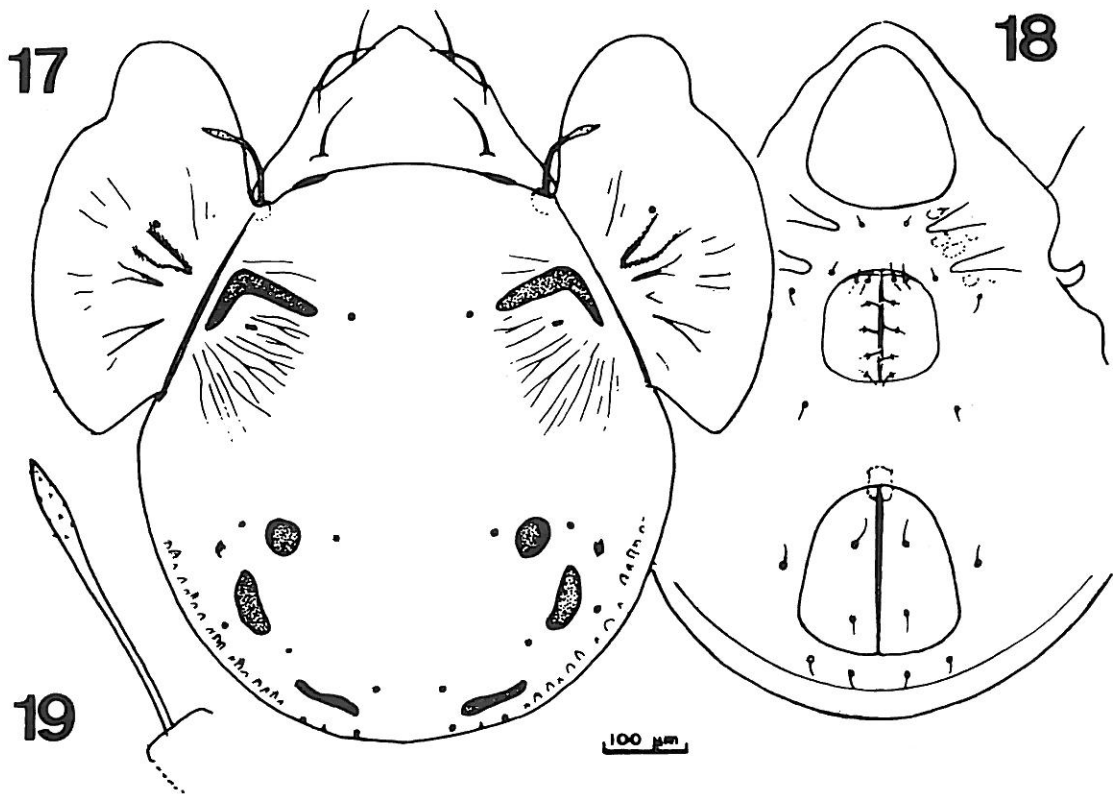
barbed, they are longer than the rostral ones. Interlamellar setae also thin and smooth, shorter than the lamellar ones but a little longer than the rostral setae. The sensillus has a thin and smooth stem and a rough and very little enlarged spindle-shaped head.

Notogaster: Arched disjugal suture present. Porous areas *Aa* very large and L-shaped. Porous areas *A1* are rounded, *A2* are oval in shape and *A3* are longish, a little irregular. Ten pairs of setae reduced to the alveoli. A great number of muscular impressions are visible around the areas *Aa*.

Ventral side: As shown in Fig. 18 there are six genital setae on each genital plate, from which two are inserted on the anterior margin. There are two anal, three adanal and one adgenital setae on each side, all of them thin and smooth.

Remarks: *Galumna azoreana* n.sp. resembles the following species by the shape of the porous areas *Aa*:

1. *G. capensis capensis* Engelbrecht, 1969, from South Africa, that is easily distinguishable from the new species by their seta-like sensilli and minute interlamellar setae.



Figures 17-19. *Galumna azoreana* n.sp. 17, dorsal view; 18, ventral view; 19, sensillus.

2. *G. confusa* Woodring, 1965, from Louisiana (U.S.A). It has a strong resemblance to the new species but the interlamellar setae of the American species are very short, and the areas A1, A2 and A3 are much smaller than they are in the new species.
 3. *G. cuneata* Aoki, 1961, from Japan. The interlamellar setae are longer and thicker than in *G. azoreana*, and areas A1, A2 and A3 are smaller. Moreover the sensillus has a different shape.
 4. *G. euaensis* Hammer, 1973, from the Tonga Islands. It shows the interlamellar setae thick, long and barbed, and the porous area A1 is kidney-shaped.
 5. *G. hamifer* Mahunka, 1985, from Guadeloupe (Antilles). It has the interlamellar setae reduced and lamellar setae very short.
 6. *G. imperfecta* Hammer, 1972, from Tahiti. It has interlamellar setae minute, no disjugal suture discernible, and porous areas Aa T-shaped instead of L-shaped.
 7. *G. monticola* Hammer, 1977, from NW. Pakistan. It shows robust and barbed interlamellar setae, long sensillus and porous area Aa with very narrow branches.
 8. *G. szentivanyorum* J. & P. Balogh, 1983, from New South Wales. It has a seta-like sensillus, minute interlamellar setae and it lacks rostral and lamellar setae.
- Galumna azoreana* is well defined by the following combination of characters:
- a: Rostral and lamellar setae well developed.
 - b: Interlamellar setae thin and smooth, a little longer than the rostral ones.
 - c: Disjugal suture present.
 - d: Porous areas Aa large and L-shaped.
 - e: Porous areas A1 rounded.
 - f: Porous areas A2 and A3 oval in shape.
 - g: Lanceolate sensillus.
33. *Galumna rasilis* Pérez-Iñigo, 1987
 Number of specimens: 45.
 Localities: Santa Maria: SMA-24 (1), SMA-25 (8); São Miguel: SMG-1 (11), SMG-2 (1), SMG-3 (24).
 Length: 650-760 µm.
 The specimens now collected are identical to the those from Santa Maria Island that were described in 1987.
 34. *Galumna obvia* (Berlese, 1913)
 Number of specimens: 2.
 Localities: SMA-24 (1), SMA 25 (1).
 Length: 836 µm.
 This species has been previously recorded from Santa Maria (Pérez Iñigo, 1987), Madeira (Willmann, 1939) and Tenerife (Pérez Iñigo, 1976).
 35. *Acrogalumna longiplumus* (Berlese, 1904)
 Number of specimens: 87.
 Localities: Santa Maria: SMA-24 (9), SMA-25 (26); São Miguel:

SMG-1 (23), SMG-3 (8); Flores
FLS-3 (3); Graciosa: GRA-2 (2),
GRA-5 (1), GRA-6 (14); Terceira:
TER-1 (1).

Length: 700-780 μm .

The Azorian specimens show the outer area *Aa* larger than the inner one and with an irregular shape, instead of being rounded as the inner *Aa* area. These characters have been already pointed out in the first paper of this series (Pérez Iñigo, 1987: 223). All the other characters are identical with those shown by the European specimens.

36. *Pergalumna* cf. *nervosa* (Berlese, 1914)

Number of specimens: 1.

Locality: Graciosa: GRA-2.

Dimensions: 616 x 462 μm .

It is not possible a sure identification because the single specimen is damaged and in bad condition.

37. *Pergalumna* cf. *formicaria* (Berlese, 1914)

Number of specimens: 2.

Locality: Flores: FLS-4 (2).

Dimensions: 660-704 μm .

The specimens agree in most respects with the descriptions of *P. formicaria*, excepting:

1. The specimens from Azores are of larger body size than it is commonly admitted (about: 560 μm long).

2. Interlamellar setae proportionally longer in the specimens from Azores than in European material.

3. The sensillus ends in the specimens from Flores in an acute club.

ACHIPTERIIDAE Thor, 1929

38. *Achipteria nitens* (Nicolet, 1855)

Number of specimens: 2.

Locality: São Miguel: SMG-3 (2).

Dimensions: 704-725 x 530-548 μm .

The specimens from Azores show slightly shorter notogastral setae than the European ones.

39. *Achipteria coleoptrata* (Linnaeus, 1758)

Number of specimens: 2.

Locality: Flores: FLS-4 (2).

Dimensions: 575 x 420 μm and 616 x 438 μm .

The specimens from Flores do not differ from the Iberian specimens preserved at the collection of the Museo Nacional de Ciencias Naturales, Madrid.

40. *Parachipteria weigmanni* Pérez-Iñigo, 1987

Number of specimens: 63.

Localities: Santa Maria: SMA-24 (40), SMA-25 (23).

Length: 630-700 μm .

The specimens studied are slightly smaller than those described in 1987, but all other characters are identical.

41. *Parachipteria petiti* Travé, 1960

Number of specimens: 5.

Localities: Santa Maria: SMA-25 (4); Flores: FLS-4 (1).

Length: 550-580 μm .

Weigmann (1976) recorded this species from Faial Island.

The specimens from Santa Maria

show all the differential characters pointed out by Travé (1960), including the body size and the anterior and paraxial position of setae *r*2 with respect to areae A2 (on the contrary, *Parachipteria weigmanni* has setae *r*2 in a posterior and antiaxial position with respect to areae A2).

42. *Pseudachipteria insularis* n. sp.
(Figs. 20-23)

Number of specimens: 6.

Locality: SMA-25 (6) (one specimen labelled holotype).

Dimensions: 590-640 x 418-440 μ m.

Prodorsum: Broad lamellae that conceal the greater part of the prodorsum, curved ventrally, with an acute antiaxial point at the distal end; rostrum rounded, rostral setae (75 μ m), only visible laterally, provided with short barbs, lamellar setae rather long (90 μ m) and rough, interlamellar setae very long (110 μ m) and smooth. Sensillus (65 μ m) with a club-shaped head, wholly glabrous (Fig. 20). Tutoria long, with free point well developed, nearly 1/3 of the total length of tutorium (Fig. 21). Lateral angle of pedotectum I without hook, but rather pointed (Fig. 23).

Notogaster: It lacks areae porosae or pori. The anterior light region is badly delimited. There are 10 pairs of notogastral setae, from which *ta* (100 μ m) and *te* (82 μ m) are the longest. These setae are smooth and thin.

Ventral region: Custodium short and acute; coxisternal formula nor-

mal. Six pairs of genital setae. Infracapitulum without anterior tectum.

Legs: The setae *p* and *s* of tarsus I are not acanthoids, seta *s* of tarsus II is thick and bears 4-5 thick finger-like projections. All tarsi are tri-dactyle heterodactyle.

Discussion: The new species can be easily distinguished from *Ps. magna* (Sellnick, 1928) on account of the following characters:

1. Size: *Ps. magna* is larger (620-725 μ m) than the new species (590-640 μ m).

2. Tutorium: The tutorium has a short free point in *magna*; on the contrary, *insularis* shows a long free point (nearly 1/3 of the total length of tutorium).

3. Sensillus: The head is glabrous in the new species and it bears very short barbs in *magna*.

4. Infracapitulum: *Ps. magna* has an anterior tectum that is lacking in *Ps. insularis*.

5. Legs: The new species has setae *p* and *s* of tarsus I of normal type in contrast with *Ps. magna*, where setae became acanthoids.

Pseudachipteria agenjoi Pérez-Iñigo, 1976, from Tenerife, shows some important differential characters:

1. Size: The average size of *Ps. agenjoi* is smaller (520-604 μ m) than the average size of the new species.

2. Tutorium: It has a very short free point.

3. Sensillus: The species from Te-

nerife has the head of the sensillus covered by very short barbs.

4. The pedotectum I of *Ps. agenjoi* is provided with a hooked outer angle.

43. *Pseudachipteria floresiana* n. sp.
(Figs. 24-26)

Number of specimens: 7.

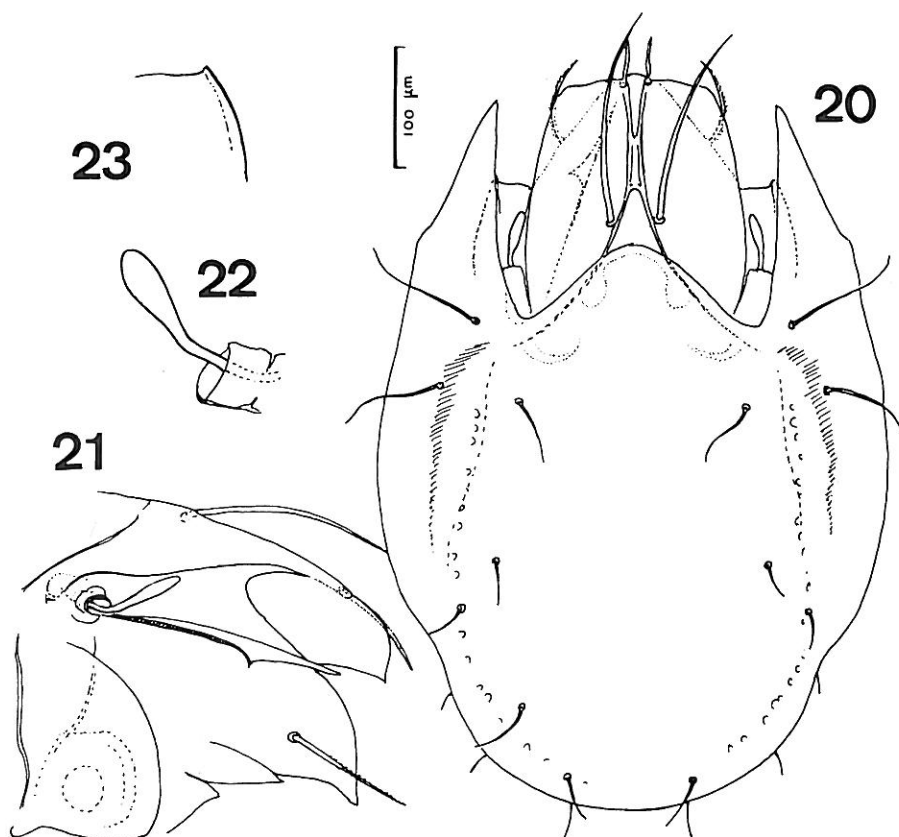
Locality: Flores : FLS-3 (7) (one specimen labelled holotype).

Dimensions: 552-576 x 396-408 μm .

Prodorsum: The large lamellae show the same shape of other species of *Achipteria*. If observed from abo-

ve the anterior end of the lamellar cusps has an acute outer angle. The sensillus is long (100-115 μm) and ends in a head long and slender terminated in a sharp point devoid of barbs. The rostral setae are rough but not barbed, the lamellar setae are thick and smooth, the interlamellar ones are long and smooth. The pedotectum I has the lateral angle without hook and without a point, or this point is very small and blunt.

Notogaster: The notogastral surface shows a very remarkable punc-



Figures 20-23. *Pseudachipteria insularis* n.sp. 20, dorsal view; 21, lateral view of prodorsum; 22, sensillus; 23, pedotectum I.

tuation or better it is covered by small pores. The setae are 10 pairs, thin and smooth. Setae *ta* and *te* are not very long (44-55 μm), but they are longer than the other notogastral setae (22-25 μm). A conspicuous clear spot is present between setae *ms* and *r3*; no areae porosae nor sacculi are visible. The anterior light region has no distinct limits.

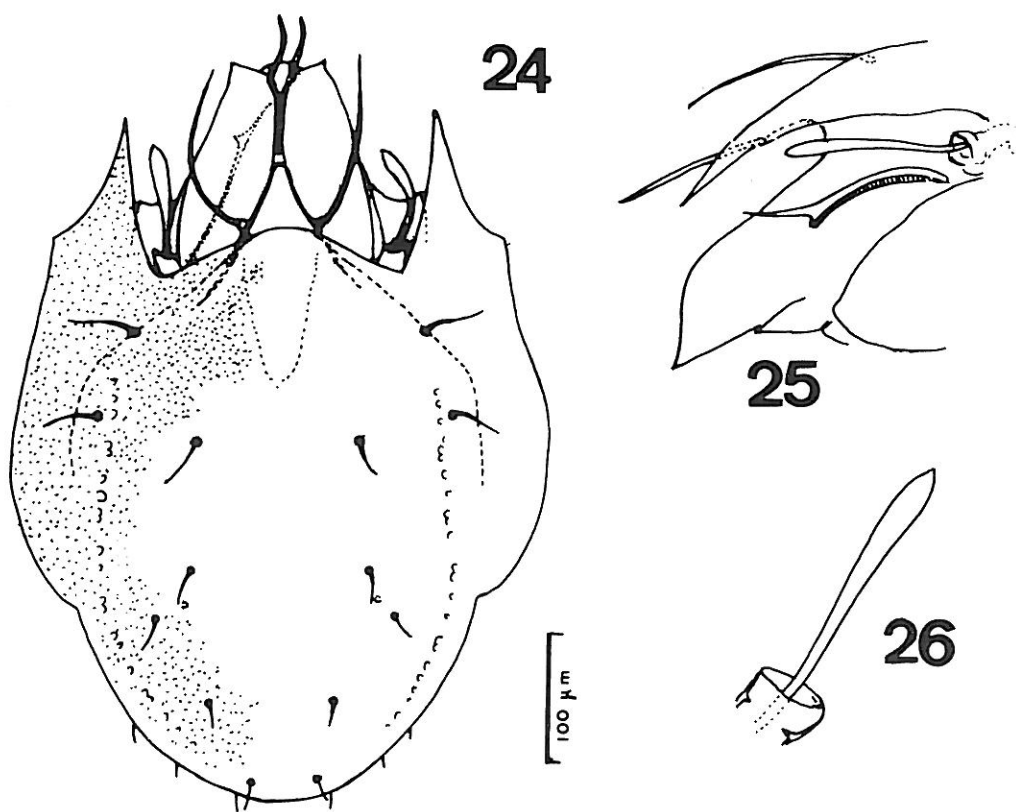
Lateral view: The tutorium is a narrow lame that ends in a long and sharp free point. The genal incisure is normal.

Ventral view: Coxisternal region

without interest. There are six setae on each genital plate, two of them inserted in the anterior edge. Two pairs of anal, one of adgenital and three of adanal setae, that are short and thin. The ventral surface is punctate as the notogaster.

Legs: All tarsi are tridactylous and heterodactylous. Setae *p* and *s* of tarsus I are normal setae, seta *s* of tarsus II is a thick seta that bears 4-5 finger-like branches.

Discussion: This species differs from *Ps. magna* (Sellnick, 1928) in



Figures 24-26. *Pseudachipteria floresiana* n.sp. 24, dorsal view; 25, lateral view of prodorsum; 26, sensillus.

the size (*Ps. magna* is larger: 670-760 μm) and in the different shape of tutorium, that in Sellnick's species is provided with a very short free point. Moreover *Ps. magna* has the sensilli covered with well visible barbs.

Pseudachipteria agenjoi Pérez-Iñigo, 1976 from Tenerife, shows a tutorium with a very small free point, sensilli with short barbs and very long notogastral setae.

Pseudachipteria insularis n.sp. from Santa Maria Island is a little larger (590-640 μm) than *Ps. floresiana*, the lamellar cusps, in dorsal view, have no acute outer angle, the sensilli are rather short (65 μm) and the head is club-shaped, with rounded end. The pedotectum I has an outer angle provided with a rather sharp point, the notogastral and ventral surface is not covered by a conspicuous punctuation and the dorsal setae are larger than in the species from Flores (*ta*: 100 μm).

ORIBATULIDAE Thor, 1929

44. *Oribatula tibialis* (Nicolet, 1855)

Number of specimens: 4.

Locality: SMA-25 (4).

Length: 490-510 μm .

This species has been already recorded from Santa Maria Island (Pérez-Iñigo, 1987). The specimens from Azores show notogastral setae, excepting seta *ta*, shorter than those of the specimens from the Iberian peninsula in such a way that *ta* is the longest of all notogastral setae.

SCHELOBATIDAE Grandjean, 1953

45. *Schelorbates laevigatus* (C. L. Koch, 1836)

Number of specimens: 5.

Locality: Flores: FLS-4 (5).

Dimensions: 490-630 x 300-410 μm .

The specimens from Azores are identical to the ones from Spanish soils preserved at the Museo Nacional de Ciencias Naturales, Madrid.

XYLOBATIDAE J. & P. Balogh, 1984

46. *Brasilobates* sp.

Number of specimens: 1.

Locality: FLS-2 (1).

Dimensions: 680 x 390 μm (without pteromorphs).

This specimen is similar in many respects to *Brasilobates bipilis* Pérez-Iñigo & Baggio, 1980, but undoubtedly it belongs to a different species. Unfortunately the single specimen is damaged, it has the sensilli broken as well as the lamellar setae. That is why it cannot be described. I hope to describe this interesting species in a future paper if I find new specimens.

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