

MARIE HAMMER

INVESTIGATIONS ON THE
ORIBATID FAUNA
OF NORTH-WEST PAKISTAN

Det Kongelige Danske Videnskabernes Selskab
Biologiske Skrifter 21,4



Kommissionær: Munksgaard

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Synopsis

Of the 131 species registered, 48 are new; there are 4 new varieties and 9 new genera are established. A large number of the previously known species have a wide distribution throughout the USSR, North America, and in part in Japan. Seven species have a world-wide distribution and the same may apply to a further 5 species additionally found in the southern hemisphere. Two species are known from Africa and 1 from Japan (see Tables I-II and Conclusion). Previous finds of *Malaconothrus ramensis* in Jordan and the Central Sahara indicate that this species earlier had an unbroken distribution stretching from the Sahara to Pakistan. In its western distribution it is now only found in small oases, split up in enclaves by the desert. The very wide distribution shown in certain species from the northern hemisphere to South America, New Zealand, the Pacific area or Africa indicates that the oribatids are a very ancient group of animals. They were presumably spread over one unbroken continent until this split up into the present continents.

Preface

The material for the present investigation was collected with the aid of my daughter, cand. scient. BIRGITTE HAMMER, in August–September 1969. The collecting expedition was financed in part by the Carlsberg Foundation and in part by the Danish Research Foundation. Furthermore, the Carlsberg Foundation supported me financially during the preparation of the material, while the Danish Research Foundation financed the translation. I am extremely grateful to these two Foundations for their very generous support.

While in Pakistan I met much help and understanding of my work at the Ministry of Forestry, who were good enough to place the guest houses of their Forest Research Stations at my disposal both in Naran and at Shogran. The Danish graduate in forestry, Mr. O. ZETHNER MØLLER, gave me invaluable assistance by pointing out very isolated but accessible mountain areas as possible collecting localities, by providing me with a responsible, charming and extremely interested guide, and by putting me in touch with the Danish missionary, Mr. JENS ENEVOLDSEN, Peshawar, who hospitably opened his home to us. I should like to express my very sincere appreciation of all this help.

I am deeply indebted to the Royal Danish Academy of Sciences and Letters, who have undertaken the publication of my many papers on the world distribution of the oribatids.

I owe my colleague, Dr. E. M. BULANOVA-ZACHVATKINA, Moscow, hearty thanks for help with the identification of a few species.

Mrs. JENNIFER DUPUIS-STARCKE has undertaken the translation of part of the manuscript and assisted me with a revision of the remainder. For this I thank her most cordially.

Fredensborg, April 1975.

MARIE HAMMER

Introduction

It was my intention to investigate the oribatid fauna of North-west Pakistan in an attempt to determine whether isolated valleys, without human beings or domestic animals, or at least with so little traffic that the fauna is virtually untouched by outside human influence, could be of importance for the emergence of varieties. However, through my investigations of the oribatid fauna in the Pacific area—or perhaps rather after these investigations—I came to realize that it takes a time-span of millions of years to produce variants and that human beings hardly have any greater significance for the distribution of the oribatids. My expectations regarding this part of the investigation were thus not very great when I came to prepare the material. Furthermore, it appeared that even in the apparently very isolated valleys there is local traffic over the mountain crests, for instance from the Chitral valley into Afghanistan. For thousands of years the Naran valley has been a thoroughfare through which semi-nomadic people twice a year drive their flocks of sheep, goats, buffalo, etc., loaded with large packs of cattle fodder, in the spring up to summer pastures and in the autumn down to winter quarters in the valley with the rice fields.

The investigation is furthermore a link in my investigations of the possibilities for spreading of the oribatids, and their routes for spreading over the face of the earth.

Collections were made in two large valleys, partly in Chitral province that borders Afghanistan to the west and the USSR to the north, and partly in the Naran valley in Hazara province that borders on Kashmir to the east and Gilgit to the north.

The Chitral valley, through which flows the Kunar a tributary of the Kabul river, is only accessible to motor traffic for a few months of the year by the more than 3000 m high Lawari Pass. Collections were made partly in the main valley from the top of the pass north via Drosh, Gahirat, Yughur, and Chitral to Izh with warm springs, and partly in a side valley, Bombret valley. The main valley is cultivated in spots with maize and rice fields. Higher up the mountain sides there is some wheat and barley, but in the main there are large dry expanses of mountain side with scattered vegetation. Suitable biotopes were almost exclusively found in the heights where water seeped down from patches of snow, or where water ran over rocks, or along the irrigation ditches and the like. Moss was very rarely found.

Bombret valley is a smiling, fertile valley with enormous cedar trees, walnut groves, apricots and pomegranates, vines, maize, rice, etc. Damp biotopes were

particularly found along the irrigation ditches. The valley is extremely difficult of access and then only on foot across 12–14 narrow planks above a rapid torrent.

The collecting localities in Hazara province were very different from those in the Chitral valley. The Forest Research Station at Shogran, just under 2600 m in altitude, lies on a steep mountain side in untouched forest and is accessible by jeep. The forest consists of pine, spruce and cedar, but chestnut, walnut, hazel, ivy and *Parthenocissus* are also found with a rich undergrowth of grasses, ferns, herbs, etc. From the station one can reach the large grazing areas of the alpine pastures above the tree line.

Down at the bottom of the valley, the road, accessible by jeep, leads north to Naran located at an altitude of just under 2700 m. Naran is tightly encircled by mountains which are grass- and partly forest-covered. From Naran a side road, accessible by jeep, leads further up above the tree line to Saiful-Maluk a good 3500 m above sea level where one finds grass, slopes with plants, snow drifts, and a view of some towering snow-clad peaks behind a jade-green lake. A road north from Naran leads to Gilgit; a side track leads to Lalazar, also 3500 m above sea level, in park-like country with large spruces.

Descriptions of the Biotopes

Chitral valley.

Lawari Pass, about 3400 m.a.s.l.

- No. 1 Thin moss on the soil, grass, *Potentilla*, *Epilobium*, northern exposure.
– 2 Grass.
– 3 5 cm high vegetation consisting of a little moss, grass, *Potentilla*, *Fragaria*,
Geranium, etc.
– 4 Melted snow-bed with vegetation, as in 3.
– 5 Moss and *Poa annua* in oozing water.
– 6 *Pinus* cones.
– 7 *Pinus* needles on moist soil.
– 8 Thick moss, *Caltha*, *Veronica*, *Cyperaceae* in oozing water.
– 9 Thick moss, *Trifolium repens*, *Veronica*, grass in oozing water.
– 10 Grass, *Trifolium*, *Dianthus*, moist.
– 11 –14 Seven miles north of the pass; near a small waterfall.
– 11 Liverwort, grass, *Epilobium*, *Caltha*, near falling water.
– 12 Thin moss on a vertical rock, a few metres from running water.
– 13 Dripping wet moss, near falling water.
– 14 Algae in running water.
– 15 Ten miles north of the pass. Moss, grass, *Adiantum* in oozing water
on a vertical rock.
– 16 As 15, but a little drier.
– 17 As 15, but higher up in dripping wet grass.
– 18 As 15, moist moss.
– 19 Fourteen miles north of the pass; moss, *Adiantum* on a vertical rock.
– 20 Wet moss on a wall with oozing water.
– 21 Grass, clover on an irrigation ditch, moist-wet.

Jughur, a few kilometres south of Chitral.

- No. 22 *Ranunculus*, *Plantago* and grass at an irrigation ditch, wet.
– 23 Grass, clover on a dike, moist-wet.

- 24 Dripping wet moss on the side of an irrigation ditch.
- 25 Liverwort and a little moss on a stone wall above an irrigation ditch.
- 26 Moss and liverwort at the side of an irrigation ditch, wet.
- 27 Grass, clover on wet soil.
- 28 As 27, under a tamarisk.
- 29 Adiantum on a dike, moist-wet.
- 30 Wet moss under Salix and tamarisk.
- 31-32 Ranunculus, grass on a slope with running water, moist.

Izh, north-west of Chitral, at Luthko river.

- No. 33-34 Moss, grass, clover, 5-10 cm above an irrigation ditch, wet.
- 35-36 Moss, grass, clover in a "meadow" with running water.
 - 37-38 Liverwort, moss, Plantago in a "meadow" with Salix, 2 m higher than 35-36.
 - 39-40 Scirpus, thin moss in oozing water, 2 m higher than 37-38.
 - 41-42 Dense vegetation of Plantago and Scirpus on slope with hot springs, very wet.

Bombret Valley, south-west of Chitral.

- No. 43-44 Dense grass vegetation with moss, Ranunculus, low Salix shrub, wet; at the guest house.
- 45-46 Moss, grass, clover, drier than 43-44.
 - 47-48 Leucobryum in running water.
 - 49-50 Dense grass vegetation with a little moss, clover, Ranunculus, Brunella, under tall walnut tree, moist.
 - 51-52 Dense vegetation of Setaria, clover, grass, Plantago, moist.
 - 53-54 Grass, clover, Geranium under Elaeagnus shrub, moist.
 - 55-56 Moss, liverwort, Primula, a little grass above an irrigation ditch, wet.
 - 57 Dead leaves of walnut tree.
 - 58-59 Luxurious liverwort, moss, a little grass splashed by water.
 - 60 Thin moss, liverwort at an irrigation ditch, wet.
 - 61 Thick moss, grass, Plantago under walnut tree.
 - 62 Thick moss, about 15 cm above an irrigation ditch, moist.
 - 63 Primula, moss, $\frac{1}{2}$ m above an irrigation ditch, under Salix.
 - 64-65 Moss, clover, grass beside a ditch, wet.
 - 66 Grass, Potentilla under tamarisk, moist.
 - 67 Liverwort, Potentilla, Taraxacum under tamarisk, wet.
 - 68-69 Scirpus, Sonchus, Mentha, Setaria under Hippophaes, moist.
 - 70 Moss on a vertical rock in faintly oozing water.
 - 80 Needles of Cedrus tree.

Drosh Gol, south of Chitral.

- 71 Moss in oozing water on a stone dike.
- 72 Liverwort, moss growing vertically on a stone wall, wet.
- 73 Grass, Oxalis on a wall.
- 74 Adiantum, moss, liverwort, 1½ m higher than 73, wet.
- 75 Low, thin, dry moss on a grassy slope.

Jughur.

- No. 76 Moss under dripping water on a vertical rock.
- 77 As 76, Adiantum, moss near dripping water, wet.
- 78 Moss, liverwort, grass, Plantago, Oxalis, Primula, wet; 1 m from the rock.
- 79 Wet meadow with Plantago, Scirpus, grass, Lotus, Trifolium and moss.

Gahirat between Drosh and Chitral.

- No. 81-84 Low, brown moss on a vertical rock, northern exposure.

Naran valley with Kunhar river.

Shogran Forest Research Station, about 2600 m.a.s.l.

- No. 85-86 Wet moss on a dead tree trunk, splashed by water from a small waterfall.
- 87 Moss, grass, clover on a dead tree trunk, moist.
- 88 Moss, liverwort on tree trunk, drier.
- 89-90 Rich moss, Brunella, on a slope with running water.
- 91-92 Dripping-wet liverwort in running water.
- 93-94 Liverwort, a little moss, drier than 91-92.
- 95-96 Moist moss at the side of a creek.
- 97 Moss on a dead tree trunk, moist-wet.
- 98-100 Slope with northern exposure, moss, Geranium, dry.
- 101-102 Same location, moss, grass, clover, Potentilla, moist.
- 103 As 101-102, near a Pinus tree.
- 104 Adiantum, moss on the soil, moist.
- 105-106 Glade in the forest above the station, moss, clover, grass, Potentilla, moist.
- 107 Needles and dead leaves on a slope with Pinus, Picea, walnut, dry.
- 108-109 Moss on a mouldering Pinus, slightly moist.
- 110 Moist, mouldering Pinus trunk.
- 111 Moist moss under mouldering tree trunk.
- 112-113 Slope with northern exposure, liverwort, moss, grass, Epilobium, Mentha on wet soil.
- 114 Above the forest. Thick moss, grass, Plantago at a small pool, moist.
- 115 Slope with western exposure, grass and dense vegetation of Achillea, a little moss, dry-moist.

- No. 116 Glade in the forest with tall *Pinus*, moss, grass, *Plantago*.
 – 117 Moist litter.
 – 118–119 Moss, grass, *Plantago*, on the edge of a small water hole, moist.
 – 120 Moss, grass, *Oxalis*, dead *Oxalis* leaves under *Berberis* shrub, dry-moist.
 – 121 Bark fallen from tree, collected on the ground.
 – 122–126 Grass, moss, *Potentilla*, clover, *Plantago* at the station, moist.

Naran north-east of Shogran, about 2700 m.a.s.l.

- No. 127 Meadow with grass and moss, moist.
 – 128 Meadow, dripping wet, with grass and moss.
 – 129 Slope with a small spring, moss, grass, liverwort.
 – 130 Near 129, drier, *Parnassia*, moss, grass, liverwort.
 – 131 Same vegetation as 130, but in shade under *Viburnum*.
 – 132 Moss, *Carex*, wet.
 – 133 Moss, grass, very wet.
 – 134 Liverwort above a small creek.
 – 135 Two hundred metres above the bottom of the valley on slope with northern exposure, *Polytrichum*, grass, moist.
 – 136 Moss, grass, small ferns under boulder, moist.
 – 137 Low moss, grass, *Adiantum*, moist.
 – 138 Needles and debris under *Viburnum* shrub, moist.
 – 139 *Polytrichum* under low shrub, moist.
 – 140–141 Moss, grass under roses, moist.

Saiful Maluk, about 3500 m.a.s.l.

- No. 142 Moss, grass in a dried-up creek.
 – 143 Liverwort, moss, *Potentilla* on moist soil.
 – 144–145 Moss, grass on a slope down to the lake, moist.
 – 146 *Polytrichum* behind a boulder, northern exposure.
 – 147 Fell-field about 75 m above the level of the lake, moss on stones, moist.
 – 148 Dripping wet moss and *Scirpus* near water running from snow-bed.
 – 149 Same location, but drier with *Cerastium* and *Rumex*.
 – 150 Lake bank with grass, moist.
 – 151 Wet moss on stones in a spring, further down in the valley.
 – 152 Near the spring, moss, grass, *Caltha*, *Rumex*, wet.
 – 153 Wet moss on stones in the spring.
 – 154 Rich moss under roses and walnut trees, near Naran, moist.
 – 155–156 Thick moss and grass under walnut trees, wet.

Lalazar, about 3500 m.a.s.l.

- No. 157 Dripping wet moss and *Scirpus* in a small spring with algae.

List and Descriptions of the Species Found

In this list I have mainly followed the same principles as in BALOGH's: The Oribatid Genera of the World. Budapest 1972. Also WILLMANN, 1931, has been extensively used. To avoid the many repetitions of descriptions of biotopes under the discussion of the different species, the samples (biotopes) are in the following indicated by number, while the number of individuals found in each sample is given in brackets. In species with many biotopes and small numbers of individuals this arrangement is simplified, i.e. 86, 89, 91(1-5), which means that not more than 5 individuals were found in any of the biotopes indicated. In a few cases, for instance, *Scheloribates pallidulus*, only the biotopes with a rather large number of individuals are indicated.

Phthiracaridae

Steganacarus striculus (C. L. Koch), 1836.

16, 18, 21, 43-46, 49-50, 55, 58-61, 63, 67, 73-74, 77, 88, 94-97, 101-103, 106, 109, 118, 120, 122-123, 129, 140(1-10); 29(18), 30(53), 62(11), 130(39), 131(26).

Phthiracarus piger (Scopoli), 1763.

98(1).

Phthiracarus borealis (Trägårdh), 1910.

129(1).

Phthiracarus tenuis n.sp.; fig. 1.

Colour light brown. Length of notogaster about 0.47 mm. Length of aspis about 0.22 mm.

In profile the aspis is very slightly arched. In a dorsal view it is rather long and slightly pointed anteriorly. Behind the rostral hairs, which are curved forwards and medially, almost reaching the tip of the rostrum, there is a small aperture for insertion of the hairs. This can be seen both in a lateral and in a dorsal view, fig. 1a. The rostral hairs are moderately strong. In front of them the low aspis keel ends in a small tip. The lamellar and the interlamellar hairs are very thin, decumbent, the lamellar hairs almost reaching the holes behind the rostral hairs. There is a small crest in the middle of the posterior border. The pseudostigmatic organs are long and thin (*tenuis*), slightly thicker towards the end, which is bifurcate ending in two extremely small tips. The integument is densely punctate. The palps have four joints.

The notogastral setae, 14 pairs, are extremely thin, flexible, the anterior ones directed forwards, i.e. c1, c2, c3, cp, and e2, the remainder bent slightly backwards. The integument is densely punctate.

Ano-genital region, fig. 1b. There are 8 pairs of genital setae, i.e. five short and thick anterior, marginal ones, and three longer and thinner posterior ones, which are removed a little from the medial borders of the plates. There are two pairs of anal hairs. They are as thin as the notogastral setae and are directed forwards. The adanal hairs, three pairs, are absent in all the specimens found. They are probably reduced. All tarsi monodactylous.

7(4), 138(2).

Phthiracarus falcatus n.sp.; fig. 2.

Colour yellowish light brown. Length of notogaster about 0.59 mm. Length of aspis about 0.26 mm.

In profile the aspis is almost flat. The rostral hairs are short, curved, and directed forwards. In a dorsal view they are bent slightly medially, fig. 2a. They are considerably stronger than the very thin lamellar and interlamellar hairs. The lamellar hairs are only a little longer than the interlamellar hairs. The exopseudostigmatic hairs are almost as long as the interlamellar hairs. The pseudostigmatic organs are curved like a sickle and slightly thinner at the tip, which has a brim of secretion. A scale from above protects the pseudostigma. Across the middle of the aspis there is a transverse band, and a low furrow at the posterior border. The integument is coarsely punctate.

There are 14 pairs of notogastral setae. They are all sickle-shaped, bent forwards. C2, cp, ps2 and ps3 are a little shorter, cl and hl longer than the remainder. The integument is coarsely punctate.

Ano-genital region, fig. 2b. There are six pairs of genital hairs, viz. two short, marginal ones at the anterior end of the plates, and posteriorly four twice as long and removed from the medial border of the plates. There are two pairs of sickle-shaped anal hairs and three pairs of adanal hairs. The latter are not alike, ad1 being stiff, and only slightly curved, ad2 much longer, thinner, sickle-shaped, bent forwards, and ad3, which is thin and flexible, directed slightly backwards. The plates are densely punctate.

60(1).

Hoplophorella pakistanensis n.sp.; fig. 3.

Colour light brown. Length of notogaster about 0.49 mm. Length of aspis about 0.22 mm.

Aspis with a well developed keel almost forming a right angle. In a dorsal view the keel has parallel sides. On either side of the keel the integument is foveolate, behind the keel it is smooth, fig. 3a. The rostral hairs are short, foliate, bent forwards and medially. The posterior part of the aspis, which is covered with dirt, is smooth

and has three to four serrate lines on either side behind the interlamellar hairs. The latter are short, stiff, smooth and slightly elevated. The lamellar hairs, which are erect and bent forwards, are twice as thick as the interlamellar hairs and about three times longer. They are barbed distally. The exopseudostigmatic hair is thin and short. The pseudostigmatic organs widen towards the tip, which is surrounded by a rounded brim, fig. 3b. A scale from above protects the base of the pseudostigmatic organ.

The collar of the notogaster is narrow dorsally, laterally almost one and a half times broader. It is a darker brown than the notogaster. There are 15 pairs of notogastral setae. They are approximately equally long, most of them erect, stiff, and barbed distally. Ps2 and ps3 are each situated in a deep tube. The integument is faintly foveolate.

Ano-genital region, fig. 3c. There are nine pairs of genital hairs, i.e. five anterior thin hairs, located rather close together, and four thicker ones with a rather long mutual distance. There are two pairs of adanal hairs, adl being stiff and smooth and only half as long as ad2. It is directed slightly backwards. Ad2 is much thinner at the tip than adl and is directed backwards in a curve. The three pairs of anal hairs are approximately equally long, the two anterior ones thinner than the posterior one and bent forwards, the posterior one stiff and erect. The distance between anl and an2 is only half as long as the distance between an2 and an3. The integument on the plates is foveolate.

7(2), 90(1), 117(2), 138(3).

Euphthiracaridae

Rhysotritia ardua (C. L. Koch), 1841.

106(1), 140(1).

Euphthiracarus shogranensis n.sp.; fig. 4.

Colour of aspis light brown, the notogaster yellowish. Length of notogaster about 0.42 mm. Length of aspis about 0.23 mm.

In profile the aspis is slightly curved, making a bend off the rostral hairs. The latter are stiff, smooth, and erect. The lamellar and the interlamellar hairs are erect, barbed distally. The interlamellar hairs are very coarse and about one third longer than the thinner lamellar hairs. Fig. 4a shows a dorsal view of the aspis (foreshortened). There are two lateral keels, the dorsal one strong, the lower one very faint. Ventrally to the dorsal keel the integument is smooth, dorsally it is pitted like the dorsal surface of the aspis. The exopseudostigmatic hair is minute. The pseudostigmatic organs are longer than the interlamellar hairs, slightly thicker towards the tip where they are unilaterally set with minute bristles. There is a triangular scale below the pseudostigma.

The notogaster has 14 pairs of equally long, stiff, distally barbed setae. They are erect, some directed backwards, c3 forwards. Ps1 is located off the middle of the long terminal fissure. The integument is very distinctly pitted.

Ano-genital region, fig. 4b. There are two pairs of moderately long, barbed aggenital hairs located in the middle of the plates near the anterior border. The nine pairs of genital setae are of different lengths. The five anterior ones are very short. The four posterior hairs, which are flexible and much longer, are situated in pairs and separated by a distance that is longer than the mutual distance of each pair. Ad1–ad3 are thick, stiff, and distally barbed like the notogastral hairs. An1 resembles the adanal hairs, whereas an2 and an3 are long, curved, slender, thin at the tip, and smooth. In a lateral view an2 is directed forwards, an3 backwards. The integument is pitted. All tarsi are tridactylous.

89(2).

Euphthiracarus pakistanensis n.sp.; fig. 5.

Colour light brown. Length of notogaster about 0.47 mm. Length of aspis about 0.26 mm.

The rostral hairs are stiff, smooth, and directed straight forwards. The lamellar and the interlamellar hairs are erect, barbed distally and thicker than the rostral hairs. The interlamellar hairs are no thicker or coarser than the lamellar hairs, but about one third longer. The distance between the rostral hairs is shorter than that between the lamellar hairs. Some faint lines can be seen across the aspis, viz. two in front of the lamellar hairs and two behind the latter. The distance between the two posterior ones is about three times longer than that between the two anterior ones. There is a posterior crest. The exopseudostigmatic hair is minute. There are two lateral keels, the dorsal one slightly thicker than the ventral one, both reaching the anterior border of the aspis. The pseudostigmatic organs are slightly clavate, thickening towards the tip, the distal third set with minute bristles and covered with a brim of secretion. Below the pseudostigma there is a rounded scale, fig. 5a. The integument of the anterior part of the rostrum is very faintly pitted.

The notogaster has a deep incurvation in the collar off c3. The 14 pairs of notogastral setae are erect, stiff, slightly curved, and barbed distally. C3 is a little shorter than the remainder. C2, c3, and cp are directed forwards. Ps1 is located off the middle of the deep terminal fissure. The integument is faintly pitted on the dorsum, the pits becoming smaller and indistinct on the sides, where they appear as dots.

Ano-genital region, fig. 5b. There are two equally long, slightly barbed aggenital hairs. There are nine pairs of genital hairs, viz. five short and thin anterior pairs and four stronger ones with the same mutual distance. The four posterior hairs are a little uneven and shorter than the aggenital hairs. Ad1–ad3 are alike, stiff, erect, and barbed distally. An1 resembles the adanal hairs, an2 and an3 are much longer, flexible, and very thin towards the tip. An2 is bent forwards, an3 backwards. The integument is densely punctate. All tarsi are tridactylous.

Remarks. Among other characteristics this species differs from *E. cribarius* (Berl.) by its stiff rostral hairs, its two equally long aggenital hairs, and its much longer posterior genital setae.

110(2).

Oribotritia asiatica n.sp.; fig. 6.

Colour light brown to brown. Length of notogaster about 1.20 mm. Length of aspis about 0.54 mm.

Across the aspis, at a short distance in front of the lamellar hairs, there is a low furrow seen as a faint line in a dorsal view, fig. 6a. The rostral hairs are erect, stiff, smooth, and about twice as long as their mutual distance. The erect lamellar hairs are a little longer than the rostral hairs, stiff, and smooth. Their mutual distance is longer than that of the rostral hairs. The interlamellar hairs are decumbent, shorter than the rostral hairs, and thinner. The exopseudostigmatic hairs are almost as long as the interlamellar hairs. A lateral keel is present. The pseudostigmatic organs are long, and proximally slightly undulating, a little thinner at the tip, and thinner than the lamellar hairs. The scale is located above the pseudostigma. The integument is densely punctate apart from a semilunar area in front of and laterally to the rostral hairs, where it is finely striated. Along the border of the rostrum there is a brim with broader darker streaks. The palp has five joints, fig. 6b.

Notogaster with 14 pairs of stiff, thin, and extremely finely barbed setae, which are approximately equally long. The integument is smooth.

Ano-genital region, fig. 6c. There are two pairs of very short aggenital hairs, set in a deep sack, fig. 6d. The nine pairs of genital setae are short like the aggenital hairs. There are three pairs of anal setae and three pairs of adanal setae, all alike and as short as the aggenital hairs. The anal hairs are located a little farther anteriorly than the corresponding adanal hairs. The integument of the anal plates is densely punctate, whereas the genital, the aggenital, and the adanal plates are finely pitted.

Legs I–IV are shown in figs. 63e–h. On Tarsus I (shown on a larger scale than Legs II–IV), I am unable to see some of the distal hairs distinctly. 89(2), 107(1), 121(3).

Mesotritia (Entomotritia) nitida n.sp.; fig. 7.

Colour brown. Integument shining. Length of notogaster about 0.87 mm. Length of aspis about 0.40 mm.

The aspis is very flat and has a lateral keel. The scale is located below the pseudostigma. The rostral, the lamellar, and the interlamellar setae are decumbent. The lamellar hairs are situated far laterally on a level with the rostral hairs, fig. 7a. The rostral and the lamellar hairs are equally long, the interlamellar hairs thinner and shorter, reaching the base of the lamellar hairs. Between the interlamellar hairs there is a distinct curved line, the ends directed forwards. There are two faint lines farther anteriorly. The pseudostigmatic organs are slender, club-shaped, smooth. On the posterior border of the aspis there is a crest, and many light areas between the pseudostigmata.

Notogaster compressed, with 14 pairs of erect, thin, smooth, and slightly curly hairs (c3 and cp are missing in fig. 7).

Ano-genital region, fig. 7b. There are nine pairs of short, smooth genital setae and two pairs of aggenital hairs. Anal hairs absent. Four pairs of adanal setae, ad1

shorter and thicker than the others. Ad2–ad4 are thin and flexible, ad2 shorter than ad3 and ad4. The distance ad1–ad2 equal to ad2–ad3. Ad1–ad3 located in the anterior half of the plates, ad4 much farther posteriorly. The terminal fissure is long. The palp has four joints, fig. 7c. Palp tarsus with a very rough, barbed hair “cm” (Forsslund & Märkel 1963, p. 290, fig. f).

Legs tridactylous, figs. 7d–g. Famulus on Tarsus I is distinctly bifurcate, the two branches being equally long. It is located close in front of S2. S1 is located distally to S2. S3 is very short. Genu IV without solenidion. Trochanter I–II each with one hair, III–IV each with two hairs (IV with three hairs in another specimen). The numbers of solenidia for the four legs are:

	genu	tibia	tarsus
I.....	2	1	3
II.....	1	1	2
III.....	1	1	0
IV.....	0	1	0

Characteristic for this species is the large number of genital setae (9), the lack of anal hairs, and as many as four pairs of adanal setae. Furthermore, the very coarsely barbed seta on the palp tarsus.

111(2).

Mesotritia (Entomotritia) dissimilis n.sp.; fig. 8.

Another specimen of approximately the same size as the preceding species, which I unfortunately assumed to be *Mesotritia nitida* until I dissected it, represents a separate species. Because of the dissection, no illustration of the complete mite can be given, but essential characteristics are shown in figs. 8a–c.

Fig. 8a shows a dorsal view of the aspis. The rostral hairs, which are located farther posteriorly than the lamellar hairs and at a little longer mutual distance than that of the preceding species, do not reach the border of the rostrum. There are three faint transverse lines behind the rostral hairs. There is no crest on the posterior border. The palp tarsus has coarsely barbed setae similar to the preceding species, fig. 8b.

Ano-genital region, fig. 8c. There are two pairs of aggenital hairs, seven pairs of thin genital hairs all of the same length. There are two pairs of anal setae. An1 is located near the anterior border of the plate, an2 between ad1 and ad2. There are three pairs of adanal hairs, ad1 shorter than ad2–ad3. The distance ad1–ad2 is approximately the same as an1–ad1; ad2–ad3 one and a half times longer. Famulus on Tarsus I is bifurcate; the distal part, however, much longer than the proximal part, which appears like a small tubercle two-fifths of the distance from the tip of famulus. 96(1).

Hypochthoniidae

Hypochthonius rufulus C. L. Koch, 1836.

10(1), 62(28), 63(3), 89(1), 90(7), 106(1), 121(4), 130(2), 131(1), 132(2).

Brachychthoniidae

Liochthonius scalaris (Forssl.), 1942.

13(a few), 25(several), 29(2), 30(2), 62(1), 98(1), 107(1), 140(1), 148(1).

Liochthonius simplex (Forssl.), 1942.

11(several), 12(a few), 93(3), 94(5).

Brachychthonius berlesei Willm., 1928.

49 (a few), 50 (several), 56(5), 137(5).

Lohmanniidae

Hamacarus n.gen.

The new genus has the following characteristics in common with *Mixacarus*: Genital plates not divided by transverse suture, preanal plate large, rectangular, much wider than long; adanal and anal plates separated by a longitudinal suture; 4 adanal setae; 2 anal setae; absence of neotrichy; dorsal transverse bands present.

It differs from *Mixacarus* by the lack of areae porosae; by the medial fusing of Epimeres I–II and III–IV; and by the rostrum with two hooks (hamus).

Hamacarus lawariensis n.sp.; fig. 9.

Colour light brown. Length about 0.72 mm.

On the tip of the rostrum there are two hooks directed medially and separated by a good distance, fig. 9a. The rostral hairs, which are situated dorsally, have long secondary bristles and a thin smooth tip. The lamellar hairs are similar to the rostral hairs, but longer. The anterior exo-pseudostigmatic hairs are also smooth at the tip, barbed proximally, whereas the posterior exopseudostigmatic hairs are short and thin. The interlamellar hairs resemble the lamellar hairs. Sensillus has about 10 thin secondary bristles. The integument is finely granulate.

The anterior border of the hysterosoma is almost straight, withdrawing slightly laterally. The posterior end is truncate, the tip of the anal plates projecting. The notogastral setae are barbed. The marginal ones are unilaterally barbed, rough, ending in a long smooth tip. The dorsal setae are finely barbed and much shorter than the marginal ones (c1, c2, d1, d2 and e1). F1 and h1 are as long as e2. H3 is situated at a good distance from the lateral border. There are eight faint transverse bands of very irregular shape, most of them incomplete. They correspond to S2, S4, S5, S6, S7, S8, and S9 in WALLWORK, 1962, fig. 1, S1 and S3 being absent. There are no areae porosae. The integument is finely granulate.

The ventral side is shown in fig. 9b. Infracapitulum with four pairs of barbed setae. There are a few areae porosae behind the setae h. Epimeres I–II and III–IV are fused medially. There is a short longitudinal ridge between Epimeres III and IV. The epimeric hair formula is 3–1–3–4. Some are short and apparently smooth, i.e. 3a, 4a–d, the others barbed. The aggenital plates are triangular. The genital plates without transverse suture. There are nine pairs of genital setae, i.e. 6 medial and 3 lateral pairs. Numbers two and five of the medial setae are longer than the others. The two posterior lateral setae are much longer and barbed; all the other genital setae are apparently smooth.

The preanal plate is much broader than long, slightly convex posteriorly. The anal hairs, two pairs, are long, barbed, smooth at the tip. The adanal hairs, four pairs, are longer and thicker, unilaterally barbed and with a thin, smooth tip. Ad4 is located immediately behind the preanal plate, ad3 off an2; ad1 off anl. The fissures ia and ih are distinct, ih being located behind h3. The integument is finely granulate. Areae porosae are absent. The legs have not been studied.
17(1).

Eulohmanniidae

Eulohmannia ribagai Berlese, 1910.

95(1).

Nothridae

Nothrus biciliatus C. L. Koch, 1844.

63(9), 99(1), 107(2), 112(1), 120(7), 123(2), 138(3), 140(4), 141(1).

Nothrus palustris C. L. Koch, 1840.

44, 45, 46, 49, 60, 61, 89, 90, 93, 94, 130, 154, 156(1–5); 62(10), 63(6), 67(24), 103(23).

Heminothrus thori (Berl.), 1913.

17, 22, 49, 56, 58, 59, 60, 65, 73, 76(1–4); 8(9), 18(26), 24(23), 25(200), 26(21), 30(10), 55(7), 62(15), 63(14), 67(65), 77(12), 132(25), 133(7), 156(16).

Heminothrus targioni (Berl.), 1885.

100, 103, 104, 107(1).

Platynothrus peltifer (C. L. Koch), 1840.

103(1).

Camisiidae

Camisia horrida (Herm.), 1804.

73(1).

Trypochthoniidae

Trhypochthonius tectorum (Berl.), 1896.

1, 54, 95, 96, 97, 98, 100, 105, 127(1-4); 101(8), 115(28), 122(6), 123(7).

Trhypochthonius excavatus (Willm.), 1919.

47(2), 71(2).

Trhypochthonius badius Berl., 1904.

35, 36, 51, 52, 53, 64(1-2); 37(34), 38(50), 39(25), 40(14), 43(50), 45(38), 46(80), 65(6).

Malaconothridae

Trimalaconothrus novus Selln., 1921.

41(10).

Trimalaconothrus foveolatus Willm., 1931.

48(1).

Trimalaconothrus glaber (Mich.), 1888.

9, 13, 28, 29, 47, 71, 72, 73, 132(1-6); 8(numerous), 27(12), 30(125), 48(21), 64(14), 65(26).

Malaconothrus mollisetosus Hammer, 1952.

8, 27, 29, 31, 35, 36, 45, 58, 65, 77, 78, 135(1-7); 28(28), 30(30), 43(100), 46(30), 130(19), 131(38), 132(numerous).

Malaconothrus ramensis Hammer, 1966.

41(100), 62(1).

Nanhermanniidae

Nanhermannia nana (Nic.), 1855.

62(2), 63(2), 77(1), 130(3).

Hermanniiidae

Hermannia gibba (C. L. Koch), 1840.

121, 137, 138(1); 107(6), 136(4).

Lioididae

Liodes silvestris n.sp.; fig. 10.

Colour brown. Length about 1.20 mm.

The rostral hairs are inserted on the lateral margin of the rostrum. They are knee-bent and apparently smooth. Lamellar hairs absent. The interlamellar hairs, located at the base of the pseudostigmata, are very short and thick. The pseudostigmatic organs are slender and club-shaped. The sculpture of the prodorsum consists of a faint reticulate-foveolate pattern in a light yellow area located in front of a ridge, pointed at the middle, between the pseudostigmata. The integument is a light brown colour behind this ridge.

The notogaster is almost circular, faintly pointed posteriorly, and elevated at the middle above its lateral margins with rib-like ridges. Its anterior part, between the lateral ridges, is a light brown colour with faint brown dots arranged in rows on a yellow ground. The middle area, which is yellow, has a dendrite pattern of brown ridges on a yellow ground. Two lanceolate setae are situated close together at the posterior end. Five pairs of notogastral hairs can be seen in a ventral view, i.e. 6 hairs along the margin of the dorsal shield, separated 3 and 3 by an indentation in the shield, two hairs behind the indentation, and further posteriorly two on the posterior border. These hairs are strong, lanceolate and smooth, fig. 10a.

Ventral side, fig. 10b. The general appearance is similar to that of *Liodes terrestris* Wallw. (1963, p. 102, fig. 6). There are, however, 10 pairs of genital setae (6 + 4), fig. 10c. There are one pair of aggenital hairs, three pairs of anal, and two pairs of adanal setae. On the genital plates, along the lateral margin of each of the four smaller plates, there is a broad furrow with grains of sand and dirt. There are 3–4 longitudinal furrows on the anal plates likewise containing particles of debris. Ian is comma-shaped, fig. 10d. The whole ventral surface is covered with secretion and debris adhering to small, indistinct tubercles.

Legs with inconspicuous reticulate sculpture. The ventral keel of the femora is weakly developed. Tarsi are tridactylous, the claws equal in size. The outer edge of the claws is finely dentate.

Remarks. This species can be distinguished by the microsculpture of the notogaster and by the number of genital setae.

85(2), 89(1), 91(2), 92(3).

Gymnodamaeidae

Gymnodamaeus femoratus (C. L. Koch), 1840.

7(1).

Damaeidae

Hypodamaeus gracilipes (Kulcz.), 1902.

96(1).

Hypodamaeus riparius (Nic.), 1855.

136(1).

Hypodamaeus crispatus (Kulcz.), 1902.
107(4).

Belbidae

Belba corynopus (Herm.), 1804.
107(6), 111(32).

Belba tatrica (Kulcz.), 1902.
109(1).

Belba verrucosa Bul.-Zach., 1962.
95(1).

Belba rossica Bul.-Zach., 1962.
103(1), 107(5), 120(1).

Belba meridionalis Bul.-Zach., 1962.
99(1), 104(4).

Nododamaeus n.gen.

Body compressed. Sensillus thread-shaped and set with spines. No tubercles on posterior part of prodorsum. No spinae adnatae. Eight pairs of notogastral setae. Ventral side with strong tubercles or knots (hence the generic name) in front of the genital field. Six pairs of genital setae, one pair of aggenital, two pairs of anal, and three pairs of adanal setae. Coxae I–IV with one seta. Associated seta on Genus I–IV. Tibiae without associated seta.

Nododamaeus monticola n.sp.; fig. 11.

Colour light brown. Length about 0.62 mm.

The rostrum is broad, rounded. The rostral hairs, which are situated laterally, are faintly barbed and bent medially following the outlines of the rostrum. The lamellar hairs, which are situated dorsally on either end of a faint transverse line, are barbed, bent medially, reaching beyond the tip of the rostrum. The interlamellar hairs, located close to the pseudostigmata, are shorter than their mutual distance and faintly barbed. The exopseudostigmatic hairs are strongly bent medially. The pseudostigmata are deep cups, opening outwards and backwards. Sensillus is a thin thread set with strong spines, ending distally in a slender club caused by secretion covering the distal spines. On either side of the propodosoma, behind the lamellar hairs, there is a short ridge continuing indistinctly to the exopseudostigmatic hairs. Between Legs I and II there is a rounded projection with an anterior short tooth.

The notogaster is round to oval, only slightly longer than broad. Its anterior margin is a chitinized band. There are 8 pairs of strong notogastral setae, arranged

more or less in two longitudinal rows, apart from the anterior pair, the setae of which are located rather close together. The notogastral hairs are almost equally long, slightly curved, the posterior ones bending ventrally round the posterior border of the notogaster. The dorsal surface is covered by granules of secretion.

The ventral side is shown in fig. 11a. Sternum is absent. Apodemata II are short. On the faintly developed sejugal apodemata there is a strong tooth directed backwards. Corresponding teeth are situated on a faint ridge in front of the genital field. The epimeric hair formula is 3-1-3-3. 1c is a short spine, 1b long and smooth. 1a and 2a are missing. The anterior end of the genital and the anal plates are rounded, projecting lobes. There are six pairs of genital setae, i.e. five smooth, strong setae in a longitudinal row, directed forwards and with the same mutual distance, and one near the posterior border. The aggenital hairs are missing, their pores distinct, located off the posterior border of the genital field. The anal field is narrower than the genital field. The distance between them is shorter than the width of the anal field. The anal plates have a medial, marginal thickening. The strong, smooth anal setae are directed forwards and situated in the anterior half of the plates. Ad1 and ad2 are also smooth, ad3 are missing. The fissure iad is removed from the anal field to a site lateral to ad3, off the anterior border of the anal field. The posterior border of the ventral plate is straight. There is an indistinct thickening on the ventral plate behind the anal field. Legs I-IV are shown in figs. 11b-e. Trochanter I-IV with one seta. Genus I-IV with an associated seta. Tibiae without associated setae. Number of setae on Genus I-II:4; Genus III-IV:3. There are strong barbed spines on the genus and the femora of all legs. Monodactylous.

7(1).

Cepheidae

Cepheus latus C. L. Koch, 1836.

120(1).

Damaeolidae

Fosseremus laciniatus (Berl.), 1905.

28, 49, 55, 56, 62, 103, 140(1); 77(4), 131(2).

Ameridae

Cristamerus n. gen.

In many ways similar to *Amerus*. It is dorso-ventrally flattened. Propodosoma and hysterosoma separated by a broad dorso-sejugal band. Lamellar and interlamellar hairs on apophyses, lamellar hairs located far anteriorly, interlamellar hairs between the pseudostigmata. Pseudostigmatic organs are thread-shaped, situated laterally. Two projecting shoulder crests (crista). Ten pairs of notogastral setae. Six pairs of genital, one pair of aggenital, two pairs of anal, and three pairs of adanal hairs. Monodactylous.

Cristamerus spinosus n.sp.; fig. 12.

Colour clear light brown. Length about 0.84 mm.

The rostrum is broadly rounded. The rostral hairs, situated laterally, are long and smooth, meeting in front of the rostrum. The lamellar hairs, situated on apophyses at some distance from the sides of the propodosoma, are dagger-shaped and longer than their mutual distance. The interlamellar hairs have the same appearance as the lamellar hairs, situated on apophyses, strong, stiff and smooth. They are located on a level a little in front of the pseudostigmata. A faint line issuing from the pseudostigmata surrounds them anteriorly. The exopseudostigmatic hairs are short and thin. The pseudostigmata are located immediately in front of the broad dorso-sejugal band, far laterally. They are open cups. The pseudostigmatic organs are filaments, smooth and longer than their mutual distance. They are directed in a broad curve outwards and slightly backwards.

The hysterosoma is oval apart from the anterior border, which is straight. Only the posterior border of the dorso-sejugal band is distinct. On each shoulder there is a projecting rounded crest on which two hairs, i.e. ta and ti, are situated. There are 10 pairs of notogastral setae, all long, overlapping, thick and slightly curved, their outer border slightly ciliate. All the hairs have a distinct interior cavity. The distance te-te is the same as ms-ms, r3-r3 being a little shorter. Ti, ms and r3 are directed backwards and curved slightly medially; r1 and r2 are directed backwards and outwards. Pl-p3 are shorter than the others, p2 and p3 are bent ventrally and backwards and can best be seen in a ventral view.

Figure 12a shows the ventral side. No sternum is developed. There are two transverse bands, one between Apodemata II, the other the ventro-sejugal band. The latter is situated some distance in front of the genital field. The epimeric hairs are long, strong and smooth. The genital field is almost round, surrounded by a frame. There are six pairs of genital hairs, the anterior one long, followed by two short and thereafter three somewhat stronger ones, directed outwards. The two posterior pairs are located closer to the lateral border than to the medial border. The aggenital hairs, situated a short distance from the genital field, are longer than the genital hairs. The anal field is much larger than the genital field, narrow anteriorly. The anal hairs are moderately long, thin, and located one at either end of the plates, the posterior one nearer to the posterior border than the anterior hair to the anterior border. Ad3 is preanal, ad2 located off the latero-posterior corner, and ad1 is postanal; the last is situated on a semilunar plate.

Figure 12b shows Leg I. The hairs of the legs are mostly very strong, stiff spines, which are slightly serrate. The solenidia are short. All the legs have one claw. At the base of the claw Legs II-IV have two short spines representing the hairs p.
107(1).

Eremaeidae

Oribella alpestris Willm., 1929.
115(5).

Eremaeus hepaticus C. L. Koch, 1836.
7(9).

Carinabella n.gen.

Lamellae fused distally forming a strong keel in the middle of the propodosoma. Eleven pairs of notogastral hairs. Six pairs of genital, one pair of aggenital, 6–7 pairs of adanal, and 7–8 pairs of anal hairs. Setae 3c and 4c three- to four-fold. Tridactylous.

Carinabella pulchra n.sp.; fig. 13.

Colour brown. Length about 0.98 mm.

The rostrum is conical. The rostral hairs, situated far anteriorly and laterally, are slightly unilaterally serrate. Across the anterior part of the propodosoma there is a transverse line in front of which are the lamellar hairs. They are a little longer than their mutual distance and uneven. The integument in front of the line is smooth, behind the line it is foveolate. The lamellae are fused for most of their length forming a thick, brown, uneven, faintly foveolate keel. At their anterior end the fused lamellae diverge a little and a transverse "pillow" with a fine ornamentation rests on their anterior ends. The pits laterally to the lamellae are arranged in longitudinal, curved rows; some are raised forming crests. Between the pseudostigmata there are no pits, but irregular lines. The interlamellar hairs, situated off the pseudostigmata, are strong, thin at the tip, slightly barbed, erect and, as long as their mutual distance. The pseudostigmatic organs are thin, densely hairy clubs. They are as long as their mutual distance and are directed outwards and backwards. The exopseudostigmatic hairs are as long as the interlamellar hairs, thin and slightly uneven.

The hysterosoma is almost as broad as it is long. Its anterior border is straight and narrow in the middle, laterally rounded and thickened by strong ridges. The posterior border is undulate. There are 11 pairs of moderately long, very faintly barbed notogastral hairs. Apart from lm and dp they are marginal. The fissure im is located medially to lp. Ip has not been observed and ia is dubious. The whole surface is covered with pits arranged in rows, running both in longitudinal and in curved transversal streaks.

The ventral side is shown in fig. 13a. The sternum goes right through to the genital field. It is broadest between Epimeres II. There are two rough transverse bands set with chitinous tongues, i.e. Apodemata II and the sejugal apodemata. Behind the latter there is a faint transverse band. The frames and surroundings of the genital and the anal fields are darker than the fields. The epimeric hair formula is 3–1–6–5, 3c being quadruple and 4c triple.

There are six pairs of moderately long, smooth genital hairs with approximately the same mutual distance, arranged in two longitudinal rows. The plates are faintly striated and without pits. The aggenital hairs are located off the posterior margin of the genital field on the border of the frame. There are seven pairs of adanal hairs (i.e. 7+6 in the type, and 7+7 in another specimen). They are moderately long, thin and smooth, arranged round the anal field, closest near its posterior end. Iad is located off the anterior end of the field, within the frame. The number of pairs of anal hair varies from 7 to 8 like the adanal hairs. The anal plates are smooth, whereas the ventral plate is rough and pitted.

Figs. 13b–c show Legs I–II. There are three claws on all legs, the middle one dentate on its outer border.

117(1), 138(2).

Proteremaeus lawariensis n.sp.; fig. 14.

Colour light yellowish, darkest at the posterior end of the hysterosoma. Length about 0.50 mm.

The new species agrees very well with the type species *P. jonasi* Piffel, 1965. As illustrated by PIFFEL, the side of the rostrum is surrounded by a deeper-lying anterior border, which is broadly rounded. The rostral hairs are situated on a short edge above this deeper border. They are slightly rough, bent medially, but do not meet. The lamellae are narrow, parallel, erect blades, which continue proximally as a very short thin line to the base of the interlamellar hairs. A curved ridge, which is the proximal part of the lamella and which issues laterally to the pseudostigma, joints the parallel part of the lamella in front of the interlamellar hair. The latter is thus situated far laterally in front of the pseudostigma, but not outside the lamella. Across the propodosoma and in front of the lamellae there is a faint transverse ridge, which laterally turns backwards to form an edge. The lamellar hairs are faintly barbed, curled, and directed forwards. The interlamellar hairs are stronger and a little rougher. The exopseudostigmatic hairs are short and thin. The pseudostigmatic organs are short, round clubs set with minute bristles.

The hysterosoma has a straight anterior border, whereas the posterior end is pointed, ending in a small "tail". The lateral borders are darker and distinctly foveolate, whereas no sculpture can be seen on the yellowish, dorsal surface. There are 10 pairs of notogastral hairs, all of them bent and set with minute bristles. Apart from te they are all marginal. The hairs pl are situated one on either side of the "tail". P3 can be seen only in a ventral view. Ia is located behind pd. II, im behind te. Ip was not observed.

In a ventral view (fig. 14a) p2 and p3 can be seen on the dorsal plate, which is bent ventrally. The ventral plate is very narrow posteriorly where it sends a rounded projection into the "tail". The ventral side is faintly chitinized and the sternum is not developed. The epimeric hair formula is 3–1–3–3. There are six pairs of thin genital hairs. The four anterior ones are located in the anterior third of the plates. The

aggenital hairs are situated off the posterior genital hairs, close to the genital field. They are stronger than the genital hairs. The anal field is very long and occupies a good part of the narrow ventral plate. The anal hairs are smooth and as long as the aggenital hairs. The adanal hairs are shorter and thinner. Ad1 and ad2 are postanal; ad2 are much closer to the anal field than ad1. Ad3 are located behind iad and very near to the border of the ventral plate.

All the legs have three almost equally thick claws.

Discussion. This species can be distinguished from *P. jonasi* Piffel among other characteristics by its round, club-shaped pseudostigmatic organs and its pointed hysterosoma ending in a little "tail".

4(1).

Tenuialidae

Hafenrefferia gilvipes (C. L. Koch), 1840.
111(4).

Liacaridae

Liacarus coracinus (C. L. Koch), 1840.
90(1).

Cultroribula trifurcata Jac., var. *rotundata* Kriv., 1962.
138(1).

Birnsteinius (*Cultroribula*) *perlongoides* n.sp.; fig. 15.

From KRIVOLUZKY's description and figures of the genus *Birnsteinius*, 1965, I am unable to decide whether *Birnsteinius* is a well-defined genus or whether the two established species: *B. clavatus* and *B. perlongus* belong to the genus *Cultroribula*. KRIVOLUZKY illustrates no aggenital and adanal hairs; the number of notogastral hairs is not the same in the two species (respectively 12 and 10); the number of claws in *B. perlongus* is 3 and is not illustrated in *B. clavatus*. *Cultroribula* has 11 pairs of notogastral hairs, and one claw similar to the new species found. The very long tutorium without a free tip, which reaches the tip of the rostrum, and the hidden pseudostigmata may, however, be sufficiently important to justify the retention of *Birnsteinius* as an independent genus.

Colour clear brown. Length about 0.48 mm.

The rostral hairs, which are slightly rough, parallel, and directed forwards, are situated at the end of a long curved ridge(?tutorium) issuing from the base of the pseudostigmata. Between the rostral hairs there is a free tip, i.e. the rostrum is tridentate, fig. 15a. The lamellae are almost fused in their distal halves, leaving between them a very narrow, but broad translamella, the length of which is equal to

the length of the cusps. On all sides the translamella is bordered by a strong chitinous thickening. The cusps run evenly into one with the lamellae. The uneven lamellar hairs are a little more than twice as long as the cusps. They are directed straight forwards. The smooth interlamellar hairs, which are as long as their mutual distance, are situated in the corner between the lamellae and the anterior border of the hysterosoma. The pseudostigmata are hidden below the anterior border of the hysterosoma. The pseudostigmatic organs are clavate, but only slightly thicker towards the end on which there are a few tiny spines. They are turned forwards, outwards, and thereafter halfway forwards.

The hysterosoma is much broader than the propodosoma. Its anterior border is slightly arched and has a low incurvation behind the pseudostigmata and only slightly protruding shoulders. There are 11 pairs of notogastral hairs, which, apart from the short anterior one, are equally long, thin, and smooth. They are all marginal apart from ms. Ia is located behind ta, im between te and r3, ip off r1. Across the anterior part of the dorsum there is a curved row of light spots.

The ventral side is shown in fig. 15b. The sternum is present for its whole length but very narrow between Epimeres II. In front of the genital field there is a strong, curved ridge running to Acetabula IV. The hair 3c is situated on a spine(? custodium). There are five pairs of genital hairs arranged in two longitudinal rows, the anterior ones a little shorter than the posterior ones. There is one pair of aggenital, two pairs of anal, and three pairs of adanal hairs. Ad1 and ad2, which are located on a faintly chitinized semilunar plate behind the anal field, are a little longer than ad3 and the aggenital hairs. The anal hairs are situated one at either end of the plates, the anterior hair nearer the frame than the posterior hair. Iad is situated off the anterior anal hair, removed a little from the anal field. The tarsi have only one claw. For the four legs the numbers of solenidia are:

	Tarsus	Tibia	Genu	Femur
I	2	2	1	0
II	2	1	1	0
III	0	1	1	0
IV	0	1	1	0

Discussion. This species can be distinguished from *B. perlongus* Kriv., 1965 by its longer lamellar hairs, by a much narrower space between the cusps, and by being monodactylous. Should KRIVOLUZKY have erroneously illustrated *B. perlongus* with three claws instead of one, the new species from Pakistan may be synonymous with *B. perlongus*.

103(6), 117(1), 138(1), 139(1).

Astegistidae

Gustavia latolamellata n.sp.; fig. 16.

Colour light brown. Length about 0.73 mm.

The lamellae are very broad and cover the propodosoma completely apart from a small area between the lamellae. They are fused, forming a translamella as broad as the lamellae. Between the lamellar hairs there is a shallow incurvation. On either side of the lamellar hairs there is a short tooth, fig. 16a. The lamellae are longitudinally wrinkled, the wrinkles forming a reticulation with longish meshes or shallow pits. The lamellar hairs, which are twice as long as their mutual distance, are parallel, smooth, and directed forwards. Below the translamella one can see the small pointed rostrum, on the sides of which are situated the short rostral hairs. The interlamellar hairs, which are located in the corner between the lamellae and the anterior border of the hysterosoma, are directed outwards. They are about twice as long as their mutual distance, faintly barbed, and thinner than the lamellar hairs. The pseudostigmata are hidden below the anterior margin of the hysterosoma. The sensillus is almost as long as the interlamellar hair, the stalk transparent, and the head black, lanceolate, fig. 16b.

The hysterosoma is a little longer than broad, and broadest across its middle. Its anterior margin is slightly convex, bordered by a darker band. Two hair pores can be seen on the shoulder. On the dorsum there are some pores, but their position may not be correct as they are extremely difficult to see.

The ventral side is shown in fig. 16c. All the hairs of the ventral side are thin, smooth, and moderately long. There are six pairs of genital, one pair of aggenital, two pairs of anal, and three pairs of adanal hairs. Ad3 are preanal, ad2 located off the latero-posterior corner of the anal field, and ad1 postanal, situated on a semilunar chitinous plate. The distance ad1-ad1 is longer than ad1-ad2. The fissure iad is preanal, located at the very narrow anterior end of the anal field. All the legs have three claws, the middle one being only slightly thicker than the lateral ones.

136(1), 138(2).

Xenillidae

Xenillus tegeocranus (Herm.), 1804.

107(1), 121(1).

Metrioppiidae

Ceratoppia bipilis (Herm.), 1804.

121(1), 136(1), 139(2), 147(1).

Ceratoppia bipilis (Herm.), var. *curtipilis* n.var.; fig. 17.

Colour chestnut brown. Length about 1.05 mm.

This large dark mite represents one of the numerous subspecies or variations of *Ceratoppia bipilis* (Herm.). As pointed out by GRANDJEAN (1936), the variations in the appearance of the rostral tips, the length of the cusps and of the outer tooth of the rostral tips, the length of the cusps and of the outer tooth of the cusps, the length of the setae and of the pseudostigmatic organs, etc., the body size, and the colour may be due to geographical distribution and to conditions of existence.

The variety from Pakistan is characterised by its very short notogastral hairs, of which only one pair on the posterior border is discernible.

98(2).

Ceratoppiella n. gen.

Rostrum very narrow, dentate. Lamellae narrow, erect, twisted blades, fused with the dorsal surface. Cusps very long and free. Pseudostigmatic organs long, barbed setae. Dorso-sejugal suture present. Hysterosoma with shoulders. Twelve pairs of notogastral hairs. Six pairs of genital, one pair of aggenital, two pairs of anal, and three pairs of adanal hairs.

Mandibulae peloptoid.

Ceratoppiella lutea n. sp., fig. 18.

Colour yellow. Length about 0.49 mm.

The anterior half of the propodosoma as far as Acetabulum I is narrow, triangular, tapering towards the tip of the rostrum. The latter ends in five small teeth, the middle one being the largest. On either side of the teeth there is a sharp tip representing the end of a prolamella on which is situated the rostral hair. The rostral hairs are parallel, unilaterally barbed, and more than twice as long as their mutual distance. The proximal parts of the lamellae converge, at the same time twisting, thereafter the lamellae continue as parallel, erect blades running into one with the narrow cusps. The distal ends of the lamellae are apparently attached to the surface by two curved hooks, which can be seen between the lamellae. There is a faint transverse line on this level. The cusps, which are two-thirds as long as the lamellae and a little narrower, have a longitudinal furrow from their tip to their attachment. On the end of the cusps there is a rather strong medial tooth. The lamellar hairs are parallel, moderately thick, barbed, and twice as long as their mutual distance. The interlamellar hairs, situated where the lamellae twist, are thinner than the lamellar hairs, barbed, and at least twice as long as their mutual distance. The pseudostigmatic cups are hidden under the anterior border of the hysterosoma. The pseudostigmatic organs are as long as their mutual distance, filiform and set with secondary bristles. Pedotecta I–II are longitudinally wrinkled. On the outer border of the camerostome there are three teeth on either side, fig. 18a.

The middle of the anterior border of the hysterosoma is slightly arched. The shoulders are rounded and pronounced. There is a mucous brim along the anterior border of the hysterosoma. There are 12 pairs of notogastral hairs, but only three

pairs of setae are present, i.e. p1–p3. Of these p1 are moderately strong, p1–p2 tiny, only discernible in a ventral view. Fissures ia and im are present. An indistinct dark spot can be seen near some of the hair pores.

The ventral side is shown in fig. 18a. The sternum is represented by some small irregular wrinkles and a narrow ridge in front of the genital field. The sejugal apodemata are connected by a ridge forming a narrow transverse belt. A similar, but much broader belt is located in front of the genital field. Epimeres III–IV are fused. There are six pairs of thin, smooth, genital hairs, the four anterior ones located in the anterior half of the plates. The two short, smooth aggenital hairs are separated by a long distance. The anal field is triangular, pointed anteriorly and broad at its posterior end. The anal hairs are smooth. Ad1–ad2 are postanal, the distance ad1–ad1 the same as ad1–ad2. Ad3 are located off the anterior anal hairs. Iad is situated in front of ad3 and removed from the anal frame by a short distance. Behind the anal field the frame reaches posteriorly to ad1.

All legs have three claws, the lateral ones much thinner than the middle one. The numbers of solenidia for the four legs are:

	Tarsus	Tibia	Genu	Femur
I	2	2	1	0
II	2	1	1	0
III	1	1	1	0
IV	0	1	1	0

Discussion. *Ceratoppiella* is related to *Metrioppia* Grandj., 1931, *Ceratoppia* Berl., 1908, and *Amazoppia* Bal. & Mah., 1969, but the number of notogastral setae and their position distinguish it from all three genera.

90(2), 138(8).

Carabodidae

Carabodes tenuis Forssl., 1953.

107(1), 111(11).

Carabodes manifera n.sp.; fig. 19.

Colour dirty brown. Length about 0.525 mm.

The rostrum, the lamellae, and the space between the lamellae are foveolate, most regularly in the anterior part of the prodorsum. In the posterior part of the prodorsum there are irregular brown ridges, running obliquely towards the sides of the lamellae. The same more or less reticulate structure is present on the posterior part of the lamellae. The rostral hairs are long, smooth, pointed, and bent medially. The lamellar hairs are shorter, rough, and dull at the tip. The interlamellar hairs are

straight, club-shaped, flattened, and barbed distally. The sensillus is a slender club, split up into 4–5 “fingers” held close together (hence the specific name).

The shoulders hardly protrude beyond the sides of the hysterosoma. The notogastral hairs are slender, the tip clavate, flattened and split, fig. 19a. The structure of the dorsal surface consists of light, almost round areolae of different sizes, surrounded by a thick, dark, reticulate network, fig. 19b. In the anterior part of the hysterosoma, behind the dorso-sejugal suture, the areolae are more irregular, and occasionally several are fused into short oblique rows.

Discussion. The present species resembles *C. peniculata* Aoki, 1970. It can be distinguished from the latter by its larger size (*C. peniculata* is 0.42 mm long), its slender sensillus, its longer notogastral hairs, and its more regular areolae, which do not fuse on the dorsum as illustrated by AOKI, fig. 54. On the other hand, the differences are so slight that the two species may be conspecific.

86(2).

Tectocephidae

Tectocephus velatus (Mich.), 1880.

Common everywhere. Found in 99 samples, most abundant in 33(50) and 150(70).

Scutoverticidae

Scutovertex minutus (C. L. Koch), 1836.

146(1), 151(1), 154(1).

Hypovortex arcualis n.sp.; fig. 20.

Colour dirty light brown. Length about 0.48 mm.

In front of the rostrum there is a broad lip, on either side of which are situated the rostral hairs. These are smooth and bent medially, almost surrounding the lip. The rostrum is slightly pointed, projecting only a little beyond the cusps. There is a light hole behind the tip of the rostrum. The lamellae are located along the sides of the propodosoma. Together with the cusps they form a very broad arch. There is no translamella although a line connects the cusps. The latter are broadly rounded, the distance between them a little narrower than the cusps. Their inner borders are parallel, their surface wrinkled. The lamellar hairs, situated in the middle of the anterior border of the cusps, are strong, set with minute bristles or spines. They are as long as the rostral hairs, but thicker and similarly bent medially. Interlamellar hairs are absent. The pseudostigmata are open cups, surrounded on their dorsal side by a broad curved plate. The pseudostigmatic organs are scaly, slender clubs, directed outwards and backwards. The tutorium reaches halfway to the tip of the rostrum. In the space between the lamellae are some irregular and indistinct lines.

There is no distinct border between the propodosoma and the hysterosoma.

Between the pseudostigmata there is a light line on either end of which a dark curved keel runs obliquely backwards and outwards, limiting the slightly protruding shoulders medially.

Apart from its anterior end the hysterosoma is a regular oval. The whole surface is covered with small round chitinous tubercles of different sizes, due to which it is impossible to see the tiny notogastral hairs except when seen in profile as on the posterior border. Only six pairs could be seen. The fissure im is long. The dorsum is arched and faintly chitinized.

The ventral side is shown in fig. 20a. No sternum developed. Very faintly developed apodemata. There is a narrow transverse belt between pedotecta II. The rectangular genital field has six pairs of hairs, all of them located along the medial margin. The anal field is much larger and broader, especially posteriorly. There are two pairs of anal hairs close to the medial border and limited laterally by a line. There is one pair of aggenital hairs, and three pairs of adanal hairs, the setae all being absent, which also applies to the genital and the anal hairs. The hair pores are, however, distinct and surrounded by a dark ring. There are many irregular folds round the genital field and in front of the anal field. The surface is entirely covered by small tubercles. The legs have short angular joints. Tarsus I with a long apophysis carrying the solenidia. All legs with three claws, the lateral ones very thin. 84(1).

Oppiidae

Quadroppia quadricarinata (Mich.), 1885.

29, 30, 46, 55, 59, 67, 96, 103, 104, 138(1-5); 45(17), 137(12).

Oppiella nova (Oudms.), 1902.

1, 10, 29, 30, 66, 96, 102, 104, 105, 106, 108, 115, 125, 126, 130, 131(1-5); 9(8), 28(11), 62(8), 103(9).

Oppia minutissima Selln., 1950.

2(1), 123(3), 126(1), 140(1).

Oppia ventronodosa Hammer, 1962.

96(1), 110(1).

Arcoppia n. gen.

The lamellae and translamella form an arch. The lateral ridges are strong, projecting as far as or beyond the lamellar arch. Interlamellar hairs present. Sensillus flat, clavate with distal branches. Ten pairs of notogastral hairs. Six pairs of genital hairs, aggenital and adanal hairs present. Iad adjacent to anal field.

Arcoppia brachyramosa n.sp.; fig. 21.

Colour light brown. Length about 0.60 mm.

Rostrum tripartite. The rostral hairs, which are situated on a thin line behind the two incisions, are twice as long as their mutual distance, directed forwards, slightly curved, and barbed. The barbed lamellar hairs, located behind the arch, are longer than their mutual distance, which is longer than that of the rostral hairs. The lamellae form a broad arch with parallel sides that are faintly chitinized posteriorly. The anterior part, i.e. the translamella, is slightly pointed at the middle. Between the posterior parts of the lamellae there are faint lines issuing from light spots of weak chitination. The interlamellar hairs are as long as the lamellar hairs, directed upwards, and barbed. Behind the latter there are grey "scales", of which the four in the middle are most distinct. Small tips from the anterior border of the hysterosoma project in between the scales. The sensillus has three rather short smooth branches on a short, flat triangular head. The two anterior ones are close together, thinner than the posterior one; the latter is more than twice as long as the anterior ones, and parallel to the middle one, fig. 21a.

The hysterosoma is oval; its anterior border has a chitinized band carrying ta, which is well developed. The notogastral hairs ti, te, ms, r3, r2, r1 and p3 are long, thin at the tip, and barbed. P1 and p2 are a little shorter. Ti is located a little further anteriorly than te, ms much further anteriorly than r3; r2 a little further anteriorly than p3; r1 almost in front of p2. The fissures ia, im, and ip are present.

The ventral side is shown in fig. 21b. The sternum is broad between Epimeres I–II. The epimeric hairs are curved, moderately long, and barbed. There are six pairs of smooth, moderately long genital hairs. The aggenital and the adanal hairs are much longer than the genital hairs and barbed. Ad3 are preanal, ad2 located off the middle of the anal field, and ad1 postanal. Ad3 are longer than ad2; the latter longer than ad1. Iad is parallel to the anal field.

Discussion. The following species should probably be included in this new genus:

Damoesome arcuale Berl., 1913.

Oppia viperea Aoki, 1959.

– *fenestralis* Wallw., 1961.

– *arcualis* (Berl.), Bal. & Mah., 1967.

– – – var. *robustia* (Berl.), 1913, Bal. & Mah., 1967.

– – – Hammer, 1968.

– *Winkleri* Hammer, 1968.

– *rugosa* Mah., 1974.

Most of them have a tripartite rostrum (except *viperea*, *fenestralis*). The number of branches of the sensillus varies from ?1: *viperea* (Aoki, 1959); 2: *arcualis* var. *robustia* (Bal. & Mah., 1967), *arcualis* (Hammer, 1968); 3: *arcualis* (Bal. & Mah., 1967), *Winkleri* (Hammer, 1968), *rugosa* (Mah., 1974); 3–5: *fenestralis* (Wallw., 1961).

As the length of the notogastral hairs and their position show further differences, the "species" *arcualis* probably represents several species, and a revision is strictly necessary.

103(18).

Amerioppia asiatica n.sp.; fig. 22.

Colour light brown. Length about 0.42 mm.

The species within this genus are much alike and can be distinguished mainly by the length of the notogastral hairs and their position. The new species is most closely related to *A. Woolleyi* Hammer, 1968. It differs, however, by its larger size (*A. Woolleyi* 0.34 mm. long) and by the appearance of the pseudostigmatic organ, fig. 22a, which is lanceolate (*A. Woolleyi* broadest distally). Ti, te, ms, r3 and r2 are longer than r1. This is also the case in *A. Woolleyi*. The positions of these hairs are, however, a little different from those of *A. Woolleyi*. Thus ti and te are arranged on a transverse line, in *A. Woolleyi* ti is located further anteriorly than te.

21(8), 28(1), 29(5), 30(6), 43(1), 49(1), 53(7), 54(9), 68(26), 69(42).

Oxyoppia cristata n.sp.; fig. 23.

Colour light brown. Length about 0.38 mm.

The rostrum is slightly pointed. On either side of its tip there is a low keel (crista) issuing from a transverse ridge. The keels reach the tip of the rostrum. From the anterior curved border of the transverse ridge projects a triangular plate, between the keels, ending in a thin, free tip. The rostral hairs, situated dorsally near the base of the keels, are long, strong, uneven, bent medially, ending some distance in front of the rostrum. The lamellae are slightly S-shaped, broad, the distal end bent round the base of the lamellar hair, proximally reaching the pseudostigmata. Their outer border is distinct, their medial border less distinct. The anterior ends of the lamellae are connected by a faint line. The lamellar hairs resemble the rostral hairs. They are directed forwards, and are approximately one and a half times longer than their mutual distance. The interlamellar hairs are rather thick, serrate, and shorter than their mutual distance. Between them there are two light areas. The exopseudostigmatic hairs are thinner than the interlamellar hairs, situated on a ridge with a strong lateral tooth. The surroundings are granulate. Laterally to the lamellae a ridge runs forwards, joining the transverse ridge with the keels. From the middle of the lateral border of the lamellae there is a connecting line to the lateral ridges. On the posterior border of the pseudostigmata there is a lobe corresponding to a strong, projecting tooth on the anterior margin of the hysterosoma. The sensillus is fusiform, slightly tapering, with short bristles or spines on its outer border. It is directed upwards, then outwards, and in a curve forwards.

The hysterosoma is oval, its anterior margin slightly pointed, projecting between the two strong lateral teeth. There are 10 pairs of notogastral hairs; ta is short and thin, situated medially to the tooth. The other hairs are curved, long, overlapping,

strong, thin at the tip, and barbed on their outer edge. P1–p3 are a little shorter. Im is located laterally to ms.

The main features of the ventral surface are shown in fig. 23a. The sternum is well developed, almost equally broad for its full length. The epimeric hairs are strong. The formula is 3–1–3–3. The genital field is small and narrow. There are six pairs of genital setae. The aggenital, the anal, and the adanal hairs are long and strong. The aggenital and ad3 are directed medially, ad1 and ad2 posteriorly and medially. Iad is located off ad2 and close to the frame of the anal field. The legs have very strong, unilaterally barbed setae, almost spines. Monodactylous.

126(1).

Ramusella puertomontensis Hammer, 1962; fig. 24.

There can be no doubt that the species from Pakistan represents the same species as found in Chile (Hammer, 1962, p. 50, fig. 42). In fig. 42 the pseudostigmatic organs are shown foreshortened. The hairs ti are asymmetric in the figure, that on the right side being displaced too far anteriorly. Fig. 24a shows the ventral side.

98(4), 100(4), 104(3), 110(2), 125(5), 126(1), 138(2).

Multioppia pakistanensis n.sp.; fig. 25.

Colour light brown. Length about 0.255 mm.

The rostral hairs are knee-bent, strongly barbed proximally, thin and smooth distally. The lamellae are indistinct, the translamella distinct. The area between the lamellae is almost square. The lamellar hairs are slightly barbed, situated on faint oblique ridges behind the translamella. The interlamellar hairs, located with the same mutual distance as the lamellar hairs, are thicker than the latter. Between the interlamellar hairs there are two longitudinal rows of light spots, viz. two large anterior ones separated by a distance as long as the width of the spots, followed by three smaller ones close together with the smallest in the middle, and then two posterior, pear-shaped indistinct spots. The sensillus has a semilunar, compressed head with about 11 pointed branches on its anterior border, the longest in the middle, the 5–6 distal ones only half as long, the proximal one still shorter, fig. 25a. The exopseudo-stigmatic hairs are short and thin.

The hysterosoma is oval, although slightly pointed at the posterior end. The anterior margin is a broad chitinous band. Twelve pairs of short, curved, faintly barbed notogastral hairs. Their position is apparently an important characteristic of the genus. *M. wilsoni* Aoki, 1964, is apparently closely related to the new species, but the two species can be distinguished by the position of the notogastral hairs. Da and la have the same position within the two species. Dm and lm are located on a transverse line in *M. wilsoni*, in *M. pakistanensis* dm is located much further anteriorly than lm. In *M. wilsoni* dp is behind lp, in *M. pakistanensis* in front of lp. In *M. wilsoni* h2 is near the lateral border, in *M. pakistanensis* in the middle of the dorsum behind dp. The distances da-da and dm-dm are the same in *M. wilsoni*, in *M. paki-*

stanensis da-da is much shorter than dm-dm. In *M. wilsoni* h2-h2 is very long, in *M. pakistanensis*, short.

Fig. 25b. shows the main features of the ventral surface. The sternum is broad between Epimeres I, narrowing posteriorly between the fused Epimeres III-IV. Epimeric hair formula 3-1-3-3. A faint reticulate sculpture covers the fused Epimeres III-IV. There are five pairs of fine genital hairs, i.e. three anterior ones directed forwards and two near the posterior border directed backwards. The aggenital and the adanal hairs are alike, ad1 a little longer than the others. Ad1 are situated on a slightly projecting "tail", ad2 off the lateral border of the anal field, and ad3 are preanal, situated far laterally. The fissure iad is near ad2.

1(1), 2(2), 126(1).

Brachioppiella gracilis n.sp.; fig. 26.

The rostrum is pointed, tripartite. The rostral hairs, located dorsally, are longer than their mutual distance, barbed, and directed forwards. The lamellar hairs, which are as long as the rostral hairs, are also barbed. The anterior parts of the S-shaped lamellae are faintly chitinized medially; the posterior parts are much broader and stronger chitinized. The interlamellar hairs are erect and barbed. Between the lamellae there is a pattern of various greyish lines arranged round and apparently above some light areas. The exopseudostigmatic hairs are moderately long, barbed, situated on small knots. The pseudostigma has a posterior lobe opposite a tooth on the anterior border of the hysterosoma. The sensillus, fig. 26a, is slender, thickening at the middle, tapering distally, ending in two equally long branches. On its posterior border there are four long, smooth branches, becoming progressively shorter distally and with the same mutual distance. A minute branch can be seen proximally on the posterior border, and a slightly larger one in the middle of the anterior border; the whole organ is very slender (hence the specific name).

The anterior border of the hysterosoma is straight, the latero-anterior border thickened, ending in a lateral dull tooth off the pseudostigma. Ta is absent. Ti, te, ms, and r2 are long and barbed, arranged almost on a longitudinal line. R1 and r3 are shorter, the setae r1 close together. P1-p3 are short and thin, hardly projecting beyond the posterior end of the hysterosoma. Im is located a little in front of and laterally to ms.

The main features of the ventral side are shown in fig. 26b. The epimeric hairs are moderately long and slightly barbed. The sejugal apodema has a broad brown lobe. Between the propodosoma and hysterosoma there are laterally on either side two transparent teeth or crests with granules. The genital field is narrow. There are six pairs of short, straight, genital setae, arranged almost on a line. The hair pores are large and bright. The aggenital and the adanal hairs are long, slightly barbed, and directed medially. The aggenital hairs are located a little further laterally than ad3, ad2 with the longest mutual distance. The posterior anal hairs are located near the border. The fissure iad is long and located off ad2. The legs are provided with spines,

i.e. Tibia I with a dorsal, distal, smooth, lancet-shaped spine; Femur II with a short, curved, dorsal spine; Genu III with a dorsal, distal, smooth, lancet-shaped spine; Tibia IV with a medial, short seta ending in a clavate brush. Tarsus IV with a medial, proximal, stronger brush. Monodactylous.

Remarks. This species can be distinguished by its slender sensillus, the different lengths of the notogastral setae and their position, the ventral sejugal lobes, and the long, medially-directed aggenital-adanal setae.

103(2), 107(8), 110(2), 117(1), 138(1).

Oppia sp.; fig. 27.

Colour light yellowish. Length about 0.223 mm.

This very small and very simple *Oppia*, of which only one specimen was found, will not be established as a new species since it has no characteristic features. The rostral hairs are long and strong, faintly barbed. The lamellar hairs, probably shorter than their mutual distance, are also barbed. The lamellae are faintly chitinized and indistinct. The interlamellar hairs are erect and as long as the lamellar hairs. Two longitudinal rows of light spots between the interlamellar hairs are very conspicuous. The anterior ones are twice as large as the middle ones, the posterior spots narrow and closer together than the others. On the lateral side of the pseudostigma is a tooth. The sensillus has a short stem and a semicircular compressed head with about 7 short spines or branches on its outer or posterior border.

The hysterosoma is oval. Its anterior margin is a chitinized band, carrying the tiny setae *ta*. The other notogastral setae are equally long and barbed. Im is located in front of r3.

The main features of the ventral side are shown in fig. 27a. The sternum and the sejugal apodemata are half covered by a greyish shining membrane. A faint reticulation covers the epimeres. The epimeric hair formula is 3-1-3-3, the setae short and thin. Five pairs of tiny genital hairs were observed. The aggenital, the anal, and the adanal hairs are barbed. Ad1, which are postanal and situated on a faint, rounded projection, are a little longer than ad2-ad3. Iad is long and located in a faint incurvation of the lateral border of the anal field. Monodactylous.

140(1).

Suctobelbidae

Suctobelbella subcornigera (Forssl.), 1941.

55, 56, 67, 94, 96, 117, 133, 138, 154(1-2); 62(14).

Suctobelbella palustris (Forssl.), 1953.

30, 43, 45, 55, 58, 67, 132(1-2); 56(5), 133(12), 154(4).

Suctobelbella acutidens (Forssl.), 1941.

62(1), 130(1), 132(2).

Suctobelbella nasalis (Forssl.), 1941.
21(2).

Suctobelbella chitralensis n.sp.; fig. 28.

Colour light brown. Length about 0.19 mm.

The tip of the rostrum projects beyond the apical lobes. The latter are broad, greyish in colour. The rostral tooth is large, pointed and directed forwards, fig. 28a. The rostral hairs are very coarse proximally, thin distally. The dorsal surface of the rostrum is granulate. The tectopedial fields are very large. Between their anterior part there are a few tubercles. The lamellar knob is rhomboid, closed posteriorly. Lamellar setae normal. The lamellae are faintly developed, each with two large tubercles. The interpseudostigmatic ridges are almost circular, broad rings with the interlamellar setae in their faintly chitinized anterior part. The pseudostigmata has a posterior lobe corresponding to a lateral tooth on the anterior margin of the hysterosoma. The sensillus has a long, spindle-shaped compressed head set with tiny bristles on its outer side.

The notogaster is oval apart from the anterior border, which is straight. The lateral teeth are smaller than the medial ones. The latter end anteriorly in broad lobes corresponding to the broad interpseudostigmatic ridges; posteriorly they continue backwards beyond ta. The notogastral hairs are equally long. They are short, stiff, equally thick throughout, and uneven. P1 can be seen only in a ventral view. Ta is located far anteriorly, almost between the teeth. Ti and te from the two sides are almost on a transverse line. The distances ti-ti, ms-ms and r2-r2 are approximately equal. There is a pore between ti and ms, and another between r3 and r2. Im is located laterally to ms.

The main features of the ventral side are shown in fig. 28b. The sternum is broad in its anterior part, narrow between the fused Epimeres III-IV. Five pairs of genital hairs were observed, the anterior one much longer than the others. The aggenital hairs are located far laterally. The mutual distance of the setae ad2 is much longer than that of ad3. The latter is shorter than ad1-ad1. The anal hairs are directed forwards.

28(2).

Suctobelbella naranensis n.sp.; fig. 29.

Colour dirty yellowish. Length about 0.21 mm.

The rostrum is rounded and does not project as a nose. The rostral hairs are coarse proximally. Unfortunately I am unable to give an exact illustration of the apical lobe and the rostral teeth. Fig. 29a is a sketch. It shows two large pointed teeth separated by a short distance. There are some granules on the dorsal surface of the rostrum. The lamellar knob is triangular, closed posteriorly. Lamellae are absent, but narrow, distinct ridges connect the posterior part of the lamellar knob and the anterior part of the interpseudostigmatic ridges; however, they do not reach the pseudo-

stigmata. The interpseudostigmatic ridges are ear-shaped, opening medially. The interlamellar setae are situated in front of them. The posterior parts of these ridges are short lobes corresponding to the medial notogastral teeth. The distance between the interpseudostigmatic ridges, which are located close to the pseudostigmata, is long, and the area between the ridges is square. The pseudostigmata have a posterior lobe. In a dorsal view the sensillus is club-shaped, when laid bare lanceolate, pointed distally, fig. 29b.

The hysterosoma has a straight anterior border provided with four teeth, i.e. the lateral ones conical, the medial ones broader, their medial border continuing backwards. Most of the notogastral setae are long, curved, and unilaterally barbed. R1 shorter than the six anterior pairs, p1–p2 still shorter. Ta and ti are directed transversally, te directed backwards, ms backwards and medially almost reaching r2. R1–r3 are radiating.

Fig. 29c shows the main features of the ventral surface. The sternum is broad for most of its length, narrow between the fused Epimeres III–IV. The epimeric setae are moderately long. Five pairs of genital hairs were observed, the anterior one very long. The aggenital and the adanal hairs are strong and barbed, all of them directed medially. The anal setae are shorter, barbed and directed forwards.

129(1).

Suctobelbella arcuata n.sp.; fig. 30.

Colour dirty yellowish. Length about 0.21 mm.

The tip of the rostrum projects a little beyond the insertion of the rostral setae. The latter are very coarse proximally. The apical lobe is apparently short (fig. 30a shows a sketch). There are two rostral teeth, approximately equally long, directed forwards and separated by an incision, which is broadly rounded medially. There are many large tubercles on the rostrum and between the tectopedial fields. An indistinct ridge (hatched) runs along the inner side of the lateral border of the tectopedial fields. The lamellar knob has three lobes anteriorly. The hole in its middle is near the posterior border and behind the lamellar setae. The lamellae are faintly developed, provided with a few tubercles. The interpseudostigmatic ridges are narrow, ear-shaped, opening medially, located close to the pseudostigmata and separated by a long distance. Their anterior ends are connected with the lamellar knob by narrow transverse ridges. The tiny interlamellar setae are present in their usual position. The sensillus is spindle-shaped ending in a long thin tip and set with hardly discernible bristles.

The hysterosoma is oval apart from the anterior border, which is straight and provided with four teeth, approximately equally strong. The medial ones are connected forming a low arch (hence the specific name). The notogastral hairs are moderately long and barbed. Ta, ti, and ms are arranged in two longitudinal rows, directed backwards and slightly medially. R1–r3 are radiating. Apart from p2 the hairs are equally long.

The main features of the ventral side are shown in fig. 30b. The posterior borders of the fused Epimeres III–IV form an almost even line medially, laterally there are three tongues off 4a and 4b.

90(1).

Suctobelbella affinis n.sp.; fig. 31.

Colour dirty yellowish. Length about 0.215 mm.

The present species is in many ways like the preceding one. The rostral setae are alike in the two species, the apical lobe and ventral teeth a little longer (fig. 31a is a sketch). On the dorsal surface of the rostrum there is an irregular pattern of confluent tubercles, while between the tectopedial fields and further posteriorly there are further tubercles. The lamellar knob is pointed anteriorly, its aperture off the lamellar setae. The interpseudostigmatic ridges are ear-shaped, narrow, and located close to the pseudostigmata. The lamellae are faintly developed and do not reach the lamellar knob. Distinct ridges run from the posterior border of the lamellar knob obliquely backwards to the anterior end of the interpseudostigmatic ridges. The latter end in small rounded lobes corresponding to the medial notogastral teeth. The sensillus is like that of the preceding species, spindle-shaped, ending in a long thin tip. Inter-lamellar hairs are absent.

The notogastral teeth differ from those of the preceding species, as the medial teeth are much stronger and not connected by a bridge. They continue backwards as faint ridges as far as ta. The notogastral hairs are moderately long and barbed as in *S. arcuata* and are arranged similarly, although the distances ti–ti and ms–ms are shorter than in *S. arcuata*.

Fig. 31b shows the main features of the ventral surface. The posterior border of the fused Epimeres III–IV is more even than in *S. arcuata*.

90(1).

Novosuctobelba n.gen.

Dorso-sejugal suture with two teeth opposite the pseudostigmatic lobes. Rostrum with lateral teeth. Rostral setae knee-bent. Tectopedial fields and lamellar knob present. The sensillus is club-shaped, smooth. Nine pairs of notogastral hairs. Type species: *Novosuctobelba dentissima*.

Novosuctobelba dentissima n.sp.; fig. 32.

Colour white to greyish. Length about 0.205 mm.

The rostrum is broad. The rostral hairs knee-bent, the proximal part barbed, the distal part very thin and smooth. Seen in a lateral view the apical lobe is hook-shaped, bent forwards, fig. 32a. There are two lateral teeth, i.e. a strong anterior tooth followed by a smaller pointed one, the two apparently separated by a long distance. The tectopedial fields and the dorsal surface to the lamellar knob are covered with

granules. The lamellar knob is round. The lamellar setae present. The lamellae are faintly developed consisting of separate tubercles. The interpseudostigmatic ridges are short, semicircular, opening medially, anteriorly connected by a transverse ridge with the lamellar knob. The interlamellar setae tiny, situated between the pseudostigmata and the interpseudostigmatic ridges. There is a large open space between the latter and the anterior margin of the hysterosoma. On the posterior border of the pseudostigmata there is a large tooth corresponding to a very large tooth laterally on the anterior border of the hysterosoma. The sensillus is a long, slender club, pointed distally. Laterally to the pseudostigma there is a granulate crest and further medially an indistinct ridge with the exopseudostigmatic hair pore.

The hysterosoma is broad, oval, not much longer than broad. On either side of the straight anterior border there is a very strong tooth corresponding to the lateral tooth of *Suctobelbella*, situated behind the lobe on the pseudostigma. There are 9 pairs of strong, moderately long, barbed, notogastral setae. Ta, ti and ms are arranged in a longitudinal row; they are directed backwards and slightly medially. Te are parallel to the lateral side and r1–r3 are radiating. P1–p2 are much shorter than the others. Im is located laterally to ms.

Fig. 32b shows the main features of the ventral side. The sternum is broad. Along the posterior border of the fused Epimeres III–IV there is a tongued border. The epimeric hair formula is 3–1–3–3. Five pairs of genital setae were observed on the genital plates. The anterior one is very long and strong. The aggenital hairs are located far laterally. The distance ad2–ad2 is longer than ad3–ad3, both pairs being preanal. The hairs ad1 are situated at the latero-posterior corner of the anal field. Iad is parallel to the sides of the anal field.
90(1).

Novosuctobelba shogranensis n.sp.; fig. 33.

Colour yellowish dirty. Length about 0.215 mm.

Unfortunately I am unable to see the rostral teeth on the only specimen found. They appear like rounded lobes. The tip of the rostrum does not project beyond the base of the rostral hairs. The latter are barbed proximally, distally thin and smooth, bent medially. The tectopedial fields are normal. The lamellar knob is triangular with a very narrow posterior border. The lamellar setae normal. There are a few large tubercles in front of the lamellar knob. The lamellae are represented by a few tubercles. Interlamellar hairs were not observed, their pores are in the usual position. The interpseudostigmatic ridges are not developed in their usual shape, but as two broad, chitinized, pointed plates directed forwards (hatched), each with a light area in their posterior part, the two areas separated by three similar areas. From the anterior tip of these interpseudostigmatic ridges there is a narrow connection to the lamellar knob. Between this structure and the anterior margin of the hysterosoma there is a large open space. Pseudostigmata with a broad posterior lobe. The sensillus is a long, slender, smooth club.

The hysterosoma is oval apart from the straight anterior border. The teeth corresponding to the lateral ones in *Suctobelbella*, situated behind the pseudostigmata, are conical, narrow, their medial border continuing medially for a short distance. The notogastral hairs are long and barbed. Ta and ti are directed backwards and slightly medially, te and ms backwards, and r1–r3 are radiating. Im is located laterally to ms.

Fig. 33a shows the main features of the ventral surface. The sternum is broad. Most of the epimeric setae are very small, longest in the fused Epimeres III–IV. There are six pairs of genital hairs, the anterior one long and strong. The aggenital hairs are situated far laterally. The setae ad2 with a slightly longer mutual distance than ad3. The aggenital and the adanal setae are barbed. The anal setae are much thinner and apparently smooth, directed forwards. Iad is long and parallel to the sides of the anal field. Monodactylous.

103(1).

In 1970 MORITZ established a new genus within the *Suctobelba* group: *Allosuctobelba* with the type species *Suctobelba grandis* Paoli, 1908 (p. 78, plate IV, fig. 32). It has the following characteristics: no teeth on the anterior margin of the notogaster. Ten pairs of notogastral setae. Rostrum with two pairs of pointed lateral teeth without distinct incision. Rostral setae not knee-bent. Medial border of tectopedial field reduced or absent. Lamellar knob absent or replaced by several large lobe-shaped tubercles. Middle part of prodorsum with large tubercles, especially near lamellar setae. Interpseudostigmatic ridges reduced or absent. Pseudostigmata without posterior lobe.

Another genus can be added to the *Suctobelba* group: *Parasuctobelba* n.gen. with the type species *Suctobelba fijiensis* Hammer, 1971 (p. 18, fig. 18). In 1971 HAMMER indicated the necessity of establishing a new genus based on the description of *Suctobelba fijiensis*. It has the following characteristics: Rostrum short, pointed. No lateral teeth. Rostral setae barbed, curved. Lamellar knob narrow without an aperture in the middle. Middle part of prodorsum with thick ridges. Medial border of tectopedial field reduced or replaced by short ridges. Sensillus club-shaped, smooth. Pseudostigma with posterior lobe. The anterior border of the notogaster has two pairs of teeth, the medial ones representing the anterior end of a complicated structure of ridges reaching far posteriorly. Ten pairs of notogastral setae. Ta located far anteriorly.

To *Parasuctobelba* belong the following species:

- Suctobelba complexa* Hammer, 1958 (p. 46, fig. 48).
- *ornatissima* Hammer, 1958 (p. 47, fig. 49).
- *mirabilis* Balogh, 1958 (p. 16; 1961, fig. 20).
- *hamifera* Balogh, 1958 (p. 16; 1961, fig. 21).
- *subcomplexa* Bal. & Mah., 1968 (p. 328, fig. 18).
- *medialis* Bal. & Mah., 1974 (p. 249, fig. 4A–D).

The different genera within the *Suctobelba* group can be distinguished according to the following characteristics:

1. No teeth on anterior margin of notogaster 2
 1–2 pairs of teeth on anterior margin of notogaster 3
2. Tectopedial field developed, lamellar knob present *Suctobelba* Paoli sensu Jacot
 Tectopedial field absent or reduced, lamellar knob
 absent or reduced *Allosuctobelba* Moritz
3. One pair of teeth on anterior margin of notogaster *Novosuctobelba* n.gen.
 Two pairs of teeth on anterior margin of notogaster 4
4. Rostral setae not knee-bent, 10 pairs of not. setae *Parasuctobelba* n.gen.
 Rostral setae knee-bent, 9 pairs of not. setae *Suctobelbella* Jacot.

Suctobelbilla dentata (Hammer), 1961.

28(1), 30(2), 68(4), 69(4).

Zetomotrichidae

Zetomotrichus lacrimans Grandj., 1934, var. *bidentata* n.var.; fig. 34.

Colour yellowish. Length about 0.365 mm.

The variety differs from the main form by having one tooth on either side of the rounded projection on the tip of the rostrum. The pseudostigmatic organs have much shorter secondary bristles than illustrated by GRANDJEAN, 1934, p. 243, fig. 2. Ta is slightly rough, not hairy as in the main form. The notogastral setae are not located as those of the main form, i.e. te is situated almost midway between ta and the gland, ti almost on a level with ms. In the main form te is located midway between ta and ms, ti midway between te and ms.

On the ventral plate, fig. 34a, the oblique line running from the side of the hysterosoma towards the anal field is missing in the variety. Genu IV has a strong spine, Tarsus two strong spines as in the main form.

82(1), 149(1), 153(1).

Oribatulidae

Nannerlia bombretensis n.sp.; fig. 35.

Colour light brown. Length about 0.42 mm.

The rostrum is long, conical. Its tip chitinized. The rostral setae are barbed, strongly curved medially, meeting. The lamellae are long, apparently twisted; their anterior outer part transparent. The medial thickening is bent outwards at the base of the lamellar hair forming an apophysis or knot, on which the lamellar seta is situated. Prolamella only developed proximally. A sublamellar ridge present. The

lamellar hairs, which are situated almost immediately behind the rostral hairs, are about half as long as the lamellae, thin, and almost smooth. The interlamellar hairs, which are located off the middle of the lamellae, are thin, almost smooth, and a little longer than their mutual distance, at their base surrounded by a scale. The pseudostigma with an outer lobe. The sensillus has a long, thin stem widening into a small club. Behind the interlamellar hairs there are small irregular spots in the integument.

Notogaster. The dorso-sejugal suture is slightly arched. Along its border there is a slightly darker belt. The anterior border of the pteromorphae project. The pteromorphae, which are immovably hinged, are a whitish colour. They reach approximately to the fissure im. The notogastral setae, ten pairs, are very short apart from pl, which can be seen in profile. There are four pairs of sacculi. Sa opens with a long narrow duct on the dorsal surface of the notogaster. The duct runs obliquely forwards, fig. 35a. COETZER, 1968, p. 49 writes: "Sacculi adalares are divided into two, the anterior sacculi adalares Saa, which are elongated structures, and the posterior sacculi adalares Sap, which are round structures". — — — "The openings of sacculi Sap could not be detected". COETZER might have taken the duct for Saa and the sacculi for Sap, or the present species differs from COETZER'S *N. longinqua* by having only four pairs of sacculi. The fissures ia, im, ips, and ip are present. The borders of the notogaster overhang the border of the ventral plate.

The ventral side is shown in fig. 35b. The sternum is developed, broadest between Apodemata II and in front of the genital field. Apodemata II and the sejugal apodemata better developed than Apodemata III. Apodemata IV absent. The epimeric setae are very short. 1c was not observed. There are four pairs of genital hairs, i.e. two hairs on the anterior border, and two immediately behind; two pairs in the posterior half of the plates. The mutual distance of the aggenital setae is the same as that of ad3. The latter is preanal. Ad1 and ad2 are located in a light furrow, which posteriorly surrounds the anal field proceeding forwards beyond ad3. All the hairs of the ventral plate are very small. Iad is located within the frame of the anal field.

Legs. Femur II has a broad ventral keel. The setae of the legs are strong, faintly barbed. All tarsi are tridactylous, the lateral claws very thin.

Remarks. The new species differs from the type species *N. longinqua* Coetzer, 1968, by its very short notogastral hairs, its arched anterior border of the notogaster, and by having only four pairs of sacculi.

62(1), 63(17), 66(6).

Gerloubia saifulmalukensis n.sp.; fig. 36.

Colour light brown. Length about 0.48 mm.

The rostrum is conical, projecting beyond half the length of the rostral hairs. The latter are almost equally thick throughout, uneven, and bent medially. The medial border of a large foveolate lateral plate (?tutorium) runs from the base of the rostral hair to the lamellar hair. The lamellae, which are removed from the sides of the propodosoma, are rather narrow with a medial thickening. The lamellar hairs,

which reach the tip of the rostral hairs, are situated on the lamellar tip. They are thin at the tip and faintly serrate or uneven. The interlamellar hairs, which are shorter than their mutual distance, are thin at the tip and uneven. They are situated immediately in front of the indistinct dorso-sejugal suture. From the anterior border of the pseudostigmatic cup a short strong ridge runs forwards covering the base of the lamella, fig. 36a. The pseudostigmatic cup opens obliquely forwards and upwards. Sensillus has a longish club on a rather long, thin stalk. The head is set with minute bristles. Laterally to the lamella there is an area porosa lamellaris.

The hysterosoma is egg-shaped apart from the straight anterior border. Its latero-anterior borders project as long chitinous spines or cusps without free tip, almost as far as the interlamellar setae. The pteromorphae do not project from the outline of the hysterosoma. A hardly discernible line runs on either side parallel to the chitinous lateral cusps, disappearing into the lateral border of the dorsum off im. There are 10 pairs of notogastral setae, all equally long, curved, thin, and smooth. The four pairs of areae porosae are very distinct and approximately of the same size. The fissure im, located in front of A1 is long. Behind it there is a small pore, the opening of a gland.

Fig. 36b shows the main features of the ventral side. There is a faintly chitinized, broad sternal plate. Apodemata II are short, thick medially. The sejugal apodemata and Apodemata III are parallel, equally well developed. Apodemata IV are not developed. Areas with a faint reticulation cover parts of the epimeres. The epimeric hair formula is 3-1-3-3. The epimeric hairs are moderately long, strong, and smooth. Forwards-directed spines issue from Acetabula III-IV, but I am unable to see whether there are two separated spines or they are fused and twisted. Along the lateral border of the ventral plate there is a sharp edge or keel on either side, meeting behind the anal field.

Femur II has a broad, ventral keel, Femora III-IV a narrow keel. The hairs of the legs are long and strong. Monodactylous.

153(1).

Gerloubia was established by COETZER, 1968, with *Eporibatula bicuspidata* Hammer, 1958 as type species. As the ventral side was not illustrated in the original description an illustration of both the dorsal and the ventral side of the type specimen is given here, figs. 36c-d. This adds a few more characteristics to the original description. Rostrum rounded. Lamellae equally thick throughout. A line connects the rostral and the lamellar hair. A small tooth is present on the tip of the lamellae. Ten pairs of notogastral hairs. Arvae porosae indistinct (or absent?). Dorso-sejugal suture interrupted in the middle. Pteromorphae do not project from outline of notogaster. Antero-lateral borders of notogaster project anteriorly as long cusps as far as the interlamellar setae. Four pairs of genital hairs, one pair of aggenital, two pairs of anal, and three pairs of adanal hairs. Iad close to the anterior border of the anal field. Forwards-directed curved spines from Acetabula III-IV issue. Monodactylous. The only spec-

imen found was pressed slightly flat by the glass cover and consequently the notogaster appears broader than in the original illustration and the pseudostigmata are displaced more laterally, outside the latero-anterior border of the notogaster. Areae porosae are not discernible in the very pale specimen, only two small dubious spots can be seen behind ti.

The new species has many characteristics in common with *G. bicuspidata* (Hammer), i.e. a broad tutorium, the position of the interlamellar setae immediately in front of the interrupted dorso-sejugal suture, the latero-anterior cusps of the dorsum, the faint line parallel to the lateral border of notogaster, the whole appearance of the ventral side. The two species differ, however, in the presence of distinct areae porosae in *G. saifulmalukensis*.

Zygoribatula arcuata n.sp.; fig. 37.

Colour light brown. Length about 0.45 mm.

This very delicate mite has a rounded rostrum with a small dark scale on its dorsal tip. The rostral hairs are unilaterally barbed. Very characteristic is the lamellar arch in which both lamellae and translamella are very thin, forming a rounded arch without corners at the transition between the different parts. The translamella is only formed by its medial thickening. There are no cusps and the lamellar setae are situated on the rounded anterior end of the lamellae. The lamellar hairs, which are longer than their mutual distance, are barbed and as thick as the translamella. The interlamellar hairs are erect, barbed, and as long as their mutual distance. Sensillus is clavate, slightly pointed at the tip and set with minute bristles.

The hysterosoma is egg-shaped, broadly rounded posteriorly and arched anteriorly, projecting beyond the pseudostigmata. The shoulders are hardly pronounced and do not project beyond the outline of the hysterosoma. The notogastral setae, 13 pairs, are curved, thin and almost smooth, the pores bright. Aa are round and larger than A1–A3. A3 is not much larger than the adjacent hair pore. The fissure im is curved and as long and thin as a notogastral hair. It is located in front of lp. The integument is smooth.

Fig. 37a shows the main features of the ventral side. The ventral plate is drawn out into a broad tongue behind the anal field. The setae ad1 are situated one at either end of this tongue. Ad3 are preanal, ad2 are abnormal being present only on the right side at a short distance behind ad3. The usual position of ad2 in *Zygoribatula* is lateral to ad1, and this position was found in another specimen examined. Iad could not be detected.

81(1), 82(1), 83(1).

Zygoribatula tenuiseta n.sp.; fig. 38.

Colour light brown. Length about 0.465 mm.

The rostrum is broadly rounded. The rostral hairs are strong and unilaterally barbed. The lamellae are much broader than in the preceding species and the medial

thickening has sharp corners at the transition between the lamellae and the translamella. The lamellae are wrinkled. The anterior border of the translamella is straight and on level with the anterior end of the lamellae, there being no cusps, and only a rounded outer edge on the lamellar tip. The lamellar and the interlamellar hairs are approximately equally long, faintly barbed. Across the interlamellar area there is a faint depression in which are situated the interlamellar hairs. Sensillus is a longish club, slightly pointed at the tip and set with minute bristles.

The hysterosoma has broad prominent shoulders on which are located the setae c1. Its anterior margin projects as far as the anterior border of the pseudostigmata. Two small ducts can be seen at its middle. The notogastral hairs, 13 pairs, are very thin, the hair pores bright. The distance c2-la is shorter than c1-c2. The area porosa Aa is semilunar, la is located close to its concave side. A1 is as large as Aa, but more round, lp is situated almost within A1. A2 is smaller, h3 is located in front of it, close to it on the left side in fig. 38. A3 is the smallest. There are oblique rows of distinct light spots in the anterior third of the dorsum. The integument is smooth.

Fig. 38a shows the main features of the ventral side. The epimeres are reticulate and the setae strong and uneven. From its posterior end the anal field is surrounded by two folds, which anteriorly reach on level with the aggenital setae. The hairs ad1 are a little stronger than ad2 and ad3. Iad is located in front of the anal field.

The present species has some resemblance to *Z. granulata* Kunst, 1958. The latter has, however, lanceolate sensilli, much smaller areae porosae, and the integument is granulate.

1(1), 6(6), 147(3).

Zygoribatula tortilis n.sp.; fig. 39.

Colour light brown. Length about 0.41 mm.

The rostrum has a long pointed tip, fig. 39a. The rostral hairs are located dorsally near the sides of the rostrum. Together with the translammella, the lamellae form an edged arch, partly due to the twisted lamellae and partly to the medial thickening at the transition between the lamellae and the translamella, where it makes an incurvation. The broad, rounded cusps project only a little beyond the translamella. The lamellar and the interlamellar hairs are strongly barbed, the former about one and a half times longer than their mutual distance, the latter are about as long as their mutual distance, but appear shorter due to their erect position. Sensillus is a broad, flat club, set with minute bristles. The anterior border of the hysterosoma projects beyond the anterior border of the pseudostigmata. The shoulders are small, but prominent. The notogastral hairs, 14 pairs, are thick and stiff, barbed spines. The distance c1-c2 is shorter than c2-la. La and da from the two sides are located almost on a line. All areae porosae are round, Aa is a little larger than A1. A2 and A3 are smaller and approximately equal in size. None of the notogastral hairs are situated close to the areae porosae as in *Z. tenuiseta*.

Fig. 39b shows the main features of the ventral side. Surrounding the anal field there is an indistinct fold as in *Z. tenuiseta*. The hairs of the ventral side are short and thick. In front of the fissure iad there is a small pore.

The present species resembles *Z. elongata* Hammer, 1961, but can be distinguished from the latter by its pointed rostrum, its thicker and longer notogastral hairs, and its much smaller areae porosae. *Z. lata* Hammer, 1961, has likewise thinner and shorter notogastral setae and much larger areae porosae.
45(2), 54(2), 67(2), 132(1), 133(9), 134(1).

Haplozetidae

Xylobates capucinus (Berl.), 1908.
30(2), 135(3).

Peloribates pakistanensis n.sp.; fig. 40.

Colour warm chestnut brown. Length about 0.55 mm.

The rostrum is broad, conical. The rostral hairs, which almost meet in a curve in front of the rostral tip, are unilaterally barbed. The lamellae are broad proximally and narrow distally with the lamellar setae. The latter, which meet in front of the rostrum, are faintly barbed, and very thin at the tip. The interlamellar hairs are thick, spine-shaped, and set with minute bristles. They are erect. Sensillus is short, club-shaped, pointed distally, and hairy. The whole dorsal surface between the lamellae is decorated with large pits regularly arranged in rows.

The hysterosoma is only a little longer than broad. Its general appearance is lumpy. The anterior margin is slightly arched. The notogastral setae are arranged as shown in fig. 40. They are proportionately short, slightly curved, thick, almost equally thick throughout, and set with minute spines, fig. 40a. Im is located in front of lp. The dorsal surface is covered with round, light pits in a darker reticulation.

The ventral side is shown in fig. 40b. The whole ventral side is pitted, the pits being smaller round the genital and the anal fields. On the genital plates the pits are of different sizes, on the anal plates more regular and arranged in oblique rows. The five pairs of genital hairs are moderately long, thin, and smooth. The aggenital, the anal, and the adanal hairs are longer, but likewise thin and smooth. Iad is located medially to ad3. All tarsi are tridactylous, the lateral claws half as thick as the middle claw.

This species can be distinguished from *P. muscicola* Hammer, 1961, (also 0.55 mm long) by its very regular and distinct pits (in *P. muscicola* small and indistinct), and by its much thicker notogastral setae. From *P. rangiroaensis* Hammer, 1972 (about 0.375 mm long), which is also distinctly pitted and has short stiff notogastral setae almost like those of *P. pakistanensis*, it can be distinguished by its larger size, by the presence of pits on the rostrum and on the genital and anal plates (in

P. rangiroaensis there are no pits on the rostrum, and on the genital plates. The anal plates are dotted). *P. areolatus* Balogh, 1958, is also pitted: "Dorsum foveolis rotundatis ornatum". It is, however, smaller (0.32–0.36 mm) and its interlamellar and notogastral hairs are smooth.

107(1), 121(4), 138(6).

Scheloribatidae

Scheloribates fimbriatus Thor, 1930.

After having found this mite in North-West Pakistan, the species, which I described as *S. fimbriatus* Thor from Viti Levu, The Fiji Islands (1971, p. 45, fig. 54), must be renamed *S. fimbriatoides* (Hammer). The pseudostigmatic organ in *S. fimbriatus* is spindle-shaped, rather thick, ending in a thin tip and set with moderately long secondary bristles. In *S. fimbriatoides* (Ham.) the pseudostigmatic organ is almost equally thick throughout and the secondary bristles are shorter.

136(5).

Scheloribates pallidulus (C. L. Koch), 1840.

Very common. Found in 47 samples. Most abundant in 2(48), 51(27), 52(67), 53(42), 101(141), 102(114), 118(28), 119(42), 122(97), 123(90), 126(27).

Scheloribates latipes (C. L. Koch), 1844.

Very common, but usually not in great numbers. 5, 10, 85, 86, 89, 90, 96, 99, 104, 105, 106, 113, 114, 117, 121, 122, 123(1–5); 98(44), 100(16), 102(14), 103(66), 118(24), 119(11), 120(34), 124(8), 125(18), 126(23).

Scheloribates laevigatus (C. L. Koch), 1836.

90, 97, 98, 101, 103, 104, 105, 115, 120, 131, 132, 134, 140, 141, 142, 146, 150(1–10); 99, 100, 102, 122(10–20); 123(24), 124(28), 125(42), 126(46), 152(32).

Scheloribates rostridentatus n.sp.; fig. 41.

Colour brown with a chestnut belt across the middle of the hysterosoma. Length about 0.98 mm.

Behind the tip of the rostrum there is a strong tooth projecting beyond the rounded rostrum. Taking the size of the mite into consideration, the faintly barbed rostral hairs are very thin. The lamellar hairs are a little thicker, the secondary bristles extremely small. The lamellar hairs are about one and a half times longer than their mutual distance. A prolamella is present. The interlamellar hairs are as long as the lamellar hairs and like these very faintly barbed. The sensillus has a very slender head no thicker than the interlamellar hair, pointed distally, and faintly barbed, fig. 41a. Both sensilli and the prodorsal hairs are apparently covered with a thin layer of wax.

The hysterosoma is as broad as it is long, rounded posteriorly, the anterior margin almost straight. Pteromorpha with a straight, transverse anterior margin. Its outer border is a dirty brown colour, bordered medially by a narrow yellow band. Further medially the pteromorpha is clear brown. Notogastral setae absent, their pores hardly discernible. Sacculi are located as shown in fig. 41.

Fig. 41b shows the main features of the ventral side. Not all the epimeric hairs could be detected. All tarsi with three claws, the lateral ones thinner than the middle one. 117(1), 121(4).

?*Schelorbates praelineatus* n.sp.; fig. 42.

Colour light brown; pteromorphae yellowish. Length about 0.54 mm.

The rostrum is rounded. The rostral hairs are about one and a half times longer than their mutual distance, and faintly barbed. In front of the lamellae there is a distinct line (hence the specific name), in the middle slightly incurved and behind it a weak line. Issuing from the end of the lamellae, a short transverse ridge runs medially on either side for a short distance. Prolamella absent. The lamellar hairs are at least one and a half times longer than their mutual distance, thin at the tip, and faintly barbed. The interlamellar hairs resemble the lamellar hairs. Sensillus is clavate, broadest behind its end.

The hysterosoma is almost as broad as it is long. Its anterior border is arched projecting beyond the pseudostigmata. The distal tip of the pteromorphae projects, but not so far as the anterior border of the hysterosoma. Posteriorly the pteromorphae reach a level off gl. Of the notogastral setae only the setae p1 are present, the hair pores are located as shown in fig. 42. Sa is much larger than the other sacculi. Across the dorsum is a row of light spots.

Fig. 42a shows the main features of the ventral side. The sternum is replaced by longitudinal wrinkles. Apodemata III are faintly developed, being short and not reaching the genital field. Together with the absence of a prolamella this shows that this species does not represent a true *Schelorbates*. The number of genital hairs is not the same on the two plates, and the position of the anal hairs is asymmetric. A line surrounding the very broad anal field posteriorly runs forwards on either side almost to Acetabulum IV. All tarsi are tridactylous, the lateral claws thinner than the middle one.

142(3).

Chamobatidae

Chamobates cuspidatus (Mich.), 1884.

62(5), 63(57), 130(1).

Ceratozetidae

Ceratozetes gracilis (Mich.), 1884.
60(1), 96(2), 98(1).

Ceratozetes paritractus n.sp.; fig. 43.

Colour light brown. Length about 0.39 mm.

The rostrum is tripartite. The unilaterally barbed rostral hairs are moderately strong and almost meet. The cusps are about two-fifths of the length of the lamellae. They are narrower than the lamellae, parallel (hence the specific name), and rounded at the tip. There is no translamella, but a faint line. The distance between the cusps is longer than their length. The lamellar hairs are twice as long as the cusps and faintly barbed. The interlamellar hairs, also faintly barbed, almost reach the tip of the rostrum. Tutorium with a free tip at a level off the rostral hair. The pseudostigmatic organs are very slender, almost equally thick throughout, and unilaterally set with thin secondary bristles, fig. 43a.

The hysterosoma is broadest off te-ti. The anterior border is highly arched reaching a level off the middle of the lamellae. The notogastral hairs are indiscernible, and only p1 can be seen in profile. Also the areae porosae are hardly discernible.

Fig. 43b shows the main features of the ventral side. Sternum is very faintly chitinized. 1c is much stronger than the other epimeric hairs, and distinctly barbed. The hair pores are large and bright. There are six pairs of genital hairs, of which the two anterior ones are a little longer than the others, fig. 43c. The aggenital, the anal, and the adanal hairs are short and thin. Ad1-ad2 are postanal. The distance ad1-ad2 is half as long as ad1-ad1. Ad3 are situated off the middle of the anal field and behind iad, which is located obliquely to the anal frame at some distance from the latter. Custodium is very long, reaching beyond 1c. All the legs have three claws, the lateral ones very thin. There is no distal tip on Genu II as in *C. mediocris* Berl., but a short spine in the middle of the genu; Tibia II has a much longer and thinner spine, fig. 43c.

103(4), 111(1).

Ceratozetella imperatoria (Aoki), 1963, var. *magna* n.var.; fig. 44.

Colour straw yellow. Length about 0.91 mm.

Apart from their much larger size (*C. imperatoria* 0.70–0.745 mm) the two specimens found differ from the main form in only a few characteristics. Besides the three teeth at its middle on either side, the rostrum has two projecting tips both located in front of the rostral hair. The lamellar hairs are three to four times longer than the cusps (in *C. imperatoria* about two and a half times). The cusps have only a very small outer tooth (in *C. imperatoria* a rather strong tooth). The cusps are parallel, their medial border straight (in *C. imperatoria* they slightly converge). The tutorium reaches the rostral hair as in *C. imperatoria*. The pseudostigmatic organs are short, rough setae similar to those of the main form. The pseudostigmatic cups are situated

in front of the anterior border of the hysterosoma. The interlamellar hairs, which reach beyond the cusps, are covered at the base by the projecting anterior border of the hysterosoma.

The hysterosoma, which is very broad, projects with its anterior border and with the distal tip of the pteromorphae. In the anterior part of the pteromorphae a light spot similar to that in *C. imperatoria* can be seen. The position of the areae porosae and the few hair pores found resemble those of *C. imperatoria*.

Fig. 44a shows the main features of the ventral surface. Apodemata II are well chitinized, but are far short of the middle line, whereas the sejugal apodemata form a faintly chitinized bridge in front of the genital field. The latter has six pairs of genital hairs of which only the setae of the three anterior ones are present. The aggenital, the anal, and the adanal setae are all missing. Ad1 are postanal, ad2 and ad3 are located at a rather short mutual distance in front of iad. The latter is removed from the border of the anal field. The epimeric hairs are smooth, apart from 1c, which is thick and barbed. Custodium is very long and thin, reaching 1c. Genus and Tibiae I–II have an outer, long spine. All tarsi tridactylous, the claws being almost equally thick.
150(2).

Sphaerozetes shogranensis n. sp.; fig. 45.

Colour light brown. Length about 0.95 mm.

The tip of the rostrum is rounded and apparently without the two small rostral tips so characteristic of *Sphaerozetes*. When laid bare, however, two closely situated short tips can be seen, fig. 45a. Behind them there is a light spot. The rostral hairs are situated far laterally, unilaterally barbed, almost meeting in a large curve. The lamellae reach three-fifths of the distance to the tip of the rostrum. The faintly striated lamellae are almost equally broad throughout and the cusps are no broader. The straight translamella is only one third as broad. At the base of the lamellar hair there is an outer tooth. The lamellar hairs are strong, barbed, and about one and a half times longer than their mutual distance. The interlamellar hairs, located very close to the anterior margin of the hysterosoma and at a shorter mutual distance than the lamellar hairs, are more or less erect, barbed, and as long as the lamellar hairs. The pseudostigmatic organs are slender clubs, broadest distally, fig. 45b. They are directed straight forwards. The tutorium has a short free tip off the translamella, fig. 45b

The anterior border of the hysterosoma is slightly arched. On either side, lateral to the pseudostigmata, there is a small indentation. The hysterosoma is broadest off ms. Its posterior end is semicircular. The pteromorphae almost reach r3. There are ten pairs of notogastral setae, however, most of them are hardly discernible. Ta is the longest. There are four pairs of indistinct areae porosae, Aa the largest, A1 the smallest. Im is located in front of r3. In profile the integument shows a faint reticulate-pitted surface.

The ventral side is shown in fig. 45c. The faintly chitinized sternum is developed for its whole length and very broad immediately in front of the genital field. Spurs from the sternum reach Apodemata II and the sejugal apodemata, both well developed, whereas Apodemata III are narrow and short. In the middle of the genital field there is a rhombic figure of a light yellow colour, whereas the remainder of the genital plates is a dirty brown. There are six pairs of genital hairs, the four anterior pairs situated in the anterior half of the plates. One pair is directed forwards, four pairs medially, the fifth pair is directed backwards. The genital hairs are uneven, thin, and rather long. The aggenital hairs are shorter. The adanal and the anal hairs are thin, apparently smooth, and as long as the aggenital hairs. Ad1 and ad2 are postanal, ad3 latero-anal. Iad is located near the anterior end of the anal field. There are three pairs of anal hairs in two of the three specimens found, two in the third. The presence of three anal hairs is probably anomalous, since an additional adanal hair is also found in the right side of the type specimen. All the legs have three claws, the lateral ones approximately half as thick as the middle one. Genus I–II have an outer, thin, rather long spine. The numbers of solenidia for the four legs are:

	Tarsus	Tibia	Genu	Femur
I	2	2	1	0
II	2	1	1	0
III	0	1	1	0
IV	0	1	1	0

96(1), 98(1), 104(1).

Trichoribates trimaculatus (C. L. Koch), 1836.
133, 141, 143, 153(1).

Diapterobates allimontanus n.sp.; fig. 46.

Colour red brown, darkest in a belt across the hysterosoma. Length about 0.85 mm.

The tip of the rostrum is rounded but lower down it broadens and has a blunt tip on either side. The rostral hairs, situated on a level behind the lamellar hairs, are thick proximally, thin at the tip and densely unilaterally barbed. The lamella and the cuspis run evenly into one. The cusps, which are longer than their mutual distance, have parallel medial borders and a large, pointed outer tooth. The translamella is narrow, and only its anterior margin is well limited. The lamellar hairs are thick, coarse, and set with short spines. They are thicker than the rostral hairs and at least twice as long as their mutual distance. The interlamellar hairs, located in the corner between the lamellae and the anterior border of the hysterosoma, resemble the lamellar hairs, but are much longer. The pseudostigmata are concealed under the anterior border of the hysterosoma and only the openings are revealed. The pseudo-

stigmatic organs are slender clubs, set with minute bristles. They are directed forwards and outwards.

The hysterosoma is oval apart from the anterior end, which is slightly arched between the pseudostigmata, undulating laterally. Lenticulus is light, finely granulate. On the bridge between the pseudostigmata there is a transverse line with small triangular, dark spots. The hinges of the pteromorphae end anteriorly in an oblong, light spot. The 13 pairs of notogastral setae are rough and spiny, of different lengths, c2, la, dp, and lp being the longest. The shorter hairs are thinner than the longer hairs, the latter almost as thick as the interlamellar hairs. The distances da-da and dm-dm are approximately the same, dp-dp a little shorter. Areae porosae are distinct. Aa round to slightly oval, the largest; A1 only a little smaller than Aa and round, A2 and A3 round, A2 smaller than A3.

Fig. 76a shows the ventral side. Sternum is not developed. Apodemata II and the sejugal apodemata are equally broad. The epimeric hairs are thick and barbed, 1c is especially strong. The genital and the anal fields are a slightly lighter colour than the surroundings. The six genital hairs on each plate are long and barbed, the three anterior ones directed forwards. The fourth is directed medially, the fifth laterally and the posterior one forwards. These hairs are thinner than the epimeric setae. The aggenital hairs are thin like the genital hairs, whereas the anal and the adanal hairs are thicker and darker, densely barbed. The posterior anal hairs are located near the posterior border. The distance ad1-ad2 is only about half as long as ad1-ad1. Ad3 is situated behind the fissure iad at a level a little behind the anterior anal hair. Area porosa postanal is very long and narrow, located behind ad1 and ad2. All legs with three claws, the lateral ones almost half as thick as the middle one.

8(11), 9(11), 10(14), 114(1), 142(30), 143(1).

Mycobatidae

Punctoribates hexagonus Berl., 1908.

25, 43, 44, 47, 48, 49, 66, 68, 69, 97, 100(1-5).

Punctoribates punctum (Berl.), 1888.

85, 86, 87, 97, 101, 105, 113, 116, 120, 123, 124, 125, 126, 128, 132, 133, 137, 152, 153(1-5); 88(17), 102(11), 106(17), 115(13), 118(30), 122(16), 127(12).

Eupunctoribates n.gen.

Eupunctoribates differs from *Punctoribates* by the absence of a chitinous bridge (on which the interlamellar setae are situated in *Punctoribates*), and by the presence of a ridge on either side, issuing from the middle of the lamellae and reaching the tip of the rostrum, meeting. Lamellae better developed than in *Punctoribates*. Areae porosae and notogastral setae present. Tridactylous.

Eupunctoribates lobatus n.sp.; fig. 47.

Colour yellowish-grey. Length about 0.35 mm.

The rostrum is broad with a dull tooth on either side. The thin, barbed rostral hairs are situated in front of the strong, pointed tutorium. The lamellae, which are more intensely chitinized than the cusps and the translamella and have a medial thickening, are bifurcate immediately behind the translamella. Between the two tips a chitinous ridge or band issues, proceeding forwards and meeting that from the other side behind the tip of the rostrum. The distal parts of the lamellae, the cusps, and the translamella are faintly chitinized. The translamella is twice as broad as the cusps. The thin, barbed lamellar hairs reach the tip of the rostrum. The interlamellar hairs are each situated on a small narrow ridge issuing from the pseudostigmata, the two ridges not meeting. There is thus no transverse bridge between the interlamellar hairs. The latter reach a short distance beyond the translamella. Sensilli are broad clubs, directed forwards and slightly outwards.

The projection on the anterior border of the hysterosoma is a broad, rounded lobe. The pteromorphae are very long, reaching midway to the posterior end of the hysterosoma. A faint transverse line connects the pteromorphae. Behind it at a deeper level there is an almost square light area. The notogastral setae are thin and moderately long. The integument is smooth.

The ventral side. There are six pairs of genital hairs, one pair of aggenital, two pairs of anal, and three pairs of adanal hairs. Ad1 and ad2 are postanal, the distance ad1-ad1 being a little shorter than ad1-ad2. Ad3 is situated off the middle of the anal field. Tridactylous, the middle claw being much stronger than the lateral ones.

Discussion. In 1972 МАХУНКА described a new species, *Punctoribates* (?) *eoeryi* (0.43–0.445 mm long) in which the interlamellar hairs are situated on short ridges as in *Eupunctoribates lobatus*. The lamellae are well developed and the species has a chitinous bridge connecting the pteromorphae. The notogastral setae are moderately long. There is thus a great similarity between the two species. *Punctoribates* (?) *eoeryi* does not, however, have ridges issuing from the lamellae that meet at the tip of the rostrum, for which reason I am uncertain whether it belongs to the new genus.

1(12), 2(1), 3(1), 6(3).

Pelopidae

Eupelops bilobus (Selln.), 1928.

136(1).

Eupelops hirtus (Berl.), 1916.

86, 107, 117, 147(1); 121(2), 122(2).

Eupelops occultus (C. L. Koch), 1836.

88(2), 103(5), 120(7).

Peloptulus phaenotus (C. L. Koch), 1844.
45, 46, 49, 50, 53, 54, 98, 105, 132, 133(1-3); 66(9), 102(6), 135(6).

Oribatellidae

Oribatella schoutedeni Balogh, 1959.
68(2), 69(6).

Oribatella meridionalis Berl., 1908.
16, 18, 35, 132, 137(1), 138(2), 139(3).

Oribatella meridionalis (Berl., var. *longisetosa* n.var.; fig. 48.
Colour light brown to brown. Length about 0.41 mm.

The tip of the rostrum is slightly pointed. The rather short and broad lamellae are faintly and irregularly striated. The lamellar tips are likewise short, the medial one slightly shorter than the lateral one. The latter has two small teeth on its outer border. The space between the lateral and the medial tips is broadly rounded at the bottom, its medial posterior border being straighter than its steeper lateral border. The lamellar setae are very thick and set with coarse spines. There is a triangular tooth on the translamella, which connects the lamellae like a bridge. The interlamellar setae are very long, reaching the tip of the lamellar setae (hence the variety name), and only half as thick as the lamellar setae. They are uneven or faintly barbed. Sensilli, which are knee-bent, and directed forwards, are a little thicker than the lamellar setae and pointed at the tip.

The anterior border of the hysterosoma is strongly undulate with thin parallel lines lateral to the pseudostigmata. The notogastral hairs are curved, thin, and smooth. The integument is smooth.

Tibiae I-II and Genus I-II have a very long outer spine. The spine on Tibia I is a little thinner than the other spines. All tarsi have three claws, of which the lateral ones are very thin.

Remarks. The variety differs from the main form by its larger size (*O. meridionalis* in Willmann, 1931: 0.30 mm; Sellnick, 1928: 0.33 mm long), by its darker colour, by its shorter medial lamellar tip, and by its extremely long interlamellar hairs.
140(62), 141(65).

Oribatella microfoveolata n.sp.; fig. 49.
Colour light brown. Length about 0.365 mm.

The tip of the rostrum is pointed. The rostral hairs, which almost meet, are densely unilaterally barbed. The lamellae are separated by a very narrow space in front of the translamella and have almost parallel sides. There is no spine projecting into this space from the translamella. The lamellae, which are a little too long in

fig. 49 due to an oblique projection, are longitudinally wrinkled. The lamellar tips are very long. The smooth medial tip is longer than the lateral one. On the outer border of the latter there are 3–4 small teeth. The space between the medial and the lateral tip is deeply rounded. The lamellar hairs are thicker than the tips and about one and a half times longer. The interlamellar hairs are thinner than the lamellar hairs and about twice as long. The sensilli, which reach the base of the lamellar hairs, are only a little thicker than the latter, pointed at the end, and almost equally thick throughout.

The anterior border of the hysterosoma is strongly undulating with the pseudostigmata located between the projecting pteromorphae and the arched middle part. The distal antero-lateral tip of the pteromorphae project as far as the middle of the anterior border of the hysterosoma. The notogastral hairs are short, thin, and curved, directed forwards. The integument is densely pitted, the pits being very small.

Genus I–II and Tibia II with a strong outer spine, Tibia I with a thinner spine. 138(4).

Remarks. With its very long lamellar tips, long interlamellar setae, and its long thin sensilli *O. microfoveolata* has some resemblance to *O. longispina* Berlese, 1914. The latter is, however, larger (0.44 mm long) and has much longer notogastral setae. Moreover, the new species is foveolate.

Lamellobates palustris Hammer, 1958.
21(2), 22(1), 23(2), 28(1), 30(5).

Unduloribates undulatus Berl., 1914; fig. 50.
Colour brown. Length about 0.75 mm.

The specimens found mainly differ from BERLESE'S description in their larger size (Berlese 0.66 mm long) and by the appearance of the cusps with a pointed medial tooth and a lateral rounded corner (in BERLESE with two equally large teeth). 146(11).

Scutozetes lanceolatus Hammer, 1952.
118(6).

Neolepidozetes n.gen.

The new genus differs from *Lepidozetes* by having sacculi instead of areae porosae.

Neolepidozetes ovalis n.sp.; fig. 51.

Colour yellow brown with a darker belt across the hysterosoma. Length about 0.42 mm.

The lamellae are fused forming a shield covering most of the propodosoma. In front of this shield protrudes a broad labium. The strong, unilaterally feathered rostral hairs are inserted laterally behind the lip. The slightly barbed lamellar hairs

are situated immediately behind the anterior border of the lamellar shield. The interlamellar hairs, situated below the anterior margin of the hysterosoma, are equally thick throughout, slightly barbed and reach the lamellar hairs. The pseudostigmatic organs, situated far behind the anterior border of the hysterosoma, are long, slender, hairy clubs, directed forwards.

Together with the short propodosoma, the hysterosoma forms an oval, slightly tapering at both ends. The pteromorphae project much farther than in *Lepidozetes singularis*, reaching the anterior half of the free part of the sensilli. There are 10 pairs of notogastral hairs, which are equally long, strong, and unilaterally barbed. Near the base of the hairs there is a bright pore. There are four pairs of sacculi. Im is located between te and r3.

Fig. 51a shows the main features of the ventral side, which is faintly chitinized. Sternum is absent. Apodemata II and the sejugal apodemata are equally well developed, the latter forming a faint transverse band. There are six pairs of genital hairs, all rather strong and barbed and with a bright pore at the base. There is one pair of aggenital, two pairs of anal, and three pairs of adanal hairs. Ad1 and ad2 are postanal, ad3 located behind iad. The latter is situated off the anterior anal hair. All the hairs on the ventral side are barbed. The tarsi have three claws, of which the lateral ones are very thin.

108(16), 109(38), 110(2), 111(12), 138(2), 139(1).

Achipteriidae

Achipteria coleoprata (L.), 1758.

129(1).

Parakalumnidae

Neoribates aurantiacus (Oudms.), 1913.

102(3), 103(42), 104(9), 106(2), 120(11), 121(14), 123(8), 137(1), 138(1).

Galumnidae

Zetes dorsalis C. L. Koch, 1841.

49(1).

Pilogalumna tenuiclava (Berl.), 1908.

25(8), 48(1), 49(1), 73(15).

?*Acrogalumna shogranensis* n.sp., fig. 52.

Colour yellow. Length about 0.35 mm.

The rostrum is conical. The rostral hairs are thin, uneven, directed forwards. The lamellar hairs, which meet at the tip of the rostrum, are situated dorsally. They are thicker than the rostral hairs and slightly barbed. The interlamellar hairs, which are much longer and stronger than the rostral and lamellar hairs, are first bent medially and forwards, the tip thereafter outwards. The sublamella has a small free tip. Lamella is absent, fig. 52a. Sensillus is sickle-shaped, the thin stem being strongly bent, the head thin, spindle-shaped, set with minute bristles.

Dorso-sejugal suture absent. Area porosa dorso-sejugal is oblong. There are only a few indistinct ribs on the pteromorphae. Areae porosae are very distinct, their borders being raised above the surroundings. Aa is the largest, A2 a little smaller than A1 (on the right side in fig. 52 A2 is displaced too close to A1). There is no median dorsal pore or group of pores in any of the specimens examined. The fissure im is located between ti and A1. The integument is decorated with longish or round ribs forming a network of deep alveoles mainly arranged in oblique rows. They are especially distinct on the sides of the dorsum, disappearing more or less towards the anterior part of the dorsum. On either side of the latter there is a narrow band running from the pseudostigma to the latero-posterior border of the dorsum.

Fig. 52b shows the main features of the ventral side. There are six pairs of genital hairs. A narrow area porosa postanal is present. Tridactylous. 89(3), 90(1), 95(5), 96(3), 106(1).

Galumna monticola n.sp.; fig. 53.

Colour light brown to brown. Length about 0.66 mm.

The rostrum is broadly rounded. The rostral and lamellar hairs are approximately equally long and slightly barbed. The lamellar hairs are located between L and S, fig. 53a. Posteriorly the lamellae almost reach the interlamellar hairs. The latter, which are located near the sublamellae, are stronger than the rostral and lamellar hairs and barbed. They are directed upwards, medially, and the tip thereafter outwards. Sensillus, which is very thin, is spindle-shaped and set with minute bristles.

The dorso-sejugal suture is indistinct. Area porosa dorso-sejugal is longish. The posterior half of the hysterosoma is semicircular. On the pteromorphae is a single dark rib in front of the fissure. The pore for ta is located behind this rib. Notogastral setae absent, the hair pores, however, bright with two smaller adjacent pores. Areae porosae adalares are angular with a long transverse branch and a shorter, thinner, backwards-directed branch. When laid bare Aa is more irregular and very broad at the transition between the two parts, fig. 53b. A1 is round, varying in shape and not completely circular. A2 and A3 are longish. Many irregular small apertures or pits in oblique rows cover the dorsum, being most distinct on the sides of the latter. The pattern on the two sides is not symmetric. Im is located close to A1.

Fig. 53c shows the main features of the ventral side. The setae 1a are strong, directed backwards. There are six pairs of genital hairs. The aggenital, the anal, and

the adanal hairs are very short. Ad1–ad3 are located in a curved row behind the anal field. Iad is situated off the anterior half of the anal field. No area porosa postanal was observed. All tarsi have three claws, the middle one being only a little thicker than the lateral ones.

63(1), 100(1), 121(9), 133(3), 136(3).

?*Pergalumna* ? *longior* (Willm.), 1928; fig. 54.

Colour brown. Length about 0.87 mm.

The rostrum is very broad. The rostral hairs are thin and apparently smooth. The lamellar hairs, situated on a small edge on the lateral border, are a little longer than the rostral hairs. They are located medially to the lamellae. The interlamellar hairs are short and bent medially. The lamellae have a short free tip. Sensillus is a thin, smooth thread, its distal end very thin and bent outwards. Area porosa dorso-sejugal is small and oblong, narrow.

The dorso-sejugal suture is indistinct. The integument in front of it is yellow, behind it light brown. In the middle of the propodosoma the integument is transparent. It is densely punctate both in the propodosoma and in the hysterosoma.

The posterior half of the hysterosoma is rounded, its anterior border straight. The pteromorphae have a deep notch in their outer border. They are light brown with darker shadows surrounding lighter areas. Their anterior part is yellow to light brown, the posterior part brown with faint light ribs. There are only three pairs of areae porosae, A2 being absent. Aa is oblong, triangular with its narrow end directed laterally. A1 is also triangular with the narrow end directed obliquely outwards. A3 is round to oblong. There are many bright pores between the two A3. In the middle of the dorsum there is a single pore. The fissure im is located on a level a little in front of A1, but more laterally. Another fissure can be seen between im and A1. The integument is densely punctate.

Fig. 54a shows the main features of the ventral side. There are six pairs of genital hairs. In each plate there is a longitudinal, yellow, light furrow, along which three hairs are located. The hairs stretch out from the furrow, the pores being located laterally at some distance from the furrow, fig. 54b. The anal plates are yellowish and densely punctate, the genital plates are greyish. Ad1 and ad2 are postanal, ad3 located off the middle of the plates and behind iad. No area porosa postanal was observed. All tarsi have three almost equally thick claws.

Discussion. The only specimen found resembles *Galumna longior* Willm., 1928 (1931, fig. 303) in length (*G. longior* 0.89 mm long), in the deeply notched pteromorphae, in the thread-shaped sensillus, in the presence of three pairs of a. porosae only, in the triangular Aa with its pointed end directed laterally, and in the presence of many posterior bright pores. It differs from *G. longior* by its broad rostrum (in *G. longior* apparently pointed) and by the position of the lamellar hairs (in *G. longior* immediately in front of the lamellar tip).

86(1).

Trichogalumna chitralensis n.sp.; fig. 55.

Colour light brown. Length about 0.32 mm.

The rostrum is very broad. The ventrally situated rostral hairs are thin and short. They are situated further posteriorly than the lamellar hairs. The latter are also thin and reach beyond the rostral hairs. Interlamellar hairs are hardly discernible. The lamellae have a small free tip. Sensillus has a flat, oblong head and a very thin stalk, fig. 55a. Areae porosae dorso-sejugales are very small.

The dorso-sejugal suture is absent. There is a deep incision in the outer border of the pteromorphae. There are four pairs of areae porosae. Aa, which is removed from the lateral border, is small, slightly oblong, A1 round, A2 also round, but smaller, A3 difficult to see. The notogastral hairs are hardly discernible and they can be seen only in profile on the posterior border. Ta is an exception, being long, and located at the end of a long furrow. R1 could not be discerned. Im is located in front of A1.

Fig. 55b shows the main features of the ventral side. There are six pairs of genital hairs, but only those on the anterior border of the plates are discernible. Ad1 and ad2 are postanal, ad3 situated behind iad off the middle of the sides of the anal field. All tarsi have three claws, the lateral ones very thin.

24(1), 25(1).

Conclusion

This investigation registered a total of 131 species, which number presumably only represents a small share of the present oribatid fauna in the area in question. Forty-eight new species are described, as well as 4 varieties, while 9 new genera are established.

From Table I, which shows the finding-places of the new species within the area investigated, it appears that considerably more new species (28) were found in the Shogran forest than in the climatologically speaking more inclement Chitral (18) and Naran valleys (18). In addition, Shogran showed very different species since only 4 are common with those of the Chitral valley, and nine with those of the nearer Naran valley. The reason why Shogran shows a far richer variety than Chitral and Naran must presumably lie in its position in the western Himalayas with more precipitation than farther west. Shogran thus provides the various biotopes in which forests are so rich, such as luxuriant undergrowth with numerous plants, thick layers of humus, dry-rotten wood, moss, lichens, layers of leaf mould, etc. In addition, Shogran is warmer than Chitral and Naran. In the last two locations the majority of biotopes were found in the open countryside and consisted mainly of moss on cliff sides where water seeps through and moss at the edge of irrigation ditches and the like, generally without humus and with very short, sparse vegetation.

Table II shows the species known earlier. The majority of these (66) have a wide distribution throughout the USSR, Europe, North America and partly in Japan. Also these species are very unevenly distributed over the three localities investigated. The number of species is about the same for all three localities (43 – 43 – 48), but the composition of the species is quite different. Thus *Trimalaconothrus*, *Malacothonus* and the majority of the *Trhypochthonius* species are totally lacking in the Shogran samples. The species in these families are hygrophile and often found in association with meadows and marshes—here in irrigation ditches which do not exist at all in the Shogran area investigated, nor farthest up the Naran valley which is uncultivated where the samples were collected. On the other hand, the *Hypodameus* and *Belba* species were almost all found in Shogran, just one being found in Naran and none at all in Chitral.

Apart from the 66 species with a holarctic distribution, Table II lists 7 species which are distributed over large parts of the world (*Trhypochthonius excavatus*, *Trimalaconothrus novus*, *Fosseremus laciniatus*, *Tectocephus velatus*, *Oppiella nova*, *Xylobates capucinus*, *Scheloribates fimbriatus*), 4 species additionally known from the southern hemisphere (*Oppia ventronodosa*, *Ramusella puertomonttensis*, *Suctobelbilla dentata*, *Lamellobates palustris*), 2 species known from Africa (*Zetomotrichus lacrimans*, *Oribatella schoutedeni*) and one species from Japan (*Ceratozetella imperatoria*).

A single species, *Malaconothrus ramensis*, has a very unusual distribution. Previously it has only been found in small oases in Jordan and in the Central Sahara. These occurrences indicate an earlier, far wider distribution from the Sahara to Pakistan, perhaps even farther to the east, through areas that are now desert. The desert has thus split up an earlier unbroken distribution into smaller enclaves.

All these small groups with representatives from South America, Africa, New Zealand, the Pacific area and Japan show that our knowledge of the distribution of the oribatids is still very inadequate, but they also show that certain species have a far larger distribution and greater tolerance of very different climates than originally supposed when first described, for example, from South America, Africa or other areas far from West Pakistan. This wide distribution suggests that the oribatids are a very ancient group of animals which were presumably spread over large areas of the world before land split up to form the present continents.

See the *Note* p. 71.

TABLE 1. New species.

	Chitral 1-84	Naran 127-157	Shogran 85-126		Chitral 1-84	Naran 127-157	Shogran 85-126
<i>Phthiracarus tenuis</i>	×	×		<i>Suctobelbella chitralensis</i>	×		
- <i>falcatus</i>	×			- <i>naranensis</i>		×	
<i>Hoplophorella pakistanensis</i>	×	×	×	- <i>arcuata</i>			×
<i>Euphthiracarus shogranensis</i>			×	- <i>affinis</i>			×
- <i>pakistanensis</i>			×	<i>Novosuctobelba dentissima</i>			×
<i>Oribotritia asiatica</i>			×	- <i>shogranensis</i>			×
<i>Mesotritia nitida</i>			×	<i>Nannerlia bombrelensis</i>	×		
- <i>dissimilis</i>			×	<i>Gerloubia saifulmalukensis</i>		×	
<i>Hamacarus lawariensis</i>	×			<i>Zygoribatula arcuata</i>	×		
<i>Liodes silvestris</i>			×	- <i>tenuiseta</i>	×	×	
<i>Nododamaeus monticola</i>	×			- <i>tortilis</i>	×	×	
<i>Cristamerus spinosus</i>			×	<i>Peloribates pakistanensis</i>		×	×
<i>Carinabella pulchra</i>		×	×	<i>Scheloribates rostridentatus</i>			×
<i>Proteremaeus lawariensis</i>	×			? - <i>praelineatus</i>		×	
<i>Birnsteinius perlongoides</i>		×	×	<i>Ceratozetes paritraclus</i>			×
<i>Gustavia latolamellata</i>		×		<i>Sphaerozetes shogranensis</i>			×
<i>Ceratoppiella lutea</i>		×	×	<i>Diapterobates altimontanus</i>	×	×	×
<i>Carabodes manifera</i>			×	<i>Eupunctoribates lobatus</i>	×		
<i>Hypovortex arcualis</i>	×			<i>Oribatella microfoveolata</i>		×	
<i>Arcoppia brachyramosa</i>			×	<i>Neolepidozetes ovalis</i>		×	×
<i>Amerioppia asiatica</i>	×			? <i>Acrogalumna shogranensis</i>			×
<i>Oxyoppia cristata</i>			×	<i>Galumna monticola</i>	×	×	×
<i>Multioppia pakistanensis</i>	×		×	<i>Trichogalumna chitralensis</i>	×		
<i>Brachioppiella gracilis</i>		×	×				
<i>Oppia</i> sp.		×			18	18	28

TABLE 2. Known species

	Chitral 1-84	Naran 127-157	Shogran 85-126	USSR	Japan	Europe	North America	South America	New Zealand	Pacific area	Vietnam, Thailand Indonesia	Africa
<i>Steganacarus striculus</i>	x	x	x	x	x	x	x					
<i>Phthiracarus piger</i>			x	x		x	x					
- <i>borealis</i>		x				x	x					
<i>Rhysotritia ardua</i>		x	x	x	x	x	x			x		x
<i>Hypochthonius rufulus</i>	x	x	x	x	x	x	x					
<i>Liochthonius scalaris</i>	x	x	x			x	x					
- <i>simplex</i>	x		x			x	x					
<i>Brachychthonius berlesei</i>	x	x		x		x	x					
<i>Eulohmannia ribagai</i>			x	x	x	x	x					
<i>Nothrus biciliatus</i>	x	x	x	x	x	x	x					
- <i>palustris</i>	x	x	x	x	x	x	x					
<i>Heminothrus thori</i>	x	x		x		x	x					
- <i>targioni</i>			x	x	x	x	x					
<i>Platynothrus peltifer</i>			x	x	x	x	x					
<i>Camisia horrida</i>	x			x		x	x					
<i>Trhypochthonius tectorum</i>	x	x	x	x	x	x	x	x				
- <i>excavatus</i>	x					x	x	x	x	x		x
- <i>badius</i>	x					x	x					
<i>Trimalacnothrus novus</i>	x			x		x	x	x	x			
- <i>foveolatus</i>	x					x	x				x	
- <i>glaber</i>	x	x		x		x	x				x	
<i>Malacnothrus mollisetosus</i>	x	x		x		x	x					
- <i>ramensis</i>	x			x ¹⁾								x
<i>Nanhermannia nana</i>	x	x		x	x	x	x	x				x
<i>Hermannia gibba</i>		x	x	x		x						
<i>Gymnodamaeus femoratus</i>	x			x		x						
<i>Hypodamaeus gracilipes</i>			x			x						
- <i>riparius</i>		x		x		x						
- <i>crispatus</i>			x	x		x						
<i>Belba corynopus</i>			x	x		x						
- <i>tatica</i>			x			x	x					
- <i>verrucosa</i>			x	x								
- <i>rossica</i>			x	x								
- <i>meridionalis</i>			x	x								
<i>Cepheus latus</i>			x	x	x	x						
<i>Fosseremus laciniatus</i>	x	x	x	x	x	x		x	x	x	x	x
<i>Oribella alpestris</i>			x	x	x	x						
<i>Eremaeus hepaticus</i>	x			x		x						
<i>Hafenrefferia gilvipes</i>			x	x		x						
<i>Liacarus coracinus</i>			x	x	x	x						
<i>Cultroribula trifurcata v. rotundata</i>		x		x			x					
<i>Xenillus tegeocranus</i>			x	x	x	x						
<i>Ceratoppia bipilis</i>		x	x	x	x	x						

1) Middle East.

TABLE 2 continued.

	Chitral 1-84	Naran 127-157	Shogran 85-126	USSR	Japan	Europe	North America	South America	New Zealand	Pacific area	Vietnam, Thailand Indonesia	Africa
<i>Ceratoppia bipilis v. curtispilis</i>			x									
<i>Carabodes tenuis</i>			x			x						
<i>Tectocephus velatus</i>	x	x	x	x	x	x	x	x	x	x		x
<i>Scutovertex minutus</i>		x	x	x	x	x			x			
<i>Quadroppia quadricarinata</i>	x	x	x	x	x	x	x					x
<i>Oppiella nova</i>	x	x	x	x	x	x	x	x	x	x	x	x
<i>Oppia minutissima</i>	x	x	x			x			x			
– <i>ventronodosa</i>			x	x ²⁾				x				
<i>Ramusella puertomontensis</i>		x	x					x				
<i>Suctobelbella subcornigera</i>	x	x	x	x		x						
– <i>palustris</i>	x	x				x	x					
– <i>acutidens</i>	x	x				x	x					
– <i>nasalis</i>	x			x		x						
<i>Suctobelbilla dentata</i>	x							x	x	x		
<i>Zetomotrichus lacrimans v. bidentata</i>	x	x		x								x
<i>Xylobates capucinus</i>	x	x		x		x	x	x	x	x		x
<i>Schelorbates fimbriatus</i>		x		x						x	x	x
– <i>pallidulus</i>	x	x	x	x	x	x	x	x				
– <i>latipes</i>	x		x	x	x	x	x					
– <i>laevigatus</i>		x	x	x	x	x	x					
<i>Chamobates cuspidatus</i>	x	x		x		x	x					
<i>Ceratozetes gracilis</i>	x		x	x		x	x		x			
<i>Ceratozetella imperatoria v. magna</i>		x			x							
<i>Trichoribates trimaculatus</i>		x		x		x						
<i>Punctoribates hexagonus</i>	x		x	x		x						
– <i>punctum</i>		x	x	x	x	x	x					
<i>Eupelops bilobus</i>		x		x		x						
– <i>hirtus</i>			x			x						
– <i>occultus</i>			x	x		x						
<i>Peloptulus phaenotus</i>	x	x	x	x		x						
<i>Oribatella schoutedeni</i>	x									x		
– <i>meridionalis</i>	x	x		x	x	x						x
– – <i>v. longisetosus</i>		x										
<i>Lamellobates palustris</i>	x							x	x	x	x	
<i>Unduloribates undulatus</i>		x		x		x					x	
<i>Scutozetes lanceolatus</i>			x				x					
<i>Achipteria coleoptrata</i>		x		x		x	x					
<i>Neoribates aurantiacus</i>		x	x	x	x	x	x					
<i>Zetes dorsalis</i>	x					x						
<i>Pilogalumna tenuiclava</i>	x			x		x	x					
? <i>Galumna longior</i>			x			x						
Total 84 species	43	43	48	61	25	68	40	13	11	10	7	12

²⁾ Himalayas.

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Explanations of the Figures on Plates I–XXXIV

- Fig. 1. *Phthiracarus tenuis* n. sp.
 – 1a. – – aspis, dorsal view.
 – 1b. – – ano-genital region.
 – 2. – *falcatus* n. sp.
 – 2a. – – aspis, dorsal view.
 – 2b. – – ano-genital region.
 – 3. *Hoplophorella pakistanensis* n. sp.
 – 3a. – – aspis, dorsal view.
 – 3b. – – tip of pseudostigmatic organ.
 – 3c. – – ano-genital region.
 – 4. *Euphthiracarus shogranensis* n. sp.
 – 4a. – – aspis, dorsal view (foreshortened).
 – 4b. – – ano-genital region.
 – 5. – *pakistanensis* n. sp.
 – 5a. – – aspis, dorsal view.
 – 5b. – – ano-genital region.
 – 6. *Oribotritia asiatica* n. sp.
 – 6a. – – aspis, dorsal view.
 – 6b. – – subcapitulum.
 – 6c. – – ano-genital region.
 – 6d. – – aggenital hair.
 – 6e–h. – – Legs I–IV (I larger scale than the others).
 – 7. *Mesotritia (Entomotritia) nitida* n. sp.
 – 7a. – – aspis, dorsal view.
 – 7b. – – ano-genital region.
 – 7c. – – subcapitulum.
 – 7d–g. – – Legs I–IV.
 – 8a. – – *dissimilis* n. sp., aspis, dorsal view.
 – 8b. – – palp.
 – 8c. – – ano-genital region.
 – 9. *Hamacarus lawariensis* n. gen., n. sp.
 – 9a. – – hooks on the tip of rostrum.
 – 9b. – – ventral view.
 – 10. *Liodes silvestris* n. sp.
 – 10a. – – notogastral hair.
 – 10b. – – ventral view.
 – 10c. – – genital plates.
 – 10d. – – fissure ian.

- 11. *Nododamaeus monticola* n.gen., n.sp.
- 11a. – – ventral view.
- 11b–e. – – Legs I–IV.
- 12. *Cristamerus spinosus* n.gen., n.sp.
- 12a. – – ventral view.
- 12b. – – Leg I.
- 13. *Carinabella pulchra* n.gen., n.sp.
- 13a. –DDD – ventral view.
- 13b–c. – – Legs I–II.
- 14. *Proteremaeus lawariensis* n.sp.
- 14a. – – ventral view.
- 15. *Birnsteinius (Cultroribula) perlongoides* n.sp.
- 15a. ö– – – tip of rostrum.
- 15b. – – – ventral view.
- 16. *Gustavia latolamellata* n.sp.
- 16a. – – anterior part of lamellae with rostral hairs.
- 16b. – – pseudostigmatic organ.
- 16c. – – ventral view.
- 17. *Ceratoppia bipilis* (Herm.), var. *curtipilis* n.var.
- 17a. – – – ventral view.
- 18. *Ceratoppiella lutea* n.gen., n.sp.
- 18a. – – ventral view.
- 19. *Carabodes manifera* n.sp.
- 19a. – – notogastral hair.
- 19b. – – structure of dorsum.
- 20. *Hypovortex arcualis* n.sp.
- 20a. – . ventral view.
- 21. *Arcoppia brachyramosa* n.gen., n.sp.
- 21a. – – pseudostigmatic organ.
- 21b. – – ventral view.
- 22. *Amerioppia asiatica* n.sp.
- 22a. – – pseudostigmatic organ.
- 23. *Oxyoppia cristata* n.sp.
- 23a. – . ventral view.
- 24. *Ramusella puertomontensis* Hammer.
- 24a. – – ventral view.
- 25. *Multioppia pakistanensis* n.sp.
- 25a. – – pseudostigmatic organ.
- 25b. – – ventral view.
- 26. *Brachioppiella gracilis* n.sp.
- 26a. – – pseudostigmatic organ.
- 26b. – – ventral view.
- 27. *Oppia* sp.
- 27a. – sp., ventral view.
- 28. *Suctobelbella chitralensis* n.sp.
- 28a. – – tip of rostrum, lateral view.
- 28b. – – ventral view.
- 29. – *naranensis* n.sp.
- 29a. – – tip of rostrum, lateral view.
- 29b. – – pseudostigmatic organ.

- 29c. - - ventral view.
- 30. - *arcuata* n. sp.
- 30a. - - tip of rostrum, lateral view.
- 30b. - - ventral view.
- 31. - *affinis* n. sp.
- 31a. - - tip of rostrum, lateral view.
- 31b. - - ventral view.
- 32. *Novosuctobelba dentissima* n. gen., n. sp.
- 32a. - - tip of rostrum, lateral view.
- 32b. - - ventral view.
- 33. - *shogranensis* n. sp.
- 33a. - - ventral view.
- 34. *Zetomotrichus lacrimans* Grandj., var. *bidentata* n. var.
- 34a. - - ventral view.
- 35. *Nannerlia bombretensis* n. sp.
- 35a. - - Sa with surroundings.
- 35b. - - ventral view.
- 36. *Gerloubia saifulmalukensis* n. sp.
- 36a. - - lamellar system, latero-anterior cuspis and surroundings.
- 36b. - - ventral view.
- 36c. - *bicuspidata* (Hammer).
- 36d. - - ventral view.
- 37. *Zygoribatula arcuata* n. sp.
- 37a. - - ventral view.
- 38. - *tenuiseta* n. sp.
- 38a. - - ventral view.
- 39. - *tortilis* n. sp.
- 39a. - - tip of rostrum.
- 39b. - - ventral view.
- 40. *Peloribates pakistanensis* n. sp.
- 40a. - - notogastral hair.
- 40b. - - ventral view.
- 41. *Scheloribates rostrudentatus* n. sp.
- 41a. - - pseudostigmatic organ.
- 41b. - - ventral view.
- 42. ? - *praelineatus* n. sp.
- 42a. - - ventral view.
- 43. *Ceratozetes paritraclus* n. sp.
- 43a. - - pseudostigmatic organ.
- 43b. - - ventral view.
- 43c. - - Leg II, custodium and surroundings.
- 44. *Ceratozetella imperatoria* (Aoki), var. *magna* n. var.
- 44a. - - ventral view.
- 45. *Sphaerozetes shogranensis* n. sp.
- 45a. - - tip of rostrum.
- 45b. - - lamella, tutorium and pseudostigmatic organ, right side.
- 45c. - - ventral view.
- 46. *Diapterobates altimontanus* n. sp.
- 46a. - - ventral view.
- 47. *Eupunctoribates lobatus* n. gen., n. sp.

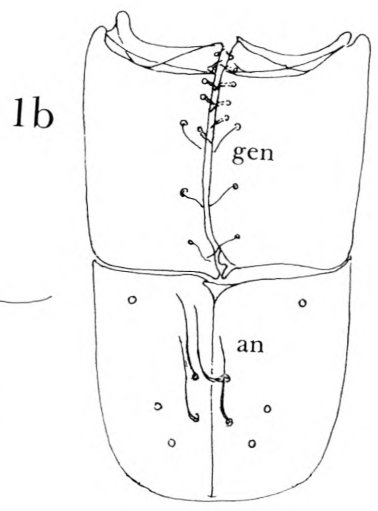
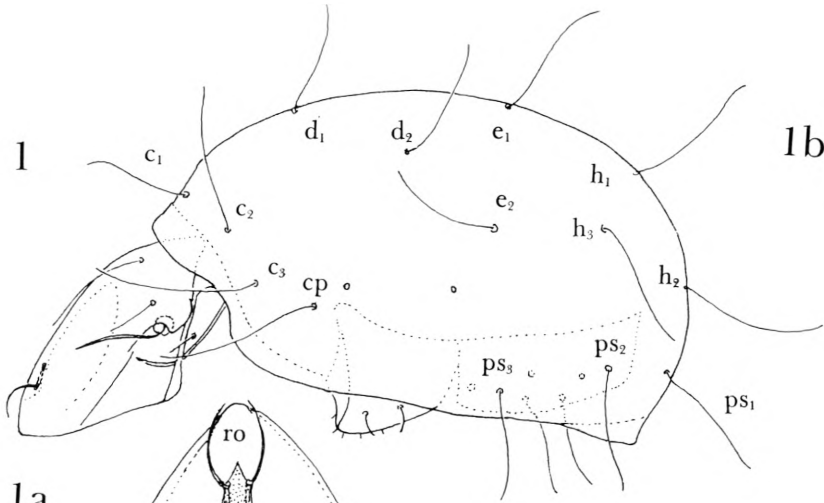
- 48. *Oribatella meridionalis* Berl., var. *longisetosa* n. var.
- 49. – *microfoveolata* n. sp.
- 50. *Unduloribates undulatus* Berl.
- 50a. – – ventral view.
- 51. *Neolepidozetes ovalis* n. gen., n. sp.
- 51a. – – ventral view.
- 52. *?Acrogalumna shogranensis* n. sp.
- 52a. – – propodosoma, lateral view.
- 52b. – – ventral view.
- 53. *Galumna montana* n. sp.
- 53a. – – propodosoma, lateral view.
- 53b. – – Aa and te.
- 53c. – – ventral view.
- 54. *?Pergalumna ?longior* Willm.
- 54a. – – ventral view.
- 54b. – – genital hairs.
- 55. *Trichogalumna chitralensis* n. sp.
- 55a. – – pseudostigmatic organ.
- 55b. – – ventral view.

Note

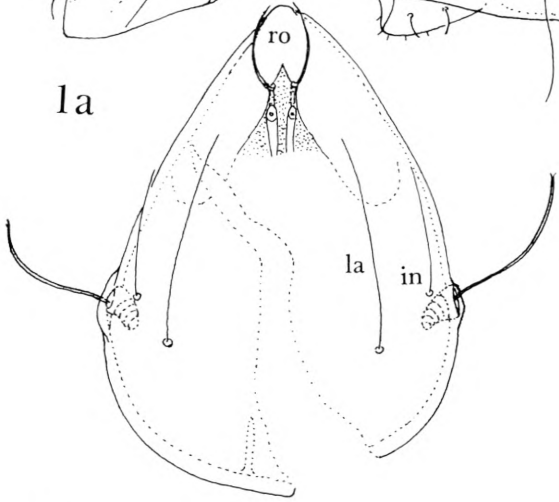
According to recent investigations carried out by HAMMER and WALLWORK on “Continental Drift and the Distribution of the Oribatids” (not yet published), Western Pakistan seems to be the meeting point of the Laurasian and the Gondwanaland faunas. The genera *Amerioppia*, *Oxyoppia*, *Ramusella*, *Brachioppiella*, *Zetomotrichus*, *Nannerlia*, *Gerloubia*, *Paralamellobates* (= *Oribatella schouledeni*), *Lamellobates* and *Trichogalumna* belong to the former Gondwanaland. They probably came to the Asian continent with the Iranian and/or the Indian plates when these in the Tertiary period drifted northwards from their former positions on the north-east and the south-east coast, respectively, of Africa and came in contact with the Asian plate, whereby the Himalaya was created.

Indleveret til Selskabet august 1975
Færdig fra trykkeriet november 1977

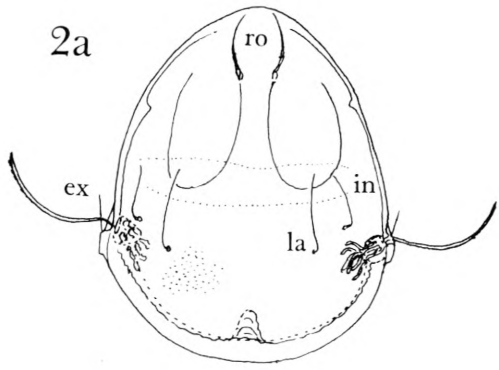
PLATES



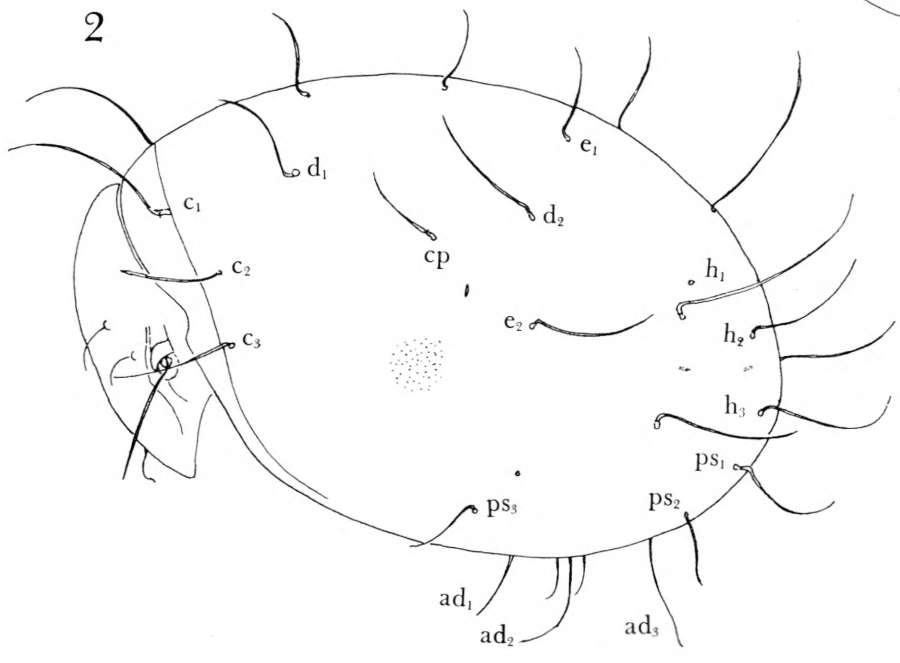
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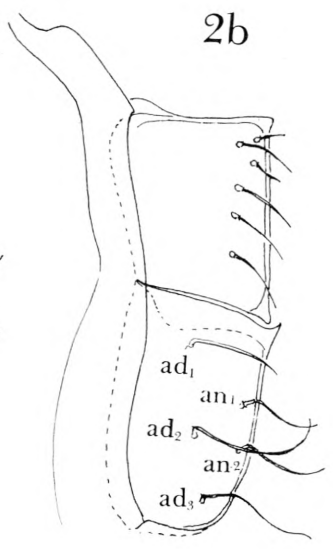
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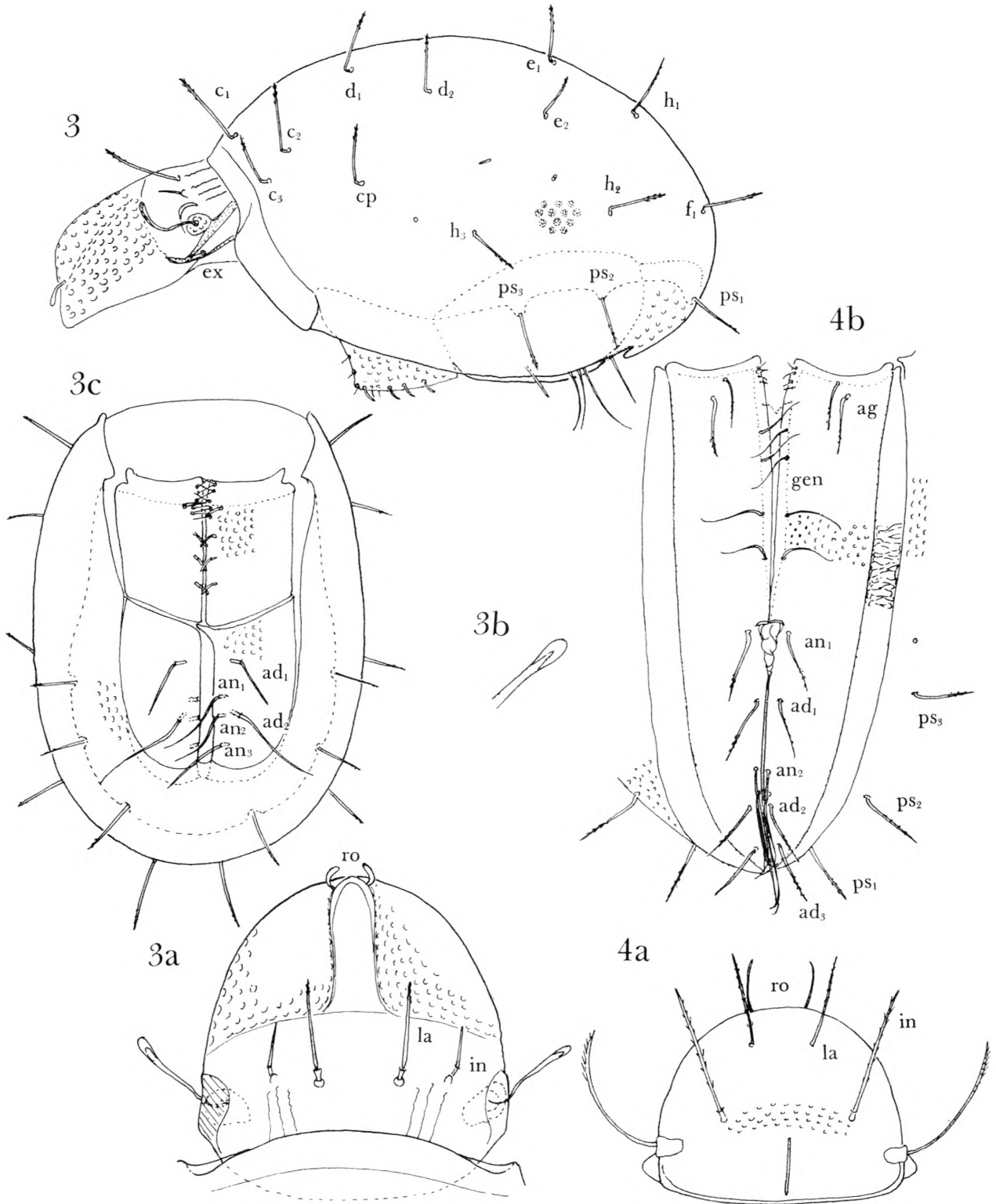


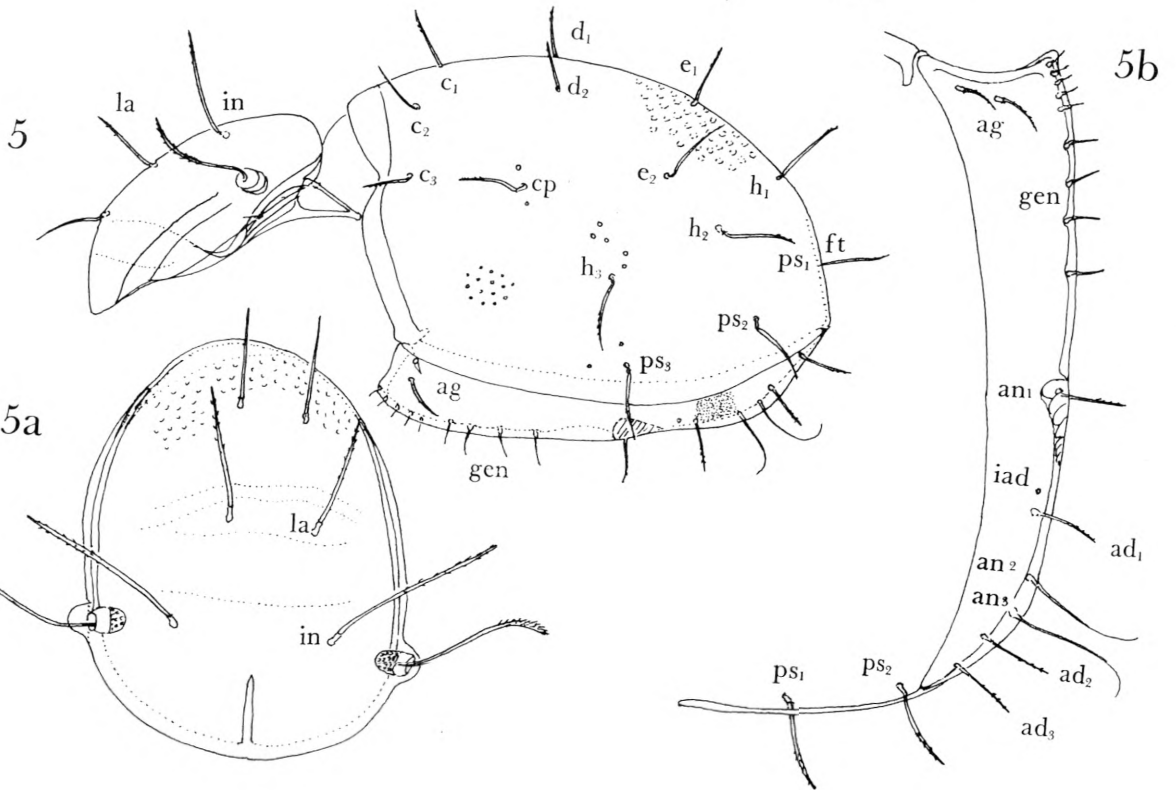
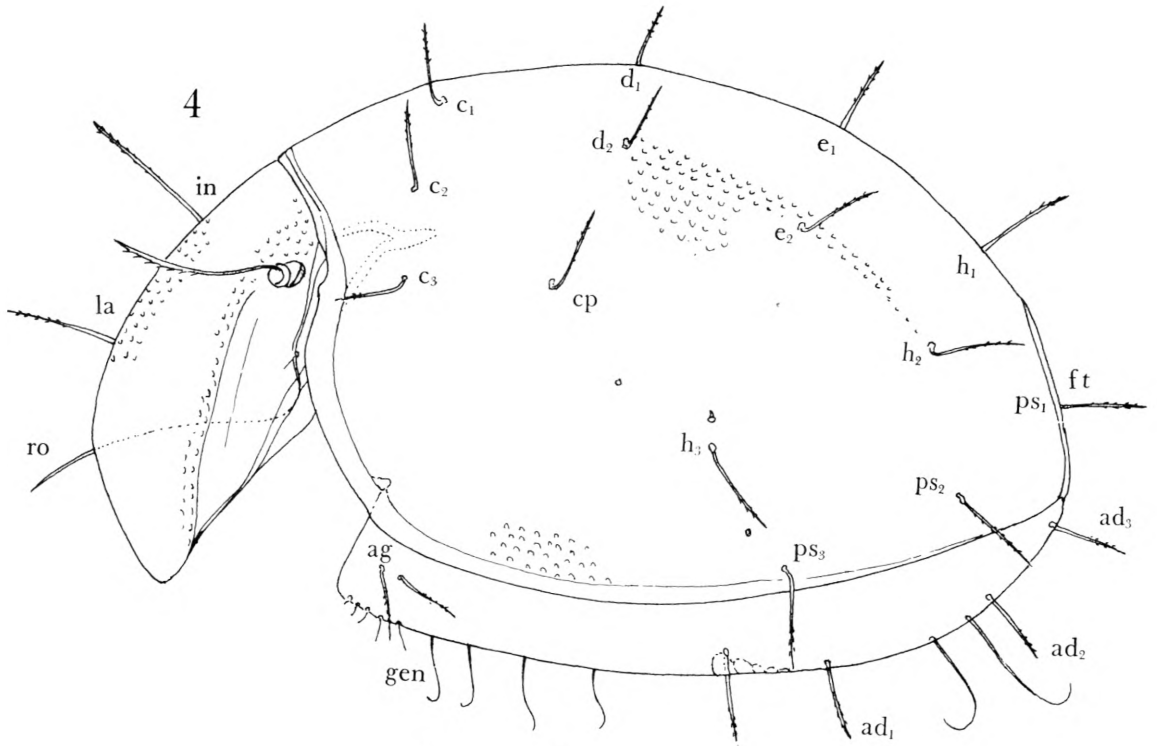
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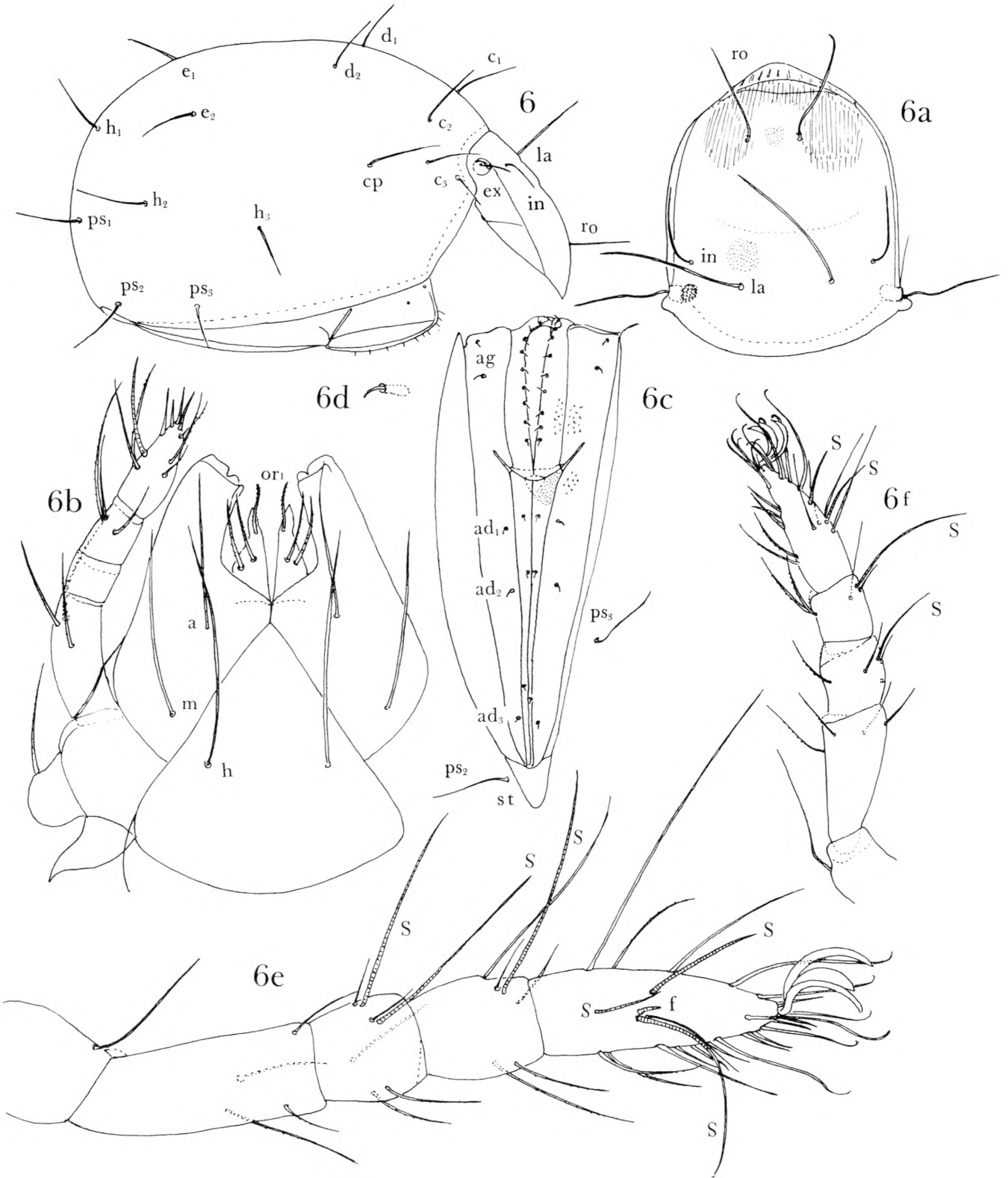


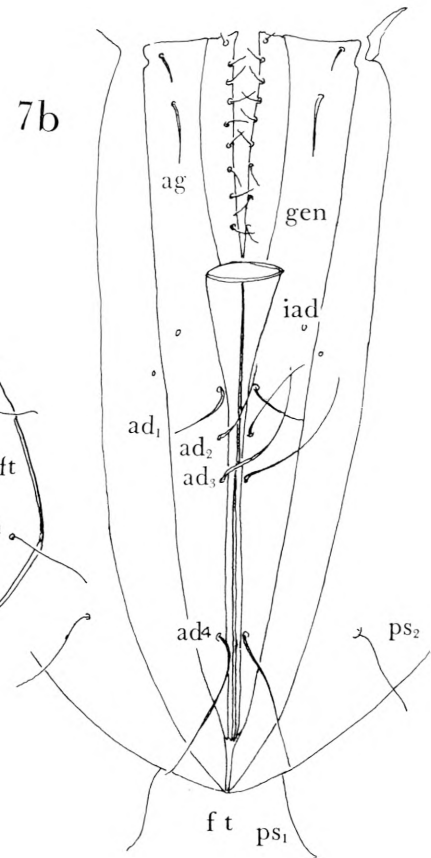
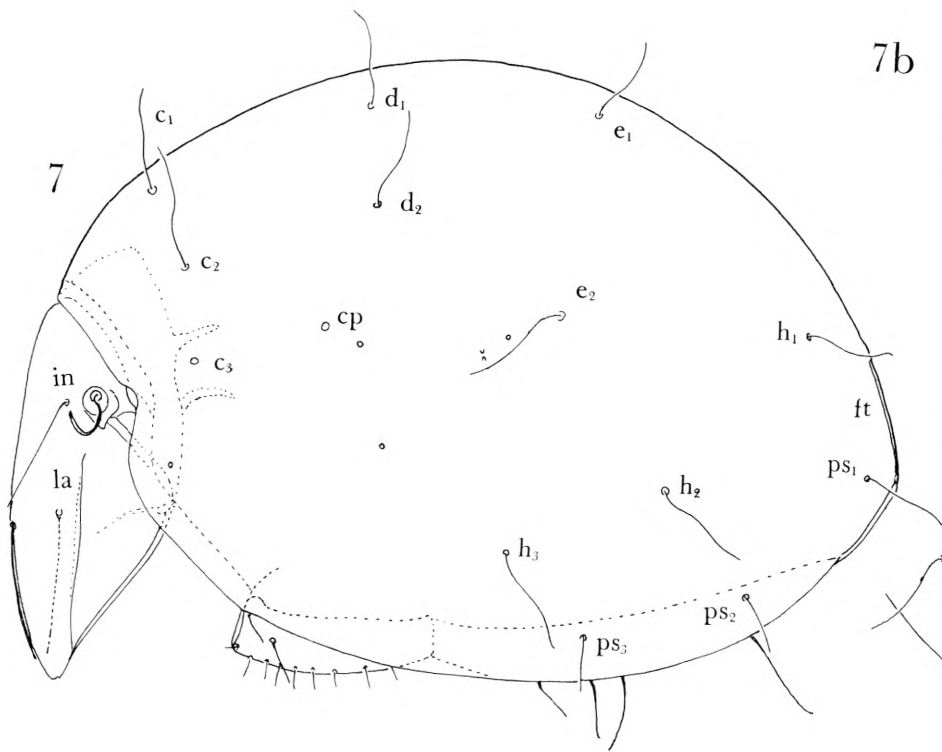
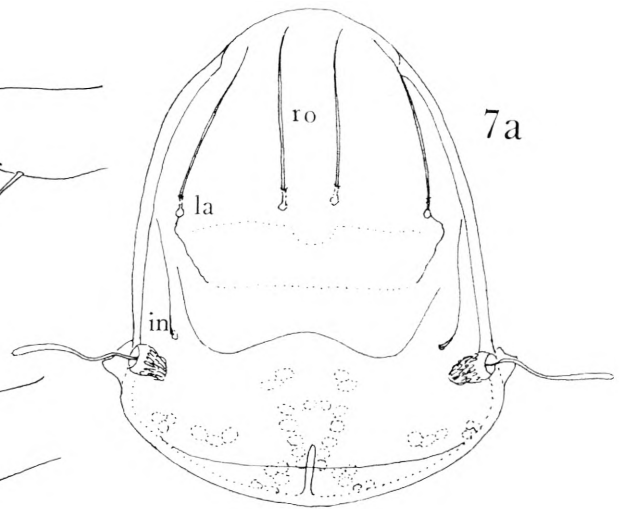
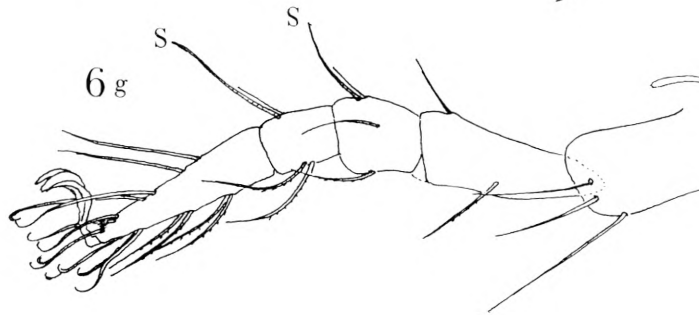
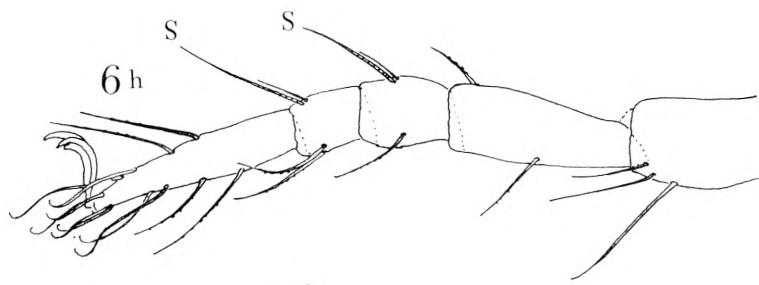
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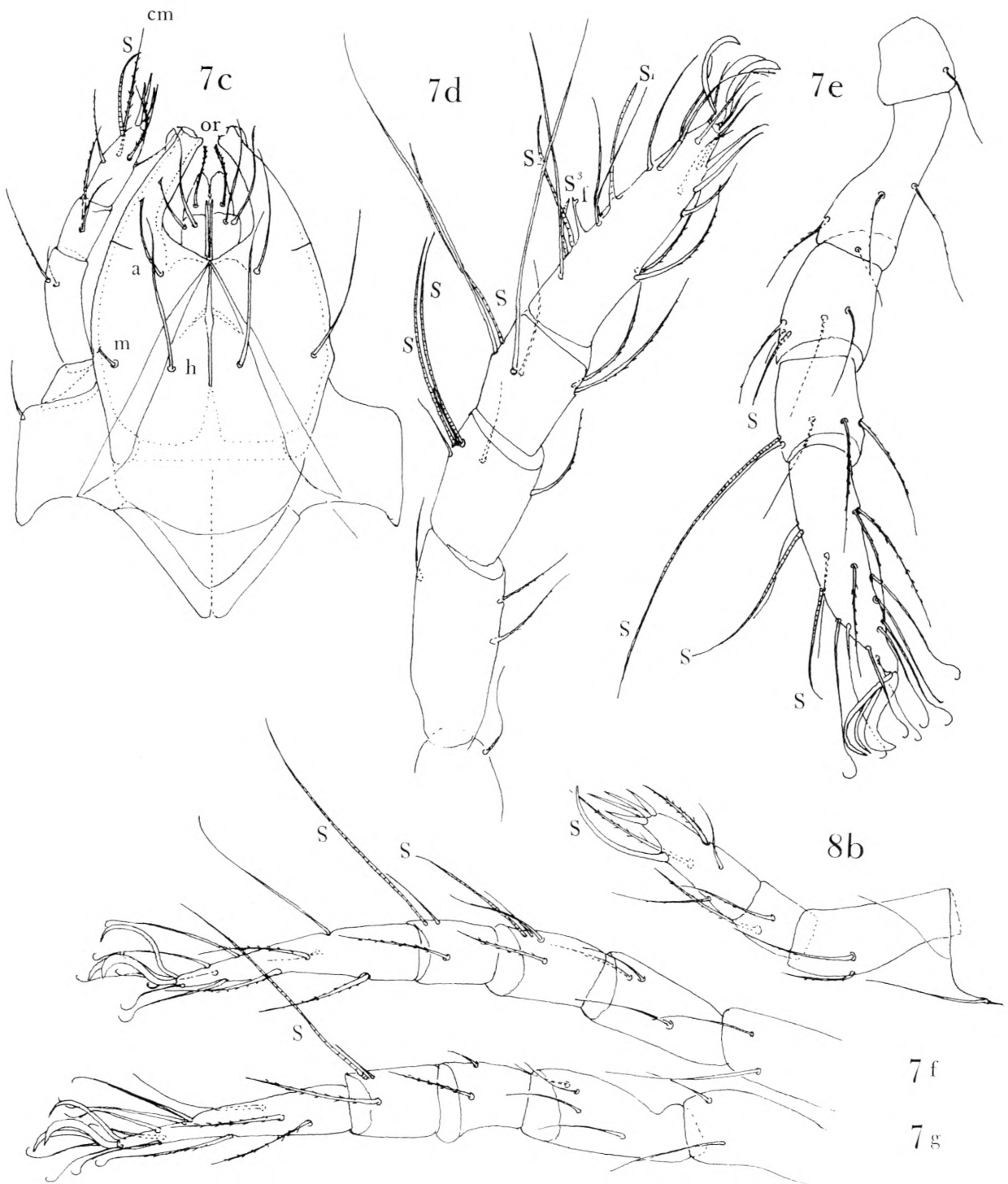


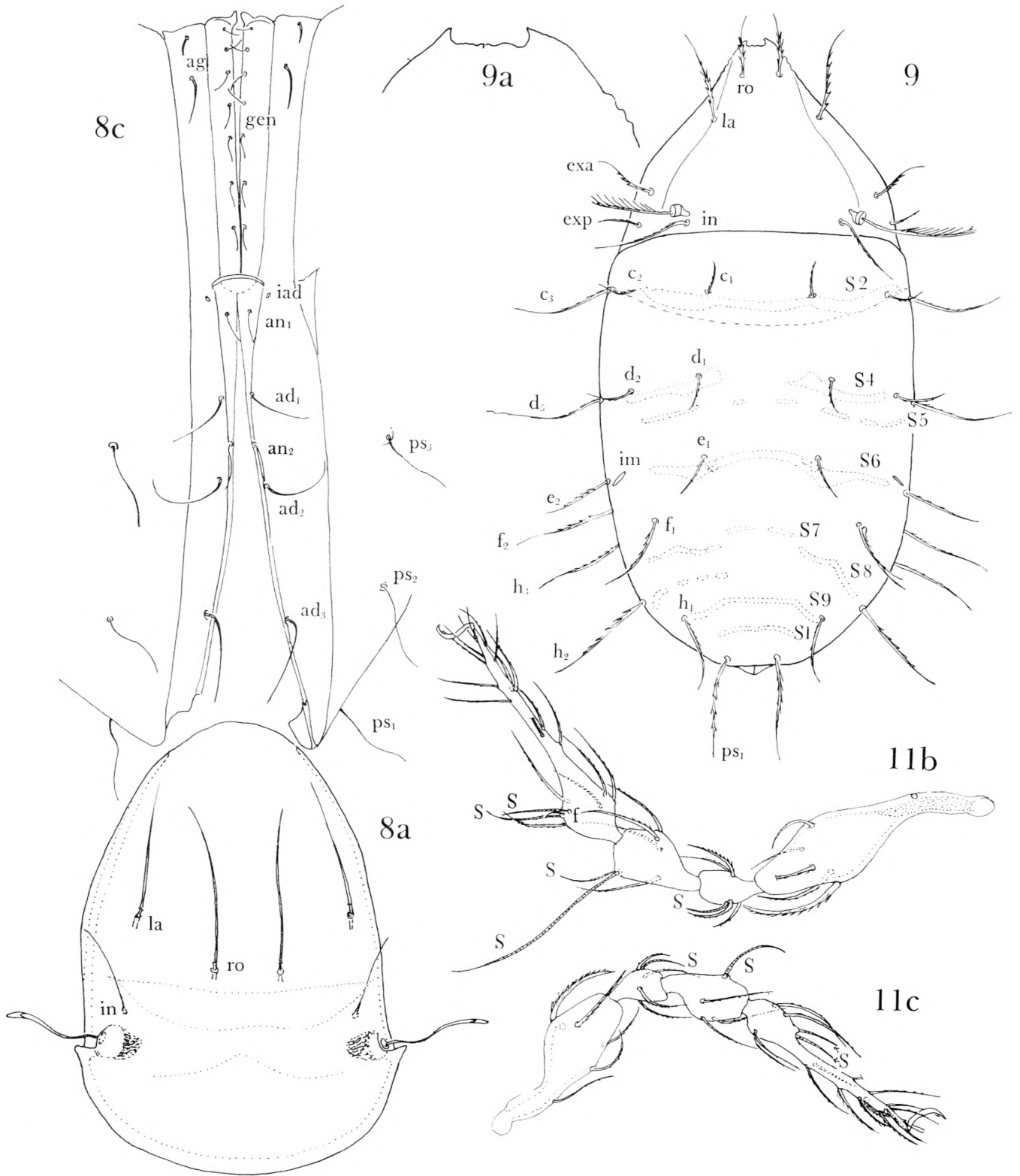


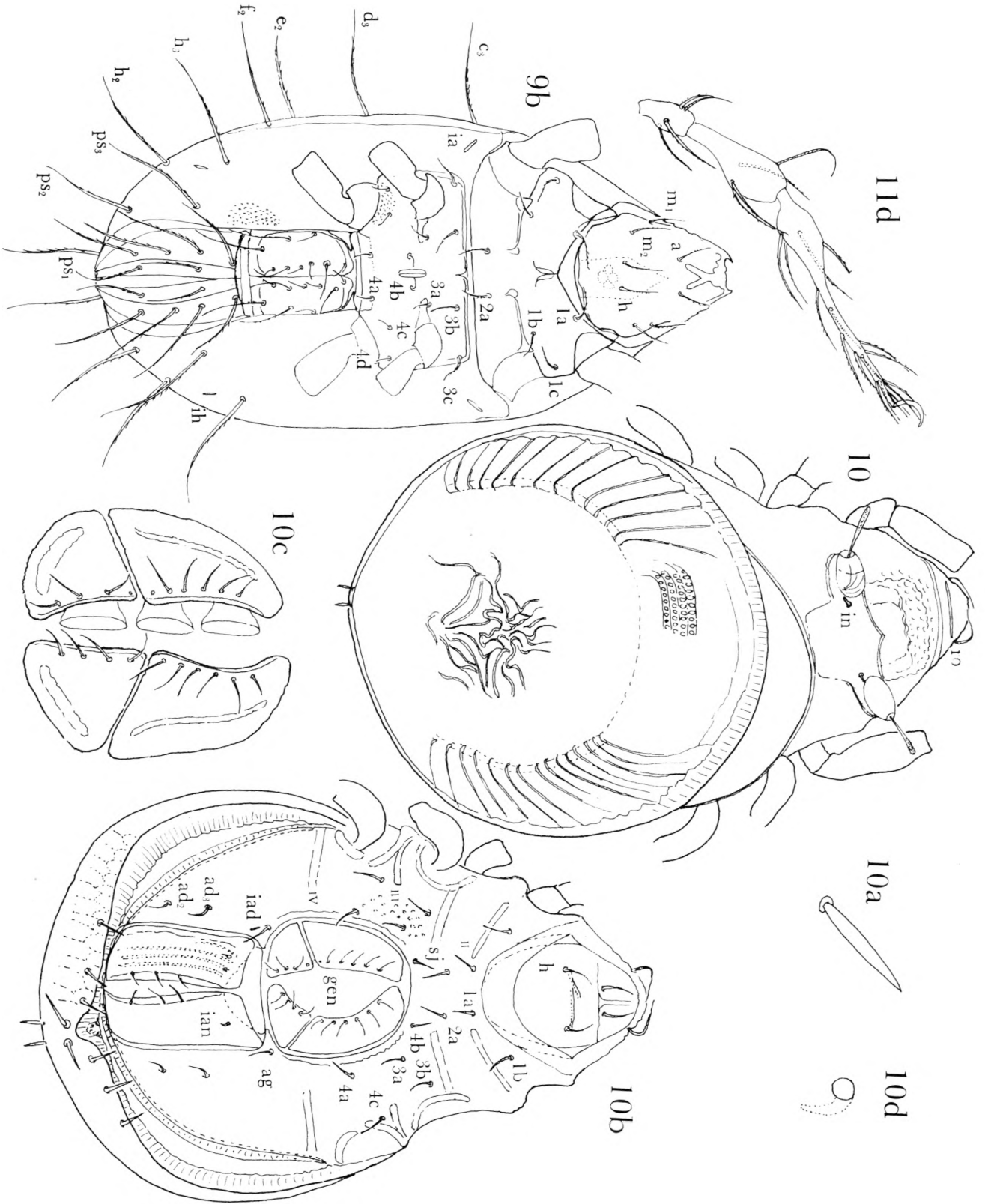


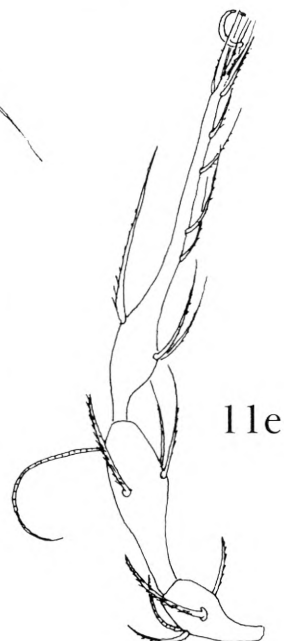
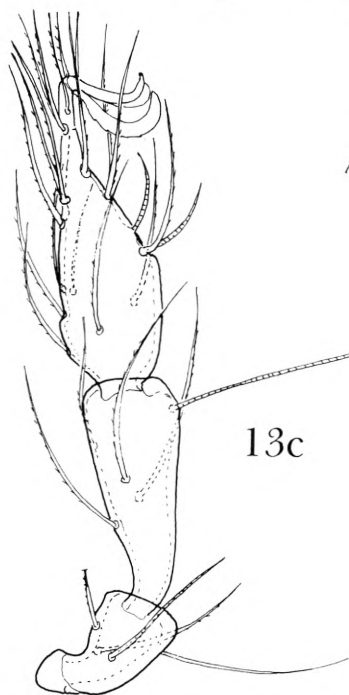
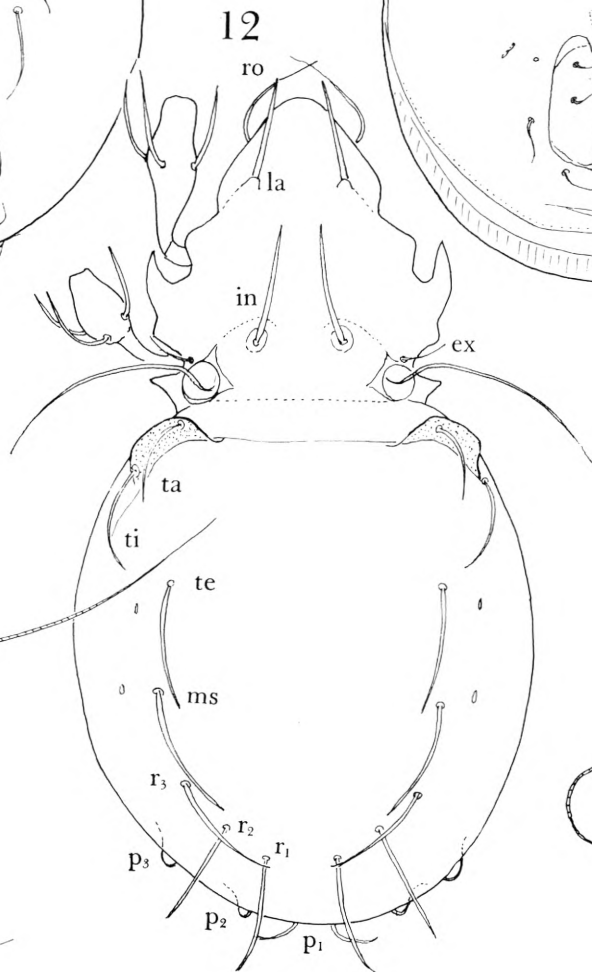
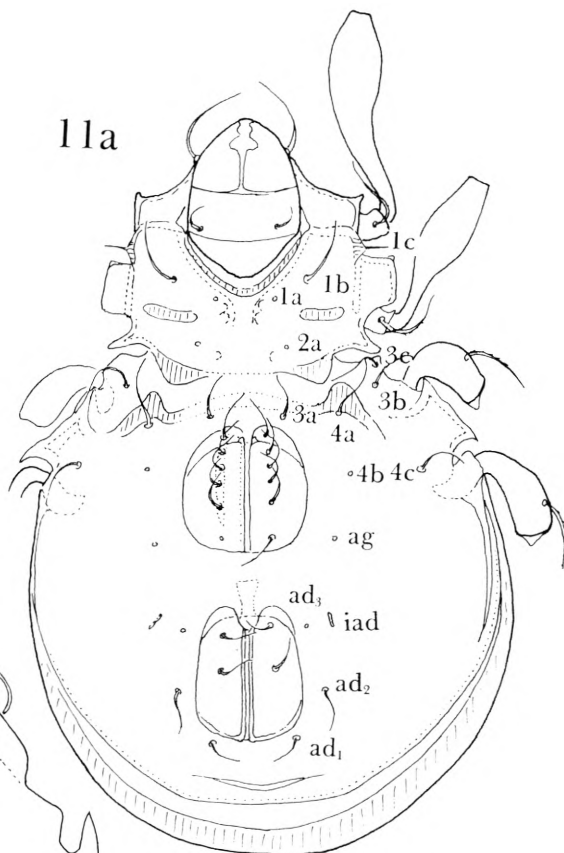
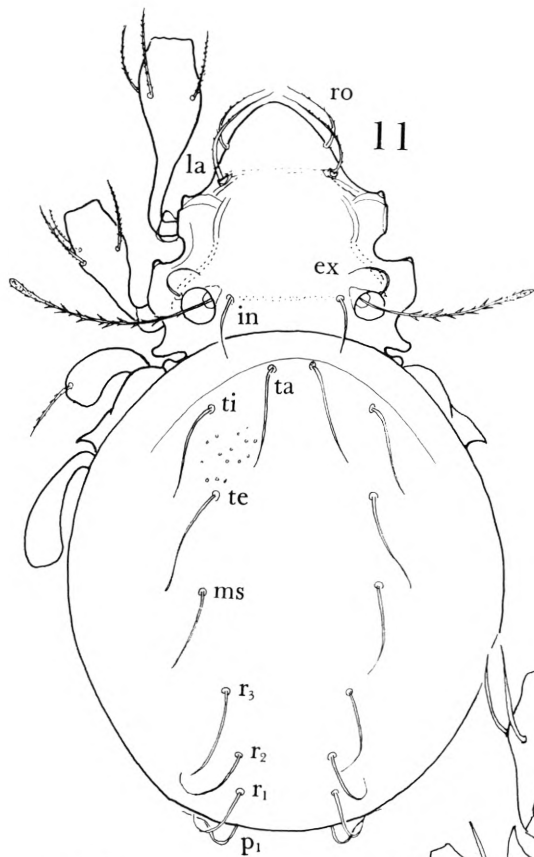




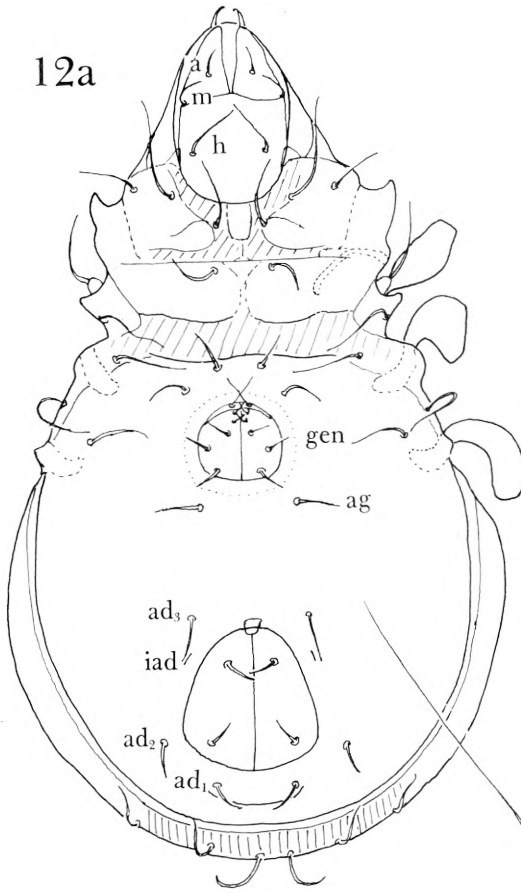




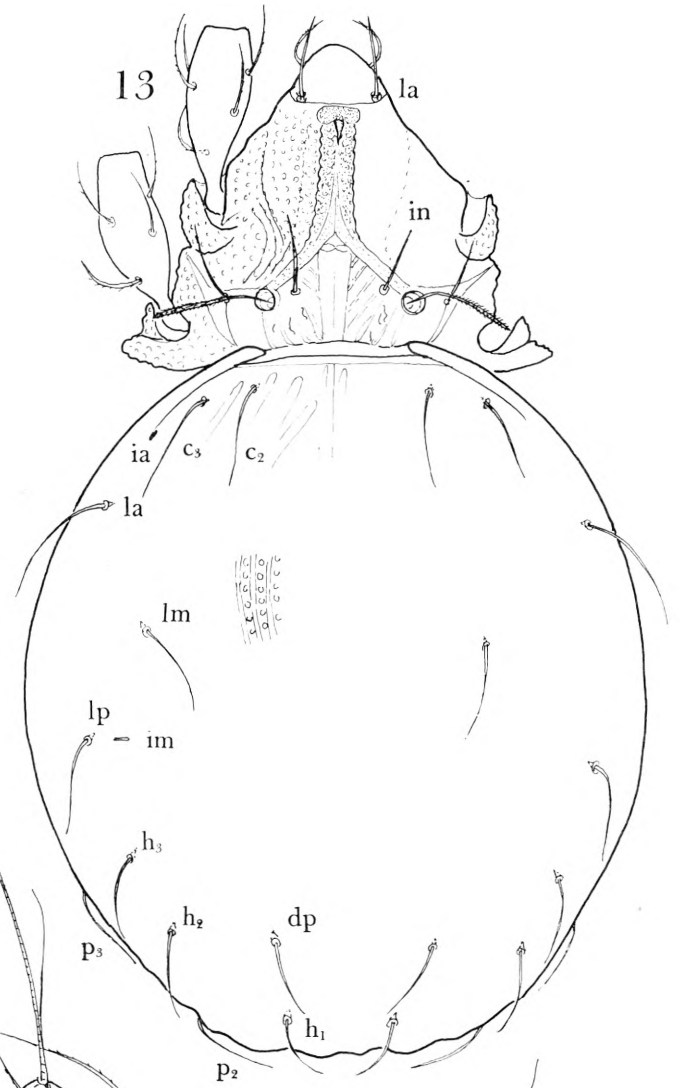




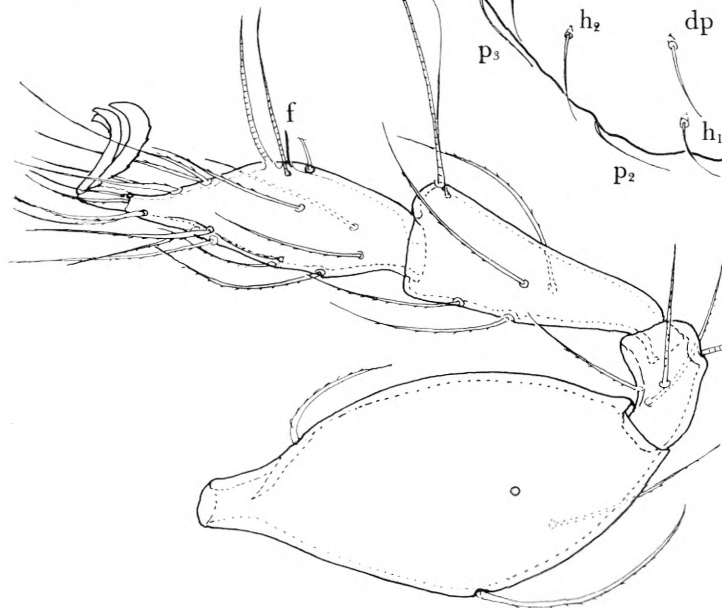
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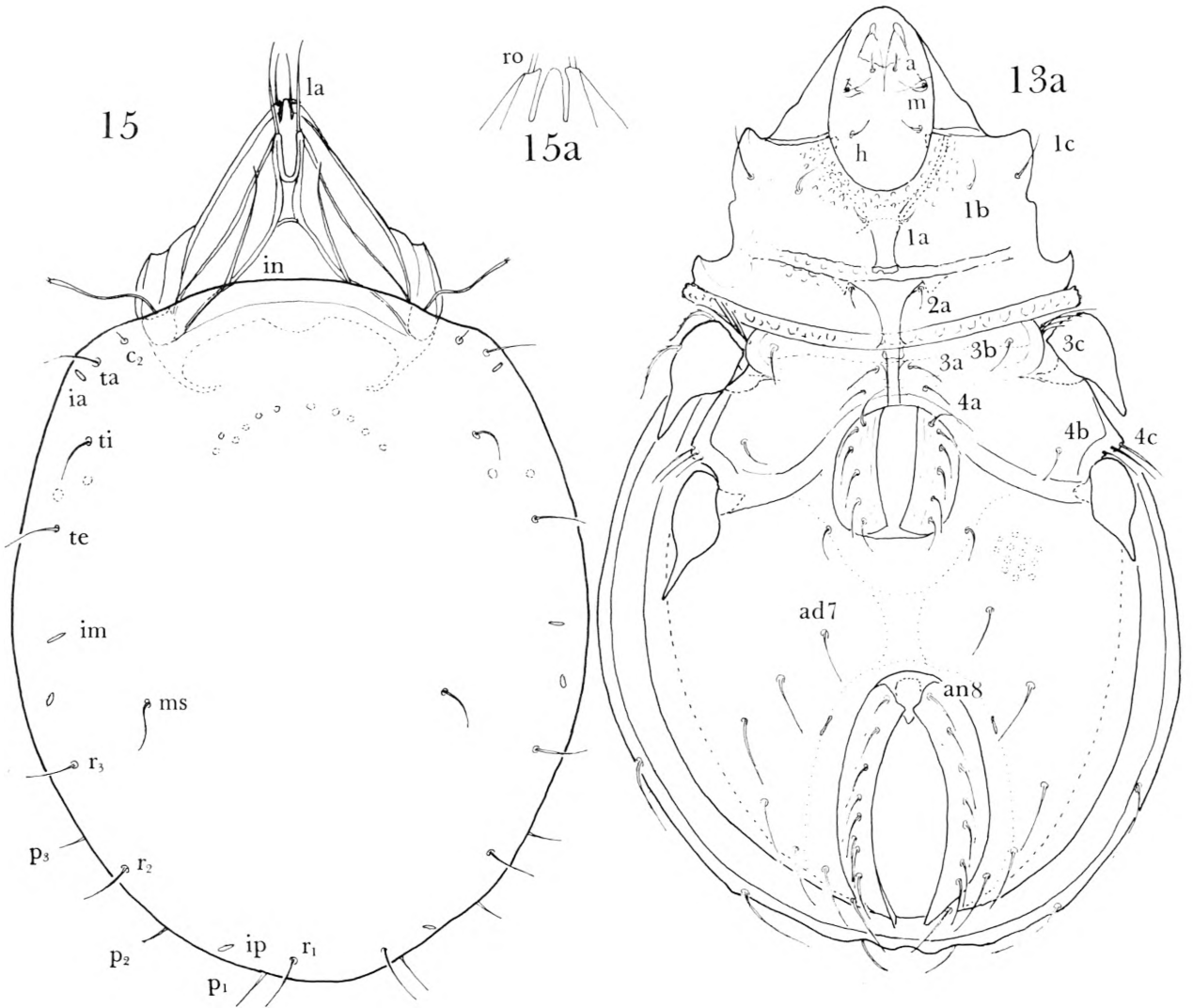
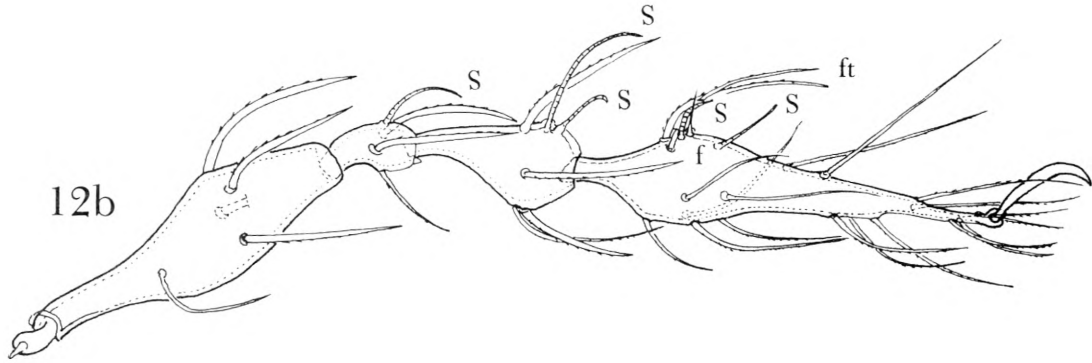


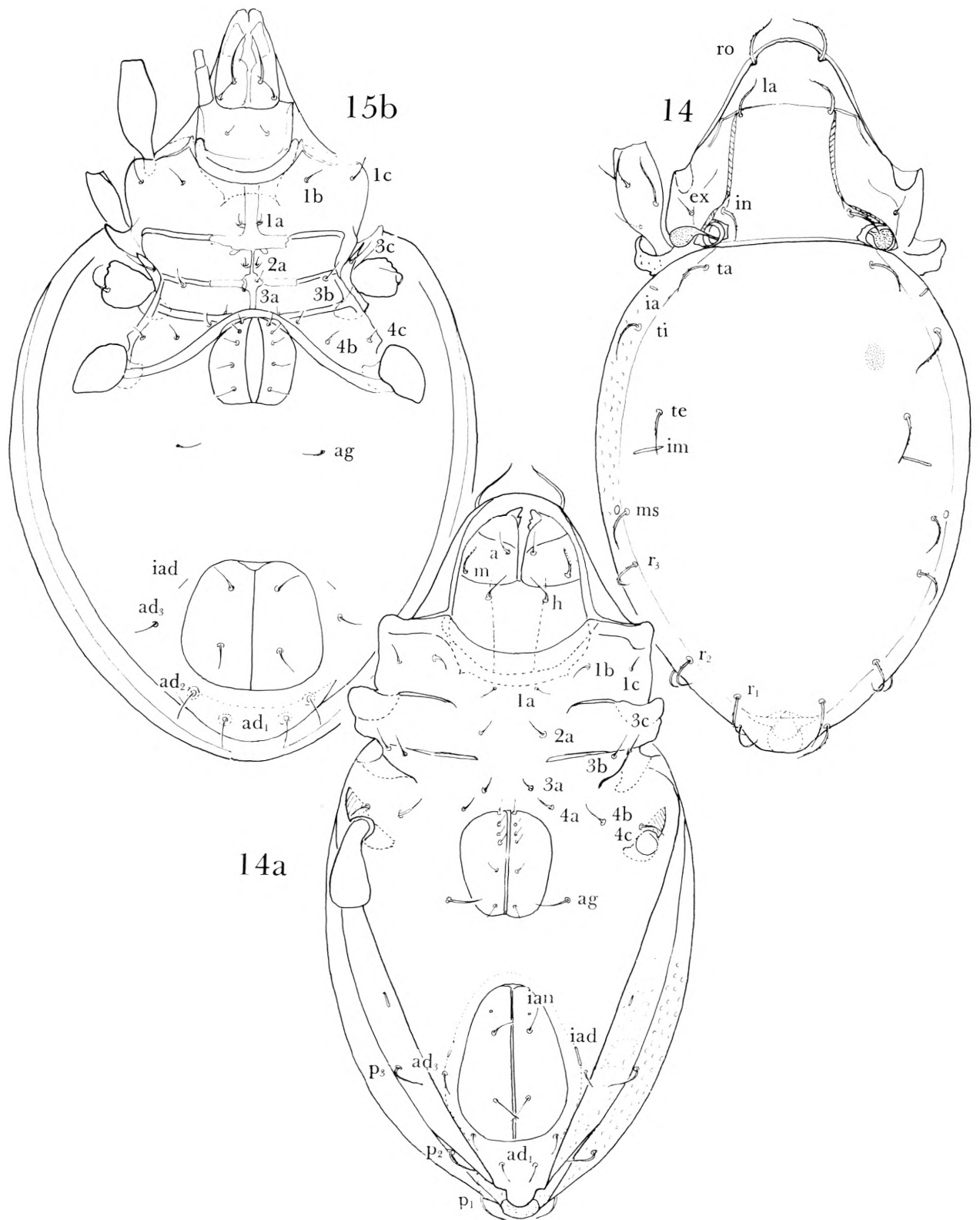
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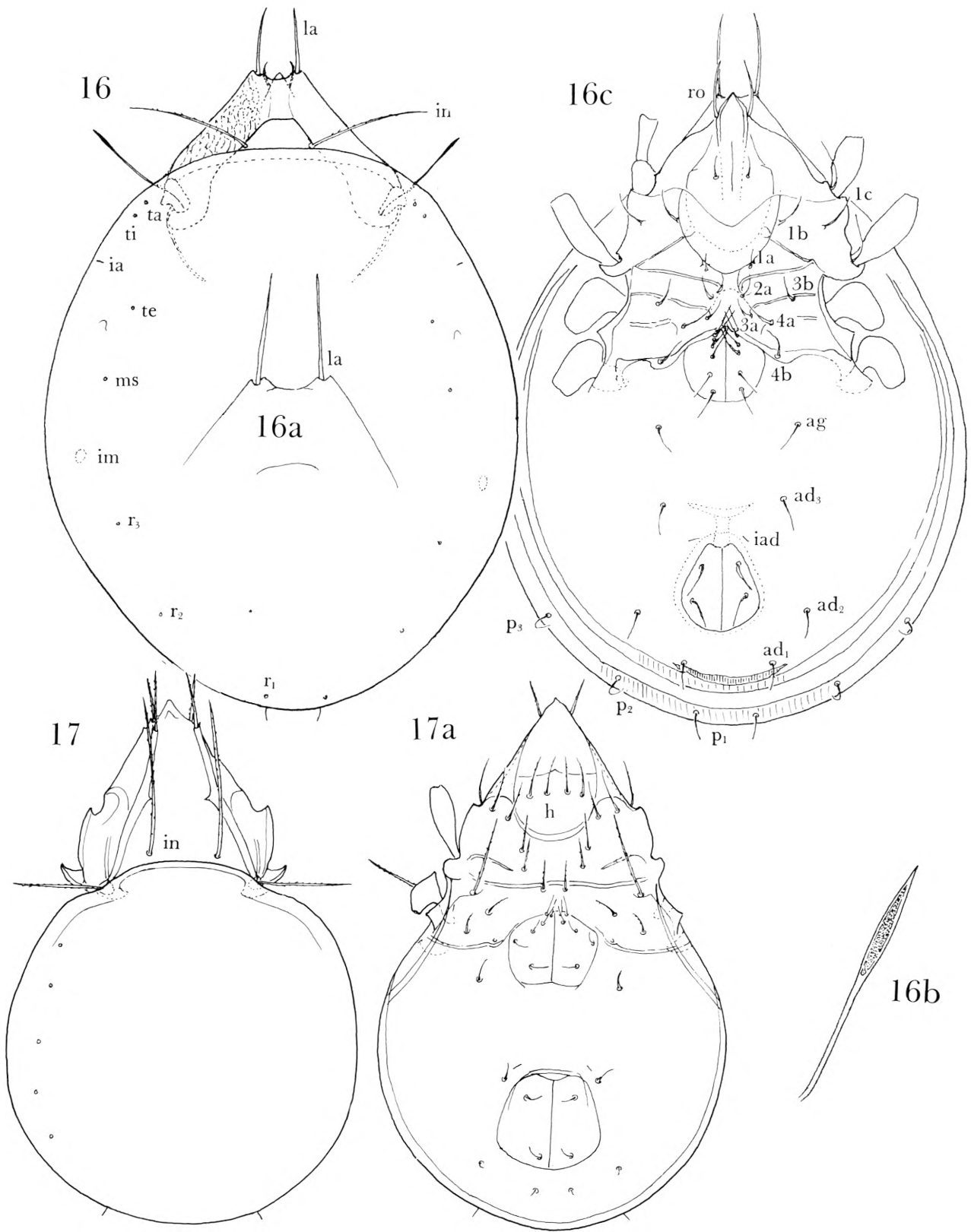


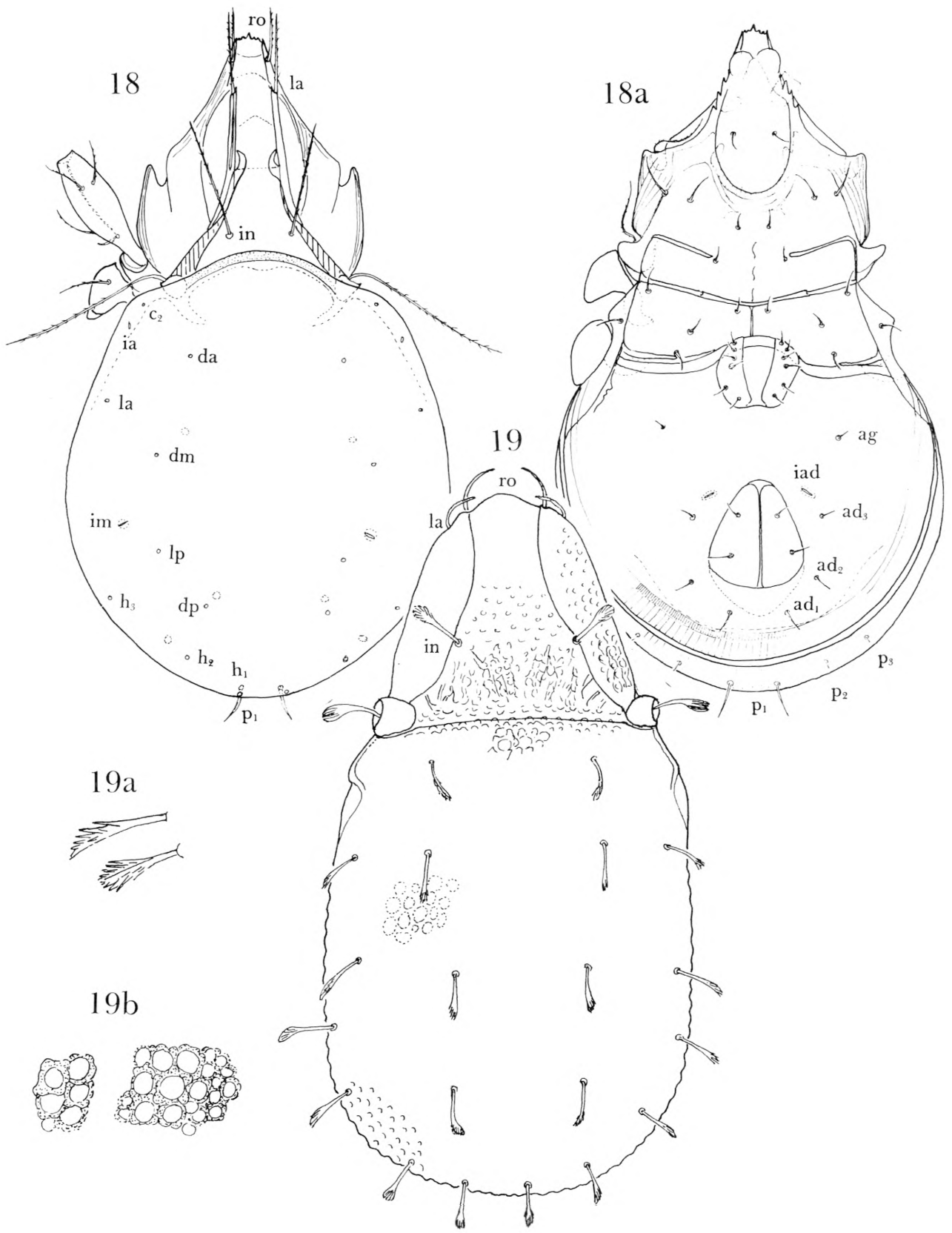
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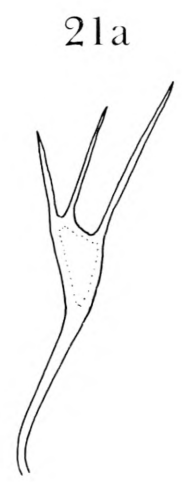
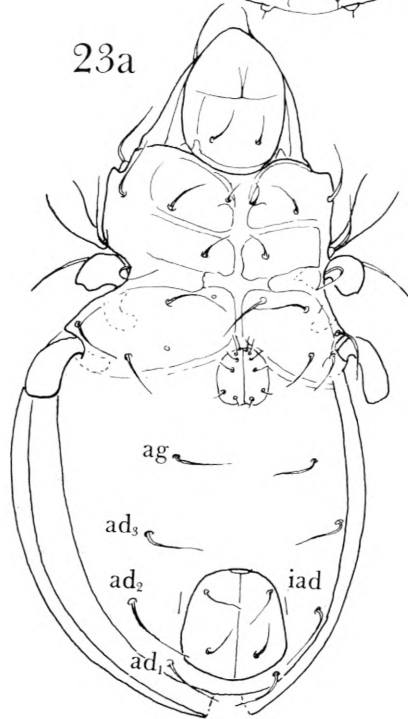
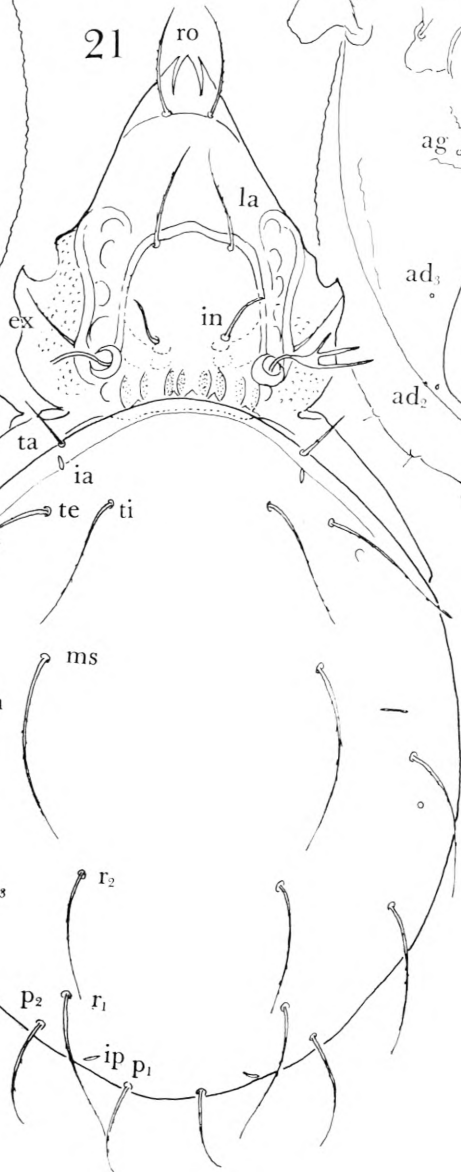
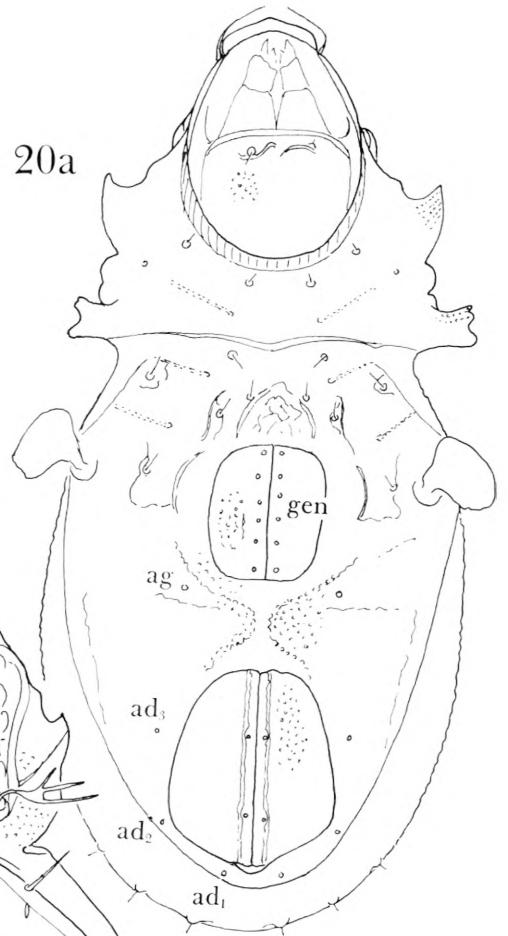
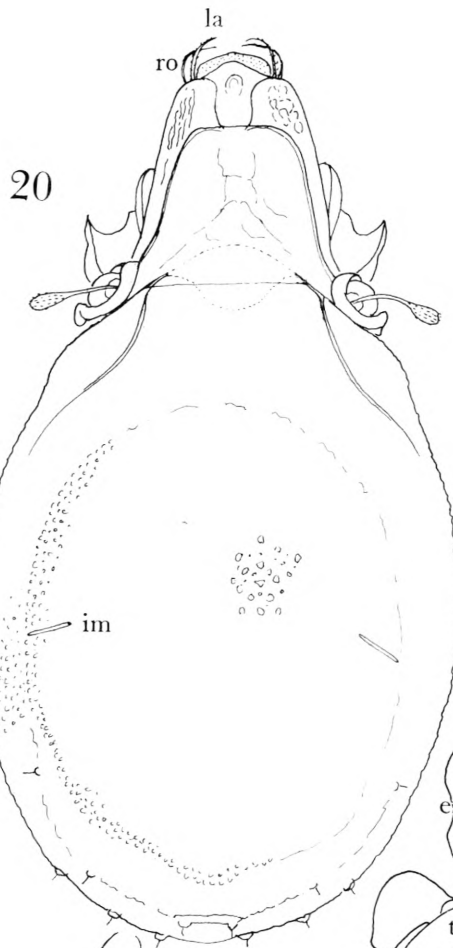


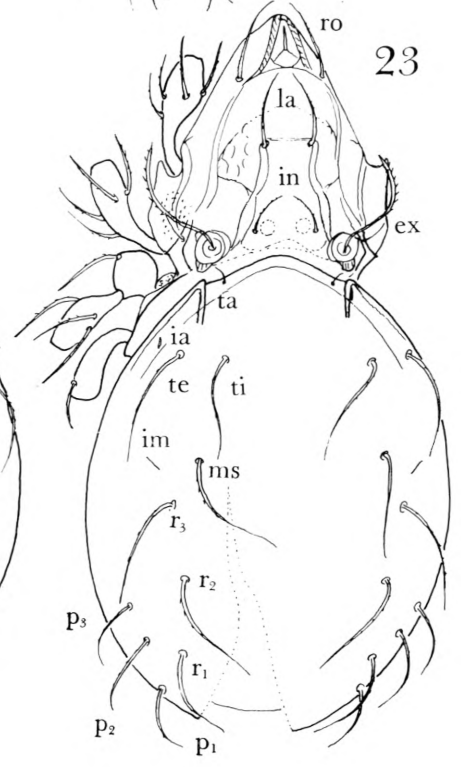
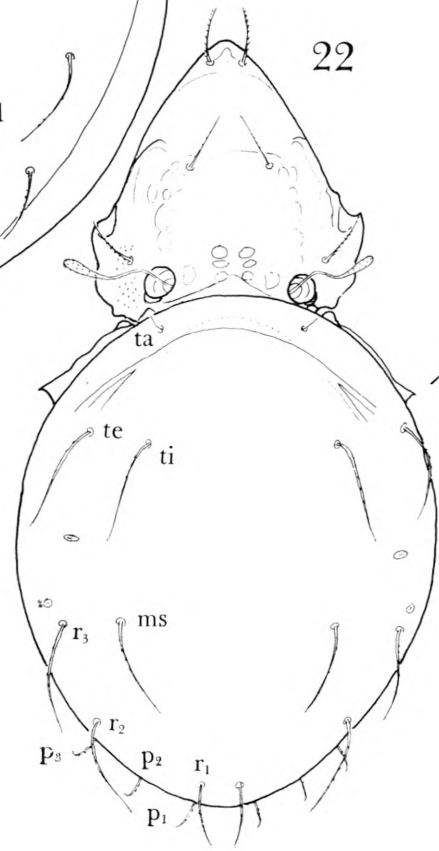
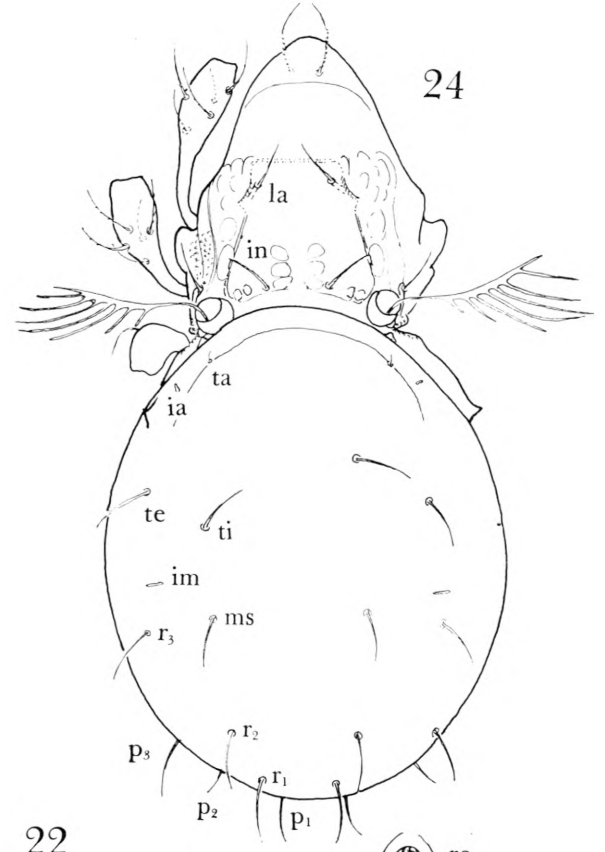
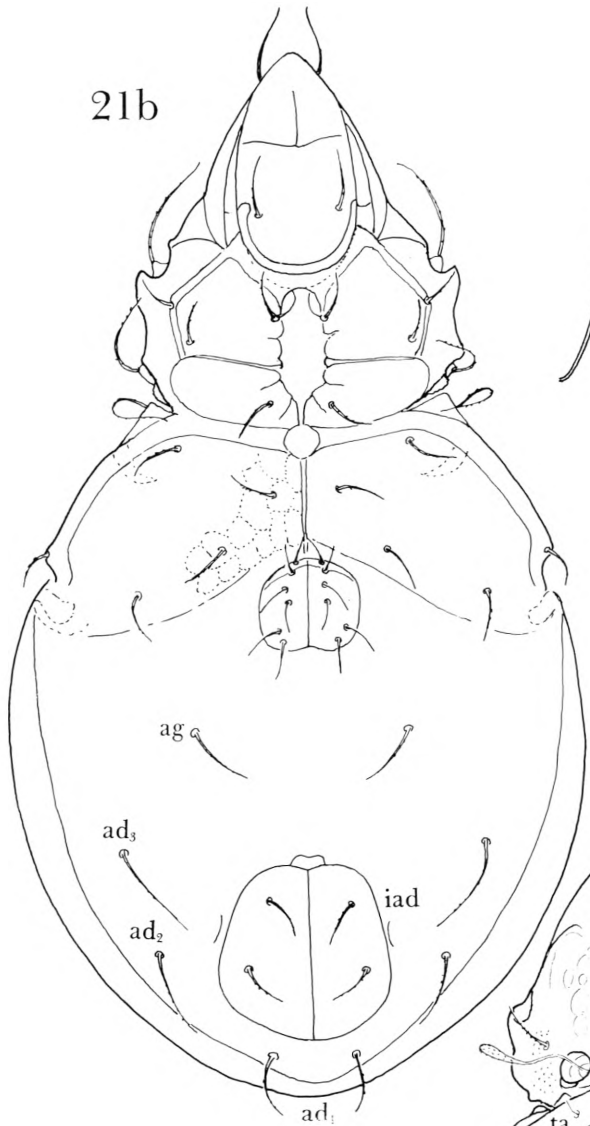




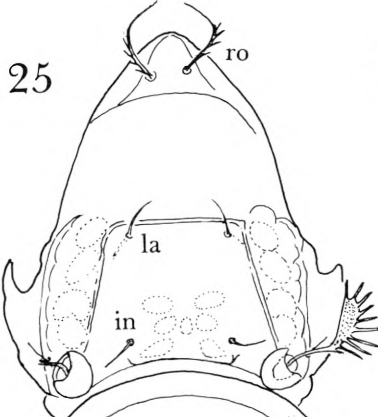




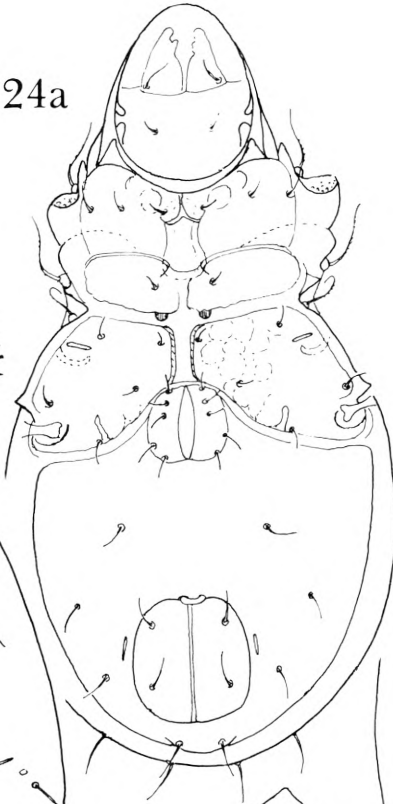




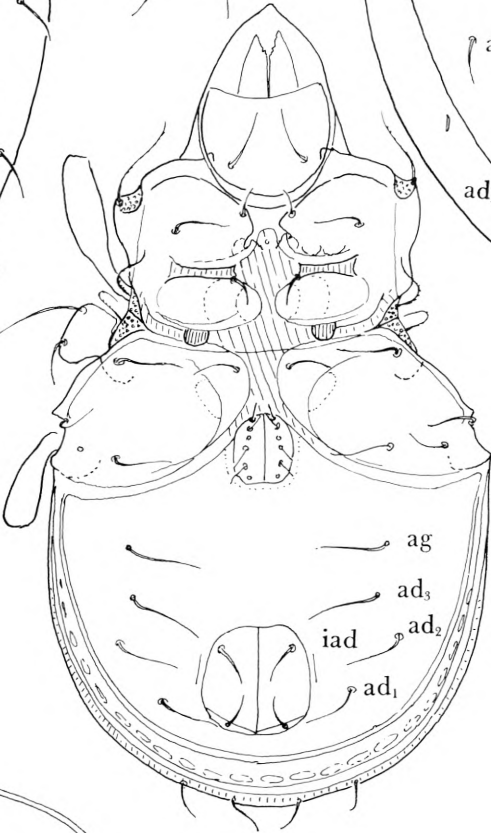
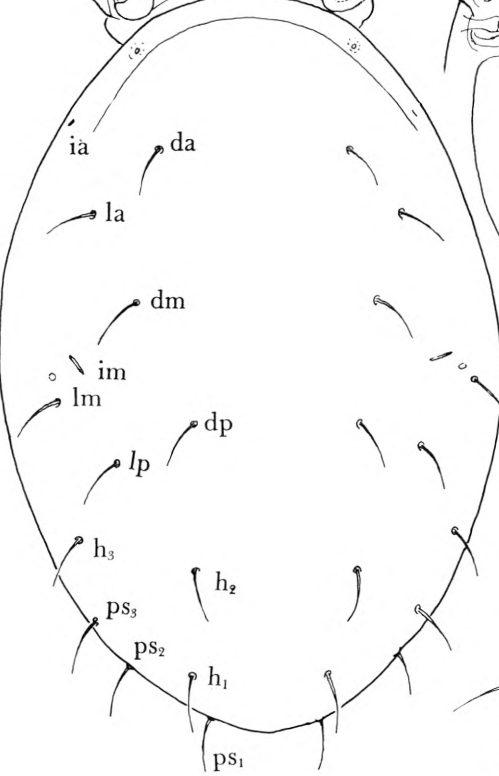
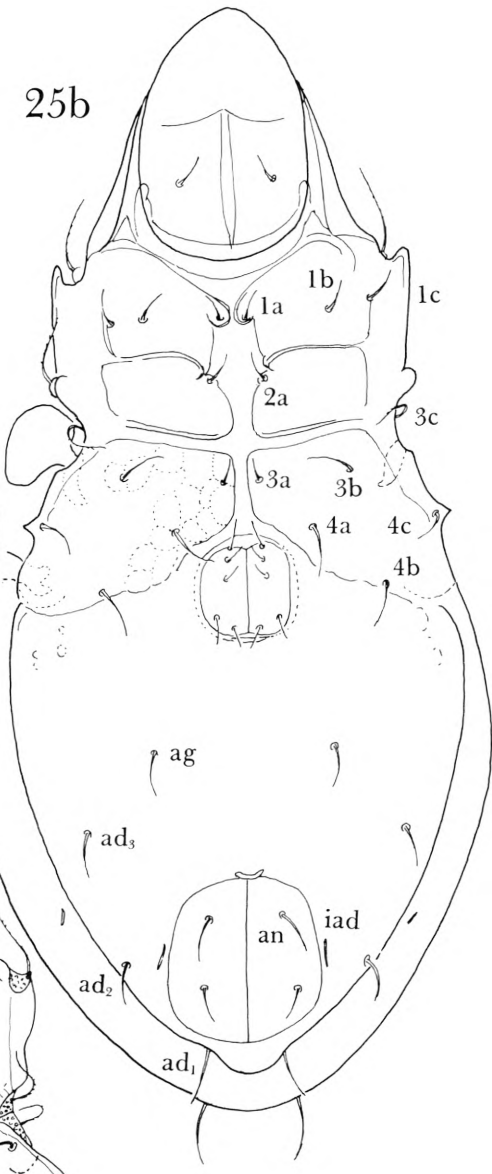
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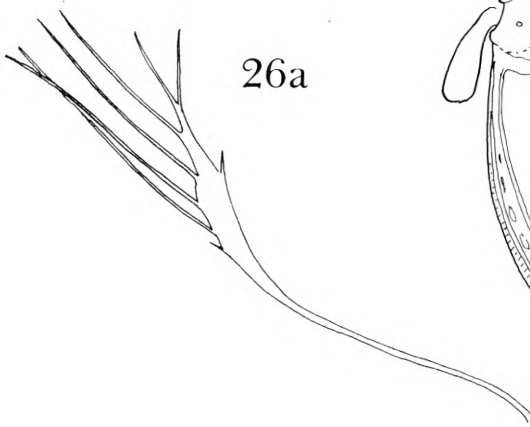
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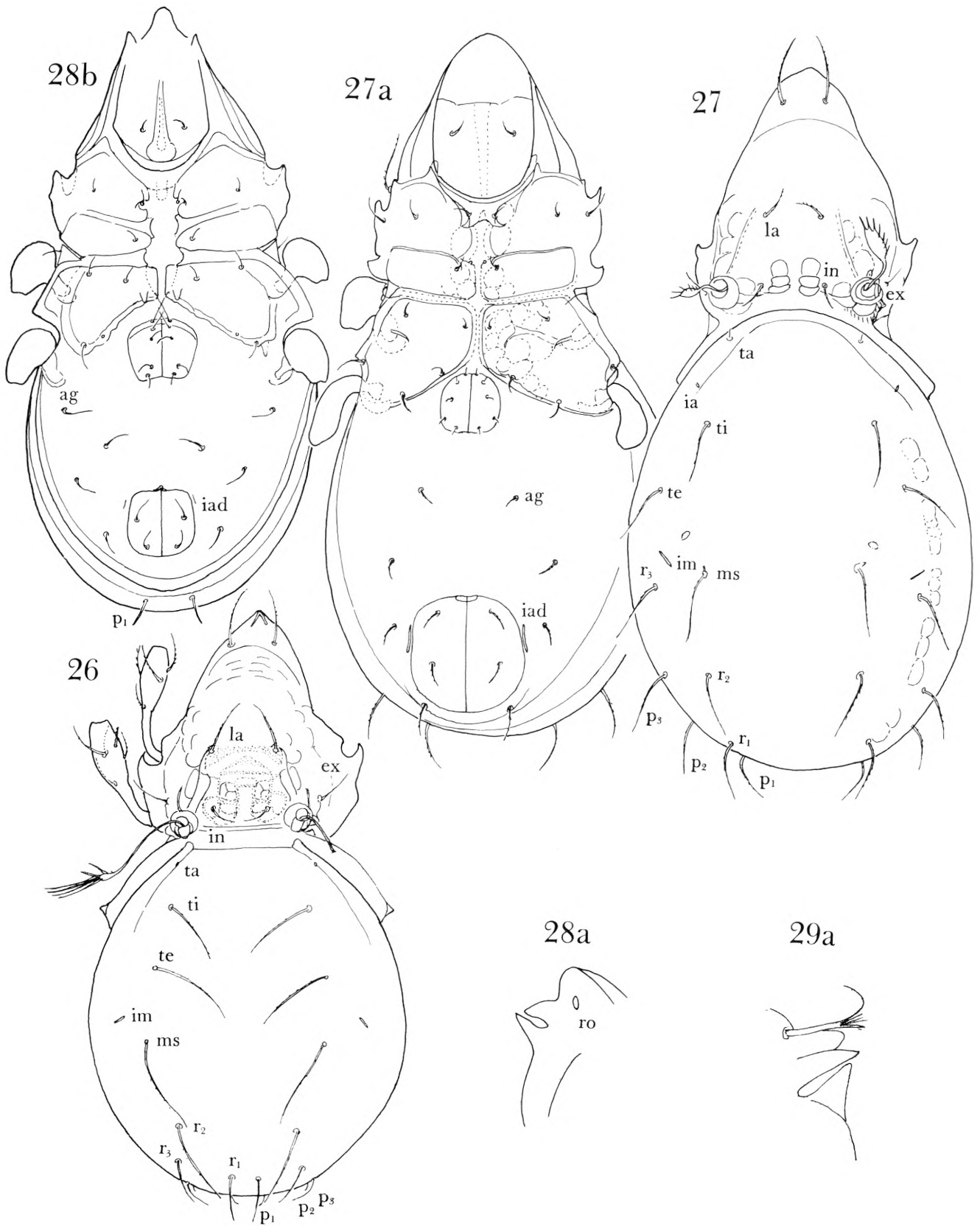
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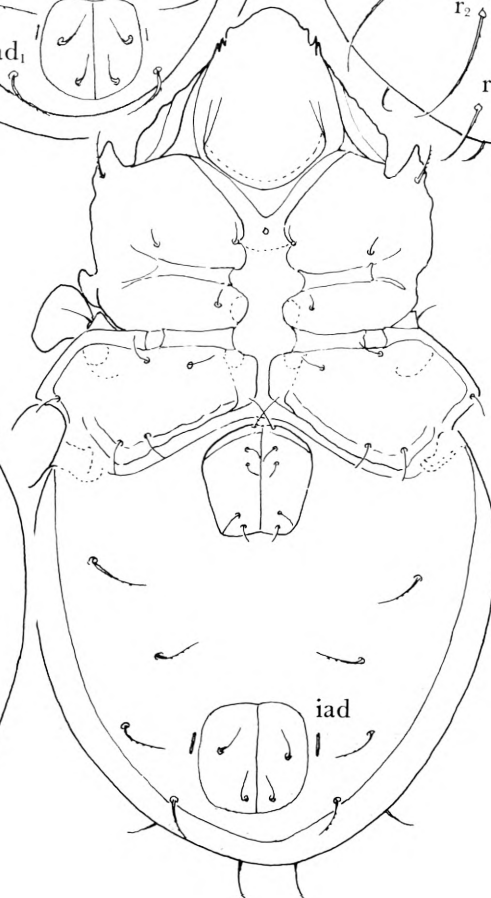
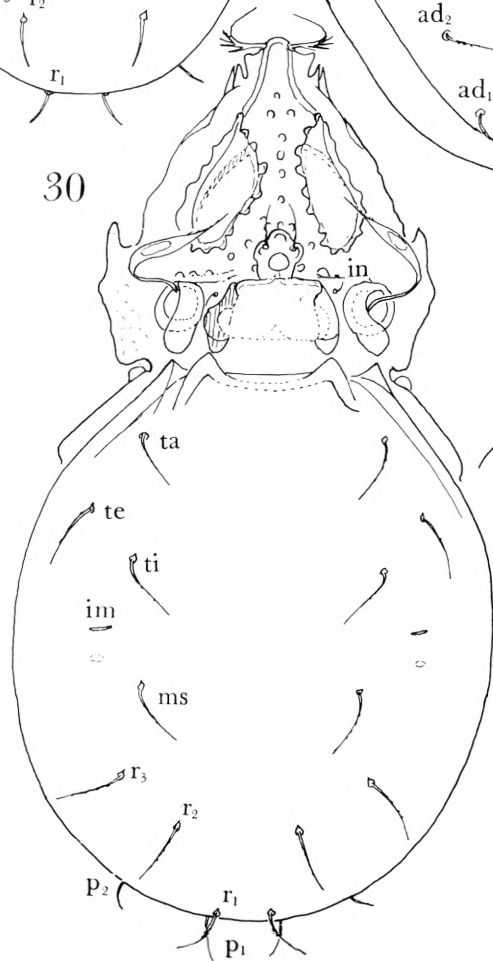
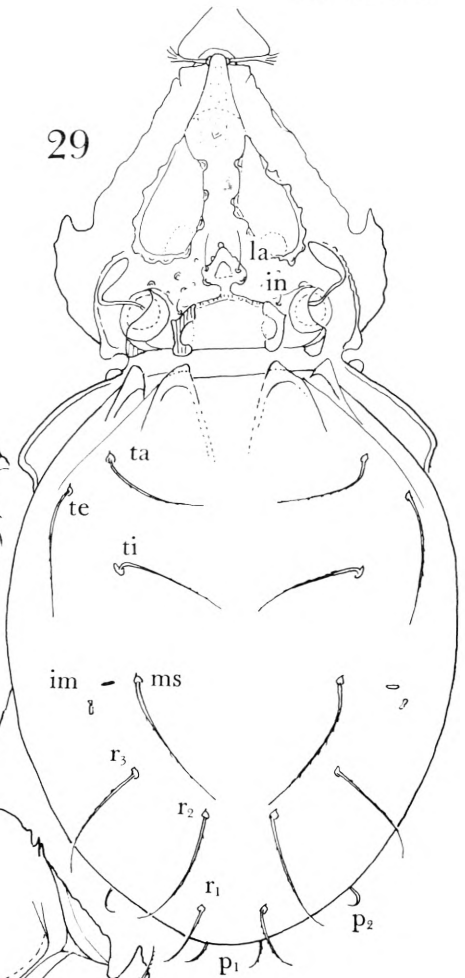
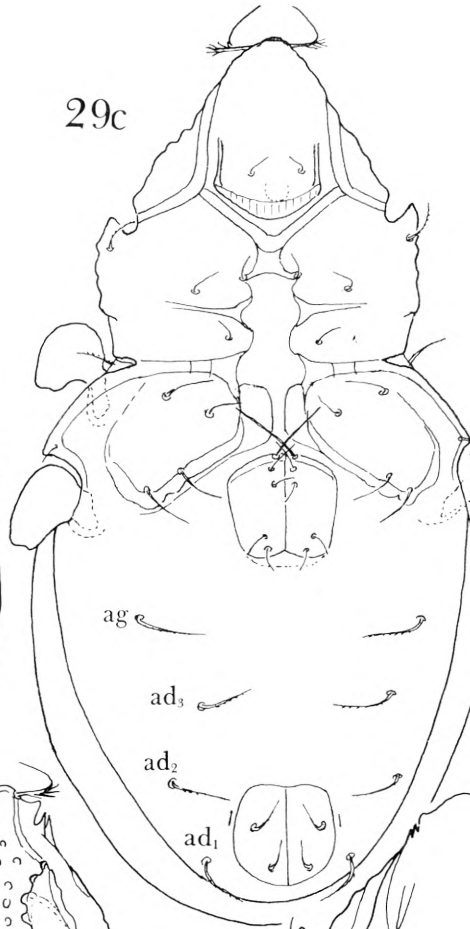
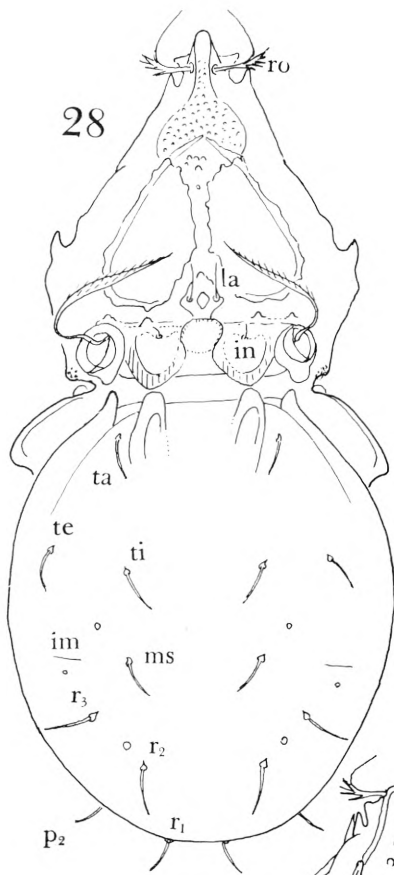


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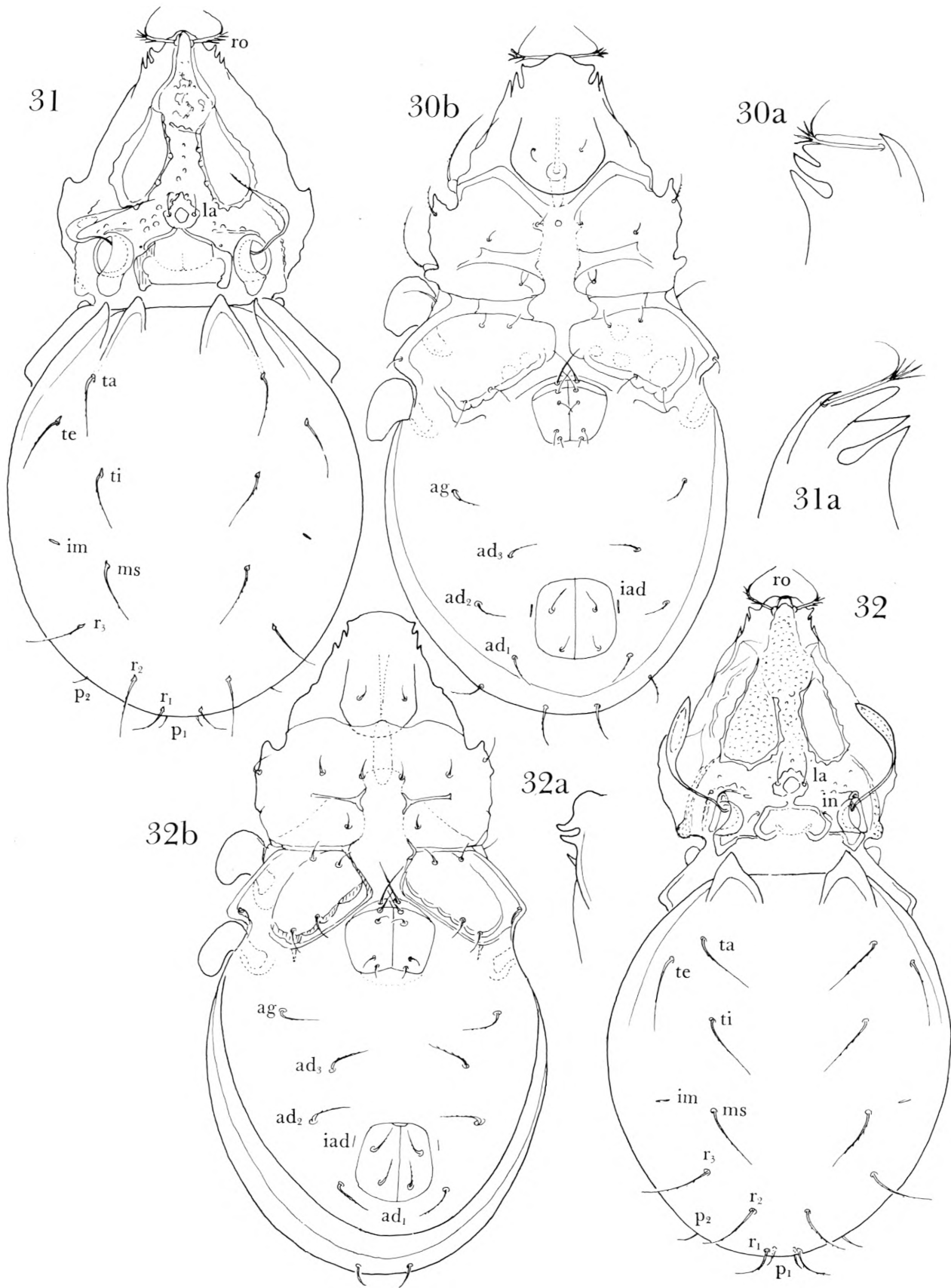
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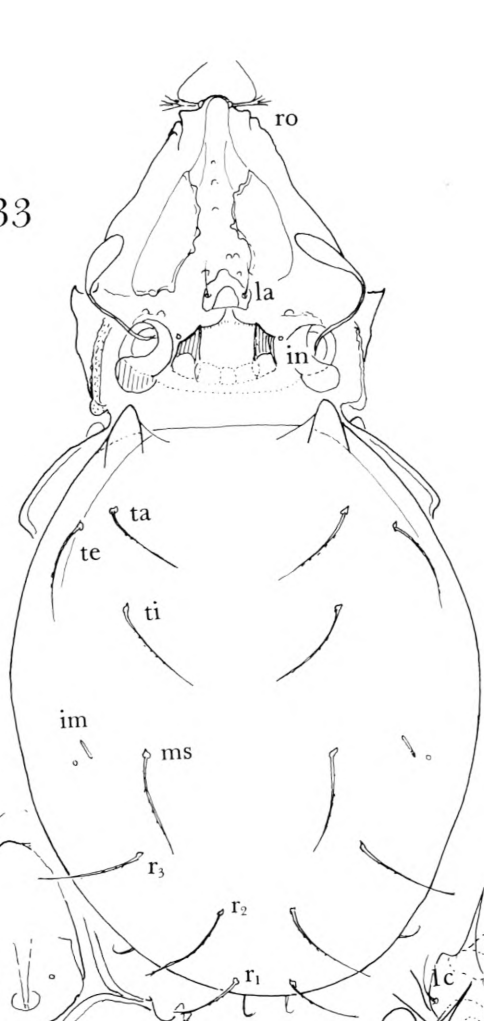


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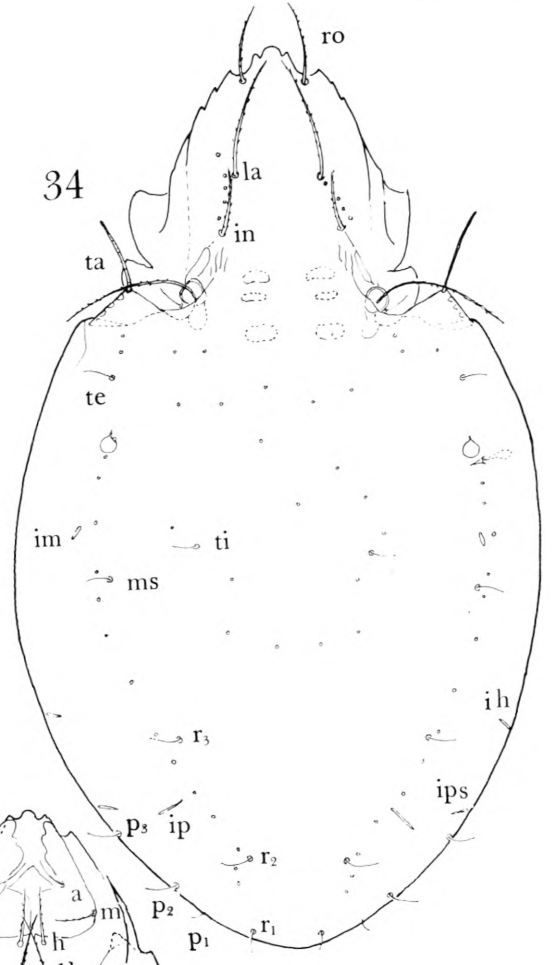




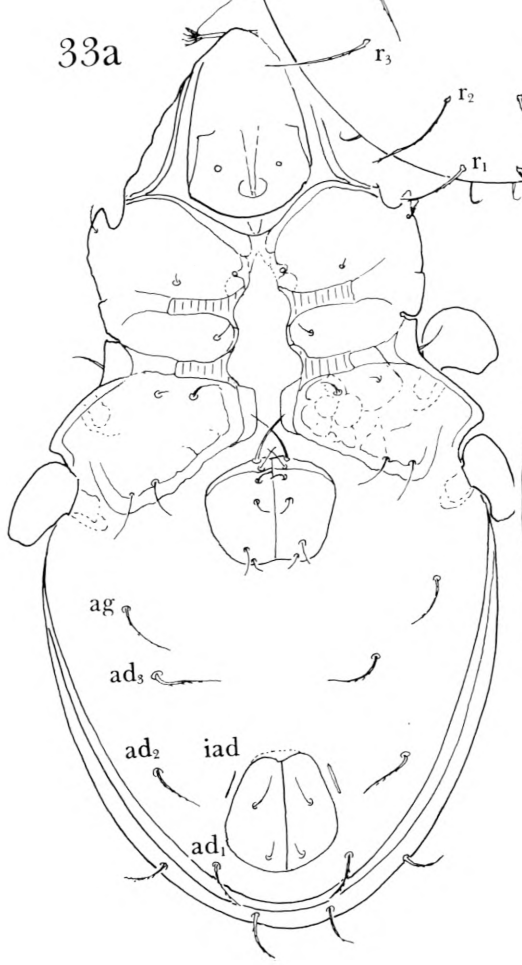
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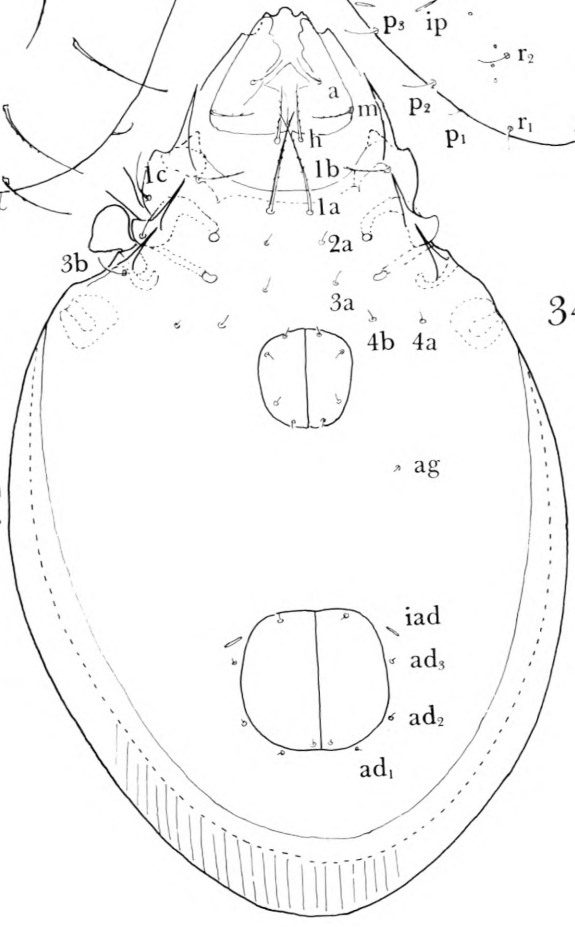
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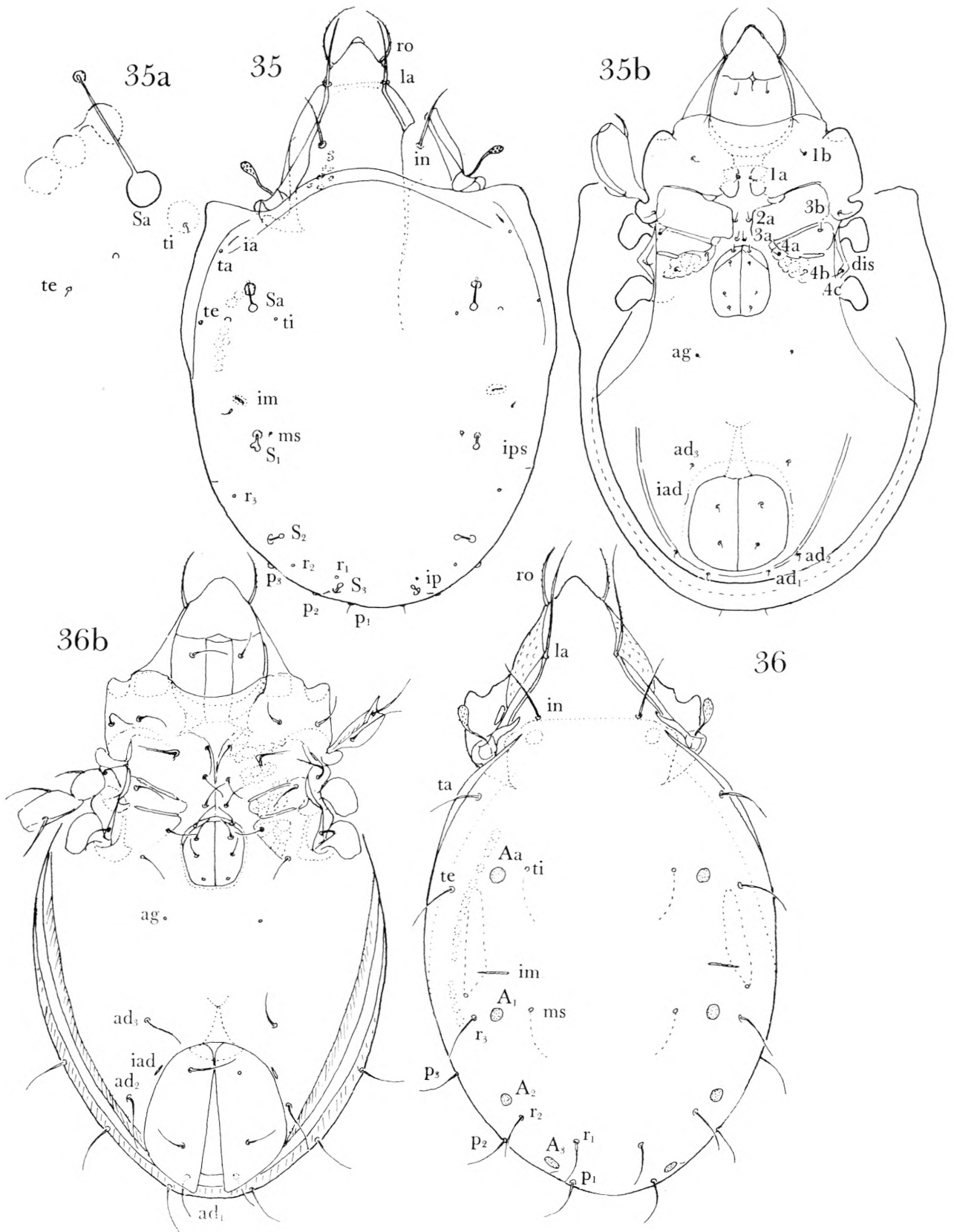


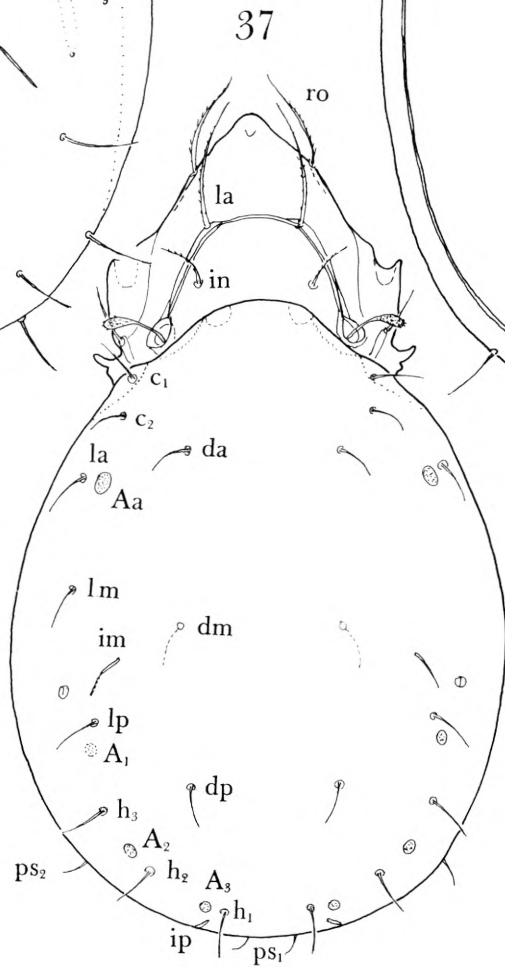
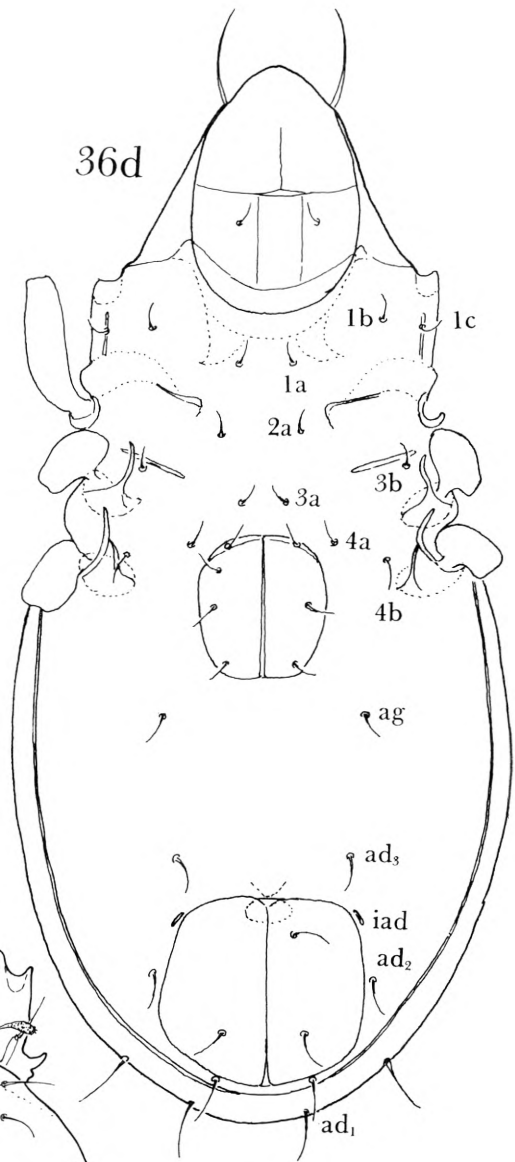
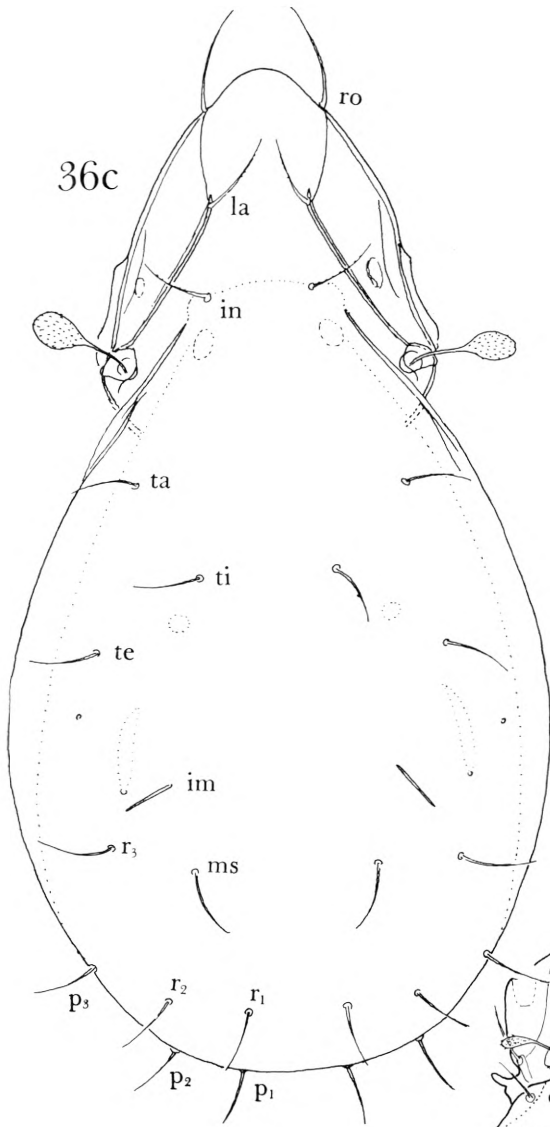
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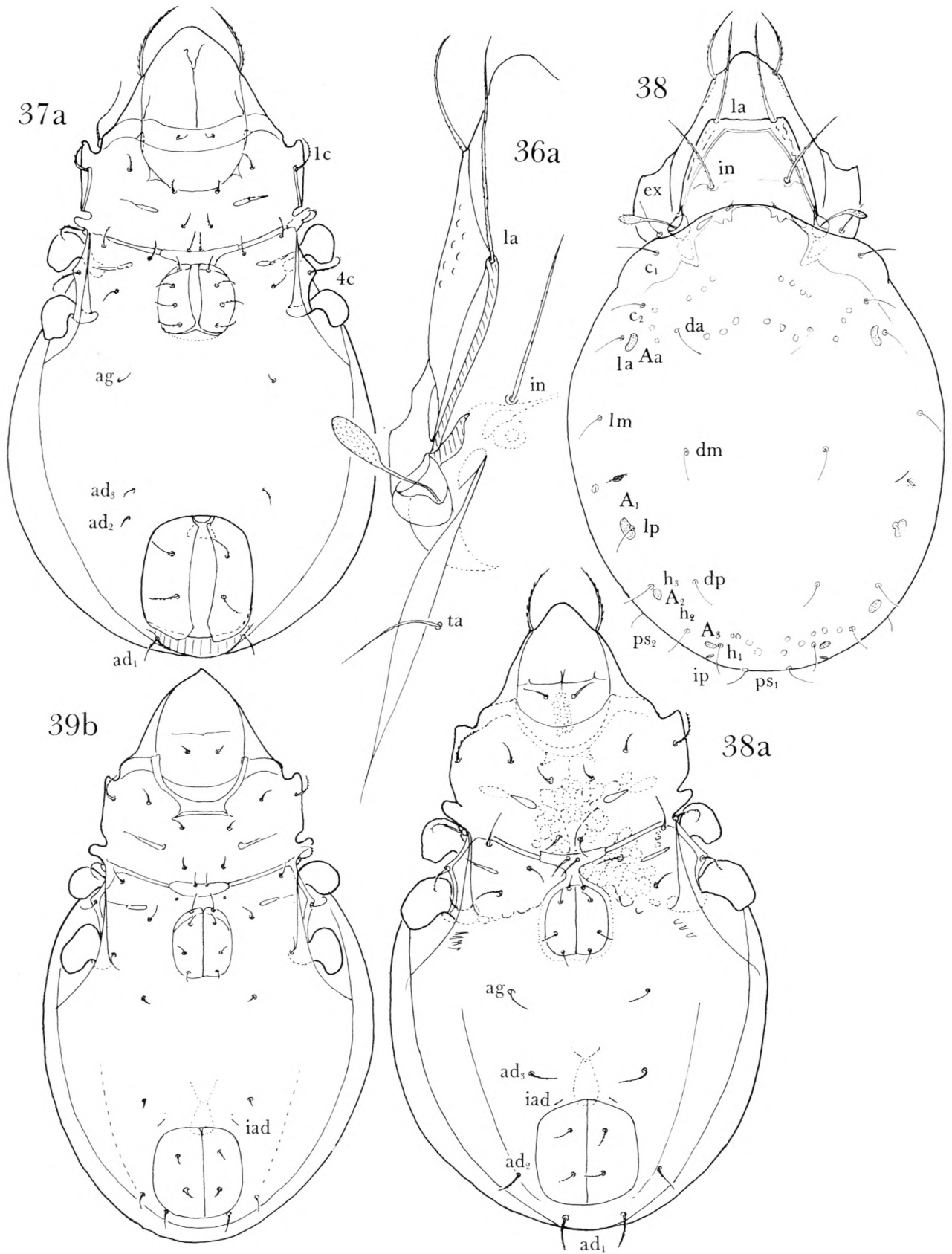


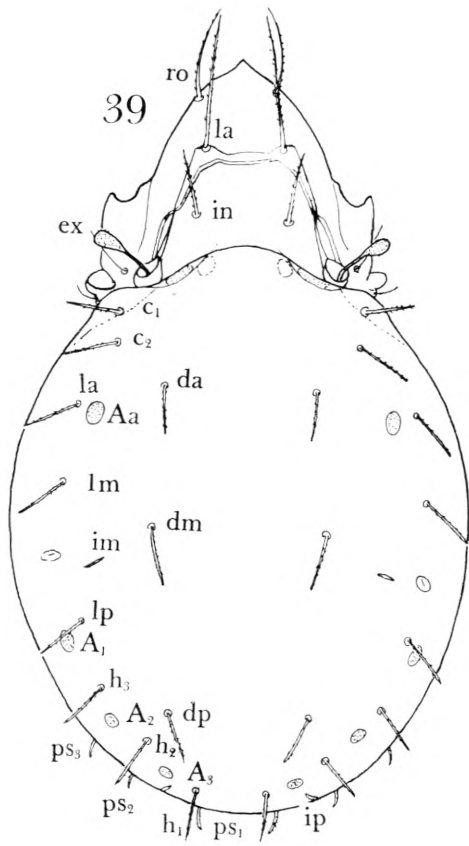
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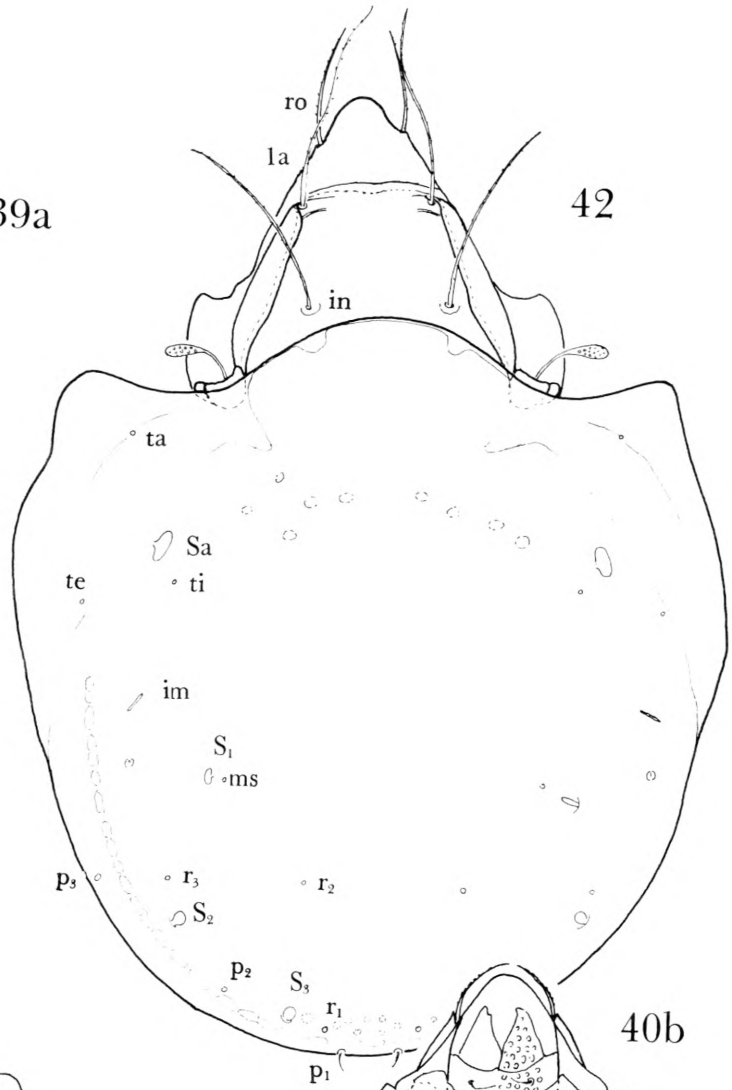




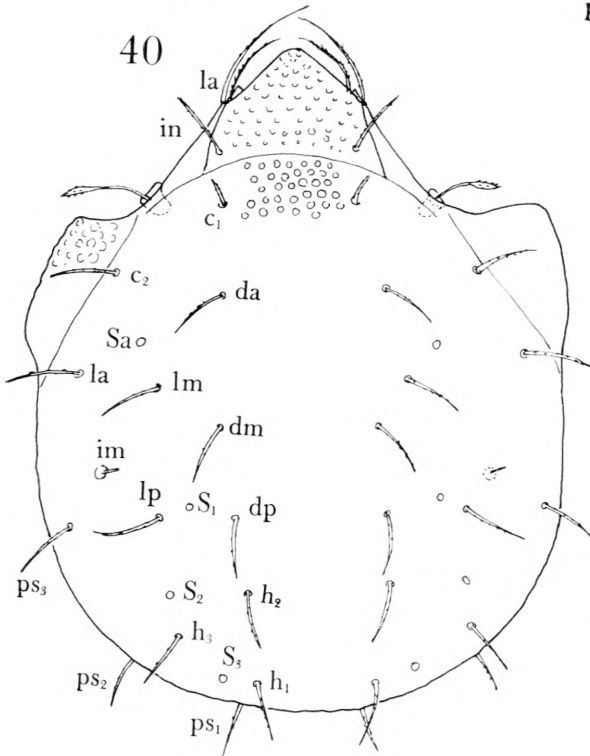




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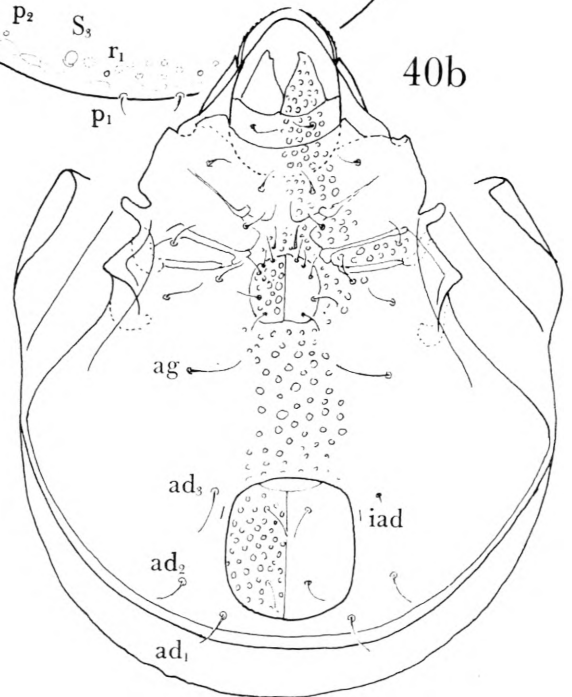


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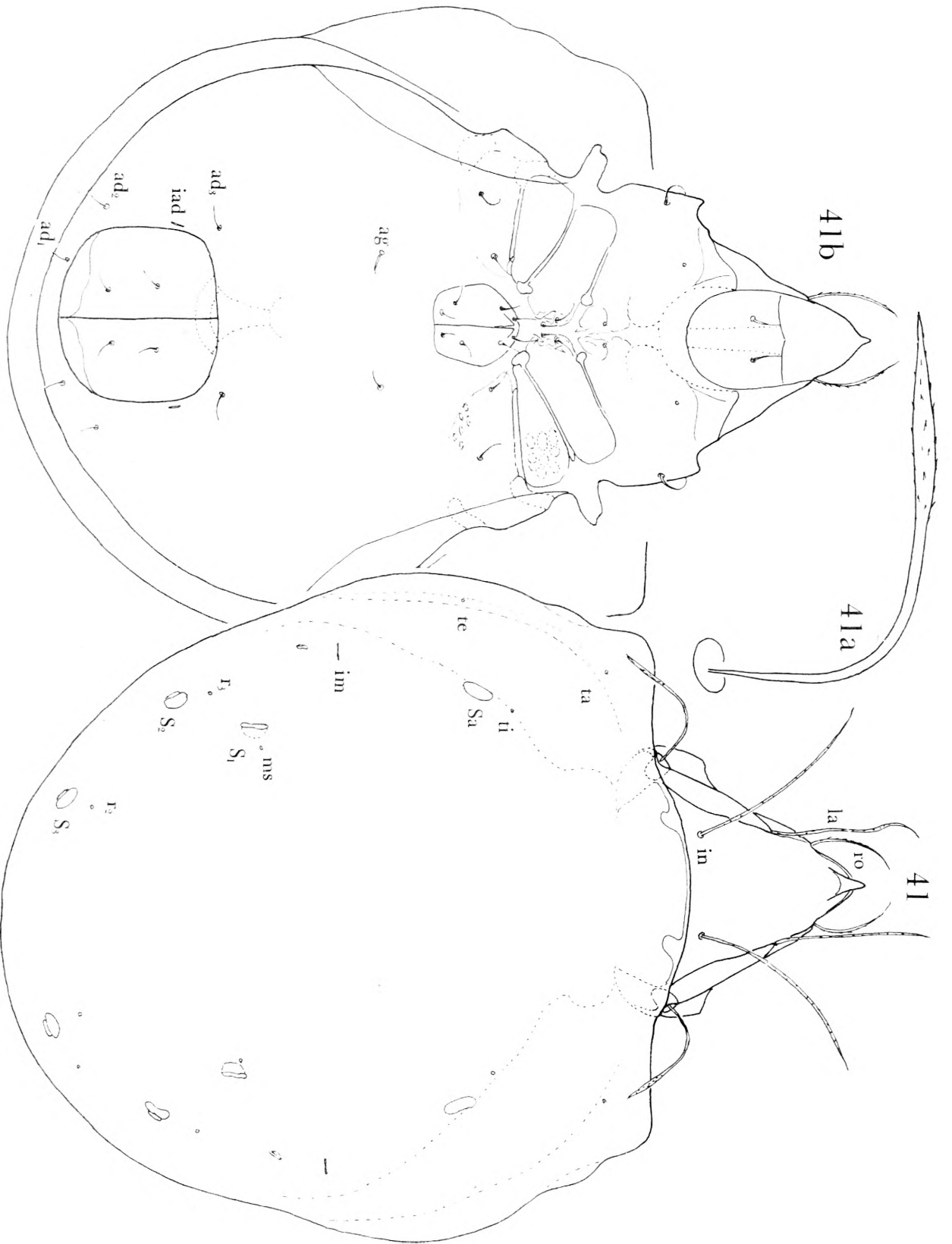


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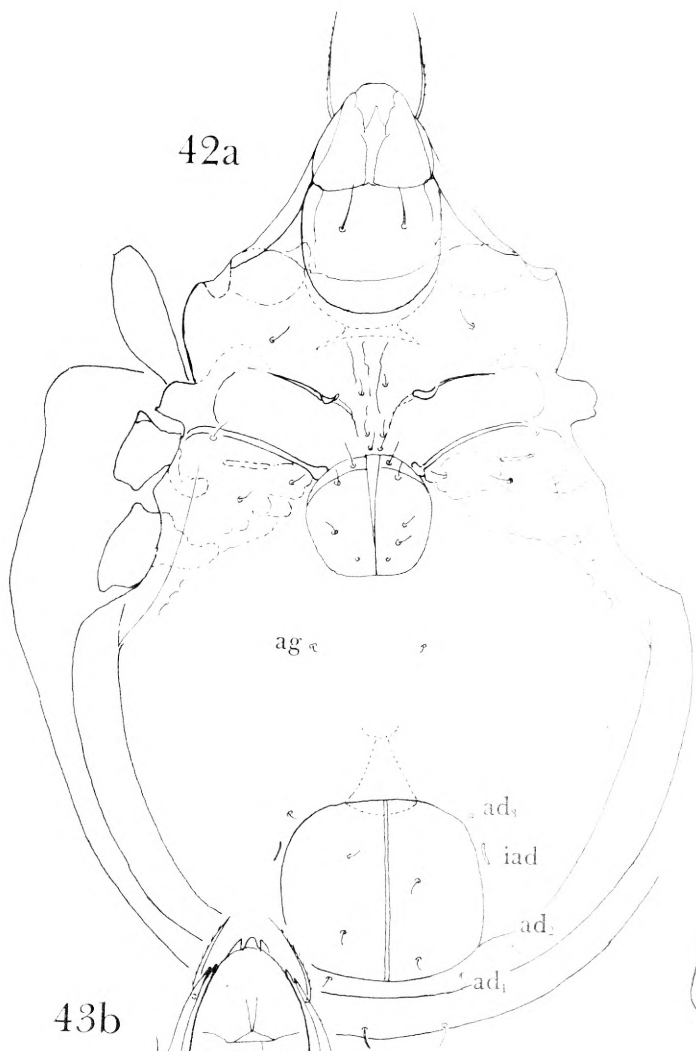
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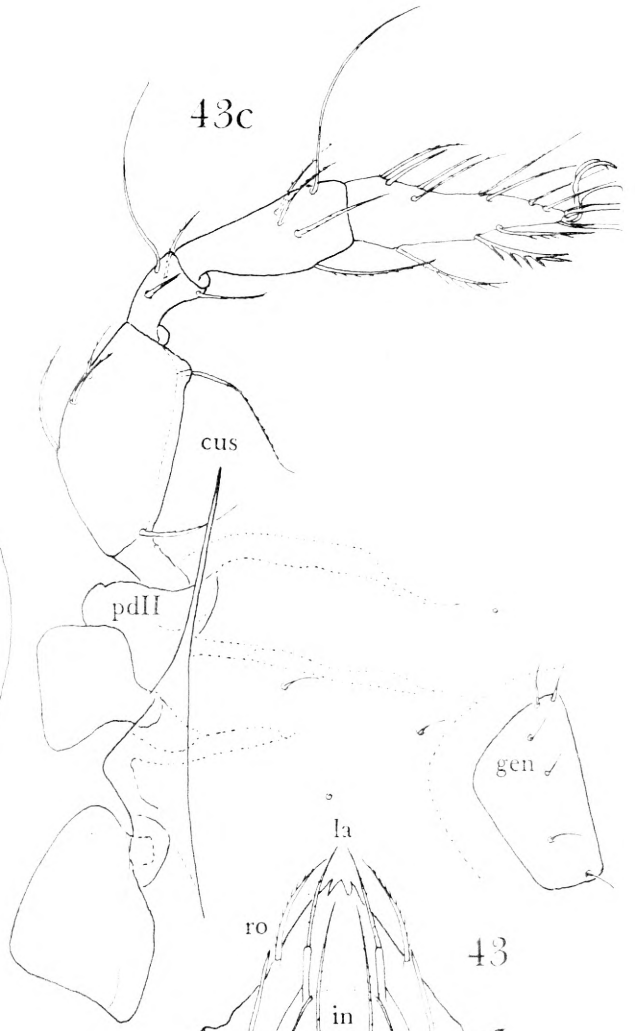
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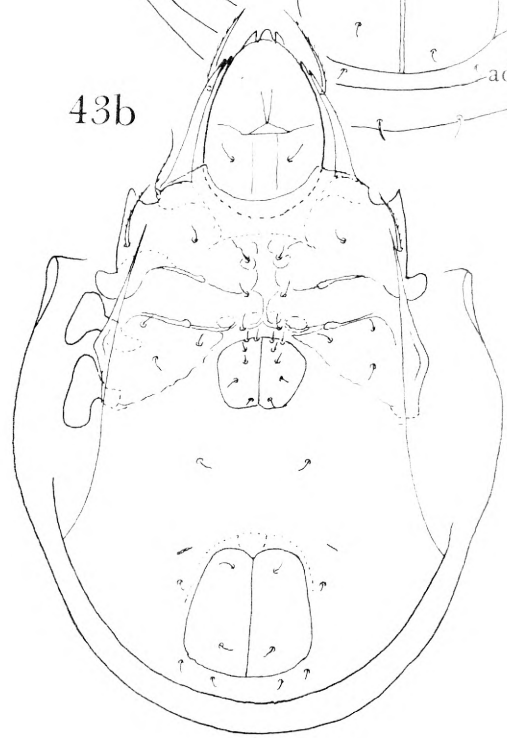
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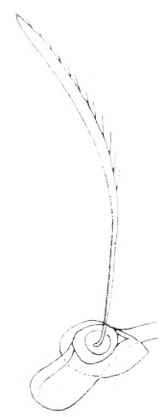
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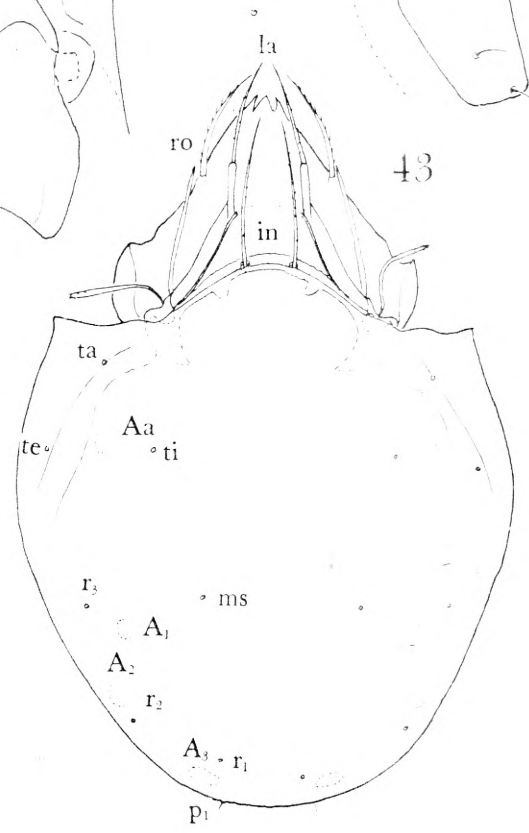
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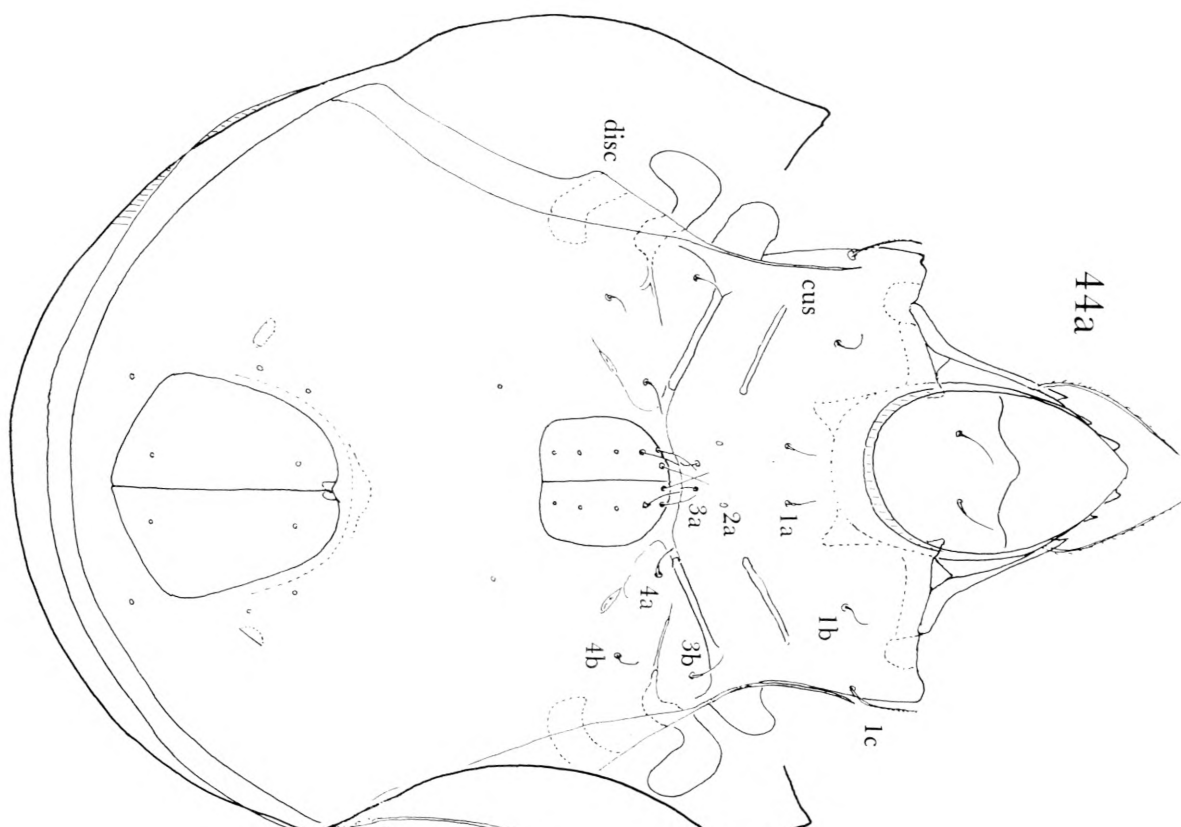
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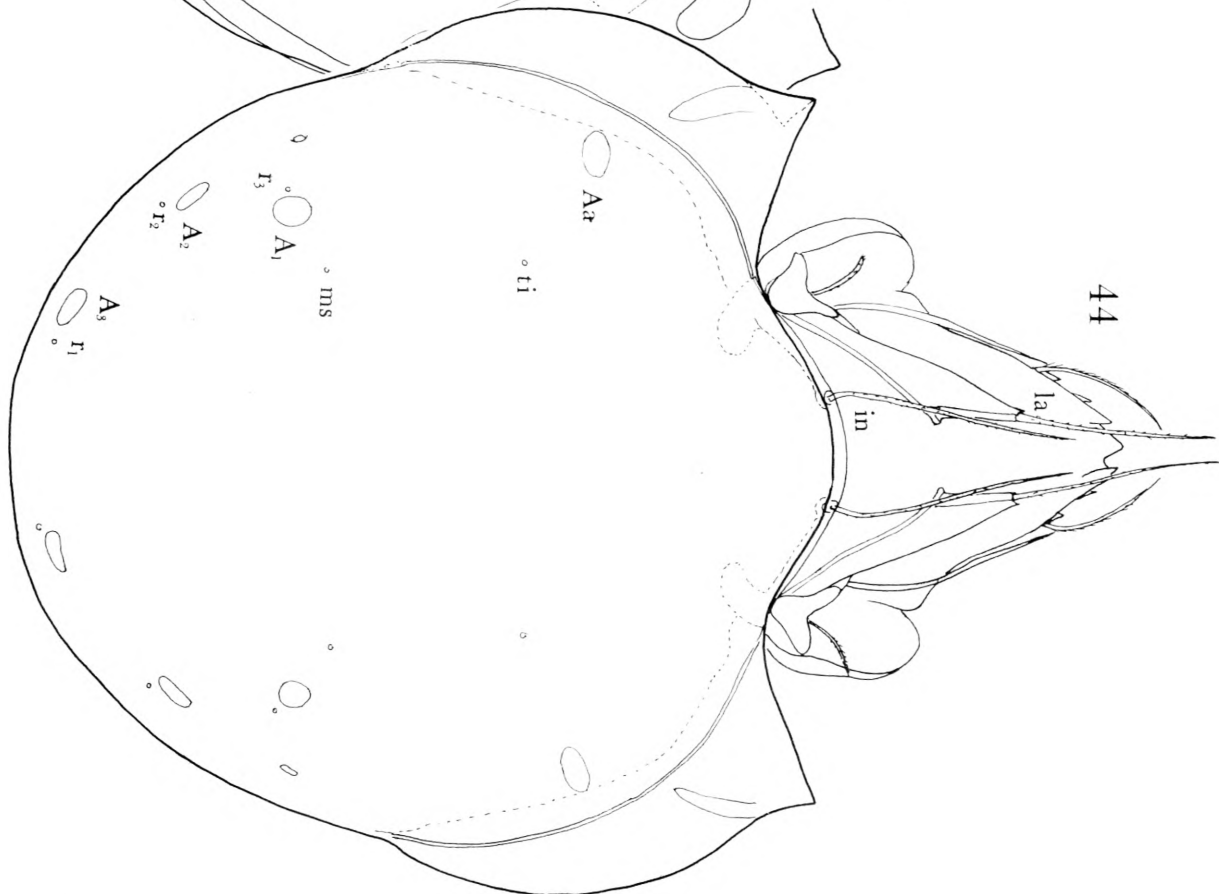
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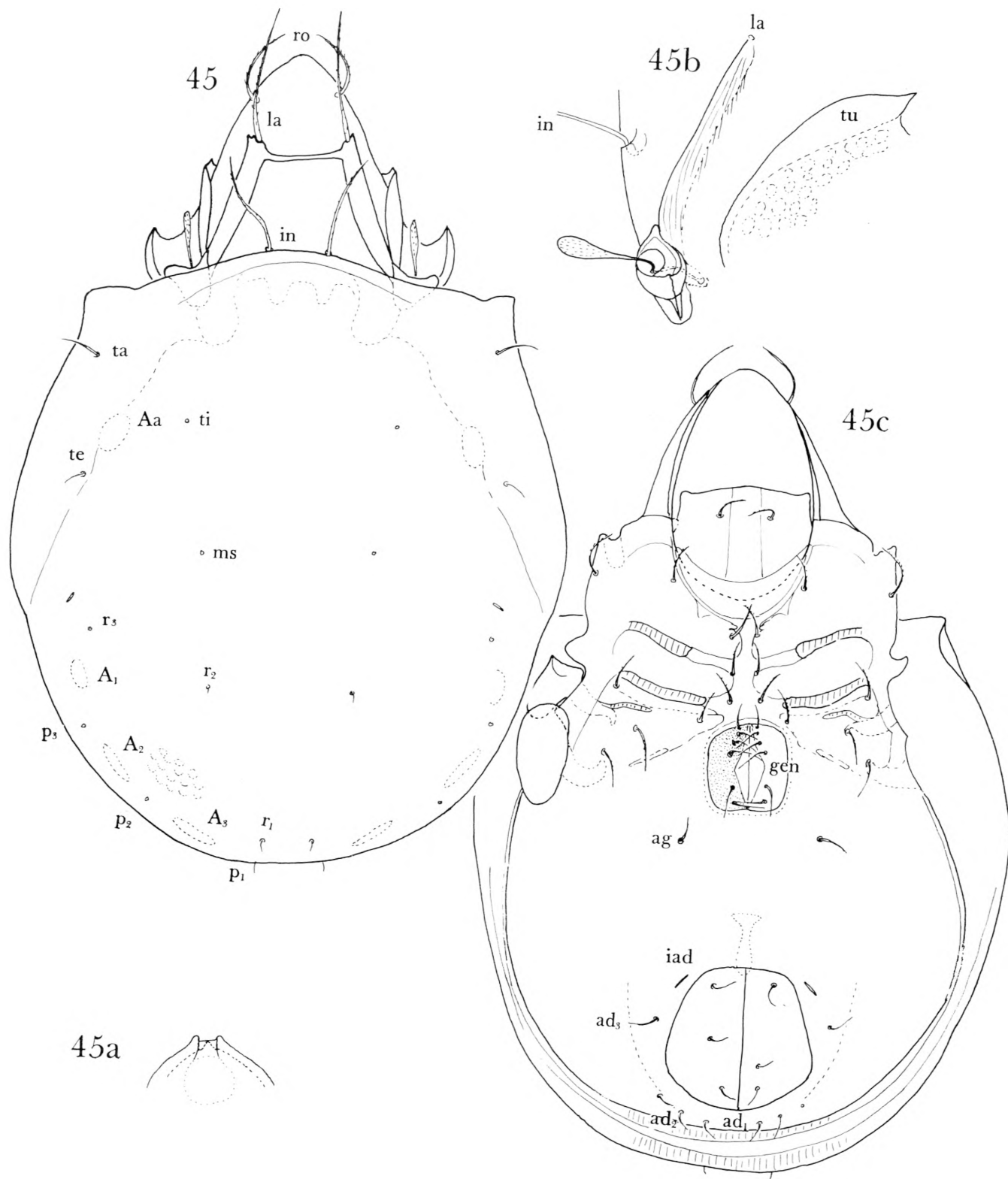


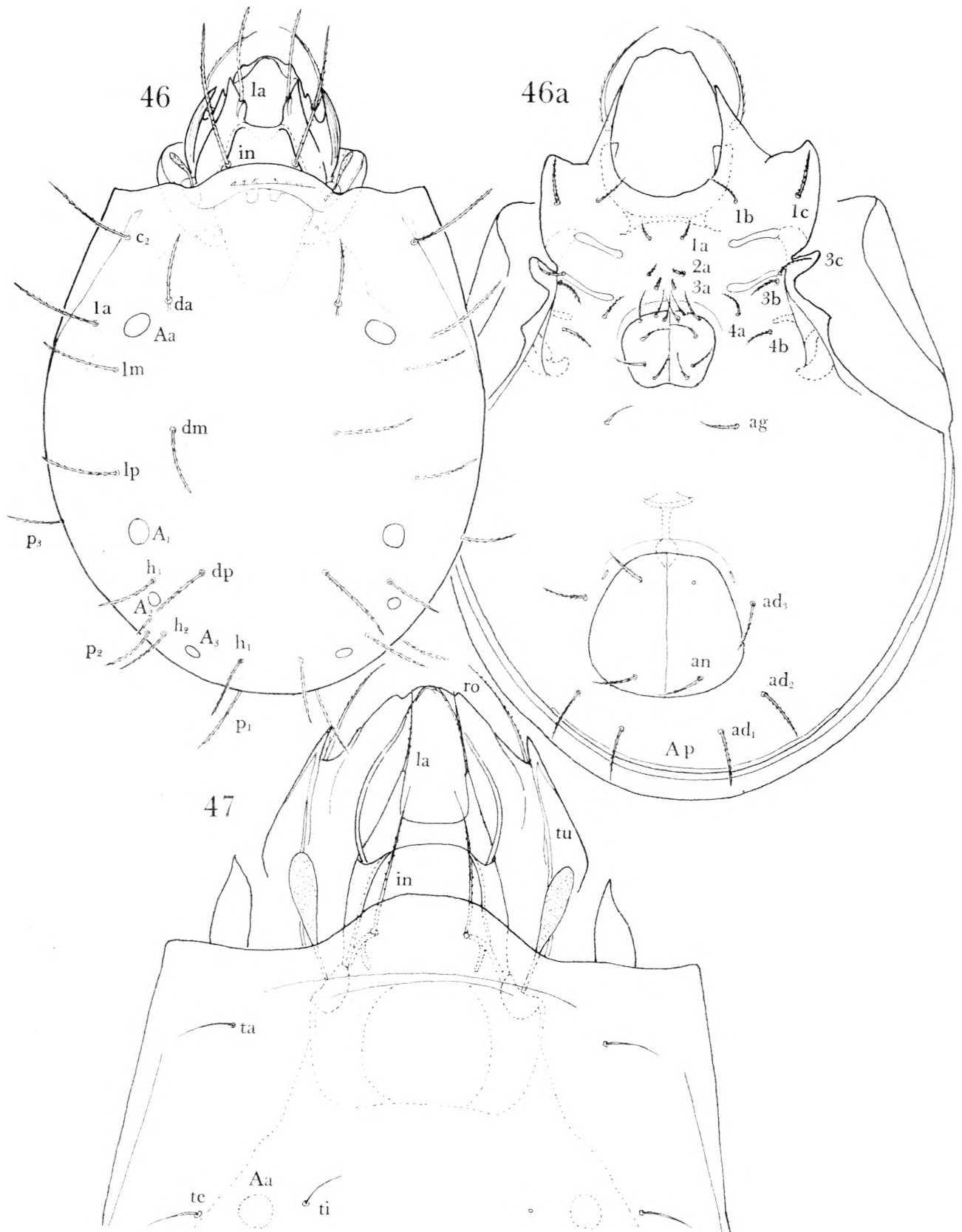
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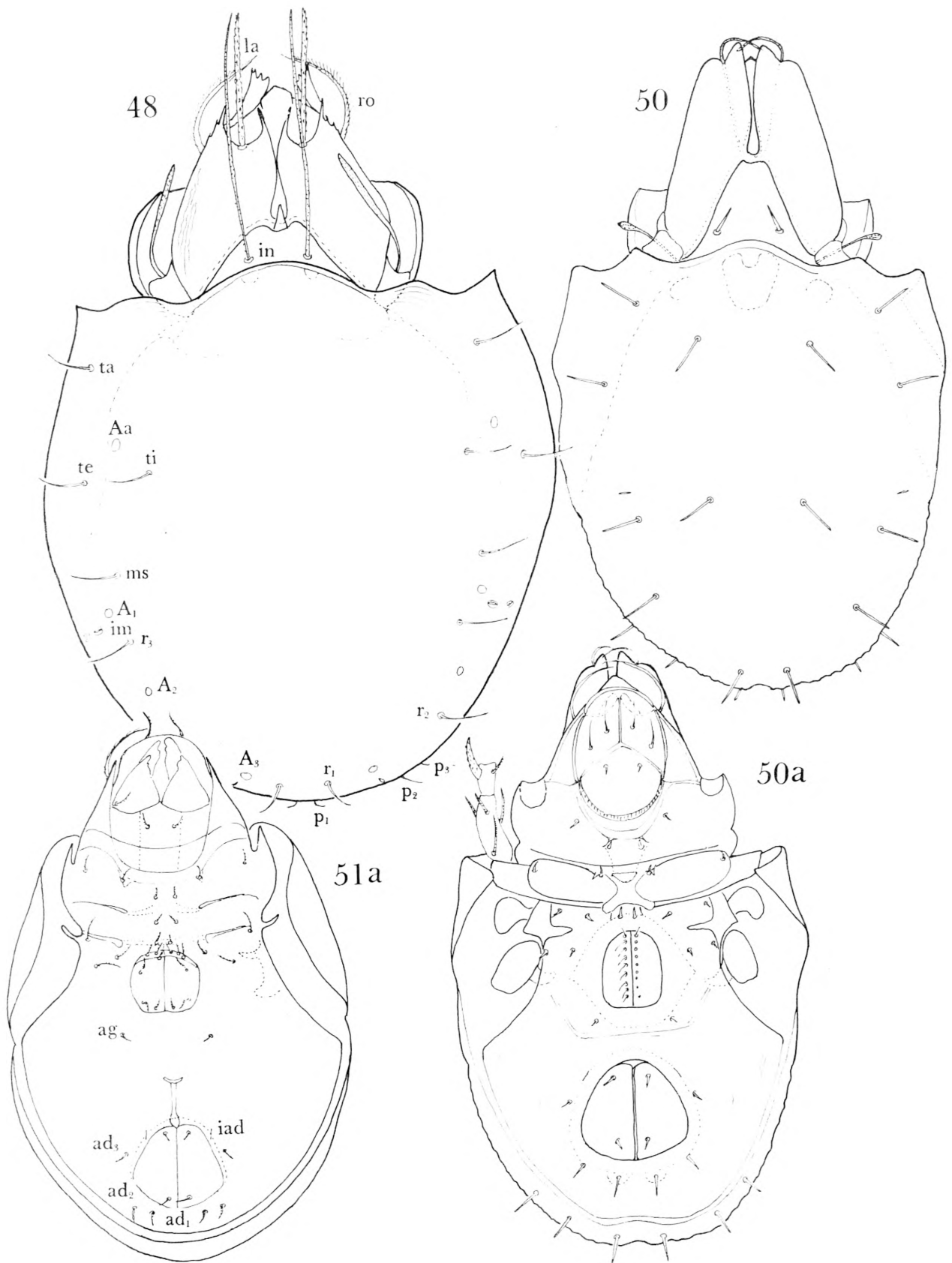


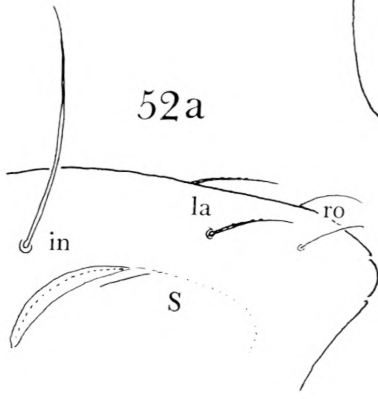
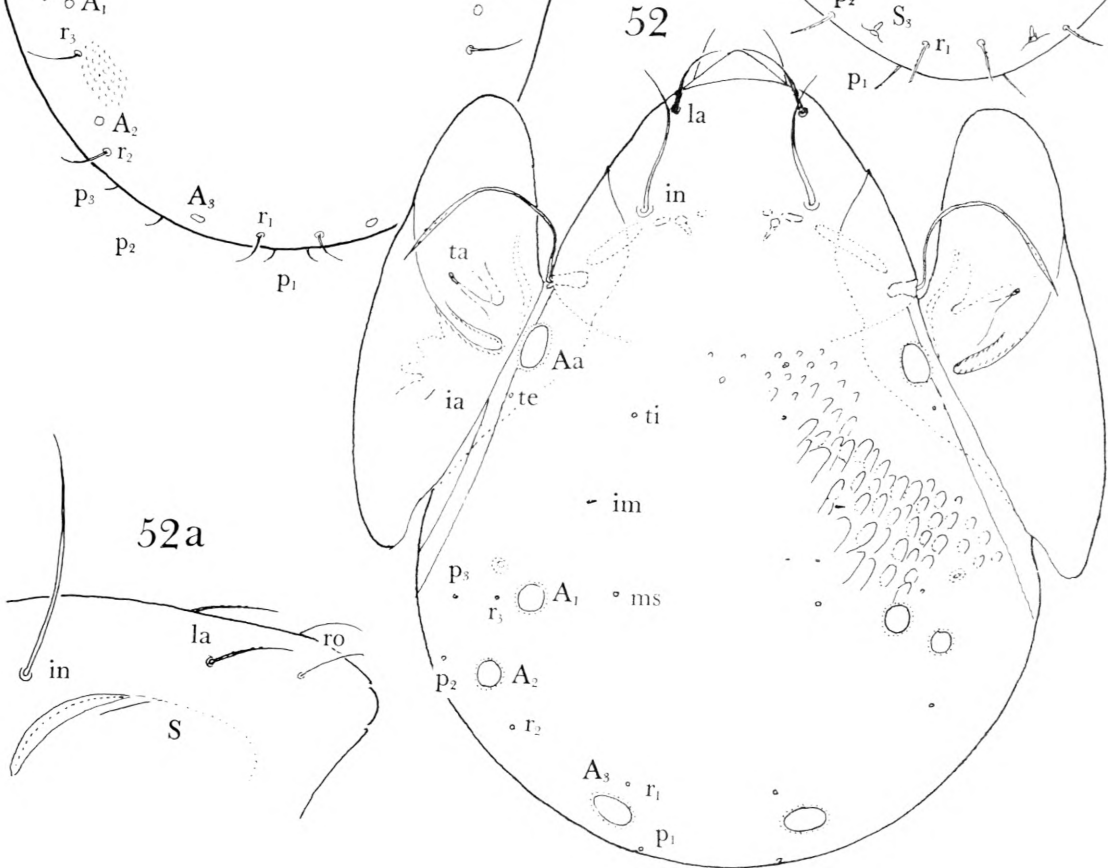
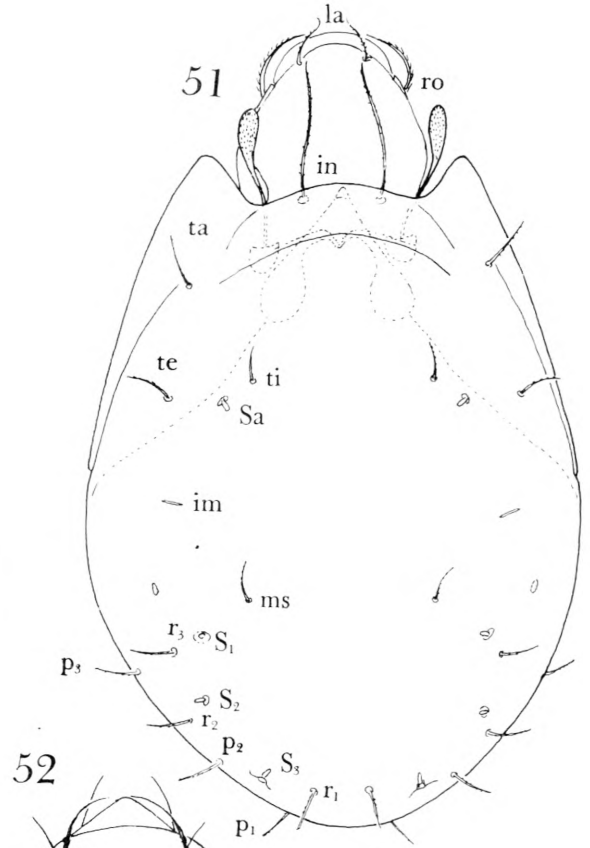
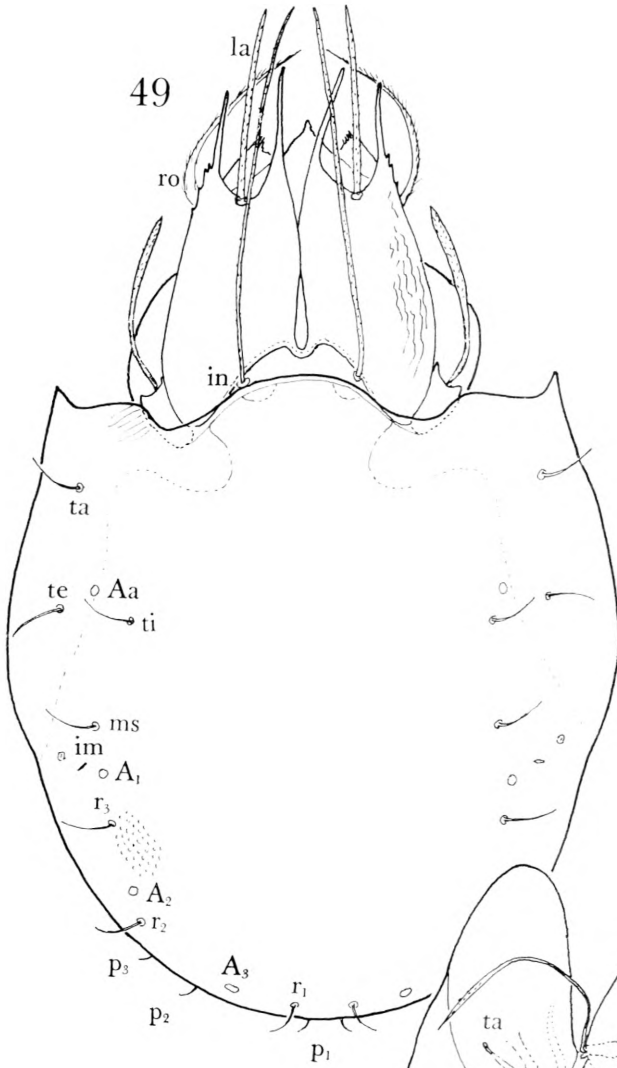
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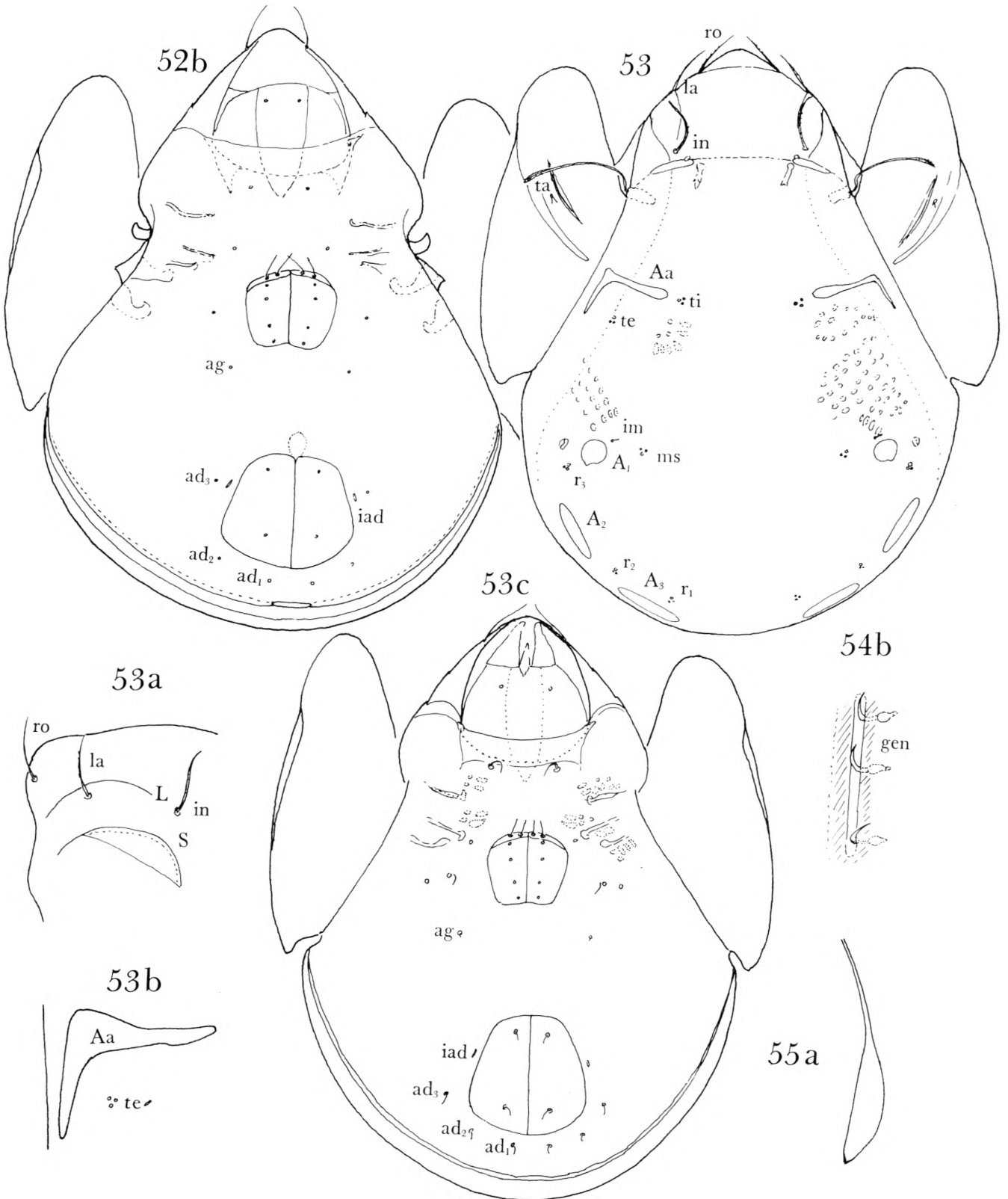


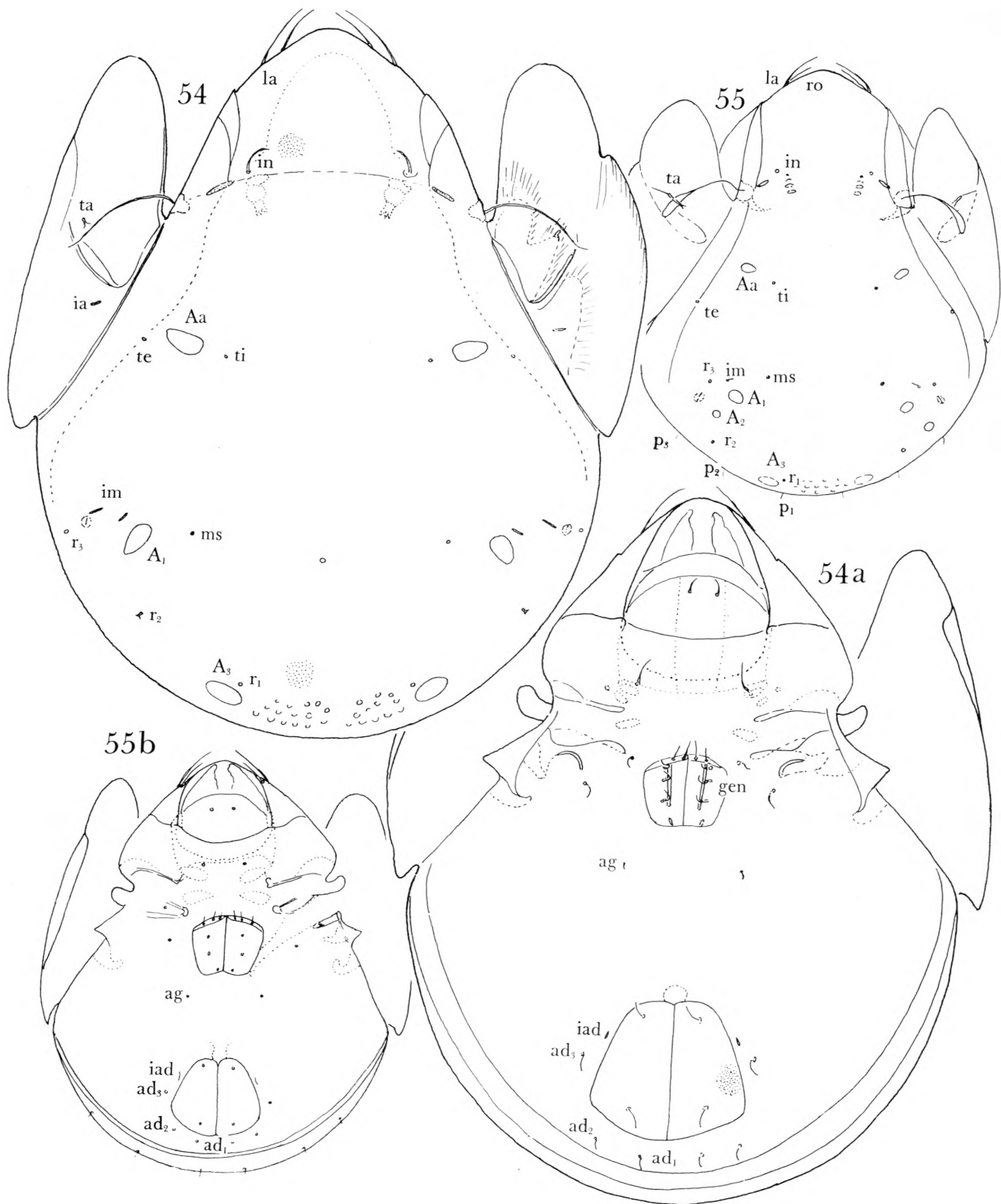












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