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Notes on the mites of the genus *Ereynetes* BERLESE (Acari : Ereynetinae), with description of five new species from South Africa

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Summary

Six species of the genus *Ereynetes* BERLESE (Acari : Ereynetinae) were collected from South Africa. The most frequent was *Ereynetes (Ereynetes) amplectorus* HUNTER, 1964, described from the U.S.A. It was exclusively collected from cow and horse dung in 3 farms of Transvaal. The other species are new and among them 3 were found on cow dung in Transvaal during a survey on the acarofauna of cattle and horse dung, i.e. *E. (E.) ueckermanni* n. sp., *E.(E.) bolitophilus* n. sp. and *E. (E.) luriei* n. sp. The 2 other species belong to the subgenus *Anereynetes*, they were found from dung beetles in Botswana, i.e. *E. (A.) copridis* n. sp. and *E. (A.) botswanensis* n. sp. A new genus, *Neoprotereunetes* n.g. is created in the family Eupodidae, with *Ereynetes lapidarius* OUDEMANS, 1906 as type species. All these new taxa are described herein. The authors propose to use some standard measurements in the descriptions of the Ereynetinae.
Key-words : Systematics, Acari, genus *Ereynetes*, new taxa, Botswana, South Africa.

Résumé

Six espèces du genre *Ereynetes* BERLESE (Acari : Ereynetinae) sont signalées d'Afrique du Sud. La plus fréquente est *Ereynetes (Ereynetes) amplectorus* HUNTER, 1964, décrite des U.S.A. C'est l'espèce la plus fréquente et abondante dans nos collections. Elle fut récoltée exclusivement dans des bouses de vaches et des excréments de chevaux dans 3 fermes du Transvaal. Les 5 autres espèces sont nouvelles et parmi elles 3 furent récoltées au cours de recherches sur l'acarofaune des excréments de vaches et de chevaux, ce sont : *E. (E.) ueckermanni* n. sp., *E. (E.) bolitophilus* n. sp. et *E. (E.) luriei* n. sp. Les 2 autres font partie du sous-genre *Anereynetes* FAIN et furent récoltées sur des coléoptères coprophiles au Botswana, ce sont *E. (A.) copridis* n. sp. et *E. (A.) botswanensis* n. sp. Un nouveau genre, *Neoprotereunetes* n.g. est créé dans la famille Eupodidae, avec *Ereynetes lapidarius* OUDEMANS, 1906 comme espèce type. Tous ces nouveaux taxa sont décrits ici. Les auteurs proposent d'utiliser des mensurations standard dans les descriptions des Ereynetinae.
Mots clé : Systematique, Acari, genre *Ereynetes*, nouveaux taxa, Botswana, Afrique du Sud.

Introduction

This paper is devoted to the study of a collection of mites of the genus *Ereynetes* (Ereynetidae : Prostigmata) collected by A.M.C. in two regions of South Africa i.e. Botswana and Transvaal.

In Botswana 2 new species were collected during 1977 from dung beetles : *Ereynetes (Anereynetes) copridis* n. sp., from *Copris subsidens*, and *Ereynetes (Anereynetes) botswanensis* from *Metacatharsius* sp. In Transvaal investigations on cow and horse dung from 1990 to 1992 allowed the collection of about 150 specimens of the genus *Ereynetes* belonging to 4 different species, of which 3 are new, i.e. *Ereynetes (E.) ueckermanni*, *E. (E.) bolitophilus* and *E. (E.) luriei*. The fourth species, *E. (E.) amplectorus* HUNTER had been described from the U.S.A. from celery. It was the most abundant in our samples.

All the measurements used here are in micrometers.

Abbreviations : IRSNB : Institut royal des Sciences naturelles de Belgique; PPRIP : Plant Protection Research Institute Pretoria, Republic of South Africa.

Material and methods

Most of our species were collected by A.M.C. from cow or horse dung in Transvaal, from 8 August 1990 to 28 January 1992. A small number of mites were also found on 2 dung beetles from Botswana during the year 1977.

In Transvaal the mites originated from 3 farms, i.e. Boekenhoutskloof, north of Pretoria, Cluny, about 40 km north of Johannesburg and Sandton, at 20 km north of Johannesburg.

The following method was used in collecting the mites from dung. Once a month a single dung pat was collected in the three localities. The pat was collected with a sharpedged spade and the dung deposited into a plastic bin with a tightly-fitting lid. The plastic of the center part of the lid was cut out and a strong wire gauze fitted in the space. On the wire gauze was glued very fine nylon netting in order to prevent secondary contamination of the pats by mites in the insectary. The bins were transported to the insectary at the University and kept for about 25 days at a temperature between 30-33°C and at R.H. between 50-55 %. Each day a sample af about 2 tablespoons of dung was taken from each bin and put

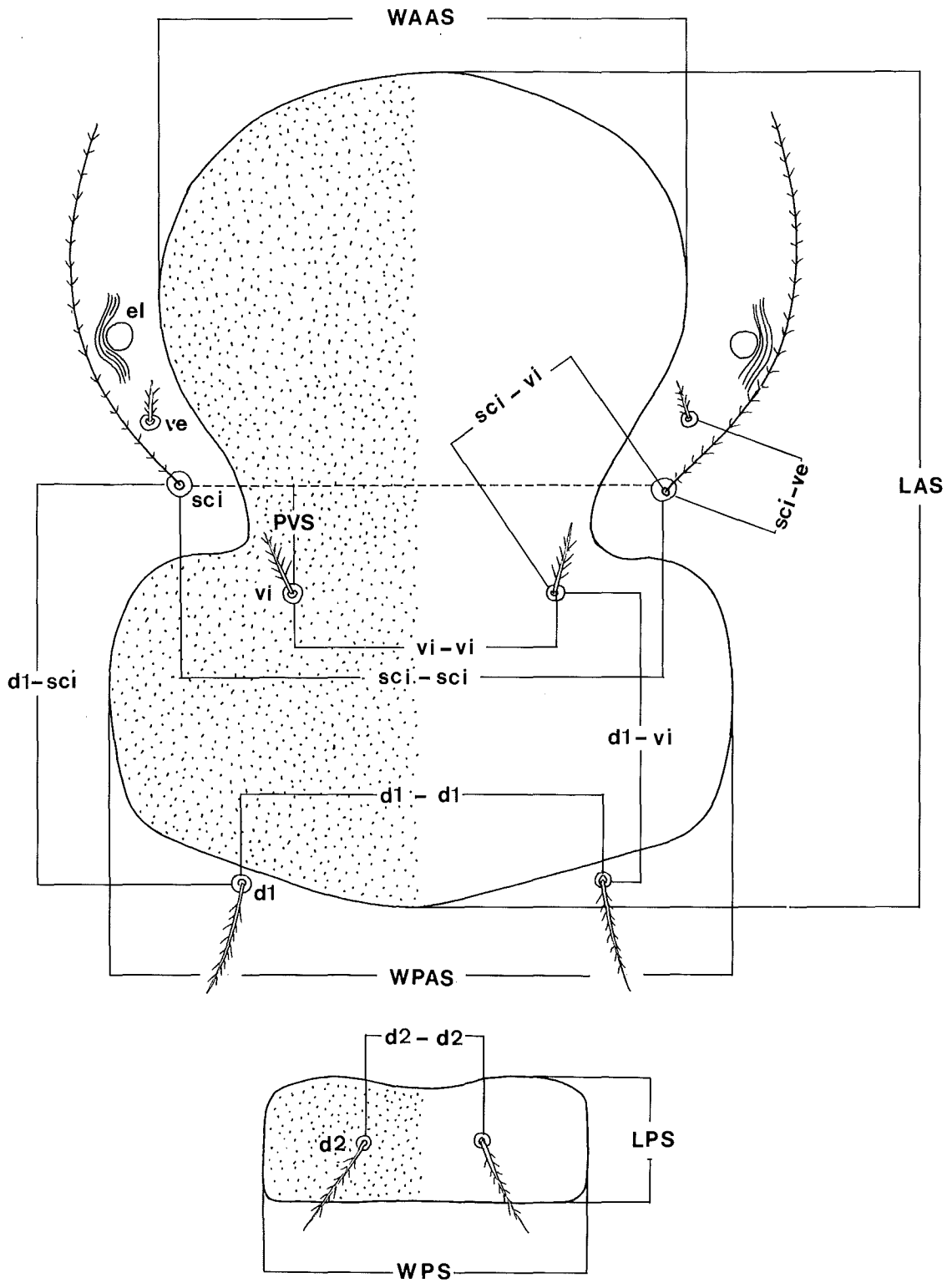


Fig. 1. – *Diagram of standard measurements of adults in genus* Ereynetes.

in a vial with 70° ethanol. This sampling continued until the whole pat was preserved in alcohol, which took sometimes 20-22 days. After about one week the mites in the vials were extracted by means of a technique using the difference in density between ethanol and saturated NaCl, as described by FAIN and HART 1986.

Remarks on some morphological characters in the Ereynetinae

1. *Setal nomenclature of the idiosoma* (fig. 1, 23, 25)

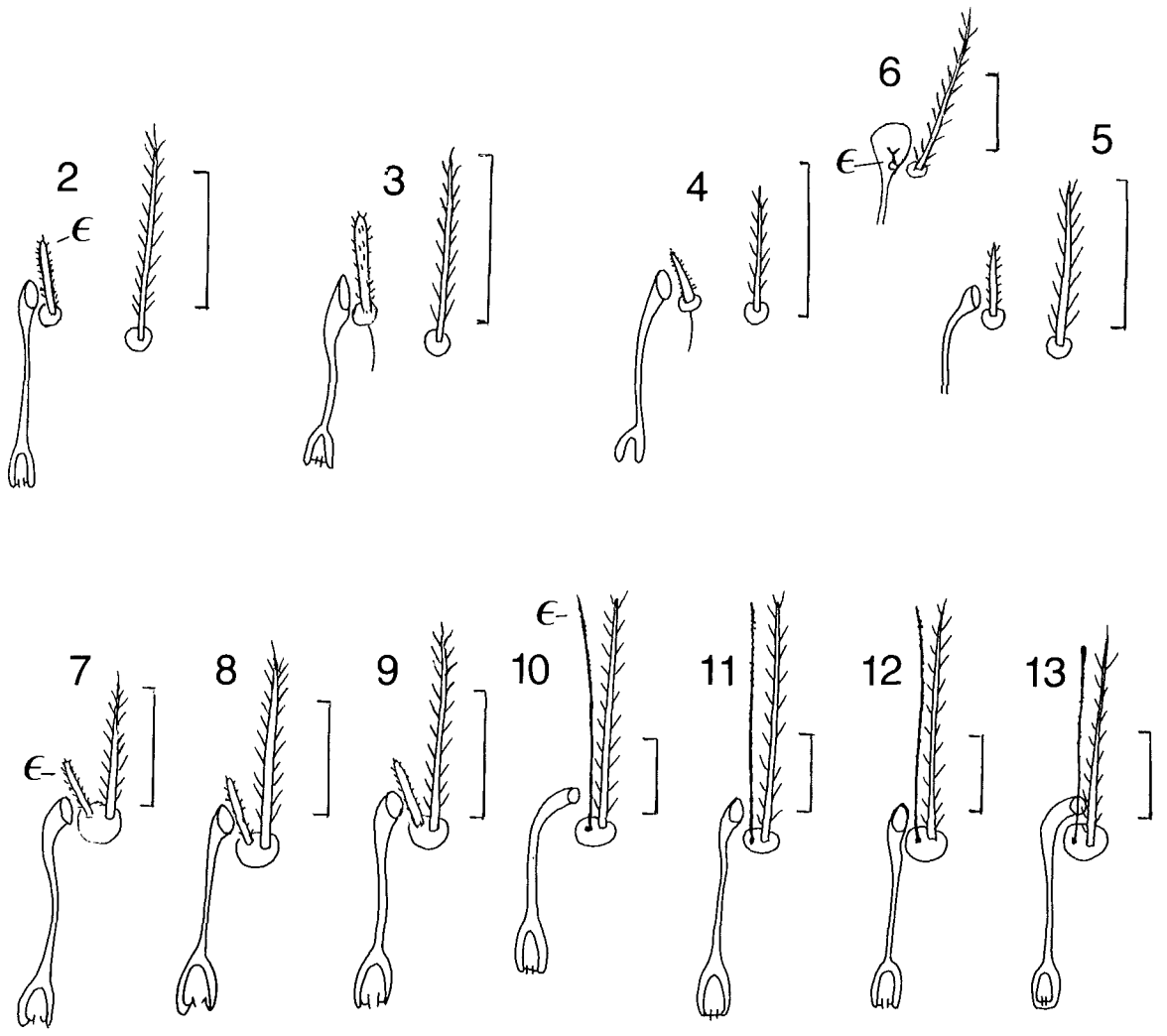
The propodonotal chaetotaxy in the Ereynetidae, espe-

cially the Ereynetinae, is basically the same as in the Astigmata (FAIN, 1970). The propodonotum always bears 4 pairs of setae, i.e. the vertical internals (*vi*), the vertical externals (*ve*), the scapular internals (*sci*) modified in the Ereynetinae into sensillae, and the scapular externals (*sce*). In the genus *Riccardoella* the *vi* are situated in front of the *sci* (FAIN & VAN GOETHEM, 1986) whilst in the genus *Ereynetes* their situation varies according to the species, either in front, at the same level, or behind the level of the *sci*. The setae *ve* are always short or very short and situated in front and lateral to the *sci*. The setae *sce* are the most lateral.

The hysteronotum bears 5 pairs of internal setae (*d1*, *d2*, *d3*, *d4* and *d5*) and 4 pairs of lateral setae : the *l1* situated behind and not far from the *sce*, the *l2* (displaced medially between the *d2* and *d3* but slightly more lateral than the row of the *d* setae), the *l4* always modified into long sensillae in the genus *Ereynetes*, the *l5* short and situated behind *l4*. The *l3* are always lacking.

Ventrally the number of coxal setae in the genus *Ereynetes* is generally 3-1-3-2. In some species the coxae I are poorly developed and the posteromedian seta is set on the soft skin and not on the coxa.

It is the be noted that in the paper of FAIN (1964b) the setae *vi* were mentioned as "scapulaires internes", the *sci* as "sensillae antérieures" and the *d1*, *d2* etc. as "poils postsensillaires".



Figs 2-13. – *Ereynetal organ in some species of genus* Ereynetes :
Figs 2-5 : Ereynetal organ of type A in subgenus Gymnereynetes : G. macquariensis *(2);* G. aurantipes *(3);* G. exilis *(4);* G. brevipes *(5) : Fig. 6 : Ereynetal organ of type A in subgenus* Huntereynetes : H. scutulis *(paratype) (6); Figs 7-13 : Ereynetal organ of type B in subgenus* Ereynetes *or* Anereynetes : E. uckermanni *(7);* E. amplectorus, *paratype (8) and specimen from Transvaal (9);* E. bolitophilus *(10);* A. copridis *(11);* A. botswanenis *(12);* A. hydrophilus *(13) (All the specimens are females except n° 7 which is a male). (All the scales measure 10 micrometers).*

2. *Chaetotaxy of the hypostome*

The hypostome generally bears 4 pairs of setae consisting of 2 pairs of equal or inequal barbed setae situated more basally and 2 pairs of very small and smooth setae situated in the apical part of the hypostome. The 2 barbed setae are either close to each other or one pair is distinctly more apical. In some species there in only one pair of barbed setae (the basel one).

3. *Chaetotaxy of legs and number of leg segments in adults of* Ereynetinae

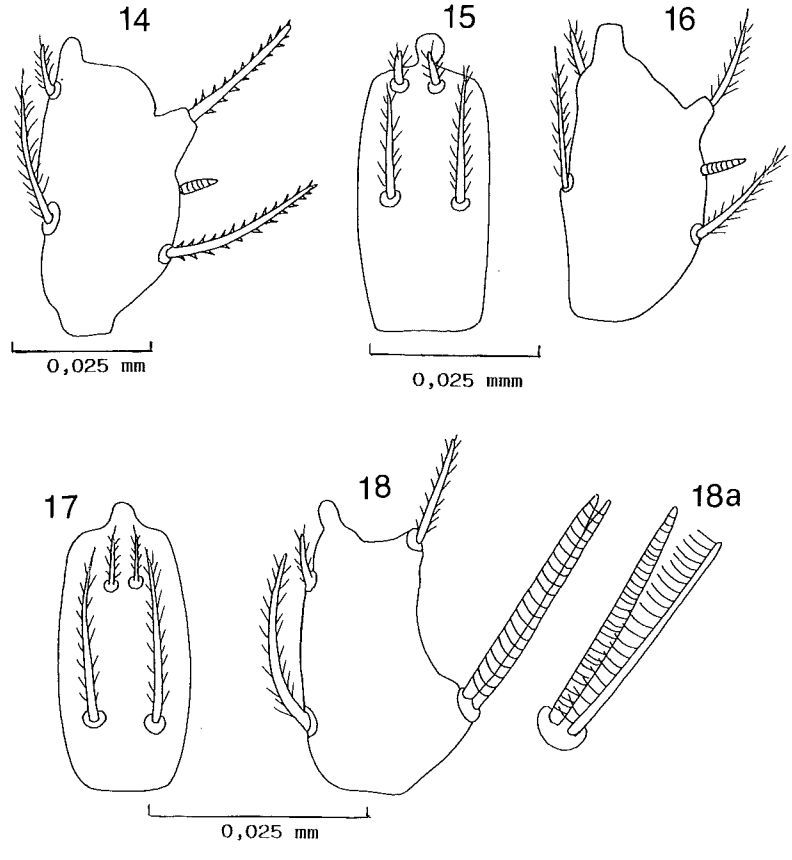
In all the species studied in this paper we have observed the following setal formula for the leg segments : Tarsi 12-10-8-8, tibiae 5-3-3-3, Genua 4-4-3-3, Femora 7-4-3-4, Trochanters 1-1-1-0, Coxae 3-1-3-2.
All the legs are formed of 5 free segments except the leg IV which has 6 free segments, the femur IV being divided into basi and telo-femur.

4. *Solenidions ω on tarsi I and II in the genus* Ereynetes (figs 14, 16, 18)

These solenidions are generally erected but in some species they are more or less oblique and directed apically (FAIN, 1963a). In a few species these solenidions are lying in a cuticular depression of the tarsi and resemble "rhagidial" organs. In *E. ueckermanni* these solenidions are very thick and long and are inserted on the same base as their guard-seta forming a complex.

5. *Ereynetal organ* (figs 2-13)

This organ is typical of the Ereynetidae. Its is present in all the developmental stages (from larva to adults) and in all the species of the family Ereynetidae and is absent in all the other families of Prostigmata (FAIN, 1962a, 1964a, 1985). This organ consists of three different structures; 1) an internal part represented by a solenidion completely invaginated in the depth of the tibia I. The small cuticular pocket containing the solenidion is prolonged apically by a very thin canaliculus which enlarges slightly in its apical part where it opens at the surface of the tegument; this orifice is situated in the apical third or quarter of the posterior surface of the tibia; 2) the second part consists of a modified seta, representing a famulus (*eta*), situated either in the distal dilated part of the canaliculus or along the border of this orifice. In some species the famulus is situated on the same base as the guard-seta; 3) the third part is formed by a simple barbed seta (guard-seta) set close to the



Figs 14-18. – E. (E.) bolitophilus *n. sp. (female) : tarsus I in lateral view (14);* E. (A.) botswanensis *n. sp. (female) : tarsus I in ventral (15) and lateral view (16) :* E. (E.) ueckermanni *n. sp. : tarsus I in ventral (17) and lateral view (18), solenidion* omega I *and guard seta slightly separated from each other (18a).*

famulus. Two main types, A and B, can be distinguished according to the situation of the famulus : In *type A* the famulus is short or very short and set at a certain distance from the guard-seta. This type is observed in the subgenera *Gymnereynetes* and *Huntereynetes*. In *type B* the famulus is either short or as long as the guard-seta and is always set on the same base as this seta. In some species this famulus is very thin and long and lies in the setules of the guard-seta so that it can be overlooked. The type B is observed in the subgenera *Ereynetes* and *Anereynetes*.
The type A appears to be more primitive than type B. It is in the subfamily Lawrencarinae parasitic in the nasal cavities of batrachians that the most primitive shapes of this organ are observed. In the genus *Xenopacarus* (FAIN *et al.*, 1969) living in the nasal cavities of the African clawed frog *Xenopus* the solenidion of tibia I is more superficial or almost completely external and there is no internal cuticular sac and no canaliculus. The famulus (*eta*) is well developed and set close to the solenidion and the guard-seta is distinctly separated from the famulus.

6. *Eyes*

A pair of eye-lenses is present in all the species of subgenera *Ereynetes* and *Huntereynetes*. These eyes are either spherical and prominent or flat and difficult to distinguish. They are situated a little in front and outside of the setae *ve*. In subgenera *Anereynetes* and *Gymnereynetes* eye-lenses are completely lacking. In subgenus *Opsereynetes* THOR the eye-lenses are replaced by a pair of pigmented eye-spots as in some Tydeidae.

7. *Dorsal median shields in the genus* Ereynetes

In all the species of *Ereynetes* the propodonotum bears a finely punctate shield. This shield is constricted at the level of the *sci* setae, into an anterior presensillar part and a posterior postsensillar part. In some species this shield is very poorly sclerotized and hard to see. In a few species of the subgenera *Ereynetes* and *Anereynetes* there is a second median shield wider than long and bearing the setae *d2*. These shields are generally reinforced by a system of sclerotized subcuticular lines. In the anterior shield these lines form a H-shaped figure. the lateral arms of the H are divided at each side in an anterolateral and a posterolateral branch. These branches are divergent and generally more or less strongly curved outside (BERLESE, 1923). In some species the lateral arms are separated in the midline, but more often they are joined by one or several transverse bridges. Between the lateral arms of the H there are generally a number of shorter lines forming a network. In the subgenus *Gymnereynetes* the pattern of lines is as a rule strongly reduced.
These shields are always more distinct in mature well-sclerotized adult specimens than in young specimens where they are generally incomplete and hard to recognize.

8. *Sexual dimorphism*

In the Ereynetinae the sexual dimorphism is entirely confined to the sexual organs and secondary sexual characters have, so far, not been recorded in this group. On the contrary in the Speleognathinae secondary sexual characters are not rare and they may be well marked (FAIN, 1963b).
In the female the vulva is in the shape of an inverted-T and there are 2 pairs of small piriform sensory organs that open in the vulva.
The sexual organs of the male consist of a superficial forked sclerite and more deeply a sclerotized penis. Inside of the body is a large granular testicle. Two pairs of sensory organs are generally present in the male. The chaetotaxy of sexual area has been depicted by FAIN and NADCHATRAM (1962).

9. *Life cycle and morphology of the immatures*

The life cycle in the genus *Ereynetes* involves the following stages : egg, larva, protonymph, deutonymph, tritonymph and adults. (FAIN and NADCHATRAM, 1962).
The nymphal stages differ from each other mainly by the morphology of the preanal region (the future genital area) and the chaetotaxy of the legs. The following structures have been observed in our specimens of *E. amplectorus* HUNTER : In the tritonymph the preanal region bears 4 pairs of very small pores forming 2 groups surrounded by 8 pairs of small barbed setae. In the deutonymph there are also 2 groups of 4 pores each but surrounded by only 3 pairs of barbed setae. In the protonymph there is only one group of 4 pores and no genital setae. In the larve only the 2 posterior setae are present and the pores are lacking.
Leg chaetotaxy in the immatures (in *E. amplectorus*) : In *Tritonymph* : Tarsi 12-8-7-7; Tibiae 5-3-3-3; Genua 4-4-3-3; Femora 7-4-3-4; Trochanters 1-1-1-0, Coxae 3-1-3-2. In *Deutonymph* : Tarsi 10-8-7-7; Tibiae 4-2-2-2; Genua 4-4-3-3; Femora 6-4-3-3; Trochanters 1-1-1-0; Coxae 3-1-3-1. In *Protonymph* : Tarsi 10-6-5-5; Tibiae 4-2-2-0; Genua 4-4-3-0; Femora 6-4-3-0; Trochanters 0-0-1-0; Coxae 3-1-2-0. In *Larva* : Tarsi 10-6-5; Tibiae 4-2-2; Genua 4-4-3; Femora 6-4-3; Trochanters 0-0-0; Coxae 3-1-2. Its is to be noted that the internal seta of coxa I in the immatures is generally situated on the soft cuticle inside the coxa.

10. *Standard measurements used in the descriptions of the* Ereynetidae

Several authors have proposed the use of metric characters in the study of larval Trombiculidae, Erythraeoi-

dea and Trombidioidea (WOMERSLEY and HEASLIP, 1943, WHARTON *et al.*, 1951, SOUTHCOTT, 1961 and others).

We propose here a list of measurements of some stable characters that could be used in the descriptions of adult Ereynetidae (fig. 1).

Dorsal shields

LAS	maximum length of anteromedian shield
LPS	maximum length of posteromedian shield
WAAS	maximum width of anterior part of anteromedian shield
WPAS	maximum width of posterior part of anteromedian shield
WPS	maximum width of posteromedian shield

Distances between setae

d1-d1	distance between setae d1
d2-d2	distance between setae d2
d1-sci	distance between setae d1 and sci
d1-vi	distance between setae d1 and vi
sci-sci	distance between setae sci
sci-vi	distance between setae sci and vi
sci-ve	distance between setae sci and ve
vi-vi	distance between setae vi
PVS	shortest distance between the centers of vi and a line joining the centers of sci. This distance is negative (-PVS) when the vi are in front of the sci or positive (+ PVS) when the vi are behind the sci.

Lengths of setae

Ld1	length of d1
Ld2	length of d2
Ll1	length of l1
Lsci	length of sci
Lsce	length of sce
Lts	length of proximal pair of ventral setae of tarsus I
Lve	length of ve
Lvi	length of vi

Lengths of leg segments

FeI (II etc.)	length of femur I (II etc.). The femur IV is divided in basi and telo femur
GeI (II etc.)	length of genu I (II etc.)
TaI (II etc.)	length of tarsus I (II etc.). These lengths do not include the claws or the short apical pedicel carrying the claws
TiI (II etc.)	length of tibia I (II etc.)

List of the known species of genus *Ereynetes* with indication of their habitat

	Habitat	Locality	References
Subgenus **Ereynetes**			
1. *E. galeatus* (BERLESE, 1923) (= *E. berlesei* OUDEMANS, 1928)	Rotting leaves	Italy	BERLESE, 1923; FAIN, 1964b
2. *E. septentrionalis* (BERLESE, 1923)	Manure	Italy	BERLESE, 1923; FAIN, 1964b
3. *E. centralis* (BERLESE, 1923)	Manure, humus, chesnut wood	Italy	BERLESE, 1923; FAIN, 1964b
4. *E. arcuatus* (BERLESE, 1923)	Manure	Italy	BERLESE, 1923; FAIN, 1964b
5. *E. excellens* (BERLESE, 1923)	?	Japan	BERLESE, 1923; FAIN, 1964b
6. *E. agilis* (BERLESE, 1923)	On *Musca*	Italy	BERLESE, 1923; FAIN, 1964b
7. *E. malayi* (FAIN & NADCHATRAM, 1962)	Nasal cavity of a Nectariin bird	Malaysia	FAIN & NADCHATRAM, 1962
8. *E. watsoni* FAIN, 1962	In *Stilbocarpa* litter	Macquarie Is	FAIN, 1962b

	HABITAT	LOCALITY	REFERENCES
9. *E. pegazzanoae* FAIN, 1964	Rotting wood	Italy	FAIN, 1964b
10. *E. amplectorus* (HUNTER, 1964)	On celery. Cow and horse dung	U.S.A. South Africa	HUNTER, 1964 present work
11. *E. faini* (HUNTER, 1964)	Soil, leave mold, leaves. Beet root from Danemark and Lily bulb from England	Mexico U.S.A.	HUNTER, 1964 HUNTER, 1964
12. *E. boharti* HUNTER & CROSS, 1968	Artificial nest of a bee	U.S.A.	HUNTER & CROSS, 1968
13. *E. gandensis* FAIN & BAFORT, 1973	Forest humus	Belgium	FAIN & BAFORT, 1973
14. *E. philippinensis* CORPUZ-RAROS, 1975	From scarabeid beetle	Philippines	CORPUZ-RAROS, 1975
15. *E. ueckermanni* n. sp.	Cow and horse dung	South Africa	present work
16. *E. bolitophilus* n. sp.	Cow dung	South Africa	present work
17. *E. luriei* n. sp.	Cow dung	South Africa	present work
Subgenus **Anereynetes**			
18. *A. cruciatus* (BERLESE, 1910)	On *Copris molossus* (L.)	Java	BERLESE, 1910; FAIN, 1964b
19. *A. hydrophilus* COOREMAN, 1947	Nest of *Larus ridibundus*	Belgium	COOREMAN, 1947
20. *A. inermis* FAIN, 1964	Humus, rotting leaves	Italy	FAIN, 1964b
21. *A. davisi* HUNTER, 1964	Under cottonwood bark	U.S.A.	HUNTER, 1964
22. *A. beauchampi* HUNTER, 1964	On Ginger roots from China	U.S.A.	HUNTER, 1964
23. *A. cenobitus* HUNTER & POE, 1971	On *Coenobita clypeatus*	Puerto Rico	HUNTER & POE, 1971
24. *A. lyratus* FAIN & PRASSE, 1973	On soil cultivated with wheat	Germany	FAIN & PRASSE, 1973
25. *A. upelbensis* CORPUZ-RAROS, 1975	Rotting bark	Philippines	CORPUZ-RAROS, 1975
26. *A. papuanus* FAIN & VAN GOETHEM, 1978	On *Coenobita rugosa*	Papua New Guinea	FAIN & VAN GOETHEM, 1978
27. *A. meliponae* FLECHTMANN, FAIN & LEAL, 1985	On *Melipona scutellaris*	Brazil	FLECHTMANN *et al.*, 1985

	Habitat	Locality	References	
28.	*A. copridis* n. sp.	From *Copris subsidens*	Botswana	present work
29.	*A. botswanensis* n. sp.	From a beetle	Botswana	present work
Subgenus **Gymnereynetes**				
30.	*G. macquariensis* Fain, 1962	Moss, lichen, green algae on coastal rocks etc.	Macquarie Is	Fain, 1962b
31.	*G. brevipes* (Berlese, 1923)	?	Italy	Berlese, 1923; Fain, 1964b
32.	*G. exilis* Fain & Prasse, 1973	In soil cultivated with cereals	Germany	Fain & Prasse, 1973
33.	*G. aurantipes* Fain & Bafort, 1973	Humus	Belgium	Fain & Bafort, 1973
Subgenus **Opsereynetes**				
34.	*O. norvegicus* Thor, 1932	?	Norway	Thor, 1932
35.	*O. simplexus* Baker, 1945	Moss	Mexico	Baker, 1945
36.	*O. robustus* Baker, 1945	Moss	Mexico	Baker, 1945
Subgenus **Huntereynetes**				
37.	*H. scutulis* (Hunter, 1964)	Tunnels of *Ips calligraphus*	U.S.A.	Hunter, 1964; Fain, 1964b (addenda)
38.	*H. propescutulis* Hunter *et al.*, 1989	Pine beetles and pine beetle tunnels	U.S.A.	Hunter, Rosario & Moser, 1989
39.	(?) *H. sinescutulis* Hunter *et al.*, 1989	On pine beetles	U.S.A.	Hunter, Rosario & Moser, 1989
Species inadequately described and tentatively included in subgenus **Anereynetes**				
40.	*A. ministralis* C.L. Koch, 1839	Moss, soil, wet forest areas etc.	Italy, Germany	Thor, 1933
41.	*A. sittardiensis* Oudemans, 1912	Nest of *Talpa europaea*	Nederland	Oudemans, 1912; Thor, 1933
42.	*A. biscutatus* (Berlese, 1923)	Dung	Italy	Berlese, 1923
43.	*A. corticalis* (Vitzthum, 1923)	In galleries of *Hylesinus* and *Myelophilus*	Austria	Vitzthum, 1923
44.	*A. potator* Vitzthum, 1932	In bamboo stumps	Sumatra	Vitzthum, 1932

	HABITAT	LOCALITY	REFERENCES	
45.	*A. simplex* WILLMANN, 1936	?	Germany	WILLMANN, 1936
46.	*A. sabinensis* BAKER, 1945	Bat guano	Mexico	BAKER, 1945
47.	*A. minutus* WILLMANN, 1949	In brackish swampy soil	Poland	WILLMANN, 1949
48.	*A. insularis* WILLMANN, 1952	Soil near sea coast	Germany	WILLMANN, 1952
49.	*A. bipilosus* WILLMANN, 1953	Soil	Germany	WILLMANN, 1953
50.	*A. ornatus* MIHELCIC, 1958	Wet area, under *Alisma* plantation	Spain	MIHELCIC, 1958
51.	*A. proximus* MIHELCIC, 1958	Wet area, under *Alisma* plantation	Spain	MIHELCIC, 1958
52.	*Ereynetes* sp. (nymphs)	Phoretic on fungal gnat *Bradynia impatiens*	U.S.A.	ZHANG & SANDERSON, 1993

Species that do not belong to the genus Ereynetes

1. *Opsereynetes tuberculatus* BAKER, 1945 : According to HUNTER (1964) this species belongs to the genus *Benoinyssus* FAIN, 1958 (Eupodidae : Benoinyssinae).
2. *Ereynetes lapidarius* OUDEMANS, 1906 : This species is the type of the new genus *Neoprotereunetus* n.g. (Eupodidae). (see below).
3. *Acarus caudatus* CANESTRINI & FANZAGO, 1877 : This species, included in the genus *Ereynetes* by THOR, is obviously not an Ereynetinae.
4. Several other species have been included in the genus *Ereyenetes* as species of *Incertae sedis* by THOR (1933) : i.e. *Acarus padi* SCHRANK, 1803, *Acarus junci* HERMANN, 1804, *Acarus mammilaris* CANESTRINI & FANZAGO, 1876 and *Acarus armatus* CANESTRINI & FANZAGO, 1876.

Description of Neoprotereunetes *n.g. (Eupodidae) for* Ereynetes lapidarius *OUDEMANS, 1906*

BERLESE (1923) created the new subgenus *Protereunetes* in his genus *Micrereunetes* BERLESE, 1919 with as type species *M. (Protereunetes) agilis* BERLESE. n. sp. THOR and WILLMANN (1941) raised *Protereunetes* to the generic rank and included this genus in the Eupodidae. FAIN (1964b) redescribed and depicted *P. (P.) agilis* BERLESE, 1923 and *M. (P.) brevipes* BERLESE, 1923 from the typical series deposited in the Acarotheca of Florence and he showed that these species actually belong to the genus *Ereynetes* and not to the Eupodidae as it had been suggested by THOR and WILLMANN (1941). The genus *Protereunetes* based on *M. (P.) agilis* is therefore a synonym of *Ereynetes* and a new genus should be created in the Eupodidae in order to include several other species described by these authors in *Protereunetes*. We propose the new genus *Neoprotereunetes* n.g., with as type species *Ereynetes lapidarius* OUDEMANS, 1906. This species presents all the characters that had been defined for *Protereunetes* by THOR and WILLMANN (not by BERLESE), i.e. legs long and thin, presence of and epivertex and several other characters mentioned by these authors.

Study of the species

Genus ***Ereynetes*** BERLESE, 1883

Ereynetes BERLESE, 1883 : fasc.V, n°1, tav. 21
Ereunetes BERLESE, 1883 : fasc.V, n°1, tav.22 (non *Ereunetes* ILLIGER, 1911 : Aves)
Micrereunetes BERLESE, 1919, n.n.; 1923 : 243
Micrereynetes BERLESE, 1923 : 243
Protereunetes BERLESE, 1923 : 245; FAIN, 1964, syn. nov.
Ereynetoides FAIN & NADCHATRAM, 1962 : 69; FAIN, 1964b syn. nov.
Neoereunetes BOTAZZI, 1950 : 38; FAIN, 1964b : 111 (addenda), syn. nov.

Type species :
Ereynetes galeatus BERLESE, 1923; FAIN, 1964b
= *Ereynetes berlesei* OUDEMANS, 1928; FAIN, 1964b syn. nov.

Type species of genus Ereynetes

The systematic position of the genus *Ereynetes* has been for a long time very confusing owing to the fact that BERLESE had designated as type species for his genus the slug mite *Acarus limacum*. In 1919, BERLESE, assuming that the name *Ereynetes* was an homonym of *Ereunetes* ILLIGER, 1911 (Aves), replaced this name by a new name *Micrereunetes* n.g. without designating a type species. In 1920 BERLESE proposed *Tydeus polymitus* KOCH as type species for *Micrereunetes*. This species, however, had been inadequately described and the types were lost. For these reasons OUDEMANS (1928) proposed to retain as type the species that BERLESE had depicted in 1883 (fasc.V, n°1, tav. 22) under the name "*Ereunetes limacum* (L.)". OUDEMANS renamed this species *Ereynetes berlesei* n. sp.
Now that we have examined and redepicted the *Ereynetes* species of the BERLESE collection in Florence we can assume that the creation of a new species by OUDEMANS was not necessary. The drawings of BERLESE correspond very well with *Ereynetes galeatus* described without figures by BERLESE in 1923, and depicted for the first time by FAIN (1964b, p. 92, fig. 1). The species *E. berlesei* may therefore be considered as a synonym of *E. galeatus*.

Subgeneric division of genus Ereynetes

The following 5 subgenera have been described in the genus *Ereynetes* :

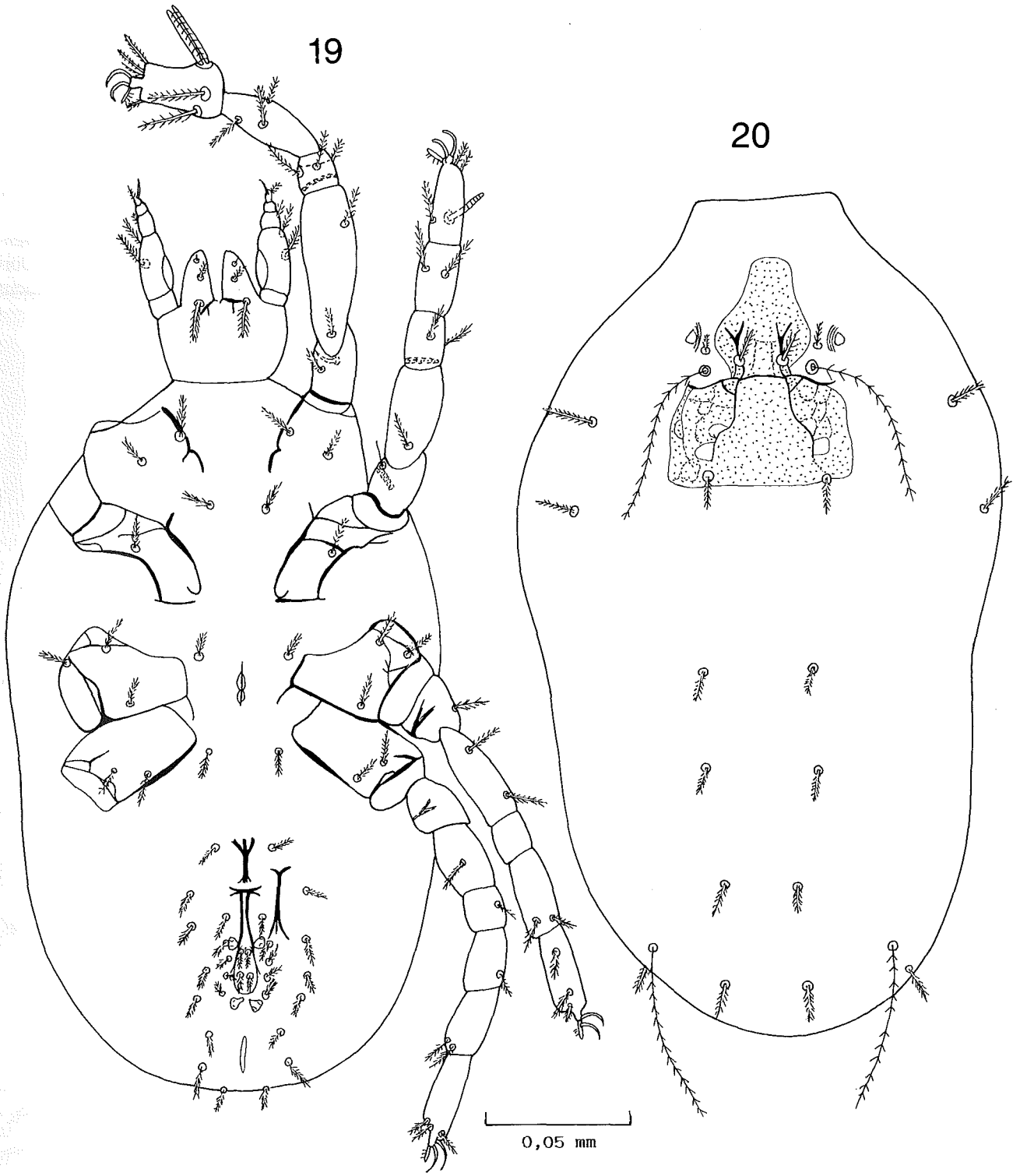
1. *Ereynetes* BERLESE, 1883 :
   With 1 or 2 median dorsal shields bearing a pattern of lines, Presence of one pair of eyelenses and 2 pairs of genital sensory organs. Ereynetal organ of type B.
   Type species :
   Micrereunetes galeatus BERLESE, 1923 (= *Ereynetes berlesei*, OUDEMANS, 1928).
2. *Anereynetes* FAIN, 1964b
   With 1 or 2 dorsal median shields and a pattern of lines. Eyes lacking. Two pairs of sexual sensory organs. ereynetal organ of type B.
   Type species :
   Ereynetes hydrophilus COOREMAN, 1947
3. *Gymnereynetes* FAIN, 1964b
   Dorsal shield and line-pattern poorly developed or sclerotized. Eyes lacking. Presence of 2 pairs of genital sensory organs. ereynetal organ of type A.
   Type species :
   Ereynetes macquariensis FAIN, 1962.
4. *Huntereynetes* FAIN, 1964b
   With one very large median dorsal shield carrying setae *d1*, *d2* and *d3* and a pattern of sclerotized subcuticular lines. A pair of eyelenses present. Genital sensory organs lacking. Setae *ve* vestigial. Ereynetal organ of type A.
   Type species :
   Ereynetoides scutulis HUNTER, 1964
5. *Opsereynetes* THOR, 1932
   With one median dorsal shield. Subcuticular pattern of lines very poorly developed. Presence of a pair of pigmented eyspots. With 2 pairs of genital sensory organs. ereynetal organ not described.
   Type species :
   Opsereynetes norvegicus THOR, 1932
   We have not seen specimens of this genus.

1. *Ereynetes (Ereynetes) ueckermanni* n.sp.

This species is named for Dr. E.A. UECKERMANN (Plant Protection Research Institute, Pretoria, South Africa) prominent specialist in prostigmatic mites.

Male (figs 7, 17 to 20; table 1) : Length and maximum width of idiosoma in holotype 245 x 148, in 3 paratypes 255 x 160; 239 x 135; 240 x 158. Standard measurements : see table 1. Dorsal shield rather poorly sclerotized in most of the specimens. Pattern of sclerotized subcuticular lines as in fig. 20. In poorly sclerotized specimens the sclerotized lines are completely separated in the midline.
Eyelenses flat. Setae *d1* to *d5* 10 to 20 long. *Venter* : Coxae I with internal margin incomplete and lacking in posterior half. Trochanters I and III with one barbed seta, trochanter II with a thin seta very shortly barbed. Genital organs. There is a superficial forked median sclerite. Penis with posterior extremity forked. Ereynetal organ of type B, the famulus of tibia I much shorter than the guard-seta (fig. 7). Gnathosoma : hypostome with 2 pairs of barbed setae, the basal pair much thicker and longer than the apical one. Tarsi I and II with a long and thick solenidon ω; on tarsus I this solenidion is set on the same base as the guard-seta and joined to it side by side (figs 18 and 18a).
Female and immatures : unknown.

Habitat
All our specimens are males. Holotype from cow dung, Cluny Farm (Cluny I (3), Transvaal (11.IX.1990, n° 0050); 19 paratypes from cow dung of which 16 from Cluny I (11.IX.1990 n° 37 and 0047 to 0055 and 6 males without n°), 2 from Sandton JHB (11.IX.1990, n° 0043 and 0044) and 1 from Innesfree Farm, Sandton (12.X.1991, n° 22N); 3 paratypes from horse dung of which 2 from Sandton JHB (11.IX.1990, 0045 and 0046) and 1 from Innesfree Farm, Sandton (29.X.1991, n° 59N).



Figs 19-20. – Ereynetes (E.) ueckermanni *n. sp. male, in ventral (19) and dorsal (20) view.*

Holotype and 13 paratypes in the PPRIP. One paratype in the collection of A.M. CAMERIK (n° 0047) and 5 paratypes in IRSNB (n° 0046, 22N, 59N, 0051 and 0049).

Remarks

This species is clearly characterized by the remarkable shape and size of the solenidions of tarsi I and II, which is unique in the genus *Ereynetes*, by the pattern of the dorsal shield, the shape of coxa I and the short famulus of tibia I.

2. *Ereynetes (Ereynetes) amplectorus* HUNTER, 1964
? *Ereynetes (Ereynetes) pegazzanoae* FAIN, 1964

This species was described from celery in the U.S.A. We have found 143 specimens of this species, among which 118 females, 16 tritonymphs, 4 deutonymphs, 4 protonymphs and 1 larva. Male were lacking. All these specimens were taken from either cow or horse dung in 2 farms (CLUNY and SANDTON), in the Transvaal district, South Africa.

Our specimens are not separable from *E. amplectorus* HUNTER (1964). Another species *E. pegazzanoae* FAIN, described from specimens in the BERLESE collection also in 1964 but a few months later, seems to be very close to the species of HUNTER. We think, however that it should be reexamined before to conclude that both species are synonymous.

Through the kindness of Prof. HUNTER (University of Georgia) we were able to examine a paratype female of *E. amplectorus* and compare it with our material. No significant differences were found between these specimens (see figures 3, 4, 21, 22 and table 2).

The paratype that we have examined is 335 long and 200 wide. The size of our females vary from 250 x 156 to 345 x 210. The small females are generally poorly sclerotized.

In all our specimens, aswell as in the paratype, the setae *vi* are set slighly in front of the *sci* setae, the ereynetal organ is of type B and the famulus is shorter (5,5 long) than the guard-seta (14 long), both setae being set on the same base and are distinctly divergent.

3. *Ereynetes (Ereynetes) bolitophilus* nov. spec.

Female (figs 10, 14, 23, 24; table 2) : Length and maximum width of holotype : 330 x 216, in the paratype 375 x 230. Standard measurements : see table 2. Dorsum with 2 median shields. Anterior shield well sclerotized, with a strong pattern of lines forming a network in the posterior part of the shield. Dorsal setae (especially the *vi*, *d1*, *d2* and *sce*) dilated in their middle part and more or less cigare-like. Setae *vi*, *sce* and *d1* 5 to 6 thick. Some coxal, intercoxal and genital setae are clavate. Setae *vi* situated far behind the *sci*. Ereynetal organ of type B, with a very thin and long famulus as long as the guard seta.

Male and immatures unknown.

Habitat

Holotype female from cow dung (n° 0065) from Sandton (15.II.1991); 1 paratype with the same data as the holotype (n° 0064). Holotype in PPRIP; 1 paratype in IRSNB.

Remarks

The subgenus *Ereynetes* includes at present 14 species with a single dorsal shield and 3 species with 2 dorsal shields, i.e. *E. arcuatus* BERLESE, *E. watsoni* FAIN and *E. philippinensis* CORPUZ-RAROS.

Our species differs from *E. arcuatus* by the different shape of the network of the shields and the shape of some dorsal setae (e.g. *d1*) which are strongly inflated in *E. bolitophilus*.

Our species appears to be more close to *E. philippinensis* which also presents dilated dorsal setae on the dorsum and the venter. We have compared our specimens

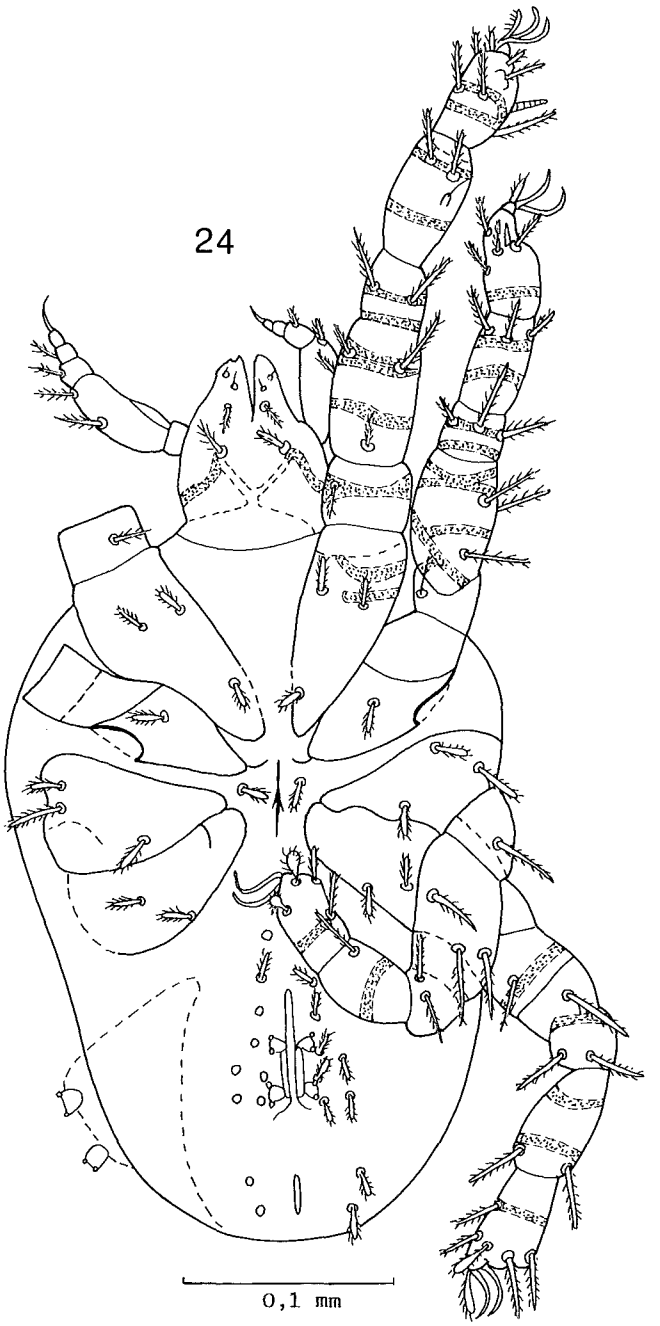
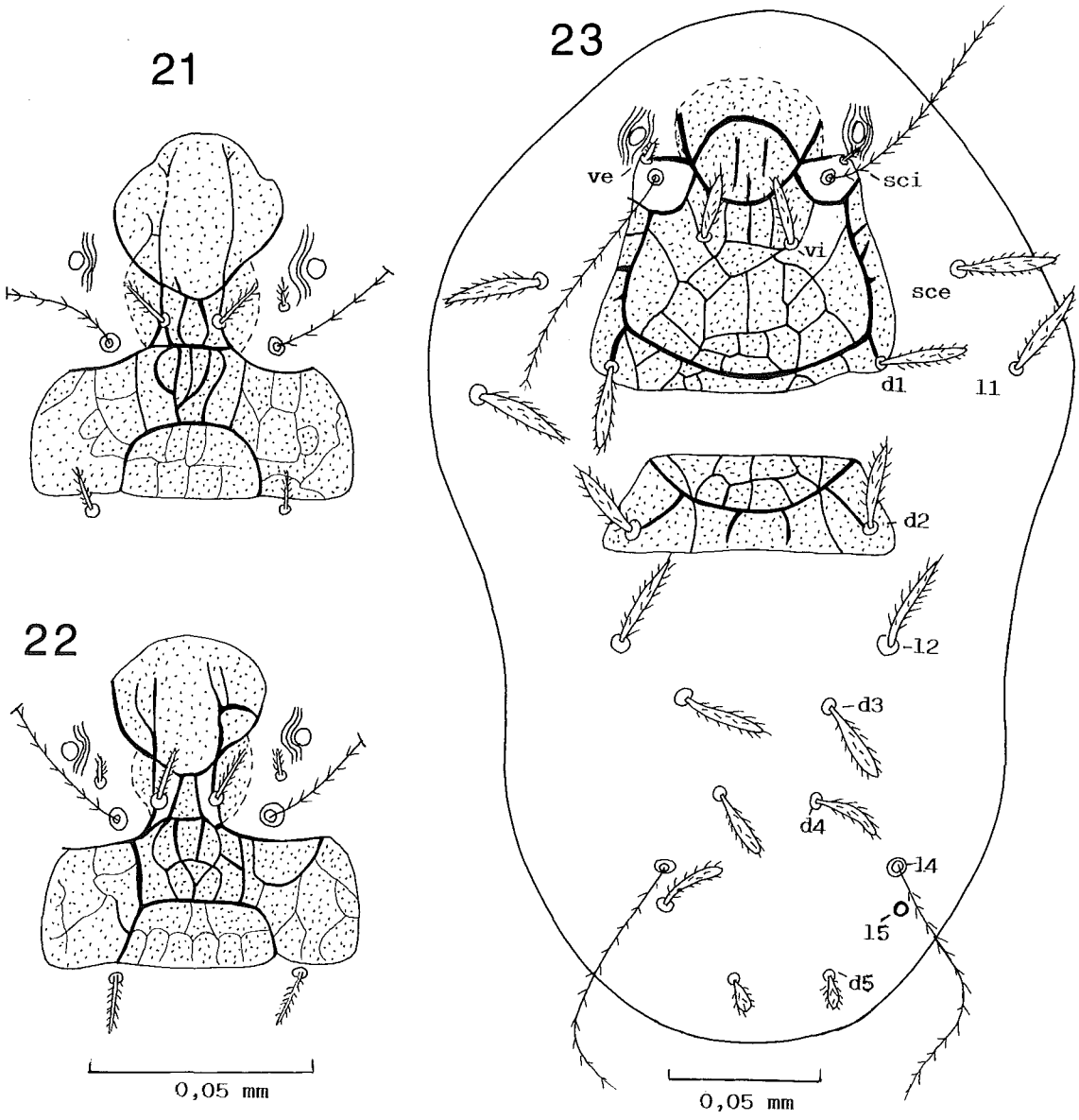


Fig. 24. – Ereynetes (E.) bolitophilus *n. sp. : holotype female in ventral view (24).*



Figs 21-23. – Ereynetes (E.) amplectorus *Hunter (females) : dorsal shield in a paratype (21) and in a specimen from Transvaal (22).*
Ereynetes (E.) bolitophilus *n. sp. : holotype in dorsal view (23).*

with a paratype of *E. philippinensis*. This paratype differs from our specimens by the following characters : dorsal shields smaller (LAS 90, WPAS 103, LPS 33, WPS 90), distances between some dorsal setae shorter (*d1-d1* 75, *d2-d2* 69, *sci-sci* 44, *sci-vi* 27, PVS +20), some dorsal setae shorter (Ld2 27, Ll1 36, Lsce 32), moveable digit of chelicerae shorter (20 instead of 30 in our species).

4. *Ereynetes (Ereynetes) luriei* n.sp.

This species in named for Mr LURIE, owner of the Sandton farm, who kindly allowed one of us to collect dung from his farm for several years.

This species is represented only by the holotype female. This specimen is 360 long and 225 wide. Ereynetal organ as in *E. bolitophilus*. This species belongs to the group *arcuatus* but differs from it by the different shape of the line pattern of the shields. It differs from *E. philippinensis* and *E. bolitophilus* mainly by the shape of the idiosomal setae which are narrower subcylindrical and not cigare-like as in these species. In addition if differs from *E. bolitophilus* by the following characters (see also table 2) : anterior shield slightly longer and narrower in its posterior part, posterior shield slightly longer and wider, distances between some setae distinctly shorter (e.g. *d1-d1*, *d2-d2*) or longer (*d1-sci*, *d1-vi*), setae *lts* longer, tibiae and femora I-IV distinctly longer (see table 2).

Habitat
Holotype collected from cow dung from Sandton, JHB (specimen n° 0063, collected 15.II.1991). Holotype in PPRIP.

5. *Ereynetes (Anereynetes) copridis* n.sp.

Female (figs 11, 25, 27; table 3) : Holotype 265 long and 171 wide, in 3 paratypes these measurements are 261 x 160, 315 x 185 and 317 x 190. Shields well sclerotized bearing a pattern of very thick subcuticular sclerotized lines.
The median area of the posterior part of the anterior shield without a network of lines. Setae *d1* set distinctly behind the *sci* setae. Ereynetal organ of type B, the famulus very thin and as long as the guard-seta (28 long). Standard measurements : see table 3.

Male and immatures : unknown

Habitat
Holotype and 3 paratype females taken from *Copris subsidens*, from Mahalapye, Botswana. (Coll. A.M.C. 26.I.1977, n° 209).
Holotype and 1 paratype in PPRIP, 1 paratype in the collection of A.M.C., 1 paratype in IRSNB.

Remarks
The subgenus *Anereynetes* includes 24 species, but among them only 3 bear 2 dorsal median shields : *E. cruciatus* BERLESE, *E. potator* VITZTHUM and *E. biscutatus* BERLESE. *E. copridis* is clearly distinct from *E. cruciatus* and *E. potator* by the different shape of the dorsal shields. *E. biscutatus* has never been depicted and is not represented in the BERLESE collection in Florence.

6. *Ereynetes (Anereynetes) botswanensis* nov. spec.

Female (figs 12, 15, 16, 26, 28; table 3) : Holotype 425 long and 290 wide, in 2 paratypes : 370 x 225 and 390 x 230. Standard measurements : see table 3. Dorsum with

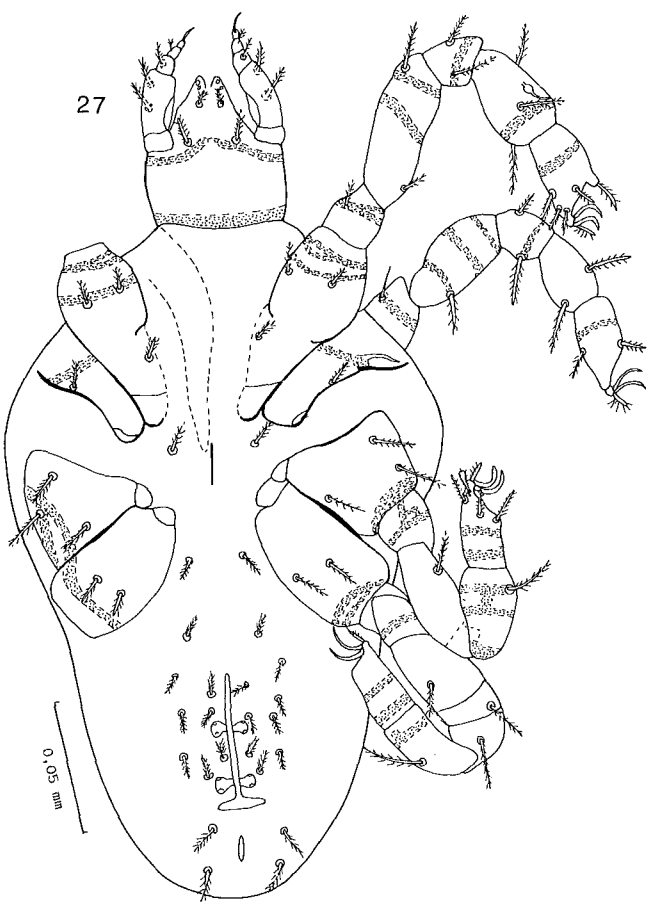


Fig. 27. – Ereynetes (Anereynetes) copridis *n. sp. : holotype female in ventral view.*

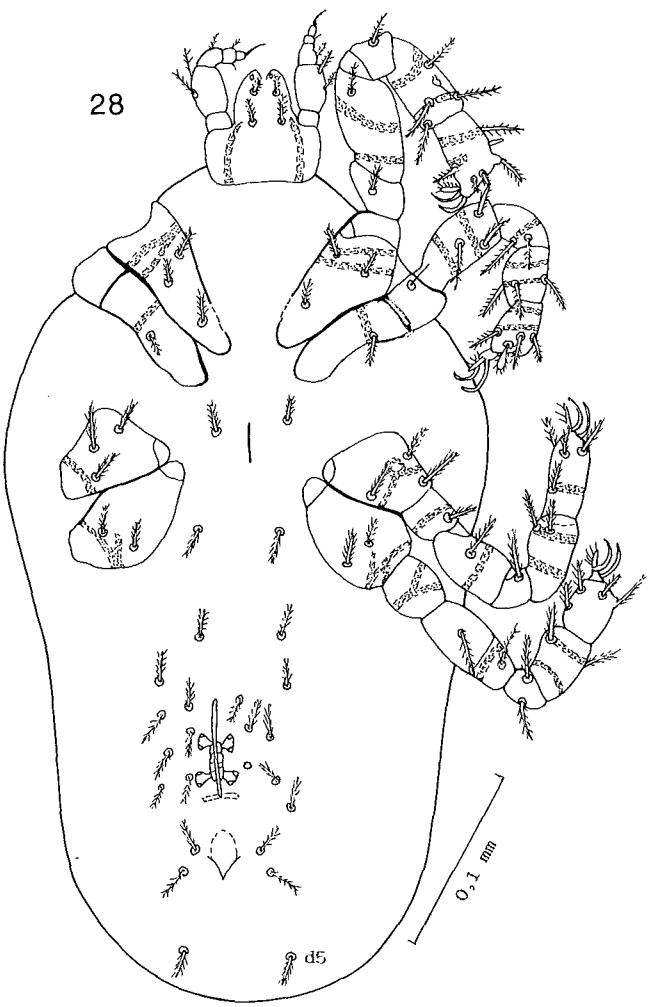
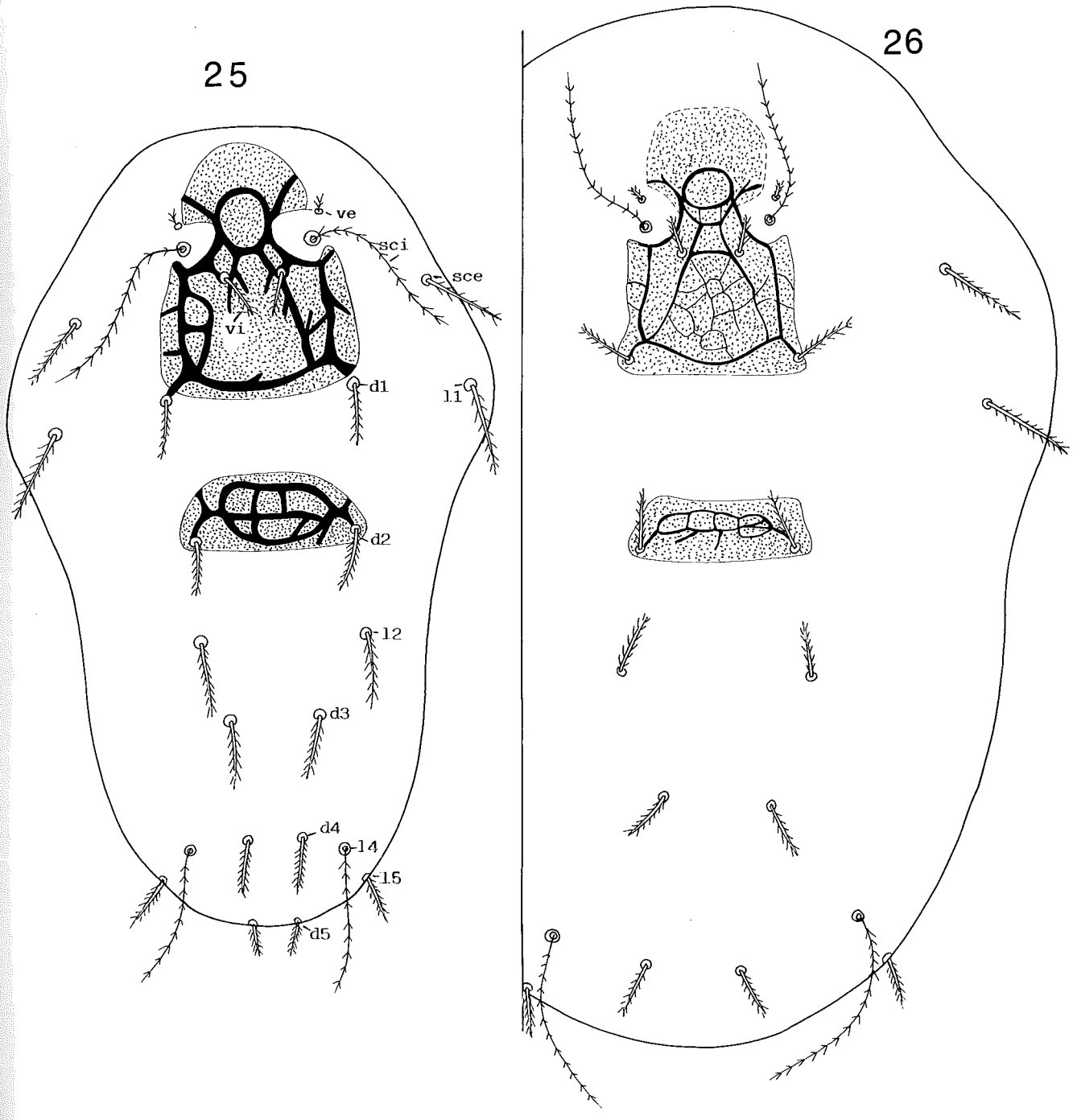


Fig. 28. – Ereynetes (Anereynetes) botswanensis *n. sp. : holotype female in ventral view.*



Figs 25-26. – Ereynetes (Anereynetes) copridis *n. sp. : holotype female (25) and* Ereynetes (A.) botswanensis *n. sp. (26) (female in dorsal view).*

2 median shields. General shape of anterior shield resembling that of *E. copridis* but the shields are distinctly smaller and the sclerotized subcuticular lignes are much thinner and there is a distinct network in the center of posterior part of the anterior shield. Moreover most of the standard measurements are smaller than in that species.

Male and immatures : unknown

Habitat

Holotype and 2 paratypes females from a beetle *Metacatharsius* sp., from Mahalapye, Botswana.

Holotype in PPRIP, 1 paratype in the collection of A.M.C. and 1 paratype in IRSNB.

Table 1
Standard measurements of *Ereynetes (Ereynetes) ueckermanni* n. sp. (males) (in micrometers)

	Holotype	Paratype 1	Paratype 2	Paratype 3	Mean
Dorsal shield					
LAS	60	54	55	60	57.2
LPS	–	–	–	–	–
WAAS	26	27	30	35	29.5
WPAS	48	50	60	65	56.7
WPS	–	–	–	–	–
Setae					
d1-d1	35	30	36	37	34.5
d2-d2	35	32	40	42	37.2
d1-sci	31	31	32	36	33.5
d1-vi	34	34	36	40	36
sci-sci	29	29	34	37	32.2
sci-vi	8.4	9.6	11	12	10.2
sci-ve	6	6	7.2	7.2	6.6
vi-vi	12	11	13	14	12.5
PVS	–2.5	–3.6	–2.5	–4.8	–3.3
Ld1	9.6	11	13	14	11.9
Ld2	8.5	11	–	12	10.5
Ll1	13	14	–	18	11.2
Lsci	62	65	60	–	62.3
Lsce	17	18	19	24	19.5
Lts	20	–	19	18	19
Lve	7	7.2	8	7.5	7.4
Lvi	9	9.5	9	12	9.8
Legs					
TaI	30	30	33	31	31
TaII	30	26	30	30	29
TaIII	32	28	32	34	31.5
TaIV	32	34	36	31	33.2
TiI	36	33	38	36	35.7
TiII	23	24	25	25	24.2
TiIII	23	24	25	25	24.2
TiIV	25	25	27	29	26.5
GeI	17	17	18	18	17.5
GeII	18	17	19	18	18
GeIII	18	18	19	18	18.2
GeIV	18	18	18	19	18.2
FeI	55	50	56	54	53.7
FeII	36	36	36	41	37.2
FeIII	36	34	39	42	37.7
FeIV	42	43	50	50	46.2

Table 2 :

Standard measurements of *Ereynetes (Ereynetes) amplectorus* HUNTER, *E. (E.) bolitophilus* n. sp. and *E. (E.) luriei* n. sp. (females) (in micrometers)

	E. (E.) amplectorus			*E. (E.) bolitophilus*		*E. (E.) luriei*
	Paratype ♀	specimens from Transvaal ♀ 0056	♀ 0087	Holotype	Paratype	Holotype
Dorsal shield						
LAS	78	76	75	110	115	123
LPS	–	–	–	36	34	40
WAAS	36	36	36	62	63	60
WPAS	73	72	69	120	114	105
WPS	–	–	–	102	99	110
Setae						
d1-d1	43	46	45	90	90	78
d2-d2	48	47	45	84	81	70
d1-sci	36	34	39	60	63	69
d1-vi	44	41	40	42	39	50
sci-sci	36	38	36	53	54	49
sci-vi	12	12	11	24	27	27
sci-ve	9	8	8	10	10	9
vi-vi	14	14	15	31	33	30
PVS	–4.5	–4.5	–4.5	+23	+24	+23
Ld1	18	16	12	32	33	30
Ld2	15	15	13	31	33	–
Ll1	21	21	22	40	42	39
Lsci	80	82	75	91	90	85
Lsce	28	26	22	38	45	43
Lts	21	22	22	20	21	30
Lve	8	7	8	10	12	10
Lvi	13	–	12	34	33	27
Legs						
TaI	39	37	36	42	45	48
TaII	36	33	34	42	43	45
TaIII	36	36	41	44	45	50
TaIV	42	38	39	46	45	51
TiI	41	40	41	55	58	72
TiII	30	30	32	40	42	53
TiIII	30	29	29	44	40	52
TiIV	33	30	30	47	40	57
GeI	23	22	21	26	25	30
GeII	21	19	19	24	24	28
GeIII	22	20	21	28	25	29
GeIV	24	21	23	28	28	30
FeI	60	58	57	72	73	78
FeII	48	47	45	61	60	72
FeIII	49	47	45	60	61	69
FeIV	60	56	55	72	70	84

Table 3 :

Standard measurements in the females of *Ereynetes (Anereynetes) copridis* n. sp. and *E. (A.) botswanensis* n. sp. (in micrometers)

	E. (Anereynetes) copridis n. sp.				*E. (Anereynetes) botswanensis*			
	Holotype	Paratype 1	Paratype 2	Mean	Holotype	Paratype 1	Paratype 2	Mean
Dorsal shield								
LAS	75	78	88	80.3	99	98	99	98.6
LPS	20	20	24	21.3	24	28	28	26.6
WAAS	42	41	40	41	48	47	48	47.6
WPAS	67	70	69	68.6	80	77	76	77.6
WPS	63	65	66	64.6	74	72	78	74.6
Setae								
d1-d1	65	68	67	66.6	70	68	70	69.3
d2-d2	54	53	57	54.6	65	61	64	63.3
d1-sci	51	53	54	52.6	55	56	54	55
d1-vi	42	41	42	41.6	42	46	46	44.6
sci-sci	42	42	45	43	44	47	48	46.3
sci-vi	15	15	18	16	16	18	18	17.3
sci-ve	8	9	9	8.6	11	11	11	11
vi-vi	16	20	19	18.3	22	20	23	21.6
PVS	+12	+12	+11	+11.6	+12	+12	+13	+12.3
Ld1	23	26	25	24.6	28	28	25	27
Ld2	24	25	24	24.3	26	29	28	27.6
Ll1	30	30	30	30	36	34	36	35.3
Lsci	63	60	65	62.6	88	75	68	77
Lsce	30	31	30	30.3	34	36	34	34.6
Lts	13	15	14	14	18	18	17	17.6
Lve	7	6	8	7	10	10	8	9.3
Lvi	18	18	19	18.3	19	18	19	18.6
Legs								
TaI	32	33	31	32	38	44	39	39.3
TaII	30	30	25	25	36	35	32	34.3
TaIII	37	33	32	34	35	34	36	35
TaIV	36	35	34	35	36	36	36	36
TiI	38	39	39	38.6	42	44	43	43
TiII	30	27	26	27.6	34	31	30	31.7
TiIII	30	26	28	28	30	30	31	30.3
TiIV	30	27	29	28.6	36	35	36	35.6
GeI	22	23	20	21.6	25	25	24	24.7
GeII	20	19	20	19.6	24	25	24	24.3
GeIII	24	23	21	22.6	23	23	25	25.7
GeIV	24	23	24	23.6	26	25	24	25
FeI	54	54	52	53.3	64	62	60	62
FeII	47	48	48	47.6	48	50	52	50
FeIII	47	45	46	46	48	48	52	49.3
FeIV	48	50	50	49.3	60	60	60	60

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