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The phoretic female of *Pediculaster australis* spec. nov. (Acari: Pygmephoridae) from South Africa and new synonyms for *P. morelliae* RACK, 1975

by A.M. CAMERIK & S.H. COETZEE

Summary

Pediculaster australis spec. n., collected from cow and horse dung in South Africa, is described along with the re-description of the legs of the morphologically closely related *P. queenslandicus* RACK, 1980. 3-D images of the pharyngeal pump system, taken with a Confocal Laser Scanning Microscope by the junior author, allowed us to view the pumps in different angles and photos of these images are presented for the first time, in this paper. On grounds of size variation found in collections of the same species in South Africa, two new synonyms of *P. morelliae* RACK 1975, syn. n. = P. *luciensis* MAHUNKA, 1981, = *P. rackae* MAHUNKA, 1986, are proposed.

Key words: Acari, Pygmephoridae, *Pediculaster*, new species, synonyms, pharyngeal pump system.

Résumé

L'auteur redécrit les pattes the *Pediculaster queenslandicus* RACK, 1980 et décrit *P. australis* spec. nov., récoltée dans des bouses de vaches en Afrique du Sud. L'étude de la variation dans les dimensions de *P. morelliae* RACK, 1975 en Afrique du Sud incite l'auteur é considérer que *P. luciensis* MAHUNKA, 1981 et *P. rackae* MAHUNKA, 1986 sont des synonymes de *P. morelliae*.

Introduction

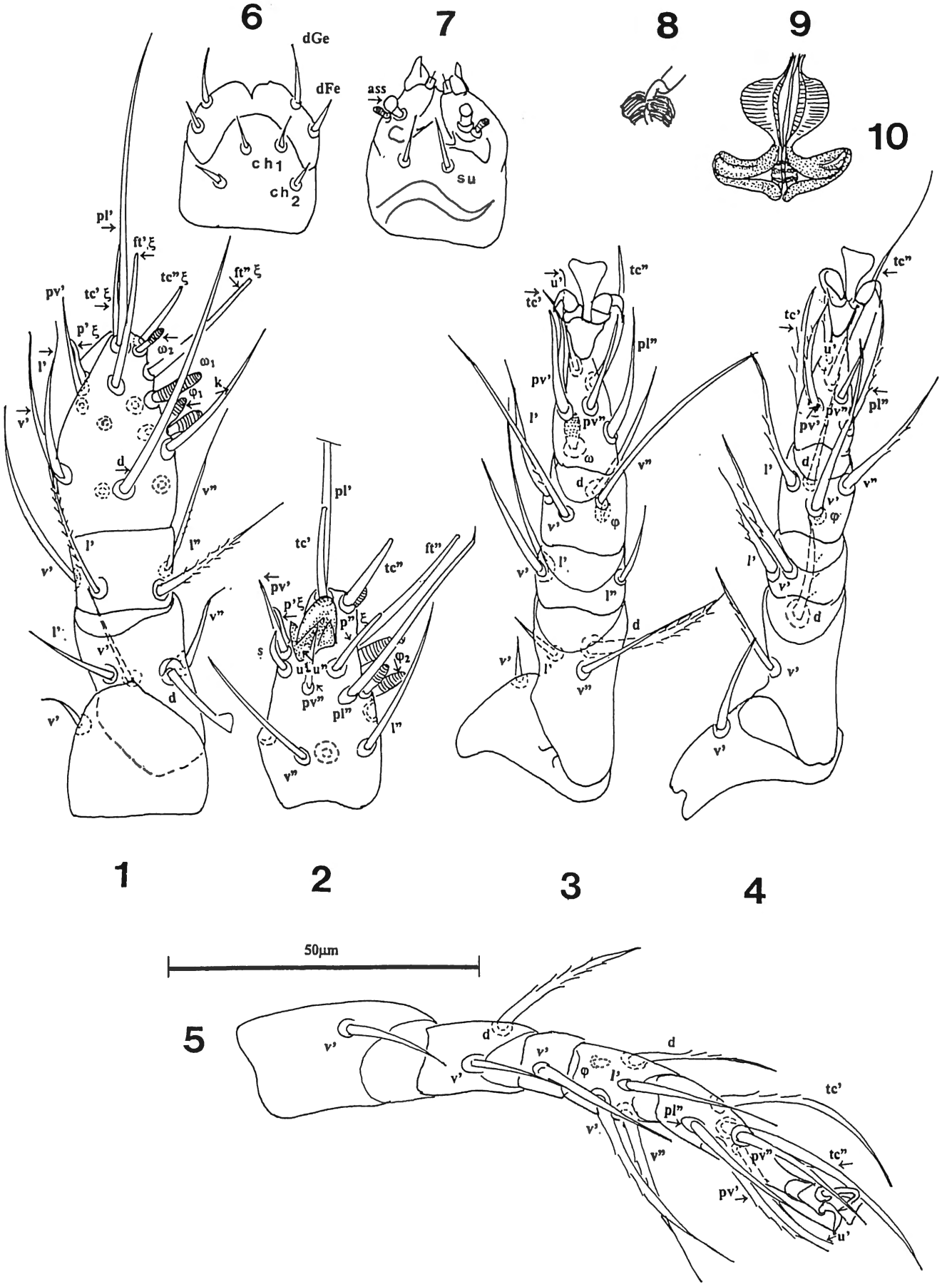
The cosmopolitan distribution of some dung and fungus – inhabiting species of the genus *Pediculaster* could well have happened in conjunction with expansion of synantropic habitats. As humans moved cattle and the mushroom industry expanded, horse, cattle dung and compost with its fauna would have been introduced into areas like Australia, where the modern mammals were not endemic. *P. queenslandicus* RACK 1980, for example, was collected in Australia from the cattle-dung fly *Stomoxys calcitrans* (Linn.), most probably imported in that continent with buffalo and cattle from Malaya HANDSCHIN (1932). In South Africa, where the buffalo is endemic, a close relative of the mite is collected from the same habitat. However, to date only very patchy information is available on the distribution of this genus. Taxonomists who find external characteristics most important have no need of this information and usually consider local varieties of the same species conspecific. Phylogenetic systematicists on the other hand, taking into account natural barriers and speciation processes, tend to describe them as distinct species. These facts, and inaccurate drawings and descriptions account for a number of synonyms within the genus.

P. morelliae RACK, 1975, for example, collected from a fly in Australia, was found in the same habitat in New Zealand, MARTIN 1978, and South Africa (this publication). Two other species, *P. luciensis* and *P. rackae*, both described by MAHUNKA (1981, 1986 respectively) were considered to be distinctly different from *P . morelliae* because of the differently shaped peritremes, as well as the arrangement of the hysterosomal setae (*P . luciensis*) and the shape and length of pseudoanal seta ps_2 and the difference in length of the smallest solenidion, ω_2 (*P . rackae*). Specimens of *P. morelliae* were collected in South Africa and the variation in setal and solenidial lengths amongst these suggest that *P. luciensis* and *P. rackae* are conspecific with *P. morelliae.*

The purpose of this paper is two fold: redescription of the legs and gnathosomal setae of *P. queenslandicus* and the presentation of CLSM photos of its pharyngeal pump system in order to describe *P. australis* spec. nov.. Secondly, to proposed new synonyms for *P. morelliae* RACK, 1975 (= *P. luciensis* MAHUNKA, 1981, = *P. rackae* MAHUNKA, 1986), based on a comparison of measurements on paratypes of the species concerned, with those from other publications and specimens collected in South Africa.

Materials and methods

Mites from Cluny and Boekenhoutskloof farms from cow dung, taken to the insectary at the University were kept at constant temperatures of 31 ±3 ° C, RH 53% and 24 hours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light. Some of the dung was removed from the pad daily and preserved in 75% ethanol. Some weeks later these samples were searched for *Pediculaster* species, using the floatation method described by HART & FAIN (1987). For the materials and methods used to collect cow and horse dung from Innesfree Farm, the use of abbreviations and measurements taken, the reader is referred to CAMERIK & UECKERMANN (1995) and CAMERIK (1996). It is important to note that the body width in the measurements of this paper, is the length of the strongly sclerotised apodeme III. It excludes the softer parts laterad of the structure as often its distension depends on the amount of pressure used to mount the specimen. Body length excludes the gnathosoma and prodorsal shield. Measurements (lm) are taken from 10 specimens, unless it is indicated differently in the text. Terminology of the structures and setal notation are those used by LINDQUIST (1986). Drawings are made by means of a phase-contrast microscope under oil immersion. Photos of the pharyngeal pump system, presented in this paper, are computer compiled images through a Confocal Laser Scanning Microscope (CLSM), that allowed us to rotate the system and view it under different angles.

Type material is deposited in the Plant Protection Research Institute (PPRI), Pretoria, South Africa; the Canadian National Collection (CNC), Ottawa, Canada and The Zoological Museum Hamburg (ZMH), Germany, IRSNB, Brussels, Belgium.

Pediculaster queenslandicus (= *Siteroptes* (*Siteroptoides*) *queenslandicus*) RACK, 1980

Material examined:
Australia: 3 phoretic females, paratypes from Townsville, Queensland, from *Stomoxys calcitrans,* biting a calf, coll. I.. BEVERIDGE, 13.I.1978, 3 Paratypes (Eing. Nr. A2/75, N° 29, 30, 21), from the collection of the Zool. Mus. Hamburg, Germany.
South Africa: 85 phoretic females: 2 specimens from Cluny Farm, Kayalami (S. 25° 57' 10.7'', E. 28° 03' 52.1''), Gauteng, 8 August, 1990; 60 specimens from the same location from a muscid fly (not *Musca*), cow dung, 11 Nov. 1990; 8 specimens from Boekenhoutskloof, Cullinan, Gauteng (S. 25° 33' 02.9'', E. 28° 27' 17.4''), from cow dung, 3 Sept. 1990; 9 specimens from Innesfree Farm, Sandton, Johannesburg (S. 26° 06' 24'', E. 28° 04' 24'') from 7 *Norrbomia marginatis* (Diptera: Sphaeroceridae), cow dung, another 2 detached from their host in the preservation fluid, 27-29 Oct. 1991. From the same location another 6 specimens, detached from their host, cow dung, 1-2 Feb. 1992. All specimens collected by A.M. CAMERIK.

Remarks: Measurements are of specimens from Cluny and Boekenhoutskloof farms. Cluny: body length 210-294 (av. 251, n = 10), width 59-75 (av. 66 , n = 10); Boekenhoutskloof: body length 189-252 (av. 227, n = 8), width 51-69 (av. 63, n = 8). Although the Cluny specimens seem on the average larger than those from Boekenhoutskloof, the length of specimens from both locations lies well within the parameters of the measurements given by RACK, 1980: 175-305 (av. 245, n = 43). The body width, measured by RACK 1980, 85-150 (av. 115, n = 43) is distinctly different. However, the reader is referred to the note about the measurement of the body width, under Materials and Methods.

For the drawings and description of the idiosoma and its setal distribution of *P. queenslandicus* the reader is referred to the original description of RACK, 1980. As the original description and drawings of the gnathosoma and legs were not detailed enough to allow an adequate comparison between the Australian and South African material, a more detailed version of these body parts from Australian paratype Nr. 30 is presented below.

Notes on the gnathosoma and pharyngeal pumps of *P. queenslandicus* RACK, 1980

Gnathosoma (Figs. 6, 7): genual setae (*dGe*) longer than femoral setae (*dFe*); cheliceral setae (ch_1, ch_2) short; subcapitular setae (*su*) reaching to the base of accessory setigenous structure (*ass*).
Pharyngeal pumps (Figs 8-14): pump 1 (Fig. 8), located under the heavily sclerotised first coxisternal plate. It is very difficult to see through a light microscope (Fig. 11) as it is situated between the first and second (*ap 1, 2*) and under the prosternal apodemes (*ap pr*). The Confocal Laser Scanning Microscope however, in a 180 ° rotation of the compiled 3-D structure, allows us to view the pump from the opposite side (Fig. 12). Pump 1 appears to be rectangular, the two parts on each side of the oesophagus bent dorsadly. Pumps 1 and 2 are striated. Pump 3 is ''winged'' (Figs. 13-14).

Redescription of the legs of *P. queenslandicus* RACK, 1980

Introduction.
GRANDJEAN, in several publications, designated for the first time the setae of Oribatidae (1935, 1939a, 1940) and Endeostigmata (1939b, 1942a,b). LINDQUIST (1986) adapted GRANDJEAN's system for the Tarsonemidae and

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Figs 1-10. – *Pediculaster queenslandicus* RACK. Phoretic female – *Leg I, in dorsal view (1) Tibiotarsus leg I in latero-ventral view (2); Leg II in ventral view (3); leg III in ventral view (4); leg IV, lateral view (5), Gnathosoma, dorsal view (6), Gnathosoma, ventral view (7), Pharyngeal pump system (8-10 (pumps 1 (8), 2 (9), 3 (10)).*

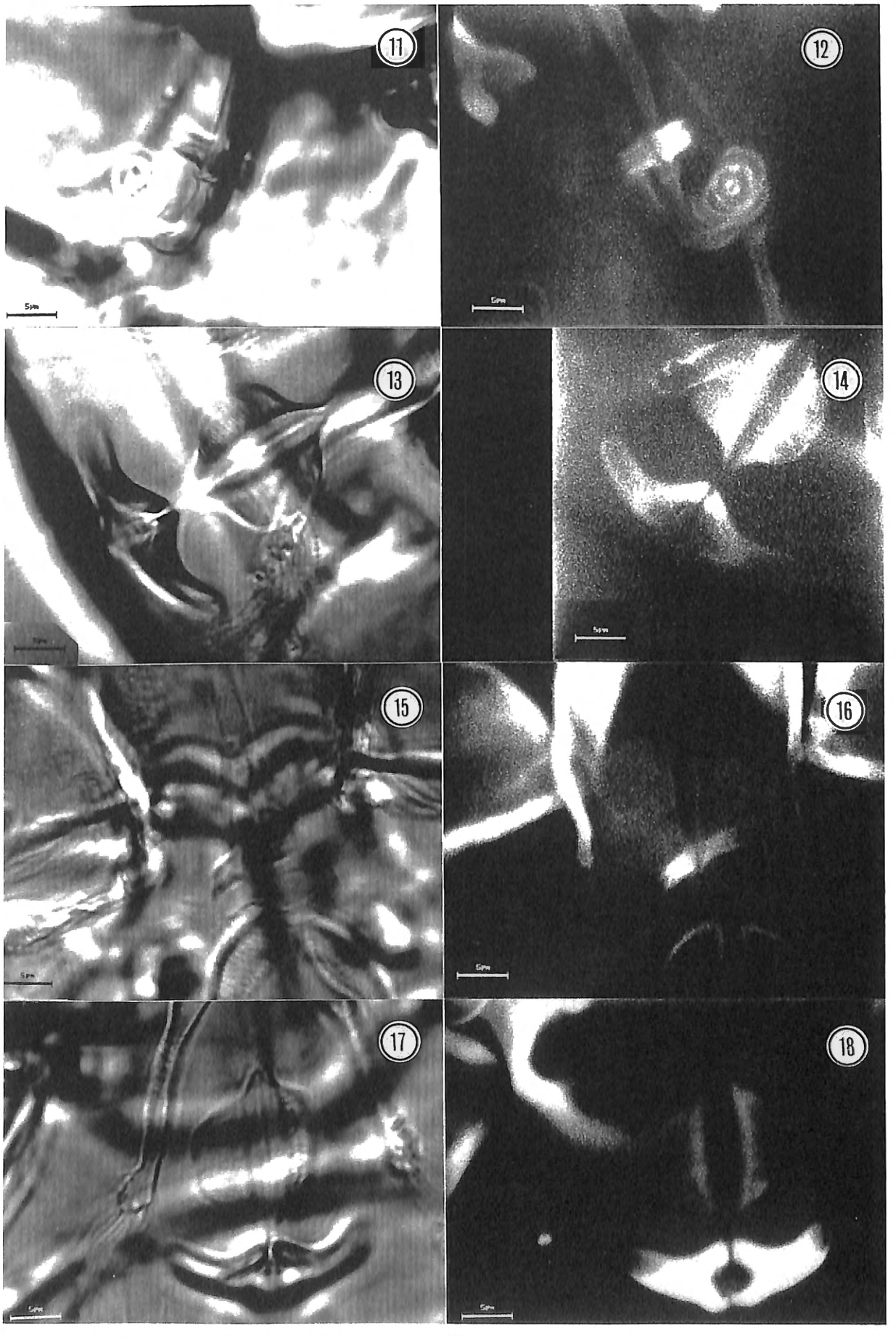
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Table 1. – Formula for leg setae of *Pediculaster* Vitzthum 1931.

Leg	**I**			**II**		**III**		**IV**	
Trochanter	1	*v'*	**Trochanter**	1	*v'*	1	*v'*	1	*v'*
Femur	4	*d, l', v', v''*	**Femur**	3	*d, l', v''*	2	*d, v'*	2	*d, v'*
Genu	4	*l', l'', v', v''*	**Genu**	3	*l', l'', v'*	2	*l', v'*	1	*v'*
Tibiotarsus			**Tibia**						
setae	12	*u', u'', d, l', l'', v', v'', pl', pl'', pv', pv'', s, k*	setae	4	*d, l', v', v''*	4	*d, l', v', v''*	4	*d, l', v', v''*
eupathidia (ξ)	7	*p', p'', tc', tc'', ft', ft''*	solenidiun	1	*u*	1	*u*	1	φ
famulus	1	*k*							
solenidia	4	ω_1, ω_2, φ_1, φ_2	**Tarsus**						
			setae	6	*u, tc', tc''pl'', pv', pv''*	6	*u, tc', tc''pl'', pv', pv''*	6	*u, tc', tc pl'', pv', pv''*
			solenidion	1	ω	0		0	
claw	1	unpaired, robust, locking into bifid structure of fused setae *u' - u''*	claws	2	paired with a pad on the empodial side	2	paired with a pad on the empodial side	2	paired, simple, without a pad

related heterostigmatid groups. The author of this article, not familiar with GRANDJEAN's setal designation, misinterpreted LINDQUIST's in two previous publications (CAMERIK & UECKERMANN, 1995 and CAMERIK, 1996) with regards to the notation prime ('), as the most proximal and double prime ('') as the most distal of several paired leg setae. LINDQUIST, 1986 correctly primed the setae located forward to the dorsoventral plane of pseudosymmetry, and double primed those located posteriad of the plane. This error is rectified in this publication.

For the sake of clarity the eupathidia are indicated in the figures with the Greek letter "ξ". Except for the discussions on the notation and designation of leg setae below, the authors of this paper refer to LINDQUIST, 1986 for further explanations of the sigla applied to certain setae. LINDQUIST, comparing the evolutionary succession of the tectals and fastigials within the Heterostigmata, and taking into account the ontogeny of the setae, discusses at length the retention of the non-eupathidial tectals of legs II-IV. Finally the reader is referred to the same publication of LINDQUIST for discussions on the sigla of the three femoral and genual setae of leg II and the six tarsal setae of leg IV.

The distribution of the leg setae of *Pediculaster* species is as summarised in Table 1.

Leg I (Figs. 1-2): Strongly developed with a coalesced tibiotarsus ending in a robust single claw, that fits into a counter piece formed by proximally fused unguinal setae *u'- u''* (LINDQUIST, pers. comm. See also the clearly bifid structure of *u' - u''* in *P. gracilis* CAMERIK & UECKERMANN, 1995). With the unguinals fused at the base of the tibiotarsal claw, the iterals suppressed in the Heterostigmata (LINDQUIST, 1986), the remaining three pairs of typical blunt-tipped, internally hollowed eupathidia (see CAMERIK & UECKERMANN, 1995, photo 5) are the prorals *p', p''*; tectals *tc', tc''* and fastigials *ft', ft''*; *tc'* usually longer than *tc''*, *ft'* as long as *ft''*; famulus *k* terminally acute, smooth and closely associated with the solenidial cluster u_1 and u_2 . Setae *pl'* and *pl''* long and smooth; *pv''* and *s* short. Solenidia cone-shaped, ω_2 smallest, ω_1 stoutest; φ_1 as long as φ_2. All tibiotarsal setae are smooth. Genu: except for *v'*, all setae barbed. Femoral setae all smooth, *d* apically club-shaped.

Legs II and III (Figs. 3-4) end distally in paired claws against which, on the side of the empodium, a pad is found with which the mite secures its grip on the object to which it attaches (see CAMERIK 1996, photo 7).

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Figs 11-18. – *Pediculaster queenslandicus* RACK. Phoretic female – *Pharyngeal pump system, Pump 1 (light microscope), ventral view (11); Pump 1, dorsal view CLSM (12); Pumps 2-3 (light microscope), ventral view (13), Pumps 2-3 CLSM, dorsal view (14).*
Pediculaster australis spec. n. *Pharyngeal pump system Pump 1 (light microscope), ventral view (15); Pump 1, ventral view CLSM (16); Pumps 2-3 (light microscope), ventral view (17), Pumps 2-3 CLSM, dorsal view (18).*

Figs 19-20. – *Pediculaster australis* spec. n. Phoretic female – *Idiosoma, dorsal view (19); Idiosoma, ventral view (20).*

Leg IV (Fig. 5) ends in a simple pair of claws. Empodia of legs II-IV spatulate and reaching beyond the claws.

Tarsus: unguinal seta *u* (legs II-IV) short and barbed. Solenidion ω in tarsus II is large, cone-shaped; the tarsal solenidion is absent in legs III and IV. Tibial solenidion ω is present in legs II-IV, clearly visible in legs II and III. Non-eupathidial tectals (*tc', tc''*) of legs II-IV appear asymmetrical in *Pediculaster*. Proximal seta in the *l'* position represents the "mate " of *tc''*, namely *tc'* and not *pl'* (LINDQUIST, 1986). The tectal pair of legs II and IV are of equal length, that same pair of leg IV however, is longer than that of leg II; in leg III *tc''* is whipped and much longer than *tc'*. The pair of primiventrals (*pv', pv''*), consistently present in the Pygmephoroidea (LINDQUIST, 1986), are inserted asymmetrically in such a way that *pv''* is placed slightly more distad than *pv'*. Primi-

ventrals II are equal in length and smooth; on leg III and IV these are barbed on one side.
In *Pediculaster* seta *pl'* is absent from legs II-IV and *pl''* is sometimes mistakenly perceived as *pv''*, due to the asymmetrical positioning the primiventrals (LINDQUIST, 1986). Seta *pl''* of legs II and IV is smooth , but one-sidedly barbed on leg III.
Tibial *v'* and *v''* are asymmetrically inserted in legs II-IV; *v'* more proximal than *v''*.

The Pygmephoridae retain genual setae *l'*, *l''* and *v'* of leg II (LINDQUIST, 1986). These setae are smooth in this species. Setae *l'* and *v'* , retained in leg III (LINDQUIST, 1986) are both one-sidedly barbed.

There are maximal 3 setae, *d, l'* and *v''* on femur II, two setae, *d* and *v'* on femora III and IV (LINDQUIST, 1986). Seta *d* is robust and strongly barbed on legs II-IV; *l'* and *v''* of leg II are both smooth, *l'* shorter than *v''*. Setae *v'* is slightly barbed in leg III, but smooth in leg IV.

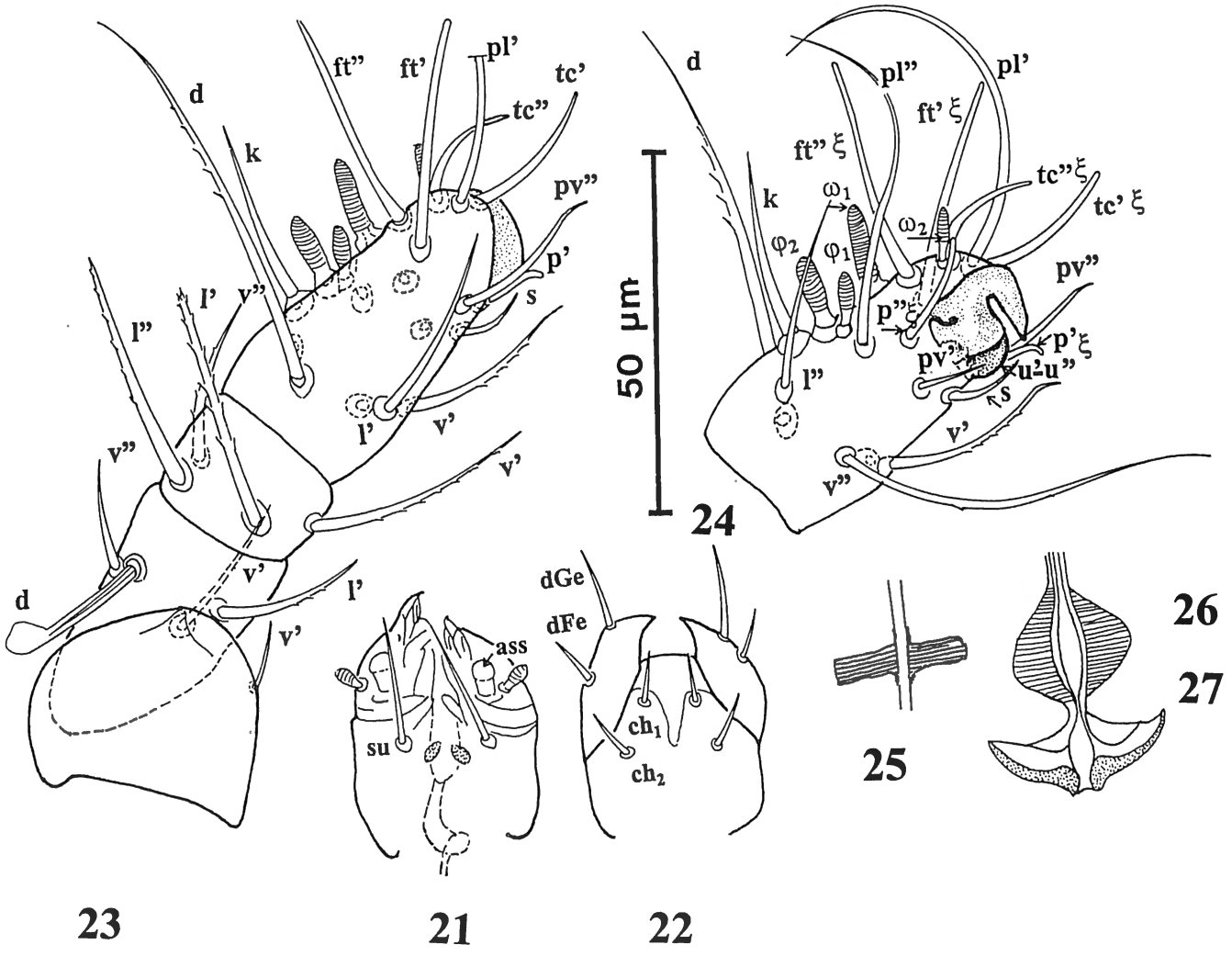
***P. australis* spec. nov. (Figs. 15-30)**

Holotype: Average length, 252.4 (av.: 238.9; range: 188.5-293.6), width 72 (av.: 68.5; range: 50.9-74.8).

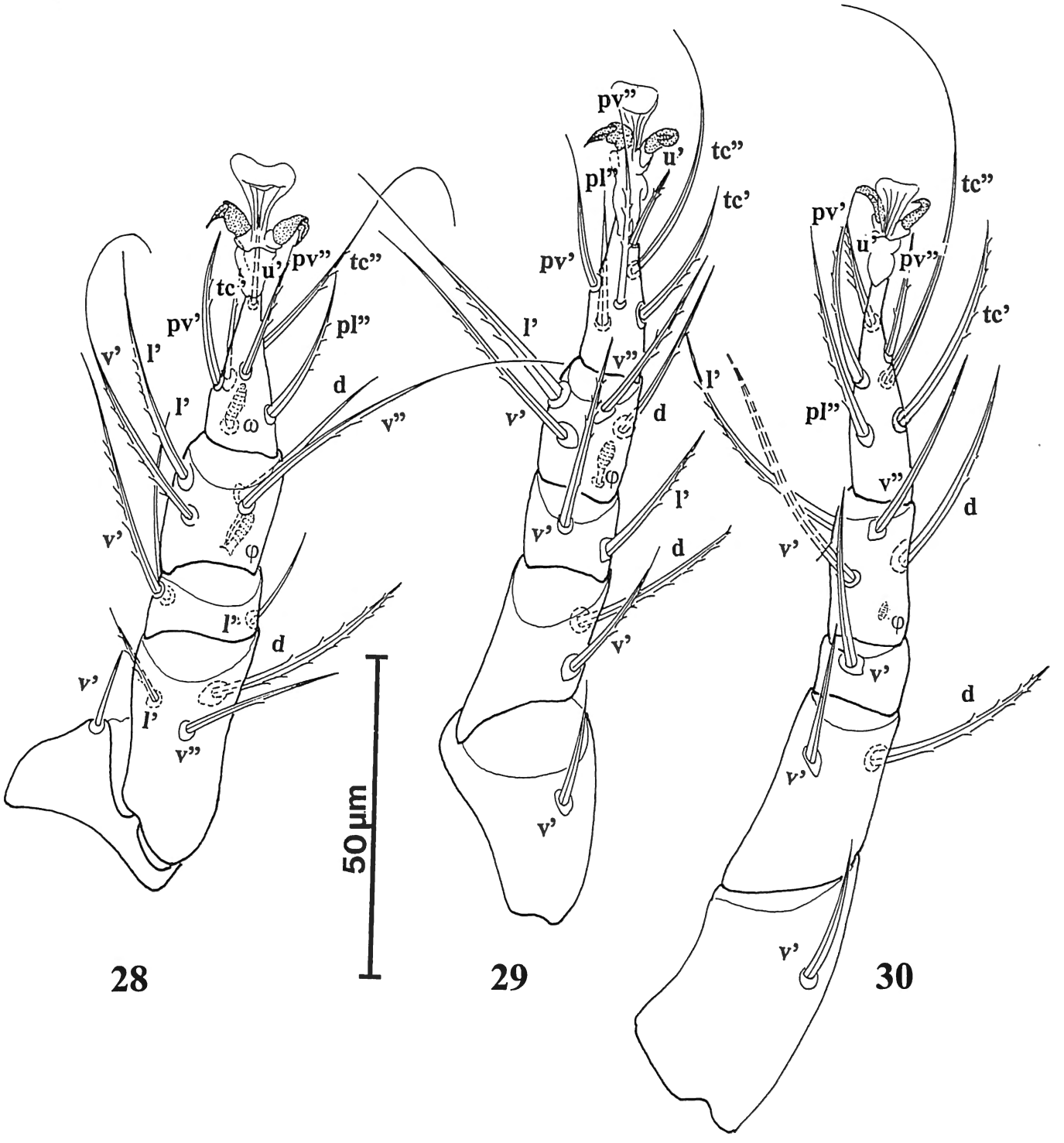
Type locality: Rep. of South Africa, Johannesburg, Boekenhoutskloof; date: 8-VIII-1990; leg. A.M. CAMERIK; habitat: cow dung.

Etymology: "australis" refers to the Southern Hemisphere, where both, *P. queenslandicus* RACK and the new species were collected.

Phoretic females: P. australis spec. nov. (Figs 19-20) has the same general morphological characteristics of idiosoma, shape and position of the stigmata and idiosomal setae as the species. The pharyngeal pump system (Figs. 15-18) is located and shaped as in the species. The following characteristics however seem consistently different.



Figs 21-27. – *Pediculaster australis* spec. n. Phoretic female – *Gnathosoma, ventral view (21), Gnathosoma, dorsal view (22), Leg I, in dors- paraxial view (23), Tibiotarsus leg I in ventro-antaxial view (24); Pharyngeal pump system, pump 1 (25), pump 2 (26), pump 3 (27).*



Figs 28-30. – *Pediculaster australis* spec. n. Phoretic female – *Leg II in ventral view (28); leg III in ventral view (29); leg IV, ventro-antaxial view (30).*

The first pharyngeal pump of *P. australis* sp. n. (Figs. 15-16, 25) appears more slender; the gnathosomal cheliceral and subcapitular setae, longer. Leg III, genual setae *v'* and *l'* are placed closely together in *P. queenslandicus*, but relatively further apart in the new species. The caudate edge of ventral hysterosomal plate *Tg* of the new species is often triangular, in *P. queenslandicus* it is semi circular. Further differences lie mainly in the length and barbation of idiosomal and leg setae. These are summarised in Table 2.

Dung preference: all specimens of the new species were collected from cow dung. None from horse dung.

Table 2. – Morphological characteristics of *P. queenslandicus* RACK, 1980 and *P. australis* spec. nov. compared. Key: =: equals; <: shorter than; =>>>: equals or is longer/much longer than.

Structures	*P. queenslandicus* RACK 1980	*P.australis* sp. n.
Gnathosoma *(Gn)* Pharyngeal pump 1 Prodorsal Shield Idiosomal dorsum Idiosomal venter	**Figs. 6-7** Setae short, relative to *Gn* **Figs 8, 11, 12** vertically relatively wide $v_1 < v_2$ setae little barbed *Tg* posterior edge rounded	**Figs. 21-22** Setae long, relative to *Gn* **Figs. 15, 16, 25** vertically relatively slender $v_1 = v_2$ **Fig. 19** setae fairly strongly barbed **Fig. 20** *Tg* often triangular
Leg I tibio-tarsus	**Figs. 1-2** $u_1 = u_2$ *d* smooth	**Figs. 23, 24** $u_1 < u_2$ *d* barbed
Leg II tarsus tibia genu femur	**Fig. 3** *tc'' = tc'* v' and *v''* without whip *v'* smooth *l', v''* smooth	**Fig. 28** long, whipped *tc'' >> tc'* *v'* and *v''* whipped *v'* barbed *l', v''* barbed
Leg III tarsus tibia genu	**Fig. 4** *pv''* smooth only *v''* barbed *v'* and *l'* close together	**Fig. 29** *pv''* barbed all setae barbed *v'* and *l'* relatively far apart
Leg IV tarsus tibia	**Fig. 5** *pl''* smooth barbed *tc'* slightly shorter than smooth *tc''* *l'* smooth *v''* barbed	**Fig. 30** *pl''* barbed barbed *tc'* much shorter than whipped and smooth *tc''* *l'* barbed *v''* smooth

Host preference: of the 85 specimens, 60 were collected from one muscid fly at Cluny Farm and 7 specimens from 6 *Norrbomia marginatis* (Diptera: Sphaeroceridae) at Innesfree Farm. The remaining 18 specimens were found detached from their hosts.

Discussion:
Taking into consideration the different shape of the first pharyngeal pump, the positioning of genual setae *v'* and *l'* on leg III and the fact that in *P. australis* the subcapitular setae (*su*) and the tarsal and tibial setae of leg II are generally longer and several are whipped, we consider the South African specimens to represent a new species.

***Pediculaster morelliae* RACK, 1975**

1981 *Pediculaster luciensis* MAHUNKA, 1981 (**new synonym**).
Material examined: 2 phoretic females, paratype from St. Lucia, Antilles, 12 . VIII . 1980, leg. MAHUNKA.

1986 *Pediculaster rackae* MAHUNKA, 1986 (**new synonym**).
Material examined: 1 phoretic female, paratype N° 39 from Kiskunság National Park, Hungary, leg. MAHUNKA.

1996 *Pediculaster* cf. *morelliae:* Innesfree Farm, Sandton, Johannesburg, Gauteng, South Africa, Oct.-Nov. 1991, leg. CAMERIK; 63 phoretic females from 3 *Imitomyia* sp. (Diptera: Tachinidae); 59 mites from cow, 4 from horse dung; 36 specimen from 12 *Norrbomia marginatis* Adams (Diptera: Sphaeroceridae): 31 from cow, 5 from horse dung; 13 from 3 Muscidae indet. (Diptera) from cow dung; 4 from 1 *Aphodius* sp. (Coleoptera), from cow dung.

Remarks: South African specimens have a body length of 156-214 (av. 191); width 50-59 (av. 56). The body length of the South African specimens compares well with the measurements given for *P. morelliae* (Australia 145-230, New Zealand 200-280), *P. luciensis* (180-193), and *P. rackae* (160-202). The difference in body width of the South African specimens is explained

under the heading Materials and Methods. There is no significant difference in the size of mites collected from cow or horse dung in South Africa. Measurements included: widths of prosoma, opisthosoma; lengths of legs 1-4 (t-Test: Paired two-sample for means: $P_{one\ tail} = 0.064$; $n_1 = n_2 = 10$). The legs of *P. morelliae*, re-drawn from a paratype, are published in a previous paper (CAMERIK, 1996).

Discussion:

P. morelliae is a true species in comparison with *P. mesembrinae* CANESTRINI, 1981 and *P. domrowi* RACK, 1975, as discussed by RACK, 1975. The number of other species to which *P. morelliae* morphologically is related, could be extended to *P. hematobi* MAHUNKA, 1981, *P. luciensis* MAHUNKA, 1981, *P. rackae* MAHUNKA, 1986 and *P. gautengensis* CAMERIK, 1996. The characteristics that distinguish *P. morelliae*, *P. luciensis* and *P. rackae* from *P. hematobi* and *P. gautengensis* are: the length of idiosomal, dorsal setae *e* and *f* and the sclerotised ''frames'' laterad of opisthosomal dorsal setae *d* and *e*, a feature for the first time described for *P. norrbomialis* CAMERIK, 1995. In the first-mentioned group of three species, these setae are equally long and the ''frames'' are present, in the latter two, *e* is shorter than *f* and ''frames'' lack. This distinction clusters the first group against the second. Within the first group MAHUNKA (1986), distinguished *P. rackae* from *P. morelliae* by the smaller first solenidium ω_2 and the ''split claws'' of legs II and III. According to our observations, all three species have pads against claws II and III [see photos 7-9, CAMERIK (1996)]. When the apices of legs II and III are sufficiently pressed down during the mounting process, the pads and the claws appear as ''split claws'' under a light microscope.

With regards to the difference in length of solenidium ω_2, we could argue the issue in two ways. Firstly, the difference is explained by a variation in size. EBERMANN 1992, did not explicitly mention such variation, but in his drawings of the *TiTa* of scutacarid *Lamnacarus ornatus*, variation in solenidial size and shape is very obvious among the progeny of the same mother. We observed a similar variation in the South African specimens of *P.* cf. *morelliae*.

Secondly, the difference in size of ω_2 lies within the normal measuring error. The Australian specimens of *P. morelliae* measured: ω_2: 8.0 1.0, n = 2; the South African specimens ω_2: 6.9 0.7, n = 2; while MARTIN, 1978 for the species in N. Zealand records: $\omega_2 = 5.3$ (range 4-6, n = 10). According to our measurements the same solenidium in *P. rackae*: $\omega_2 = 8$, n = 1; and in *P. luciensis*: $\omega_2 = 7.5$, n = 2. Taking into account their localities, on three different continents, the size of the tiny solenidion, the small sample size and the fact that three people did the measurements, the variation in length is considered to be well within the range of the measuring error.

The same arguments are proposed to refute the distinction between *P. luciensis* and *P. rackae*, based, according to MAHUNKA (1981), on a difference in size of setae ps_2. We therefore suggest that *P. luciensis* and *P. rackae* are synonyms of *P. morelliae*.

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This paper is part of a PhD project on *Pediculaster* species in cow and horse dung, undertaken by the senior author at the University of the Witwatersrand in Johannesburg, South Africa. In collaboration with Mr. S. H. COETZEE of the Electron Microscope Unit, the first 3-D computer generated images of the pharyngeal pump system are taken. Professor S. HANRAHAN of the Department of Zoology and Dr. M. J. WITCOMB of the Electron Microscope Unit, provided all the facilities needed for this study and the Research Committee of the same University the funding.

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