

MOSADOLUWA ADETOLA BADEJO, STEFFEN WOAS & LUDWIG BECK

Mesoplophora ifeana, a new species of ptychoid mite (Acari, Oribatida) from Nigeria

Abstract

In this paper, we describe a new species of *Mesoplophora* collected from forest floor litter in southwestern Nigeria. *Mesoplophora* is a cosmopolitan genus of ptychoid mites that has been recorded from the Palaearctic region as well as Morocco and Tchad in the Ethiopian region. *M. ifeana* is the first *Mesoplophora* species to be fully identified and described from Nigeria. Differences between this species, *M. ifeana*, and other *Mesoplophora* species recorded from Africa are observed in respect of the number of spines on the sensillus, presence of two pairs of exobothridial setae and leg chaetotaxy. The lack of information on fine taxonomic details of adults and deutonymphs of *M. africana* from Tchad as well as the discrepancies in the description of certain morphological features such as organisation and chaetotaxy of the ventral plates as well as the nomenclature of setae on the aspis were noted. Attention was drawn to the unique combination of traits of both lower and higher Oribatida in *Mesoplophora*, a trait which may be responsible for its ubiquitous distribution.

Authors

Prof. Dr. MOSADOLUWA ADETOLA BADEJO, Department of Zoology, Obafemi Awolowo University, Ile-Ife, Nigeria;
Dr. STEFFEN WOAS & Prof. Dr. LUDWIG BECK, Staatliches Museum für Naturkunde Karlsruhe, Erbprinzenstr. 13, D-76133 Karlsruhe, Germany.

Key words

taxonomy, Acari, Oribatida, Africa, Nigeria

1. Introduction

The Mesoplophoroidea was regarded as one of the four superfamilies of ptychoid mites when the Ptyctima was regarded as a separate taxonomic group from Arthronota (BALOGH 1972). Later, the Mesoplophoroidea was classified as Arthroptyctima, a cohort of the Supercohort Arthronota (BALOGH & MAHUNKA 1983). This separated the mesoplophoroids from their ptychoid mates Phthiracaroida and Euphthiracaroida which were classified as Mixonomata, another supercohort of lower Oribatida. The organisation of the anogenital plates in the juveniles of Mesoplophoroidea is the same as in Mixonomata, but in the adults the anal and genital plates are separated as in higher brachypiline mites. The genus *Mesoplophora* is cosmopolitan. Most other ptychoid mite genera are not. The Protoplophoroidea which are also arthroptyctimid Arthronota are predominantly palaeartic soil dwellers. Members of the genus *Mesoplophora* are more abundant and more widely distributed in the tropical rainforest zone in Nigeria than

other ptychoid mites (BADEJO & LASEBIKAN 1988; BADEJO et al. 1999). It therefore appears that *Mesoplophora* possesses unique taxonomic and ecological traits among the ptychoids which confers on it an ubiquitous status. For these reasons, detailed study of taxonomic features which may have conferred unique ecological traits on mesoplophorid mites collected from the tropical rainforest zone in Nigeria were embarked upon with the aim to add to the existing information on the biogeographical distribution of the genus, as well as reveal its true taxonomic position among the lower Oribatida.

2. Systematics

Mesoplophora ifeana BADEJO, new species

Figures 1-6.

Mesoplophoroidea EWING, 1917
Mesoplophoridae GRANDJEAN, 1933
Mesoplophora VAN DER HAMMEN, 1959

Holotype: female collected from forest floor litter in Ile-Ife, Nigeria in June 2000, M.A. BADEJO col., (specimen dissected for the description) deposited in the Museum of Natural History (MNH) at Obafemi Awolowo University, Ile-Ife, Nigeria
Paratypes: 78 females and 10 deutonymphs with the same collecting dates, deposited in MNH, 10 females and 5 deutonymphs with the same collecting dates, deposited in Staatliches Museum für Naturkunde Karlsruhe (SMNK), Germany.

Description

Measurements: aspis length 160 – 191 µm, aspis height 92 – 120 µm, notogaster length 275 – 322 µm, notogaster height 138 – 161 µm.

Integument yellowish, smooth with fine irregular microsculpture on the cerotegument.

Aspis: The lateral view reveals a conspicuous margin which extends frontally beyond the base of the rostral seta (ro) to meet the lateral carina which extends to the lower margin of the aspis (fig. 1 a). Present on the aspis are 5 pairs of setiform setae, each of which bears 18 spines. The sensillus (ss) is the most conspicuous of all the setae. It is directed sharply backwards in such a way that the long axis forms an acute angle with the short basal part which is inserted into the bothridium (fig. 1 b). Being relatively long when compared with other setae, the spines of the sensillus are also long and conspicuous making it relatively easier to count the number (fig. 1 c). A pair of inter-

bothridial setae (in) is present between the two bothridia (BO), each of which is inserted very close and slightly anterior to the bothridium (fig. 1 c). Two pairs of exobothridial setae are inserted laterally on the aspis. The first pair (ex_1) which is spiniform is very close but slightly anterior to the centre of the bothridium, while the more conspicuous and spinose second pair (ex_2) is along the same axis as ex_1 but in a more anterior position. The distance between ex_1 and ex_2 is exactly half of the distance between ex_2 and ro (Figs 1 a, 2). Each ro is directed forward, curving gently towards each other and extending well beyond the aspis in frontal view (fig. 2). The distal 1/5th of the aspis is covered by the proximal end of the notogaster.

Notogaster: The notogaster is perfectly round in shape and appears convex in lateral view. Irregular microsculpture on the cerotegument ramify all over as a tiny dark pattern on the yellowish body (figs 1 a, 2). The posterior margin of the aspis is seen through the integument inside the anterior part of the notogaster, suggesting that the aspis does not move out of the notogaster when at rest, unlike in some ptychoids, where the base of the aspis could be away from the notogastral collar. A small notch is present anteriorly on either side of the notogaster. This notch which represents the depression in a penknife joint most likely accommodates the upward movement of the posterior end of the aspis and the simultaneous lateral movement of the anterior corners of the notogaster when the aspis is closing up. Lines of thickened exoskeleton are seen on the base of this notch suggesting an extra strengthening of the area to facilitate the closing of the aspis (fig. 2). There are eight pairs of setiform and spinose setae on the notogaster. Each seta has 18 spines.

Ventral region

Mouthparts: The infracapitulum is of the anarthric type lacking a labiogenal articulation. The rutellum is narrow. The anterior adoral setae (or_1) is the smallest and least conspicuous of the three pairs of adanal setae. The posterior adoral setae (or_2) is big and modified to form a structure that looks like a stretched foot pointing upwards. The posterior antiaxial setae (or_3) is filiform and it often extends beyond the or_2 and rutellum (fig. 5 a). The anterior (a) and median (m) smooth setae on the genua (G) are also filiform, the ratio of a:m in length being 5:4. The chelicerae are of the basic chelate-dentate type but are narrow and somewhat elongated (fig. 5 b). There are no setae on the chelicera but spines pointing towards the anterior end are present on the antiaxial surface. The spines occur in groups increasing gradually in number from one at the proximal end to six at the distal end (fig. 6 b). The spines that occur in groups of three or more are arranged in such a way that their base forms an arc.

There are no ornamentations on the chelicerae. The pedipalps are 4-segmented with setal formula 1-0-1-10 (fig. 5 c). At the tip of the tarsi is a set of tripartite setae which is typical for Hypochthonidae.

Epimeral region: As in all ptychoid mites, the epimere is divided into 2 regions. Epimere I and II are clearly separated from epimere III and IV. There is considerable overlap between epimere I and II such as only the inner lateral margin and the base of epimere II are not covered by epimere I (fig. 3 a). The trochanters of legs I and II are relatively small and partially sunk inside their respective epimeres in such a way that the epimere appears like the first leg segment (see figs 4 a,b). The relatively smaller epimeres III and IV are completely fused (fig. 3 b). The trochanters of legs III and IV are inserted closely together within the fused epimera in a way that suggests that the movement of the two pairs of legs are controlled in unison by the fused epimera. Chaetotaxy of the entire epimeral region is 2-1-2-1.

Legs: Leg I is stronger than leg II which is in turn stronger than legs III and IV (figs 4 a-d). Each leg has 5 segments and the tarsi are monodactyl. The claw on leg I has a weakly developed midventral tooth. The claw on leg II is bidentate, while those on legs III and IV appear multidentate with poorly developed teeth which look more or less like tiny spines. Leg chaetotaxy is as follows: I - 0-2-2-4-19-1, II - 0-3-3-3-14-1, III - 2-3-3-2-2-11-1, IV - 2-4-2-2-8-1. This is rather different although similar in pattern to the leg chaetotaxy of *M. pulchra* (I - 0-3-3-4-19-1, II - 0-4-3-3-14-1, III - 2-2-3-3-10-1, IV - 2-3-0-2-8-1) (GRANDJEAN 1965).

Ventral plates: The anal (AP) and genital (GP) plates are clearly separated and lie at the central part of the venter (fig. 3 c) bounded all over by a pleural plate (P) that is almost as big as the notogaster in ventral view. The irregular microsculpture seen on the notogaster is also present in the ventral region. There are ten pairs of setae on the pleural plate (p_1 - p_7 ; ad_1 - ad_3) three of which lie in the adanal region (ad_1 , ad_2 , ad_3) surrounding the anal plates. One tiny pair (p_7) is present at the proximal end of the pleural plate lying almost midway between the aggenital area and the margin of the pleural plate. Each genital plate looks like the sector of a sphere. The pair therefore appears semispherical with the proximal end of each plate folding backwards like a twisted lip to accommodate the rostrum of the aspis when it is closed (fig. 3 c). There are seven pairs of setae on the genital plates. The anal plates are semi-circularly shaped and bear only two pairs of setae (an_1 and an_2). All the ventral setae are small, setiform and spinose, excepting one pair (p_6) which is as long as some notogastral setae. The anal and genital openings are very narrow slits along the length of their respective plates and they are not contiguous because of the clear separation of the anal and genital plates. The ovipositor sometimes protrudes out of the genital opening and can be seen from ventral view (fig. 3 c) to

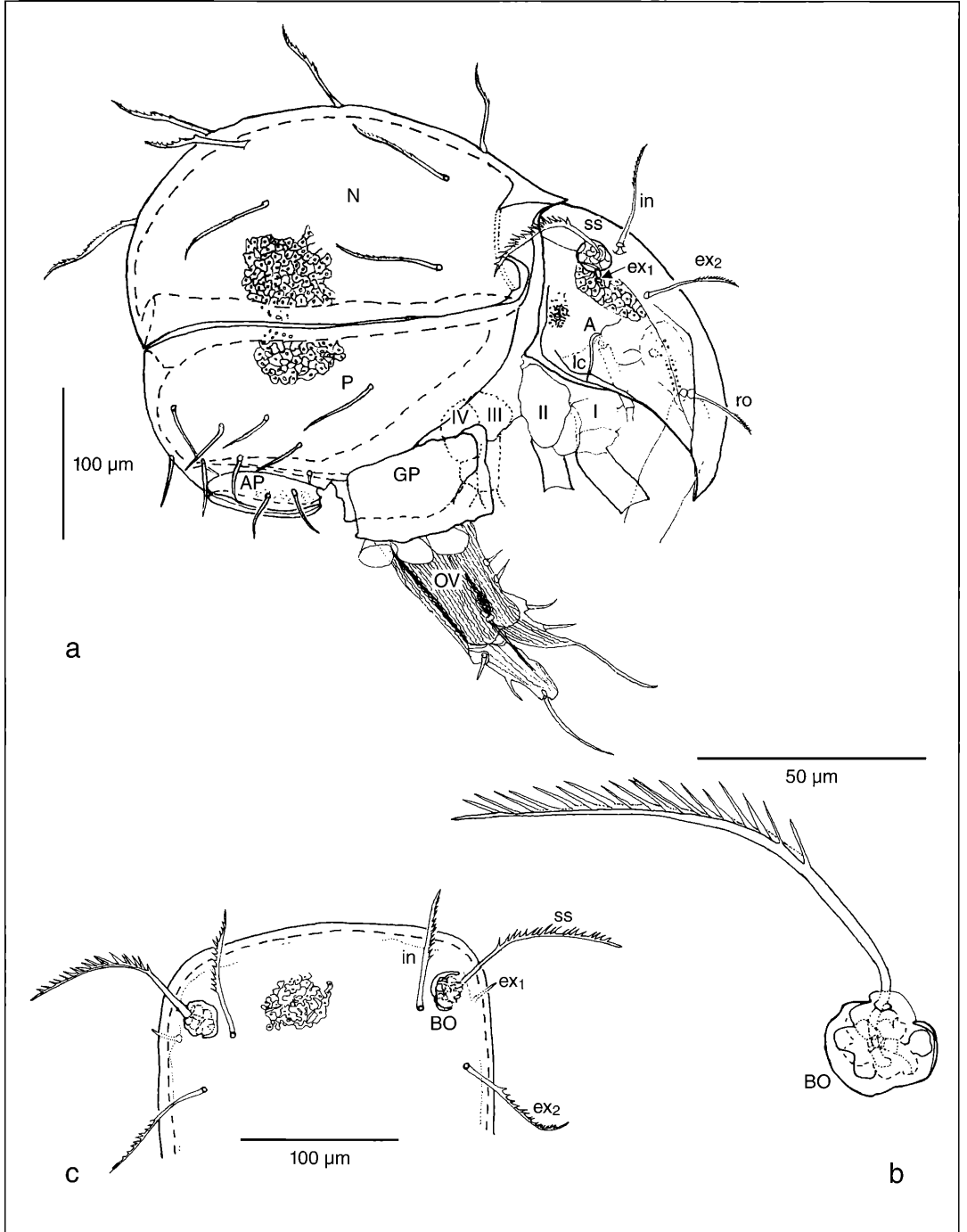


Figure 1. a) *Mesoplophora ifeana* BADEJO, new species: lateral view: ro, in, ss, ex₁, ex₂ - prodorsal setae; lc - lateral carina; A - Asp-is; I, II, III, IV - epimeral plates at the bases of legs I-IV; N - Notogaster; P - Pleural plate; AP - Adano-anal plate; GP - Aggenito-genital plate; b) sensillus showing the 18 spines, BO - Bothridium; c) frontal view of aspis, posterior half: ro, in, ss, ex₁, ex₂ - prodorsal se-

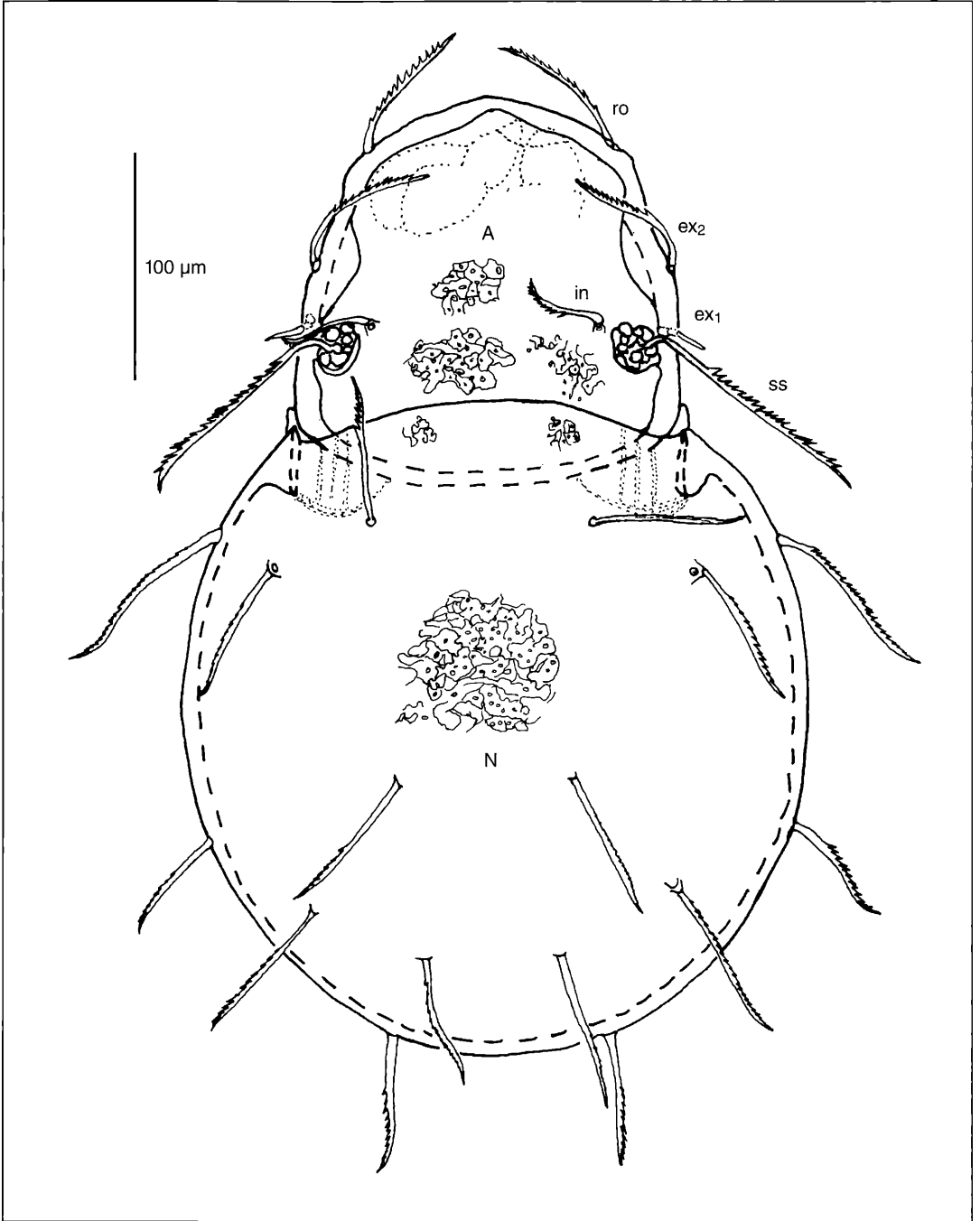


Figure 2. *Mesoplophora ifeana* BADEJO, new species: dorsal view.

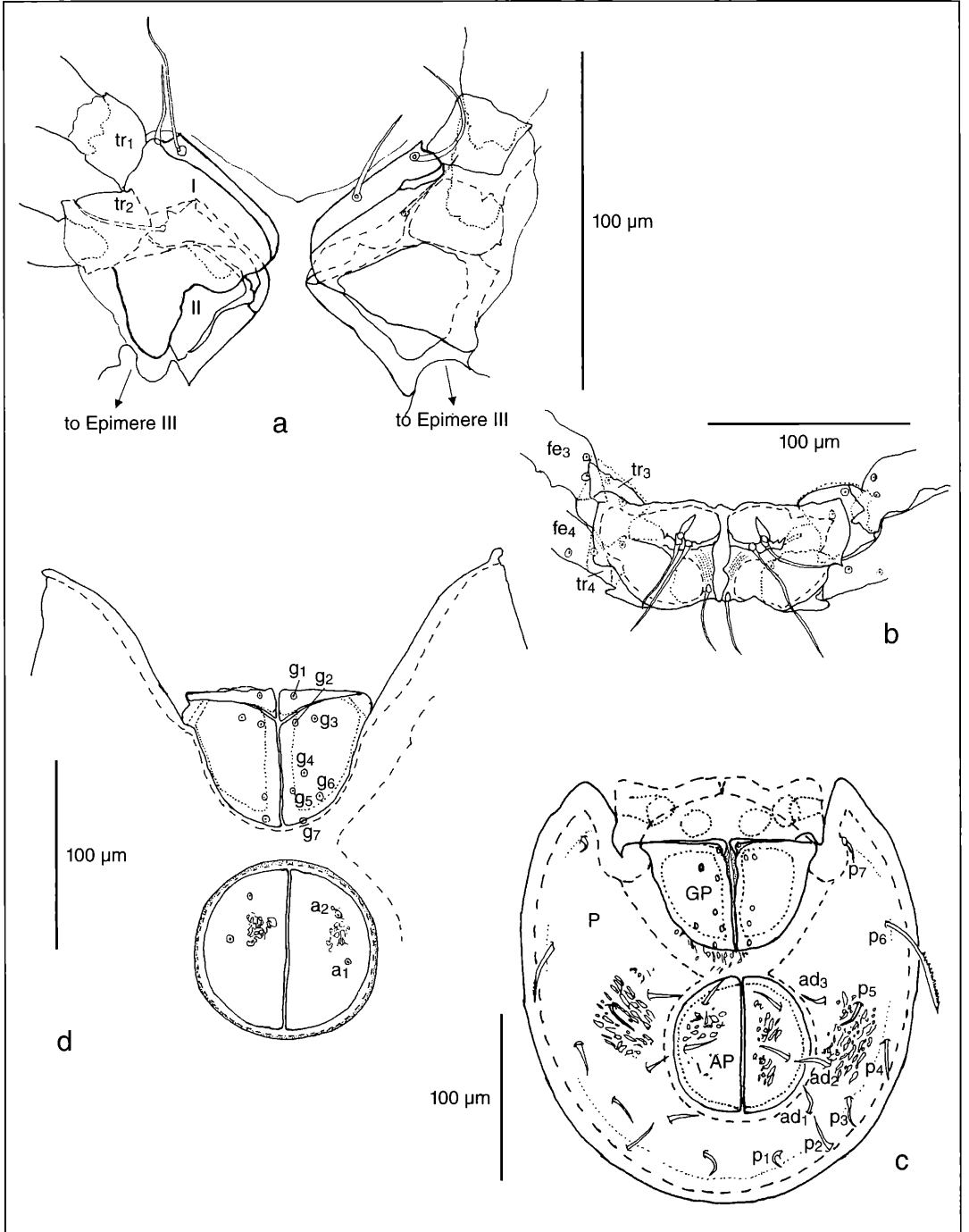


Figure 3. *Mesoplophora ifeana* BADEJO, new species: a) epimeral plates I, II; tr₁, tr₂ - trochanters of legs I, II. b) epimeral plates III, IV; tr₃, tr₄ - trochanters of legs III, IV; fe₃, fe₄ - femora of legs III, IV; c) ventral region: AP - adano-anal plate, GP - aggenito-genital plate; d) adano-anal and aggenito-genital plates showing the positions of anal and genital setae.

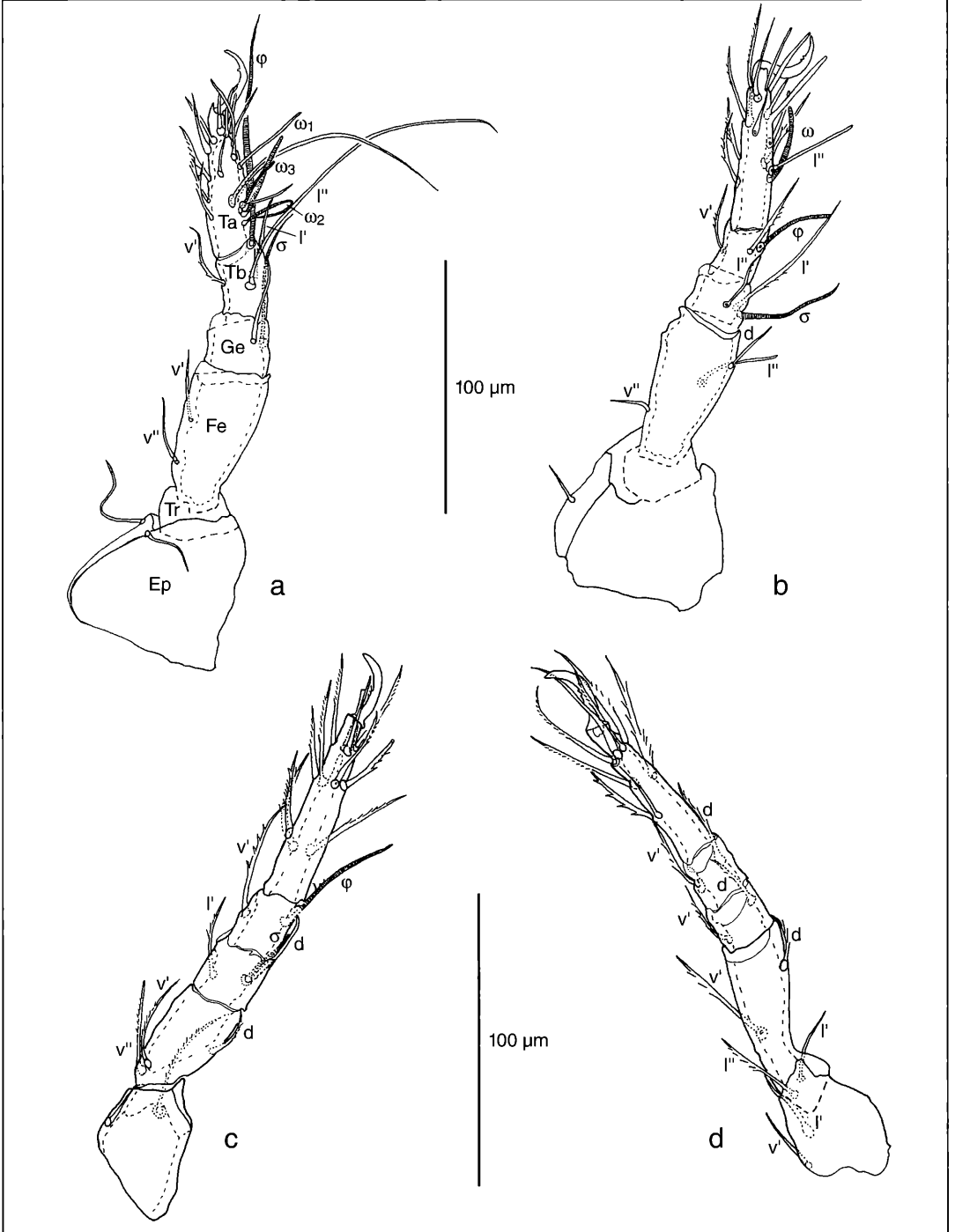


Figure 4. *Mesoplophora ifeana* BAĐEJO, new species: a) leg I, b) leg II, c) leg III, d) leg IV; Tr – Trochanter, Fe – Femur, Ge – Genu, Tb – Tibia, Ta – Tarsus.

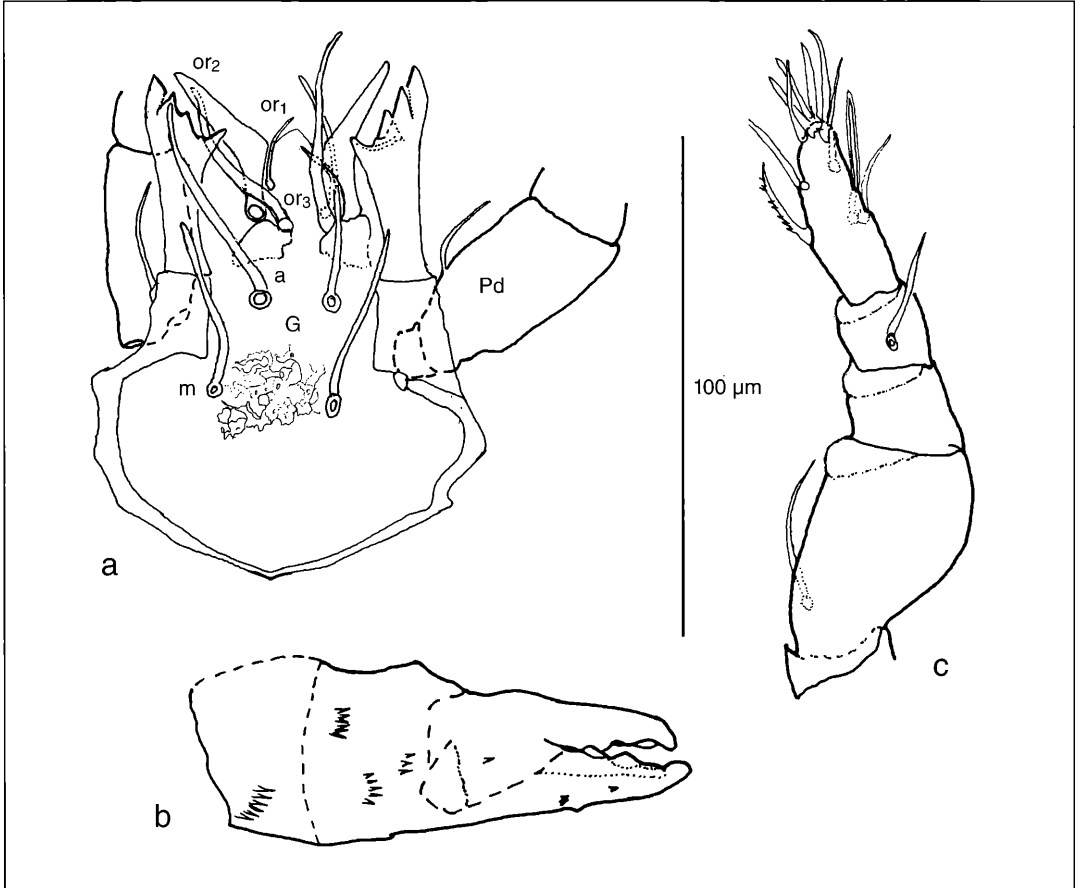


Figure 5. a) *Mesoplophora ifeana* BADEJO, new species: infracapitulum: or₁ - anterior adoral setae, or₂ - posterior adoral setae, or₃ - posterior antiaxial setae, a - median setae, m - smooth setae, G - Genua, Pd - distal segment of pedipalp; b) chelicera; c) pedipalp.

possess many lobes and setae which is the basic form of the ovipositor of oribatid mites.

Deutonymph: The integument of the deutonymph is sclerotized as in the adult but it is lighter in colour. There are eight pairs of notogatal setae as in the adults although some of them are not fully developed. The setae on the venter are also poorly developed and fewer than in the adults (fig. 6). No setae were observed on the genital plates. The anal plates are distinct from the adanal plates and each pair bears two pairs of setae. The most notable difference between the deutonymph and the adult is the organisation of the ano-genital region. The genital plates are elongated and contiguous with the equally elongated anal and adanal plates thus producing an ano-genital aperture as in adult Euphthiacoidea.

3. Discussion

Mesoplophora as a genus is a good example of a taxonomic group that must be defined by a combination of characters. This genus possesses the traits of both lower and higher Oribatida. For example, features shared with the lower Hypochthoniidae include the following: two pairs of exobothridial setae, anathric infracapitulum, small or poorly developed rutella, triplet setae on the tip of the pedipalp and sclerotized nymph. Features shared with the Phthiracarids are the pythoid exoskeleton and spines on the chelicera. The separation of anal and ventral plates in adults is a brachypylina (higher Oribatida) trait which is not possessed by any other group of lower Oribatida.

Five species of *Mesoplophora* have been described from the Palaearctic region (BALOGH & MAHUNKA 1983). One of these five species, (*M. pulchra*) was first

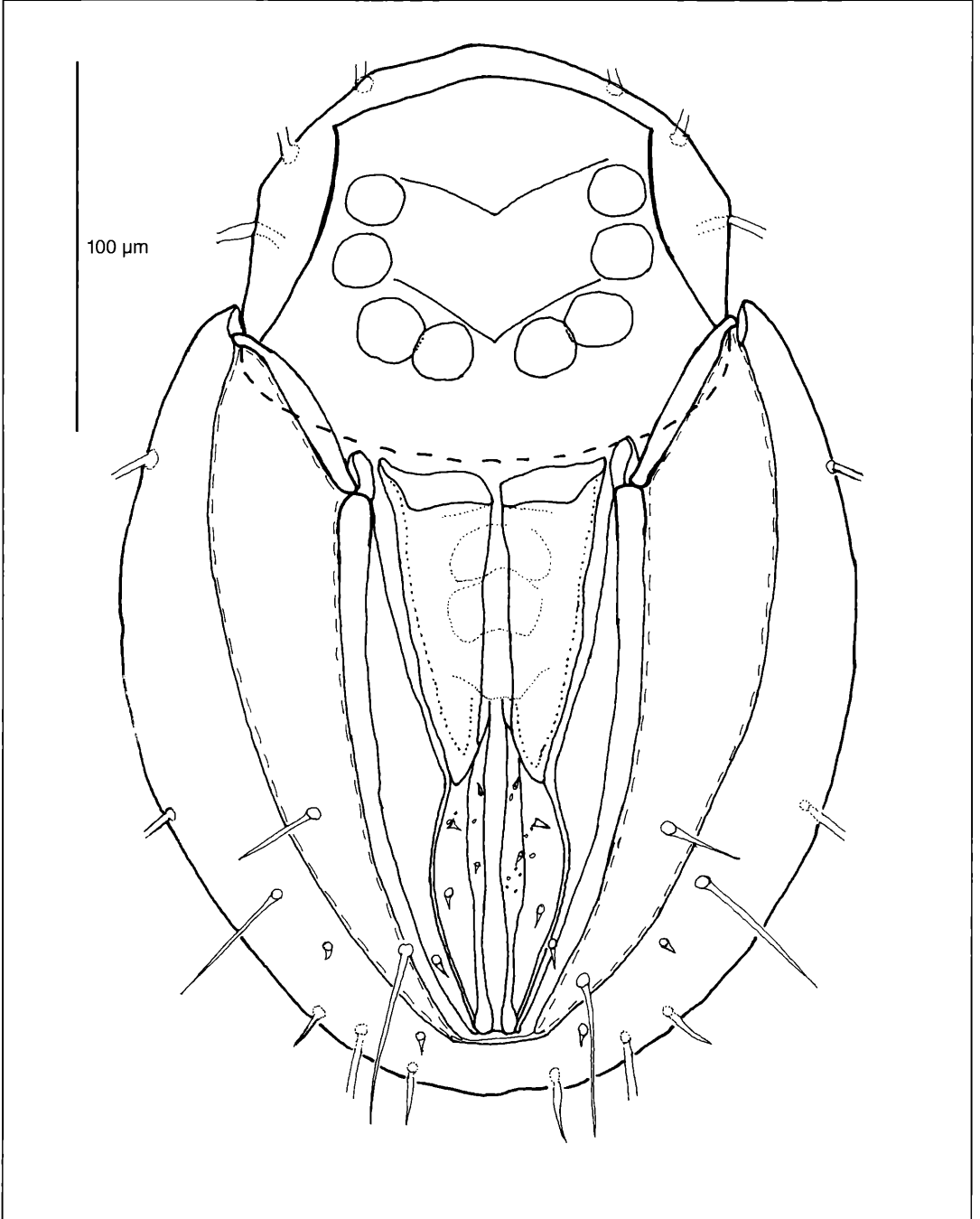


Figure 6. *Mesoplophora ifeana* BADEJO, new species: ventral view of the Deutonymph.

recorded from Morocco in the Ethiopian region (GRANDJEAN 1933). The only species of *Mesoplophora* that has been described from the tropical rainforest zone is *M. africana* which was first described by BALOGH (1958) and later redescribed by MAHUNKA (1985). However, there are a few differences in the morphological features of *M. africana* and *M. ifeana* such as the number of spines on the sensillus (13-15 in *M. africana*, 18 in *M. ifeana*) and presence of two pairs of exobothridial setae in *M. ifeana*. There are also discrepancies in the description of certain morphological features such as chaetotaxy of the ventral plates and the nomenclature of setae on the aspis. Comparison of *M. africana* and *M. ifeana* can never be detailed enough without reference to the type specimens of BALOGH & MAHUNKA. The descriptions of *M. africana* by these workers reveal nothing about many features of taxonomic interest in the adults and deutonymphs of *Mesoplophora* which we have highlighted in this study. It thus appears as if the option of establishing a separate identity for the specimens collected from Ile-Ife in Nigeria seems the most appropriate for now.

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