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THE ORIBATEI (Acari) OF MACQUARIE ISLAND[1]

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Abstract: A taxonomic survey is presented of the Oribatei of Macquarie Island, based on the collections of ANARE and Bishop Museum. The following species are described or re-described: *Holonothrus foliatus* n. gen. n. sp. (family Holonothridae n. fam.), *Macquariella striata* n. gen. n. sp. (family Metrioppiidae), *Oppia crozetensis* (Richters) (family: Oppiidae), *Halozetes marinus* (Lohmann), *H. intermedius* n. sp., *H. crozetensis* (Richters), *H. macquariensis* (Dalenius), *H. belgicae* (Mich.) ssp. *brevipilis* n. ssp., *Alaskozetes antarcticus* (Mich.) ssp. *Grandjeani* (Dalenius) (family Podacaridae), *Cryptobothria monodactyla* n. gen. n. sp., *Neomycobates tridentatus* n. gen. n. sp. (family Mycobatidae), *Sandenia rotunda* n. sp. (family Parakalummidae) and *Totobates anareensis* (Dalenius) (family Haplozetidae).

INTRODUCTION

The material on which the present account is based originates from two sources, namely the collections of the Australian National Antarctic Research Expedition made by J. H. Calaby and K. C. Watson[2] during 1960–61, and the collections of Dr. J. L. Gressitt of Bishop Museum, Hawaii (1960). I am indebted to ANARE and to these workers for the opportunity to study these collections.

The collections of ANARE comprise over 100 samples of oribatid mites and provide a comprehensive picture of the fauna of the island. Several new genera and species are present, together with representatives of species described from previous expeditions to this locality and to others in the sub-Antarctic region.

Published accounts (see References) of the Oribatei of the Antarctic and sub-Antarctic regions refer, in the main, to isolated collections comprising only a few species. Several of the early descriptions are inadequate by modern standards and re-descriptions are required. Dalenius and Wilson (1958) have provided the most comprehensive survey to date, but this work, unfortunately, contains some errors.

The purposes of this account are to describe the new genera and species in the collections, to re-describe existing genera and species and to re-define the systematic position of the groups represented. During the course of this work it was necessary to consult the collections of Hammer and of Michael in the British Museum. I am especially grateful to Dr. Hammer and to Dr. G. O. Evans, Dr. J. G. Sheals and Mr. D. Macfarlane for the opportunity to examine the Museum collections.

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1. The cost of publication of this paper was borne by the Antarctic Division Department of External Affairs, Melbourne, Australia.

2. Antarctic Division, Dept. of External Affairs, Melbourne.

The descriptions given below are based, in all cases, on series of population samples and include ranges in variations of morphological characters. This is considered particularly important for the Antarctic species are highly variable, as a general rule. The method of taxonomic description is based upon the principles enunciated in the numerous works of F. Grandjean. Type specimens have been designated for reference purposes only; these specimens, together with representative samples from each locality, will be placed in the Australian National Insect Collection at the Commonwealth Scientific and Industrial Research Organization, Division of Entomology, Canberra.

Superfamily NOTHROIDEA Grandjean 1954

Genus **Holonothrus** Wallwork, n. gen.

This is the only genus of the lower division of the Oribatei, the Oribatei Inferiores, represented in the collections. It shows several superficial resemblances to members of the Camisiidae, in particular the genus *Acronothrus* Berl., but also has some unusual characters not associated with this family. A definition of the genus and a discussion of its systematic position will be given after the description of the type species, *Holonothrus foliatus* n. sp.

Holonothrus foliatus Wallwork, n. sp. Figs. 1–8.

MATERIAL EXAMINED: 9 adults, 4 tritonymphs, 2 deutonymphs, 1 protonymph, 1 larva.

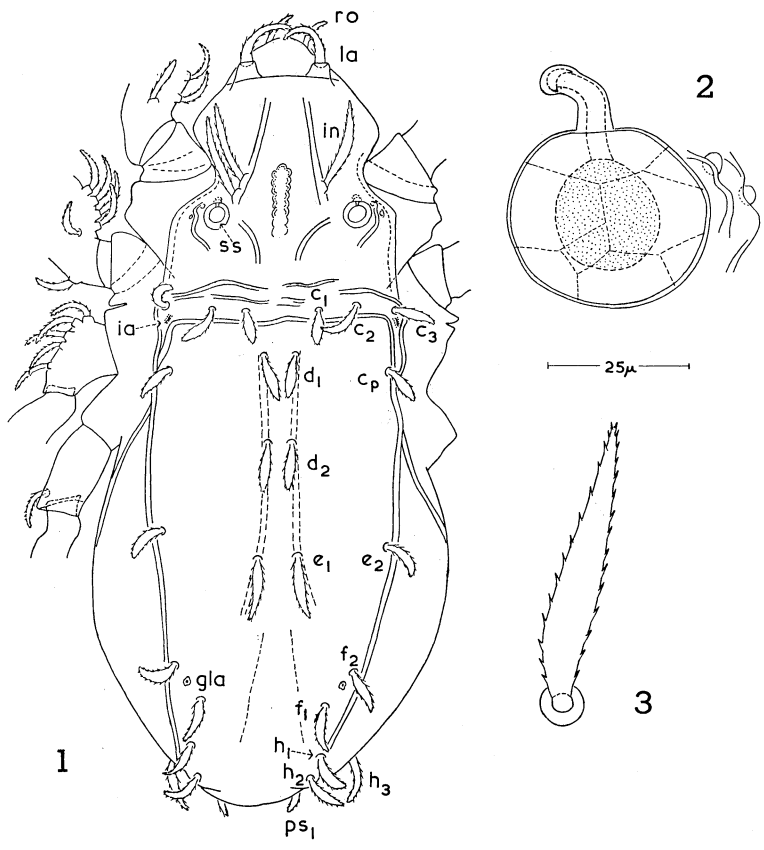
Adult.

Measurements: Average body length: 757.5 μ (range: 727.6 μ–791.8 μ); average body width (at widest part of hysterosoma): 357.4 μ (range: 342.4 μ–395.9 μ).

Sexual dimorphism lacking.

Integument: A clear, transparent cerotegument covers body and legs. Cuticle generally smooth dorsally, punctate ventrally and on legs. Body color brown. Debris frequently attached to cerotegument.

Prodorsum: Rostral tectum entire, not incised, and produced into a shallow rounded lobe. Rostral setae thickened, faintly barbed, slightly curved, longer than their mutual distance. Lamellar setae strongly curved mediad, greatly thickened, barbed, inserted on strongly chitinized apophyses which project for a short distance above prodorsum. Central part of prodorsum bears a pair of slightly convergent chitinized ridges originating near pseudostigmata and running anteriad almost to level of lamellar apophyses. Each ridge bears a short apophysis on its outer margin in which is inserted the interlamellar seta. Interlamellar setae generally long and foliate; occasionally much shorter. Fig. 1 shows, on left side, an unusual condition, present in one specimen only asymmetrically, of the duplication of the interlamellar seta. Each sensillus completely contained within pseudostigma and not projecting (figs. 1 & 2). Aperture of pseudostigma closed by a thin membrane having a fine veined microsculpture. Sensillus has a short stalk and rounded head. Lateral to each pseudostigma is an exopseudostigmatic ridge bearing 2 alveoli (fig. 2); these structures may possibly represent insertions of exopseudostigmatic setae. No trace of these setae found on prodorsum. A 3rd pair of prodorsal ridges runs postero-mediad from pseudostigmata (fig. 1). Central part of prodorsum bears a curious elongate lobed chitiniza-



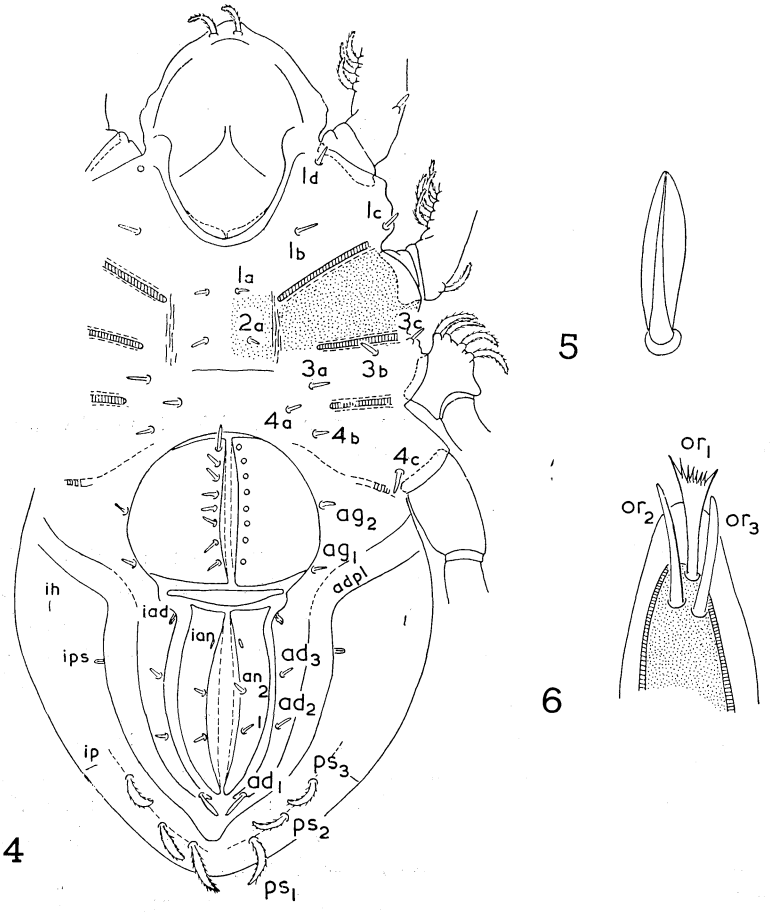
Figs. 1–3. *Holonothrus foliatus* n. gen. n. sp., adult. 1, dorsal view; 2, pseudostigma and sensillus; 3, hysterosomal seta d_1.

tion.

Hysterosoma: Prodorsal/hysterosomal separation complete; lateral margins convex. A pair of lateral ridges strongly developed delimiting dorsal part from lateral region (fig. 1). Central part of dorsal shield has a pair of grooves running in antero-posterior direction. Hysterosomal setae d_1, d_2 and e_1 inserted on inner margins of these grooves. Hysterosoma narrows posteriorly; posterior extremities of lateral ridges curve mediad to form a pair of broad, shallow lobes. There are 16 pairs of foliate, barbed hysterosomal setae (*i.e.* holotrichy); pattern of chaetotaxy shown in fig. 1 similar to that in the genus *Nothrus* except that setae f_1 in *Holonothrus* are latero-dorsal instead of centro-dorsal in position. Foliate nature of hysterosomal seta shown in fig. 3. Fissure *ia* and aperture of lateral abdominal gland (*gla*) are seen in dorsal view (fig. 1); fissures *ih*, *ip* and *ips* seen in ventral view, as are the 3 pairs of hysterosomal setae, ps_{1-3} (fig. 4).

Genito-anal region: Genital and anal fields contiguous, separated by a narrow, vertically-aligned preanal plate. Anal and adanal plates long and narrow; lateral limits of adanal plates usually indistinct. Anal plates with longitudinal ridges medially. Anal and ad-

anal setae short and thickened, located on inner margins of their respective plates; there are 2 pairs of anal and 3 pairs of adanal setae. Adanal setae ad_1 (posterior) appreciably longer than ad_2 and ad_3. Anal and adanal fissures, *ian* and *iad* respectively, conspicuous (fig. 4). Adanal plicature, separating adanal plate from ventral margin of hysterosoma on each side, continuous posteriorly; anteriorly this plicature band curves sharply antero-laterad at level of preanal plate. Ventral margin of hysterosoma V-shaped in post-anal region, as in *Nothrus* and *Platynothrus*. Adanal plates continuous with aggenital plates, although this continuity is sometimes difficult to see. Each aggenital plate broad and approximately triangular in shape; anterior boundary with coxisternal field IV poorly defined. Two thickened aggenital setae on each side, inserted on inner margin of aggenital plate. Genital aperture strongly rounded anteriorly and laterally, appearing as an excavation is the aggenital/coxisternal field. Genital plates large, poorly defined laterally. All genital setae thickened, inserted on median margin of plate; number of setae on each plate varies between 7 and 9, 8 being commonest number; this may indicate a slight genital regression.



Figs. 4-6. *Holonothrus foliatus* n. gen. n. sp. 4, adult, ventral view; 5, deutonymph, genital seta; 6, adult, adoral setae.

Ventral region of podosoma: Coxisternal ridges I continuous with posterior border of camerostome; ridges II, the ventro-sejugal and III well developed, as are the apodemes associated with them. Ridges IV weakly developed. Coxisternal fields poorly delimited sternally; setae short and thickened, formula being (4–1–3–3), indicating neotrichy on coxisternal fields I.

Gnathosoma: Labio-genal articulation complete, curving postero-laterad, remote from base of palp (stenarthral). Rutellum atelebasic, with large ventral lobed expansion. Infracapitular setae *h* (1 pair) and *a* (1 pair) present; setae *m* not observed. Three pairs of adoral setae (or_{1-3}, fig. 6) similar to those of *Camisia spinifer* (see Grandjean 1957, p. 260).

Legs: Detailed chaetotaxy not studied. All setae foliate, inserted on prominent apophyses, as in the genus *Acronothrus*. All tarsi tridactyle, claws being equal in size.

Immature stages.

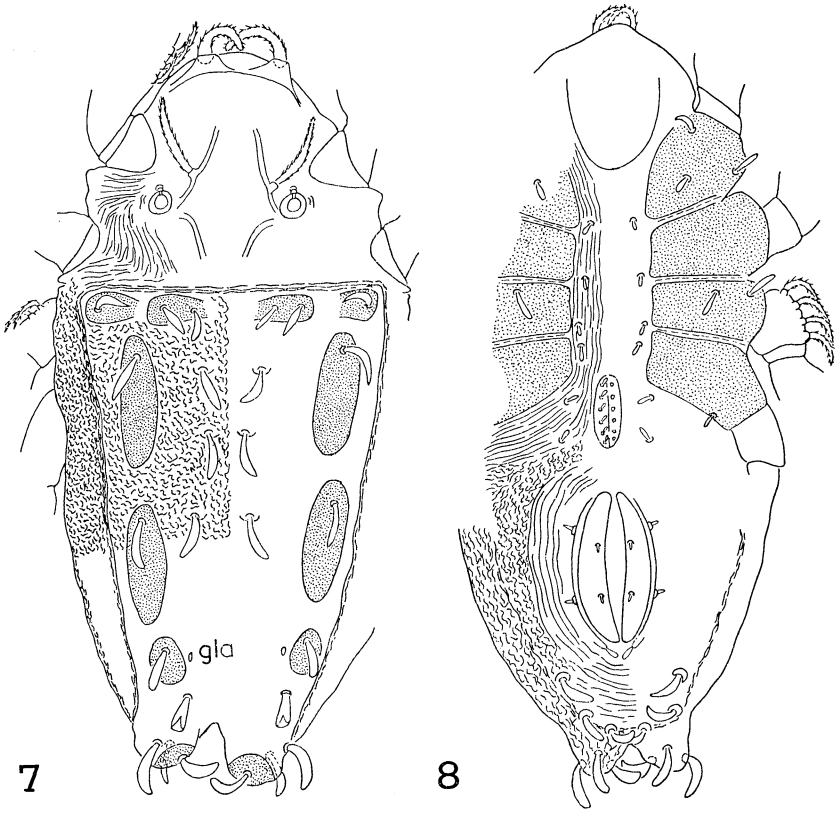
Measurements: Larva: length of body: 392 μ; width: 196 μ. Protonymph: length of body: 515.2 μ; width: 252 μ. Deutonymph: length of body: 560 μ; width: 252 μ. Tritonymph: length of body: 679.5 μ; width: 321 μ.

Description: Figs. 7 & 8 show dorsal and ventral views respectively of the tritonymph which is typical of immature stages. Integument strongly pleated. Hysterosoma bears a series of chitinized plates; dorsally there are 6 pairs of plates in all immature stages, weakly chitinized in larva and protonymph, more strongly developed in deutonymph and tritonymph. Plates bear porose areas, paralleling to some extent the condition present in Podacaridae. Each plate bears the insertion of at least 1 hysterosomal seta, a pair of plates anteriorly bears insertions of 2 setae, c_1 and c_2. Centrodorsally there are no plates, setae d_1, d_2, e_1 and f_1 inserted on short apophyses; the same is true for setae h_1 and h_3. Each pseudoanal seta inserted on a small rounded plate in the nymphal stages. Posteriorly hysterosoma produced into a pair of large, rounded projections or tubercles, present in all stages except the adult. All stages holotrichous (*i. e.* larva has 26 hysterosomal setae, nymphal stages have 32). Setae f_1 occupy dorso-lateral positions in larva and nymphs, as in adult. All hysterosomal setae foliate.

Ventrally, paraproctal plates glabrous in larva, protonymph and deutonymph (*i. e.* paraproctal atrichosy at 3 levels). Aggenital setae have the developmental formula (0–1–2–2) for proto-, deuto-, trito-nymph and adult stages. Genital setal formula for proto-, deuto- and trito-nymph is (1–3–6). Genital setae resembling other ventral setae in being short and foliate, with wing-like lateral extensions (fig. 5). Coxisternal setal formula for larva, proto-, deuto- and trito-nymph is: (2–1–2) (4–1–2–1) (4–1–3–3) (4–1–3–3). All tarsi monodactyle in all immature stages.

DISTRIBUTION: Nuggets Point (ex *Stilbocarpa* litter): type locality; Sub-plateau (ex moss); Plateau (ex *Azorella*, moss); Plateau (ex lichens, moss, soil); Mt. Hamilton (ex *Azorella*, moss).

Remarks: *Holonothrus* n. gen. The genus may be defined as follows: All stages holotrichous; setae f_1 widely separated and latero-dorsal in position. Larva and nymphs have pleated integument and bear porose hysterosomal sclerites. Sensillus completely contained within pseudostigma in all stages. Rostral tectum entire, without incision. Lateral margins of hysterosoma convex; posterior margin with a pair of prominent tubercles in larva and nymphs; these tubercles lacking in adult. Lateral abdominal gland present. Two pairs



Figs. 7–8. *Holonothrus foliatus* n. gen. n. sp., tritonymph. 7, dorsal view; 8, ventral view.

of anal setae, 3 pairs of adanals. Two pairs of aggenital setae in tritonymph and adult. Genital setal formula for proto-, deuto-, trito-nymph and adult is: (1–3–6–[7–9]); setae marginal in position. Neotrichy present on coxisternal fields I in all stages except larval. Labio- genal articulation complete (stenarthral); rutellum has ventral lobed expansion; 3 pairs of adoral setae. Tarsi monodactyle in immature stages, tridactyle in adult; leg setae inserted on prominent apophyses.

At first glance the specimens assigned to this genus appear typical of the family Camisiidae. To support this view the similarities in general appearance, the presence of aggenital setae, the marginal position of the genital setae and presence of 3 adoral setae similar in form to those of *Camisia*, may be noted. The genus resembles *Acronothrus* in the form of the sensillus and in the general appearance of the ventral region and legs. The differences between the 2 genera are as striking as their similarities. *Acronothrus* has very long lamellar apophyses on the prodorsum, curious apophysial projections on the posterior margin of the hysterosoma of the adult, and a disposition towards genital neotrichy. Further comparisons must be suspended until a satisfactory definition of the genus has been published. *Acronothrus* has an interesting distribution pattern, being recorded from New Zealand (Michael 1908), Australia (fossil) (Womersley 1957), South Pacific (Jacot 1935) and

South America (Beck 1962).

Despite affinities with the Camisiidae, *Holonothrus* has 3 characters more commonly associated with the Nothridae, namely holotrichy in all stages of development, coxisternal neotrichy and the absence of genital neotrichy. The first of these represents, in my opinion, a fundamental difference between this genus and those presently included in the family Camisiidae. *Holonothrus* cannot be readily assigned to the family Nothridae however, for the latter is characterized by the lack of aggenital setae, 2 pairs of adoral setae, coxisternal neotrichy on fields II, III and IV (but not on fields I), hysterosomal setae f_1 centro-dorsal in position and an incised rostrum.

Holonothrus does not fit easily into either the Camisiidae or the Nothridae. To resolve the systematic position it is proposed to place the genus in a family of its own, the family Holonothridae n. fam., having strong affinities with the Camisiidae.

Family HOLONOTHRIDAE Wallwork, n. fam.

This new family is defined as follows: Holotrichy at all stages of development, including adult; setae f_1 latero-dorsal in position. Immature stages with pleated integument and porose hysterosomal sclerites. Coxisternal neotrichy present. Aggenital setae present. Genital setae marginal in position. Three pairs of adoral setae. Fissure *iad* present. Paraproctal atrichosy at 3 levels. Lateral abdominal gland present. Immature stages with a pair of large hysterosomal tubercles. posteriorly.

Superfamily LIACAROIDEA Balogh 1961

Genus **Macquariella** Wallwork, n. gen.

This new genus, represented by 13 specimens in the Macquarie collections, belongs in the family Metrioppiidae Balogh, 1943. Characteristics of the genus and its relationships with other genera in the family are given after the description of the type species, *Macquariella striata* n. sp.

Macquariella striata Wallwork, n. sp. Figs. 9–15.

MATERIAL EXAMINED: 13 adults.

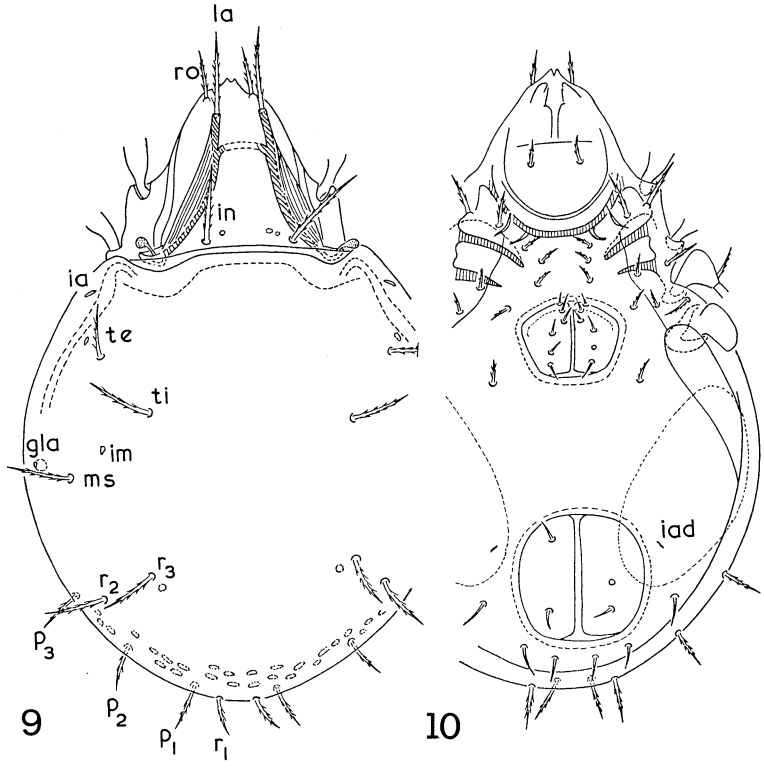
Measurements: Average body length: 645.5 μ (range: 618.6 μ–695.5 μ): average body width (at widest part of notogaster): 423.6 μ (range: 374.5 μ–460.1 μ).

Sexual dimorphism lacking.

Integument: Generally smooth, brown in color. A number of small, dark areas, irregular in shape, present on peripheral regions of notogaster and in interlamellar region. Cerotegument very thin or lacking.

Prodorsum: Anterior margin of rostrum variable in form (figs. 12–14), often produced to a fine point or indented to form 2 points. Lateral margins of rostrum may be toothed, broadly indented or entire. Rostral setae inserted on small apophyses located laterally on rostrum; these setae strongly thickened and barbed, directed straight forwards, generally as long as their mutual distance, although they may be rather shorter or longer. Lamellae

are strongly developed ridges; each ridge produced dorsally into a vertically-aligned blade, which extends for almost whole length of lamella, and ornamented with a series of longitudinal striae from which the species derives its name. Anterior 1/4 of each lamella projects anterodorsad as a free cusp (figs. 9 & 11). Lamellar seta inserted at apex of lamellar cusp; these setae strongly thickened and barbed, generally about 2× as long as their mutual distance, occasionally only slightly longer, directed forwards over the rostrum. Incipient translamella present at level of bases of lamellar cusps, usually represented by a pair of abbreviated curved ridges, directed mediad but usually not complete in mid-line. Pseudostigma on each side opens antero-laterally and has a broad, thickened rim (fig. 15). Base of lamella bifurcates to enclose each pseudostigma, the whole structure being almost completely covered by anterior margin of notogaster. Sensillus consists of a short, slender stalk and a swollen, rounded head covered with small granules. Interlamellar setae thickened, strongly barbed, directed almost vertically; variable in length; in holotype (fig. 9) as long as lamellar setae; in other specimens frequently rather longer than this.



Figs. 9-10. *Macquariella striata* n. gen. n. sp., adult. 9. dorsal view; 10, ventral view.

Lateral region of podosoma: Details of this region shown in fig. 11. Tutorium (*tu*) strongly developed on each side, extending from pseudostigma to insertion of rostral seta as a vertically-projecting ridge ornamented with longitudinal striae. A weakly chitinized

prolamella (*prl*) hidden by lamellar cusps in dorsal view, but visible in lateral view (fig. 11) extending anteriad as far as tip of rostrum. Pedotectum I large, extending posterodorsad to pseudostigma; terminus of this pedotectal ridge bears insertion of the slender, finely barbed exopseudostigmatic seta (*ex*). Between tutorium and pedotectal ridge I surface of propodosoma bears a fine granular ornamentation and a series of weak fenestrations (fig. 11). Parietal ridge (*pa*) extends forwards from insertion of leg I to insertion of rostral seta, on each side. Pedotectum II smaller than pedotectum I.

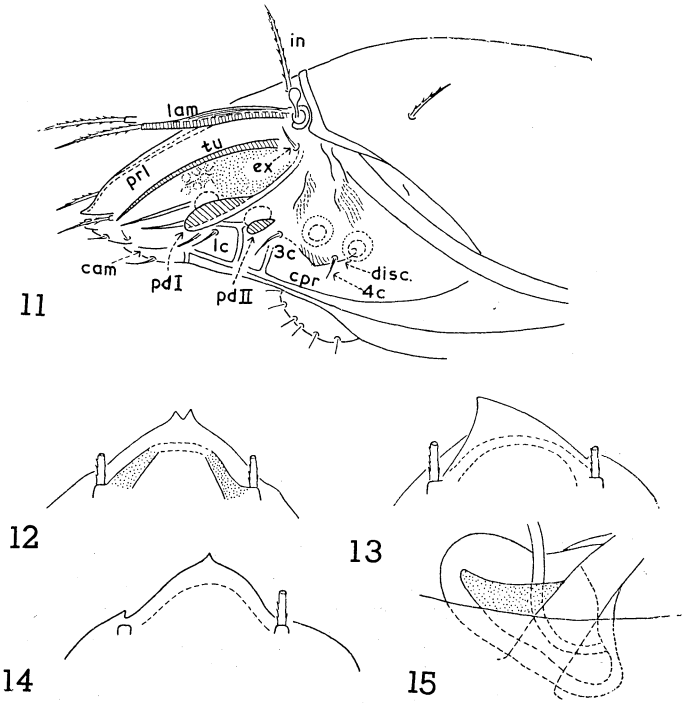
Notogaster: Dorsal shield strongly rounded with prominent humeral lobe on each side; anterior margin weakly arched or straight and covers prodorsal/hysterosomal articulation. Nine pairs of notogastral setae (*i. e.* multideficient condition); particular notation employed for these setae illustrated in fig. 9; setae *ta* (anteriorly) lacking in all specimens. Setae approximately as long as rostrals, conspicuously barbed; setae in series p_{1-3} usually slightly shorter than remainder; setae r_1 slightly longer than remainder in some specimens (but not in holotype). Fissure *ia* difficult to see in most specimens, being more distinct in newly emerged forms. Fissure *im* irregular in shape, located antero-median to seta *ms* on each side. Aperture of lateral abdominal gland represented by a dark rounded area lateral to seta *ms*.

Genito-anal region: Anal setae (2 pairs) and adanals (3 pairs) finely barbed; occasionally anal setae more conspicuously barbed than adanals. More anterior pair of anal setae usually inserted near antero-lateral margins of anal plates; in holotype and one other specimen 1 anal seta is located more posteriorly (fig. 10). Adanal setae ad_2 and ad_1 posterior to anal field, ad_3 are lateral. Adanal fissures (*iad*) obliquely oriented slits located lateral to anal field. Aggenital setae (1 pair) and genital setae (6 pairs) barbed; genital setae *G6* (anterior) inserted on anterior rim of genital plates. Genital aperture trapezoidal in shape, broader anteriorly than posteriorly.

Ventral region of podosoma: Coxisternal ridge I continuous with posterior border of camerostome, on each side. Ridges II and the ventro-sejugal short, not continuous in mid line; ridges III and IV lacking. Coxisternal setae generally thicker than aggenitals and genitals, conspicuously barbed; antiaxial setae usually longer than paraxial ones; setae *1c*, *3c* and *4c* inserted on lateral margins of podosoma (fig. 11) and frequently difficult to observe in ventral view; seta *4c* inserted on discidium (*disc.*). Coxisternal setal formula (3–1–3–3). Circum-pedal ridge well developed, located ventro-laterally on each side of podosoma; this ridge aligned anteroposteriorly and crossing coxisternal ridge II and ventro-sejugal; at level of insertion of leg IV ridge divides into 2 branches which curve broadly postero-laterally.

Gnathosoma: Hysterostome (=hypostome) broadly U-shaped, bearing 1 pair of barbed setae; central region of this plate fenestrated in several specimens. Infracapitular setae *a* and *m* finely barbed. Labiogenal articulation complete, diarthral. Rutellum has a strongly lobed basal expansion and is atelebasic. Two pairs of smooth or finely barbed adoral setae. Palp consists of 5 articles; palpal setal formula (0–2–1–3–9) (solenidion ω not included). Seta *acm* eupathidial on palpal tarsus and not associated with solenidion in a "corne double"; solenidion ω baculiform. Distribution of setae, eupathidia and solenidion very similar to that described for *Belba geniculosa*. Chelicerae normal and strongly toothed.

Legs: Rather slender; all femora have ventral crest. Distribution of solenidia normal, formula being: I (1–2–2); II (1–1–2); III (1–1–0); IV (0–1–0) for genu, tibia and tarsus.



Figs. 11–15. *Macquariella striata* n. gen. n. sp., adult. 11, podosoma, lateral view; 12–14; variations in form of rostrum; 15, pseudostigma.

Famulus on tarsus I is a short spine. All tarsi tridactyle, claws equal in size. True setae generally conspicuously barbed. Trochanter III bulb-like; barbed seta on this segment only moderate in length.

DISTRIBUTION: Subplateau (ex *Stilbocarpa* litter): type locality; Gadget Gully (ex *Pleurophyllum* litter); Brothers Point (ex cave scrapings); Plateau (ex herbfield plants); Caroline Valley (ex *Poa hamiltoni* litter); North Head (ex green algae, coastal rocks).

The species is uncommon in the collections, although the distribution pattern indicates an absence of severe ecological restriction.

Genus **Macquariella** Wallwork, n. gen.

This new genus is defined as follows. Lamella with vertical blade-like extension; lamellar cusps present; prolamella present; translamella incomplete in mid line. Tutorium developed; pedotectum I large. Notogaster pycnonotic, anterior margin weakly arched or straight, humeral lobe present. Notogaster of adult multideficient; 9 pairs of thickened, barbed setae. Six pairs of genital setae in adult. Coxisternal setal formula (3–1–3–3) in adult. Coxisternal ridges III and IV lacking. Circum-pedal ridge well developed. One pair of hysterostomal setae on infracapitulum. Labio-genal articulation complete, diarthral, rutellum with basal lobe, atelebasic. Chelicerae normal. Seta *acm* free on palpal tarsus.

Legs tridactyle, claws equal in size. Tracheal system normal. Sexual dimorphism lacking.

The genus can be distinguished easily from other genera in this family (*Metrioppia* Grandj., *Ceratoppia* Berl., *Pyroppia* Hammer and *Trichoppia* Balogh) by the possession of 9 pairs of thickened, barbed notogastral setae. A general evolutionary tendency to notogastral regression is less evident in *Macquariella* than in the other genera. A more detailed discussion of phylogenetic trends within this family is given elsewhere (Wallwork, in press). It is sufficient for present purposes to regard *Macquariella* as being most closely related to *Metrioppia*, by virtue of the common character of the form of nymphal setae; differences between the two genera include the stronger notogastral regression in *Metrioppia*, the form of sensillus (flagelliform in *Metrioppia*, clavate in *Macquariella*) and the presence of a peloptiform mandible in *Metrioppia*.

Superfamily OPPIOIDEA Balogh 1961

Family OPPIIDAE Grandjean 1954

The only representative of this large family in the collections is *Notaspis crozetensis* Richters. The original description is sufficient to identify the species which is placed provisionally in the genus *Oppia* pending a revision of this genus. Richters' description does not include details of notogastral chaetotaxy or the ventral surface; a re-description is provided below.

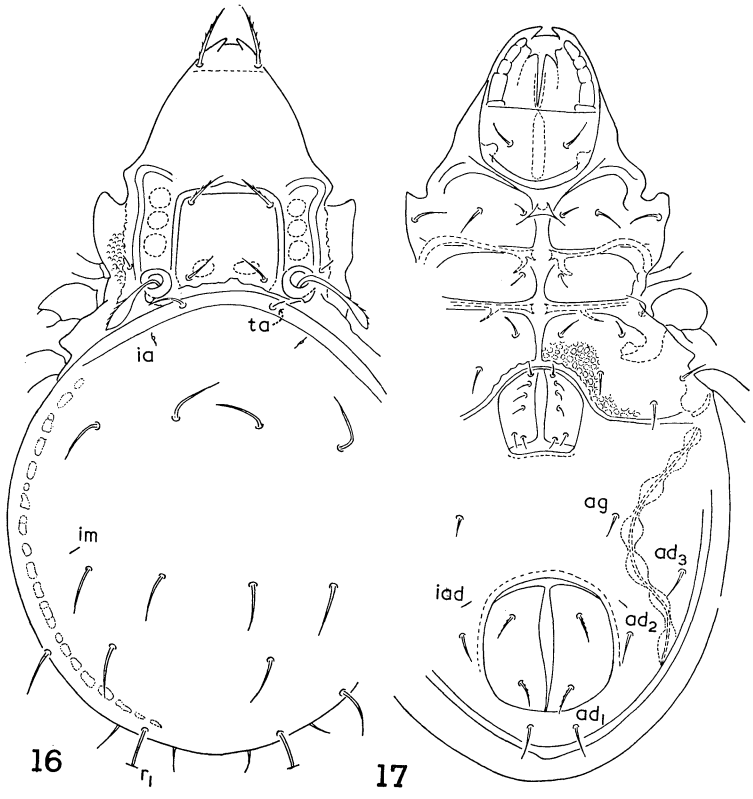
"Oppia" crozetensis (Richters) Figs. 16–17.

Notaspis crozetensis Richt., 1908.

MATERIAL EXAMINED: 15 undamaged adult specimens.

Measurements: Average length of body: 312.1 μ (range: 285.6 μ–330.4 μ); average width (measured at widest part): 162.4 μ (range: 134.4 μ–179.2 μ).

Prodorsum: Rostrum trimucronate, lateral lobes strongly chitinized, rather pointed, inclined anteromedially; median rostral lobe broadly rounded, very weakly chitinized. Rostral setae barbed, about 1.5× longer than their mutual distance, inserted on dorso-lateral margins of prodorsum, curving forwards for a distance equal to 1/2 their length in front of rostrum. Lamellae are distinct ridges extending forwards from median wall of each pseudostigma for about 1/2 length of prodorsum. Each ridge of uniform thickness throughout its length, the 2 lamellae being continuous anteriorly through a curved translamella which traverses the prodorsum anterior to insertion of lamellar setae. Junction between translamella and each lamella may be rather abrupt, giving an angled appearance; translamella slightly broader in mid line than at lateral extremities. A lateral ridge (tutorium) present on each side of prodorsum, curving mediad in direction of lamellar setae (fig. 16). Between tutorium and lamella on each side is a series of 3 pale areas of weak chitinization. Lamellar setae barbed, shorter than their mutual distance and shorter than rostrals; slightly curved and directed forwards. Insertions of lamellar setae slightly variable, being located immediately posterior to translamella in some cases, or some distance behind this ridge in others. Interlamellar setae directed upwards, appreciably shorter than their mutual distance, slightly shorter than lamellar setae, inserted in interlamellar region between pseudostigmata. Integument of prodorsum between insertions of interlamellar setae weakly fenestrated in some



Figs. 16–17. *Oppia crozetensis* (Richters), adult. 16, dorsal view; 17, ventral view.

specimens, not in others. Posterior border of interlamellar region bounded by a chitinized ridge which may have a smooth or irregular contour. Pseudostigmata prominent, with well-developed postero-lateral lobe. Structure of sensillus and variations in this structure have been described adequately by Richters. Exopseudostigmatic seta present lateral to each pseudostigma. Pedotectum I well developed; integument covering this region granular in appearance.

Notogaster: Ovoid in shape; integument smooth for most part, except for a peripheral ring of pale areas. Ten pairs of smooth or finely barbed notogastral setae; these, with exception of *ta*, curved, tapering apically, appreciably longer than interlamellar setae; setae r_1, located posteriorly on notogaster, slightly longer than remainder. Setae *ta* usually very short or virtual, inserted on anterior margin; occasionally these setae may be almost as long as other notogastral setae; the 2 conditions shown in fig. 16. The condition of this seta observed in 10 specimens (*i. e.* 20 cases); in 14 cases (70 %) seta very short (right side in fig. 16); in 3 cases (15 %) it is long (left side in fig. 16); in 3 cases it is virtual. The presence of these various conditions may indicate that the seta in question is undergoing regression. Notogastral fissures *ia* and *im* shown in fig. 16.

Genito-anal region: Anal aperture slightly wider posteriorly than anteriorly; each anal

plate bears a pair of barbed setae. Adanal setae (3 pairs) finely barbed; ad_1 inserted immediately posterior to anal aperture on each side of mid line; ad_2 lateral to anal aperture; ad_3 antero-lateral to anal aperture. Adanal fissure, *iad*, aligned obliquely. A single pair of aggenital setae (*ag*) present. Genital aperture trapezoidal in shape. Six pairs of genital setae, divided into 2 groups; setae *G3–6* (anteriorly) arranged in a linear manner on anterior 1/2 of each plate; setae *G1–2* (posterior) inserted near posterior margin.

Ventral region of podosoma: Integument covering this region granular over coxisternal fields I, fenestrated over coxisternal fields III/IV, generally smooth over remaining areas. Coxisternal ridges I, II and sejugal well developed and extend to mid line where they join a conspicuous sternal ridge. Coxisternal ridge IV strongly curved around anterior margin of genital aperture; coxisternal ridge III lacking. Apodemata associated with ridges I, II and sejugal conspicuous; apodemata III and IV short (fig. 17). Sternal ridge bears a series of pale areas of weak chitinization, cresentic in shape; one of these present at junction of coxisternal ridges I and sternal ridge; a pair of these present at junctions between coxisternal ridges II and sternal ridge and between the sejugal ridge and sternal ridge. Coxisternal setal formula (3–1–3–3); setae finely barbed and arranged as shown in fig. 17.

Gnathosoma: Infracapitular setae *h*, *m* and *a* finely barbed. Labio-genal articulation complete (diarthral). Rutellum without basal expansion, atelebasic. Palp 5-segmented; chaetotaxy normal, formula (0–2–1–3–9).

Legs: Not examined in detail. All tarsi monodactyle.

DISTRIBUTION: North Head (ex cave rookery debris); North Head (ex *Poa hamiltoni* litter); North End (ex *Pleurophyllum* debris); Wireless Hill (ex *Stilbocarpa* litter); Handspike Point (ex *Stilbocarpa* litter and albatross nest material); Aerial Cove (*Colobanthus muscoides* litter); Aerial Cove (ex *Puccinellia macquariensis* litter); Langdon Point (ex *Stilbocarpa* litter); Mt. Elder (ex *Pachyptila desolata* nest material); Lambing Gully (ex *Stilbocarpa* litter); Plateau (ex *Pterodroma lessoni* burrow); Brothers Point (ex cave scrapings); Douglas Point (ex *Stilbocarpa* and *Pleurophyllum* litter); Scoble Lake (ex *Stilbocarpa* litter and soil); Nuggets Point (ex *Stilbocarpa* litter); Camp Hill (ex *Colobanthus muscoides* litter).

Remarks: Dalenius (1958) has named a subspecies, *O. crozetensis anareensis*, from Macquarie on the basis of longer rostral setae. This distinction is not sufficient, in my opinion, to warrant the naming of a subspecies. Richters (1908) does not give details of the rostral setae apart from noting that they are present ("Rostralhaare vorhanden"); the figure accompanying the text (Richters 1908, pl. 19, fig. 19) includes the rostral setae but not their insertions, so that their length is difficult to judge.

The species "*Oppia*" *crozetensis* appears to be very similar indeed to *Oppia magellanis* Hammer, 1962. I can find no distinct differences between the 2 species. Both forms show an unusual appearance of the tracheal trunks. A pair of these is present in the hysterosoma; each tube consists of a lumen, the diameter of which is constant, and a tracheal wall produced into nodal swellings at regular intervals along the length of the trachea. Details of this structure are shown on the right side in fig. 17. The distribution of *O. magellanis* in the Punta Arenas and Tierra del Fuego regions of Chile indicates, perhaps, a rather wide and discontinuous distribution of the "*crozetensis*" group.

Superfamily AMERONOTHROIDEA Balogh 1961

Family PODACARIDAE Grandjean 1955

This family has been defined by Grandjean (1955). Included within it, until recently, have been the genera *Podacarus* Grandj., 1955, *Alaskozetes* Hammer, 1955, *Pertorgunia* Dalenius 1958 and *Fortuynia* van der Hammen, 1960. The genera *Halozetes* Berl. and *Anarea* Dalenius, although inadequately defined, may be added to this list.

With the exception of *Fortuynia*, which has now been placed in a separate family (van der Hammen 1963), all groups are represented on Macquarie. Evidence from the collections examined indicates that there is little or no justification for distinguishing between the genera *Halozetes*, *Anarea* and *Pertorgunia*. As noted earlier (Wallwork 1962a), the naming of a genus, *Anarea*, to accommodate the species *Notaspis marina* Lohmann is inadmissable for this species is the type for the genus *Halozetes* Berl. The distinction between *Halozetes* and *Pertorgunia* is rendered arbitrary rather than natural by the discovery, in the Macquarie collections, of a new species resembling members of the *Pertorgunia* group; this species further demonstrates a lack of prodorsal/notogastral separation in the adult and a regression of the sensillus in the nymphal stages (although not in the adults); these 2 characters are generally considered diagnostic of the genus *Halozetes*. In the light of this evidence it is proposed that the name *Pertorgunia* be rejected on the grounds of synonymy with *Halozetes*. A more detailed discussion of the phylogenetic trends within this family are given elsewhere (Wallwork, in press).

Genus **Halozetes** Berl. 1916

Five species of this genus are present in the Macquarie collections, namely *H. marinus* (Lohmann), *H. intermedius* n. sp., *H. macquariensis* (Dalenius), *H. crozetensis* (Richters), and *H. belgicae* (Mich.) ssp. *brevipilis* n. ssp. The first of these is the type for the genus; the other 4 correspond to the "*Pertorgunia* group" of Dalenius (1958). A list of generic characters is given after the following descriptions.

Halozetes marinus (Lohmann) Figs. 18–21, 24, 36.

Notaspis marina Lohm., 1908.
Anarea macquariensis Dalenius, 1958.

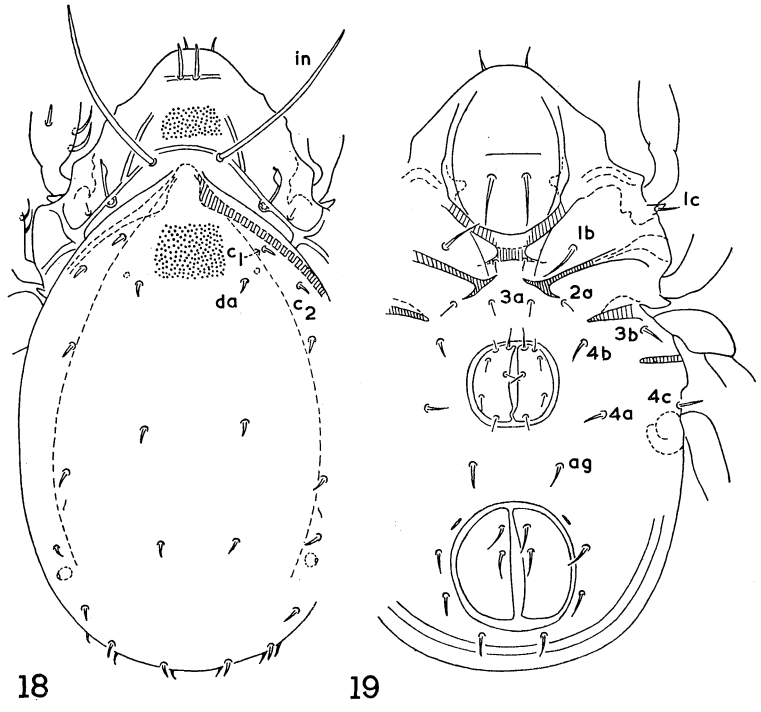
MATERIAL EXAMINED: 30 adults (17 ♂♂, 13 ♀♀) and 1 tritonymph.

Adult.

Measurements: ♂♂: Average body length: 791.8 μ (range: 749 μ–834.6 μ); average body width (at widest part of notogaster): 442.5 μ (range: 417.3 μ–481.5 μ). ♀♀: Average body length: 840.1 μ (range: 802.5 μ–879.2 μ); average body width (at widest part of notogaster): 478 μ (range: 428 μ–504 μ).

Sexual dimorphism present; ♀♀ larger in body size and have relatively larger genital aperture than ♂♂. The following description is applicable to adults of both sexes unless stated otherwise.

Cerotegument: A thick envelope covers body and legs. Embedded in cerotegument are dark granules, irregular in shape and size, similar to those in *Alaskozetes antarcticus*,



Figs. 18–19. *Halozetes marinus* (Lohmann), adult. 18, ♀ dorsal view; 19, ♂ ventral view.

although they have a more regular arrangement and are more densely packed in *H. marinus*. Covering always conspicuous on notogaster where it is perforated to allow notogastral setae to project; lacking or present only as fragments on ventral surface of body. Cerotegument covering prodorsum continuous with that covering notogaster in mid line.

Prodorsum: Rostrum broad; rostral setae smooth or roughened, shorter than their mutual distance. Lamellar setae strongly thickened, usually dark in color, smooth or roughened, inserted very close together on a transverse ridge. Interlamellar setae very long, thickened, dark in color, broadly curved and divergent, smooth or roughened but not barbed. Lamellar and interlamellar setae hollow. Lamellar ridges weakly convergent. Each lamella originates in a pseudostigmatic ridge which is an oblique chitinized bar enclosing pseudostigma. Pseudostigmatic ridge extends anteriorly almost to insertion of interlamellar seta; posteriorly ridge gives rise to 2 lateral ridges, one of which curves antero-laterad in direction of insertion of leg I; other branch curves posterolaterad in direction of insertion of leg II. A transverse ridge crosses interlamellar region immediately anterior to insertions of interlamellar setae; this interlamellar ridge weakly joined to apices of pseudostigmatic ridges in some individuals. Arrangement of prodorsal ridges illustrated in fig. 18. Pseudostigmata are very small cups enclosed within pseudostigmatic ridges. Sensillus has a thin stem and a flattened, expanded head, constricted apically. Head reflexed in a number of specimens; this condition shown on right side in fig. 18. In majority of individuals examined sensillus broken off. An exopseudostigmatic seta inserted postero-

lateral to pseudostigma, in pseudostigmatic ridge; this seta difficult to see. Pedotecta I and II present, but inconspicuous.

Notogaster: Ovoid in shape. A narrow zone of continuity between prodorsum and notogaster as indicated in fig. 18, anterior border of notogaster being interrupted or represented, at most, by a weak line at this point; as noted above, cerotegument of the 2 regions continuous in mid line. In fig. 18 contour of anterior border indicated by shaded areas. There are 28 smooth, simple notogastral setae (fig. 36); humeral seta c_3 lacking in all cases examined. Fissure *im* and aperture of lateral abdominal gland (*gla*) indicated in fig. 18. Fissure *ia* not observed, possibly due to dense coating of cerotegument in humeral region.

Genito-anal region: Each anal plate bears 2 stout setae inserted near median margin. Three pairs of short, stout adanal setae inserted close to rim of anal aperture; setae ad_3 and ad_2 lateral, ad_1 posterior to anal field (fig. 19). Adanal fissure (*iad*) is an oblique slit located just anterior to seta ad_3, on each side. A single pair of short, thick aggenital setae located mid-distant between genital and anal fields. Each genital plate bears 6 setae; setae *G1* (posteriorly) inserted on or near posterior margin of plates; setae *G6* (anteriorly) appreciably longer than remainder and inserted on antero-median margin of plates; setae *G5* inserted on or near anterior margin, lateral or postero-lateral to *G6*. Postero-median margin of each genital plate thickened and forming an interlocking tooth and socket arrangement. Genital field appreciably larger in ♀♀ than in ♂♂ and extending anteriorly into coxisternal field II.

Ventral region of podosoma: Coxisternal ridges I and associated apodemes continuous with posterior border of camerostome; ridges II conspicuously developed, but not continuous in mid-ventral line; paraxial limits of these ridges strongly bifurcate. Ventro-sejugal ridge shorter than ridge II and extends for only 1/2 distance from lateral margin to mid-ventral line, on each side. Coxisternal ridges III very short; ridges IV lacking. All coxisternal setae smooth and thickened. In some specimens these setae rather stout, ending abruptly; in other cases they have flagelliform tips. Basic chaetotaxy appears to be (3–1–2–3), although obscured by displacement of setae *3a* (these lie in coxisternal fields II at same level as setae *2a*) and *4b* (inserted antero-lateral to genital aperture). Interpretation of podosomal chaetotaxy given in fig. 19.

Gnathosoma: Labio-genal articulation complete. Rutellum has basal expansion. Infracapitular setae *h*, *m* and *a* smooth, with fine tips; setae *h* and *a* more strongly developed than *m*.

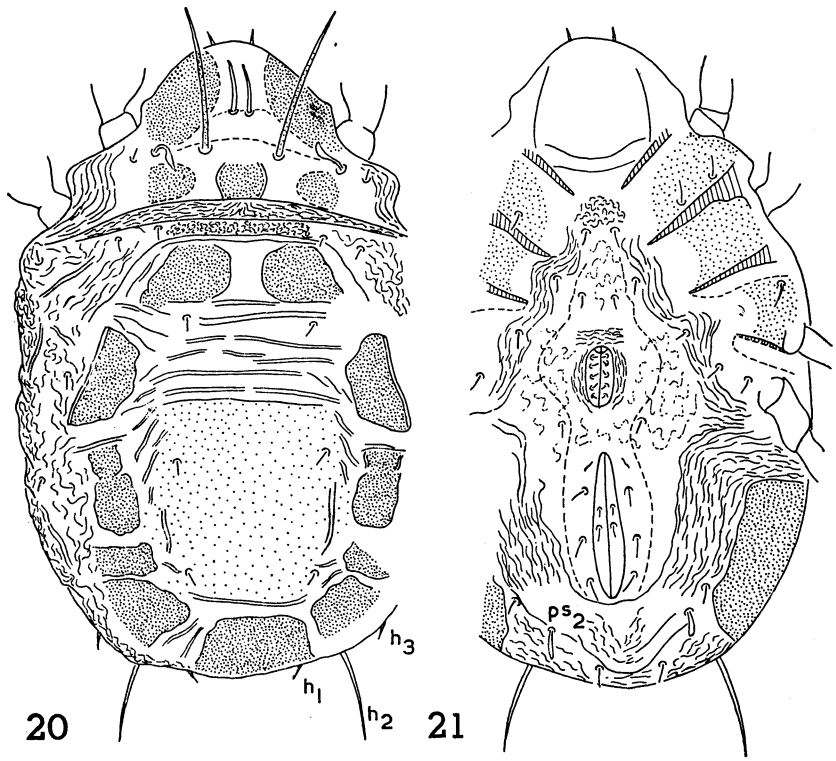
Tracheae: Tracheal system normal, with terminal caecae, as in *Podacarus auberti* (see Grandjean 1955, fig. 9F).

Legs: All legs are tridactyle. Setae *ft'* and (*it*) lacking on tarsus IV. Chaetotaxy not studied in detail.

Tritonymph.

Measurements: Length of body: 759.7 μ; width: 481.5 μ.

Description: This stage recognized by a pair of long setae on posterior part of hysterosoma (fig. 20). Chaetotaxy of prodorsum very similar to that of adult, one slight difference being that surface of lamellar and interlamellar setae granular instead of smooth. Hysterosoma unideficient, humeral seta c_3 being present. Dorsal porose sclerites present;



Figs. 20–21. *Halozetes marinus* (Lohmann), tritonymph. 20, dorsal view; 21, ventral view.

form and arrangement of these shown in fig. 20. Limits of sclerites difficult to define in some cases; interpretation given in fig. 20 recognizes 6 pairs and an unpaired sclerite posteriorly. This arrangement resembles that described previously for "*Pertorgunia colobanthi*" (see Wallwork 1962b), although shapes of sclerites differ in the 2 species.

Ventral view of tritonymph given in fig. 21. Comparisons between this and that of "*P. colobanthi*" indicate differences in positions of coxisternal setae in the 2 species. Setae ps_2 appreciably longer than ps_1 and ps_3 in *H. marinus*.

DISTRIBUTION: Inhabits the marine littoral. Collected in samples of green algae from coastal rocks at following localities: Garden Cove; Buckles Bay; Nuggets Point; Catch-me Point.

Remarks: Dalenius (1958) has distinguished *Anarea macquariensis* from *Notaspis marina* Lohmann on the basis of the difference in form of the sensillus, the prodorsal/notogastral separation and body size. Lohmann's drawing of the adult (Lohmann 1908, pl. 28, fig. 7) does not include the sensillus, but this structure is shown on the drawing of the nymph (Lohmann 1908, fig. 3); it corresponds to that given by Dalenius (1958, fig. 7a) and that described above. Lohmann's figure does not show the contour of the anterior border of the notogaster, but rather the cerotegument continuous over prodorsum and notogaster in the mid line. As indicated above, in some individuals of *H. marinus* the prodorsal/noto-

gastral separation is present, although weak; in others the separation is lacking. This character is a variable one, representing an incipient separation of the 2 parts of the body – a trend carried further in other species in this genus (see below) – and is unreliable as a point of distinction. The body size given by Lohmann for the adult of *N. marina* is 820 μ; the sample considered above has size limits 802.5 μ–879.2 μ (♀♀) which approximate Dalenius' measurement for *A. macquariensis*. In the light of these similarities *A. macquariensis* does not appear to differ sufficiently from *H. marinus* to warrant separate specific rank.

Halozetes intermedius Wallwork, n. sp. Figs. 22–23, 25–28, 37.

This species is very similar to the previous one in certain respects, namely the chaetotaxy of notogaster and ventral surface, and in the continuity or weak separation of prodorsum and notogaster.

MATERIAL EXAMINED: 44 adults (19 ♂♂, 25 ♀♀), 4 tritonymphs, 2 deutonymphs, 5 protonymphs.

Adult.

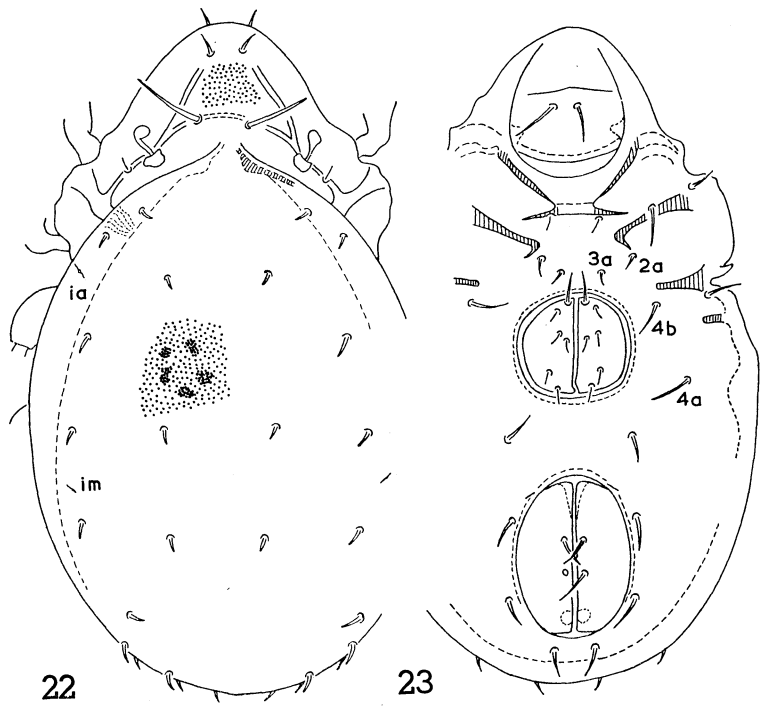
Measurements: ♂♂: Average body length: 671.1 μ (range: 631.3 μ–738.3 μ); average body width (at widest part of notogaster): 393.9 μ (range: 363.8 μ–428 μ). ♀♀: Average body length: 724.5 μ (range: 674.1 μ–791.8 μ); average body width (at widest part of notogaster): 430 μ (range: 374.5 μ–481.7 μ).

Sexual dimorphism present; ♀♀ differ from ♂♂ generally in being larger, having a relatively larger genital aperture and in possessing a pre-genital ridge. This dimorphism not as strongly developed as in other species of this genus described below.

Cerotegument: Similar to that of *H. marinus*, but with some variation in granular composition; in some cases granules not irregular in shape, but perfectly circular; in other cases granules aggregate to form large dark areas as shown in fig. 22. Concentration of granules varies from individual to individual; thus some specimens darker in color than others. Cerotegument of prodorsum usually continuous with that of notogaster in mid-dorsal line, although occasionally, when anterior border of notogaster complete, cerotegument follows closely contour of anterior notogastral margin.

Prodorsum: Rostrum broad; rostral setae are stout spines with finely barbed surface, inserted on small apophyses on antero-lateral margins of rostrum. Lamellar setae thickened, dark in color, with smooth or slightly roughened surface; as long as or slightly longer than their mutual distance. Interlamellar setae strongly thickened, dark in color, with barbed surface; variable in length, being usually about 2× as long as their mutual distance, occasionally much shorter; they never attain the length of the corresponding setae in *H. marinus*. Lamellar and interlamellar setae pale in color, almost transparent, in newly emerged adults. Pseudostigmata well-developed, sac-like structures, rim of each being enclosed in pseudostigmatic ridge. Sensillus consists of slender stem and strongly expanded spherical head. Short, spine-like exopseudostigmatic seta inserted on pseudostigmatic ridge, posterolateral to pseudostigma. Relationship between pseudostigmatic, lamellar and interlamellar ridges very similar to that described for *H. marinus*.

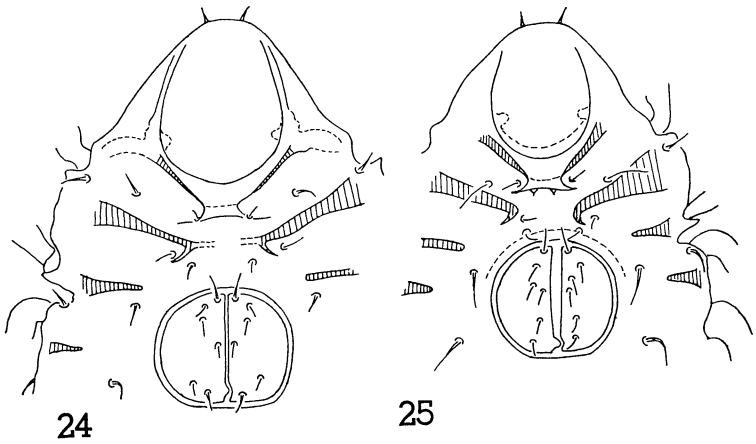
Notogaster: Resembles that of *H. marinus* in most respects. Anterior border may be interrupted in mid line, resulting in continuity of prodorsum and notogaster (fig. 22). A



Figs. 22–23. *Halozetes intermedius* n. sp., adult, ♂. 22, dorsal view; 23, ventral view.

line of demarcation between the 2 regions present in some cases; in this condition anterior border of notogaster narrows strongly to a mid-dorsal peak. Humeral region faintly ridged. Basic pattern of notogastral chaetotaxy is that of bideficience (*i. e.* 28 setae). Occasional variations from this pattern include the presence of seta c_3; this condition was observed as an asymmetrical distribution on one individual; in several cases in which this seta is lacking, the insertion is present. Occasionally setae c_1 and c_2 appear to be lacking, although positions of these setae are variable and may be obscured by dense granular cerotegument in humeral region. All setae are short spines, with surface roughened or with occasional fine barbs (fig. 37); dorso-lateral setae slightly more strongly developed and more conspicuously barbed than centro-dorsals. Fissure *ia* observed on humeral region after removal of cerotegument (fig. 22); fissure *im* also present. Posterior rim of notogaster rather irregular in outline, due principally to slight indentations at points of insertion of setae ps_1.

Ventral region: Anal and adanal setae are thickened spines, with surface roughened or finely barbed, arranged as in *H. marinus*. Aggenital, genital and coxisternal setae relatively longer than in *marinus* and have flagelliform tips; antiaxial setae markedly flagelliform. Six genital setae on each plate. In some ♀ specimens a slight pre-genital ridge present in form of a curved chitinized bar traversing sternal region immediately anterior to genital field (fig. 25); ridge not present in ♂♂. Positions of coxisternal setae *2a* slightly variable. Coxisternal setal formula is (3–1–2–2); seta *4c* not observed in any of the specimens. Other features of ventral surface similar to those of *H. marinus* and shown in



Figs. 24–25. 24, *Halozetes marinus* ♀, podosomal region; 25, *Halozetes intermedius* ♀, podosomal region.

figs. 23 & 25.

Nymphs.

Measurements: Protonymph: length of body: 352.4 μ; width: 224.7 μ. Deutonymph: length of body: 428 μ; width: 267.5 μ. Tritonymph: length of body: 609.9 μ; width: 374.5 μ.

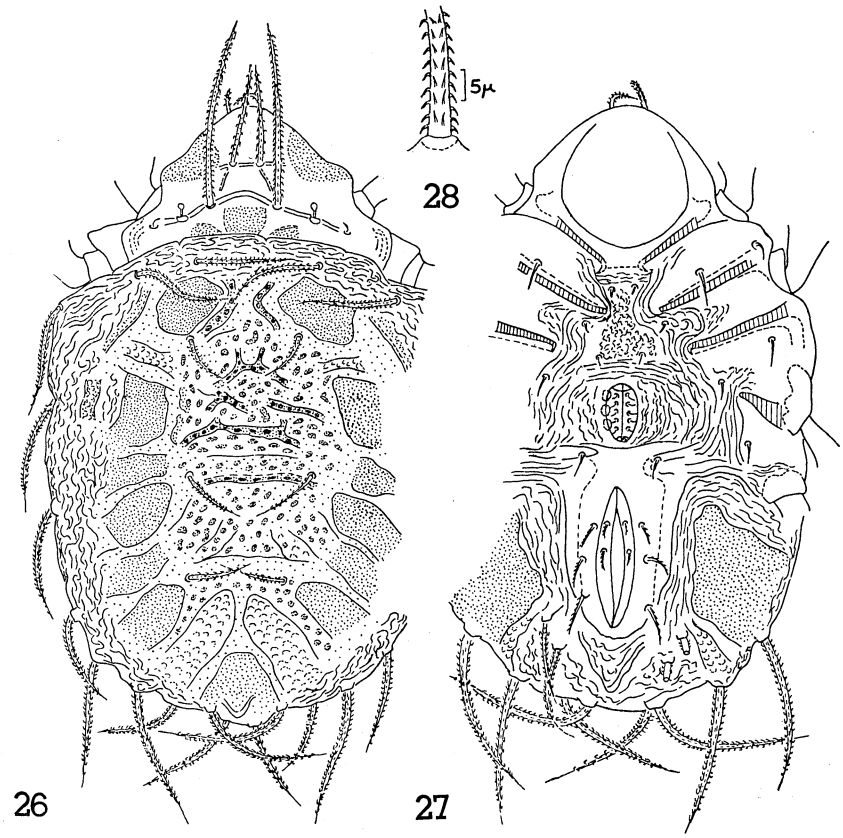
Description: General pattern of development similar to that of "*Pertorgunia colobanthi*" (see Wallwork 1962b). One of the main differences between *H. intermedius* and other species of this genus is in the form of the body setae, which are very long, particularly on the posterior border of the hysterosoma, in all nymphal stages (figs. 26–27); body setae richly provided with recurved barbs (fig. 28). Lamellar and interlamellar setae long and barbed, the latter being inserted on a conspicuous transverse ridge. Pseudostigmata weakly developed, resembling the condition in the adult of *H. marinus*. Sensillus small and delicate with slender stem and rounded head. Hysterosoma strongly pleated in all nymphal stages and is unideficient; chaetotaxy shown in figs. 26–27. There are 6 pairs of porose sclerites and an unpaired porose sclerite posteriorly. The form of the various sclerites differs from that described for "*Pertorgunia colobanthi*" (*cf.* fig. 26 & Wallwork 1962b, fig. 1). Development of coxisternal, genital, adanal and anal setae very similar to that in "*P. colobanthi*", except that coxisternal seta *4c* is lacking. Adanal setae strongly thickened and barbed; pseudoanal setae relatively long and conspicuously barbed. A large, well-defined porose sclerite present on each side of the anal field.

DISTRIBUTION: Aerial Cove (ex *Puccinellia macquariensis*); Aerial Cove (ex *Colobanthus muscoides*): type locality; Garden Cove (ex green algae, coastal rocks); Garden Cove (ex rockhopper nest material); Green Gorge (ex crevices, coastal rocks); Catch-me Point (ex algae, coastal rocks); Isthmus (ex *Puccinellia macquariensis*); Nuggets Point (ex *Puccinellia macquariensis*); North Head (ex *Agrostis magellanica*, soil); North Head (ex *Colobanthus muscoides*); North Head (ex green algae, coastal rocks); North Head (ex cave rookery debris).

Remarks: The distribution of *H. intermedius* is similar in some respects to that of *H. marinus*; the 2 species populations were recovered in the same sample on several occasions. *H. intermedius* is possibly a more tolerant species than *marinus* for it is not confined to the marine littoral. The 2 species are clearly morphologically and ecologically similar. Adults of *intermedius* may be distinguished from those of *marinus* by the following characters: 1. Pseudostigmata well developed; sensilli strongly clavate. 2. Interlamellar setae only 2× as long as mutual distance at maximum length, barbed. 3. Lamellar setae usually separated by a distance equal to their length. 4. Notogastral setae with occasional barbs. 5. Coxisternal setae *3a* inserted posterior to setae *2a*. 6. Coxisternal setae *4c* lacking. 7. Females with weakly developed pre-genital ridge.

As indicated above, variations in length and distribution of setae occur. Characters (1) and (6) in the above list are constant; each of the others must be used with discretion and in combination with the remainder.

Immature forms of the 2 species are easily separated on the basis of development of body setae and form of hysterosomal porose sclerites.



Figs. 26–28. *Halozetes intermedius* n. sp., tritonymph. 26, dorsal view; 27, ventral view; 28, proximal part of interlamellar seta.

Halozetes crozetensis (Richters), n. comb. Figs. 29–31, 38 & 40.

Scutovertex crozetensis Richt., 1908.
Pertorgunia crozetensis (Richt. 1908); Dalenius, 1958.
Pertorgunia colobanthi Dalen. 1958.

The description and figures by Richters (1908) are sufficient to identify this species; in particular the length and form of interlamellar setae, the shape of the notogaster and form of notogastral setae are useful characters in this identification.

Certain features of this species together with a description of the immature stages have been given previously under the name "*P. colobanthi*" (see Wallwork 1962b). The larger samples examined in the present work have shown a range of morphological variability not evident in samples examined previously. Previous descriptions (Richters 1908, Dalenius 1958, Wallwork 1962b) are incomplete in several important respects; a re-description is given below.

The species is the commonest in the collections, both in terms of numbers of individuals and frequency of occurrence. The following description refers to adults and is applicable to both sexes unless otherwise stated.

MATERIAL EXAMINED: More than 100 adults comprising approximately equal proportions of ♂♂ and ♀♀.

Measurements: ♂♂: Average length of body: 612 μ (range: 556.4 μ–695.5 μ); average width of body (measured at widest part of notogaster): 315 μ (range: 267.5 μ–374.5 μ). ♀♀: Average length of body: 647.6 μ (range: 599.2 μ–706.2 μ); average width of body (measured at widest part of notogaster): 343.3 μ (range: 288.9 μ–406.6 μ).

Sexual dimorphism present; ♂♂ have relatively smaller genital aperture than ♀♀ and show weak aggenital neotrichy; ♂♂ usually smaller in body size than ♀♀, although a considerable overlap occurs.

Cerotegument: Granular in appearance, as in *H. intermedius* but granules distributed more sporadically, particularly over notogaster, so that *H. crozetensis* appears paler in color than *intermedius*.

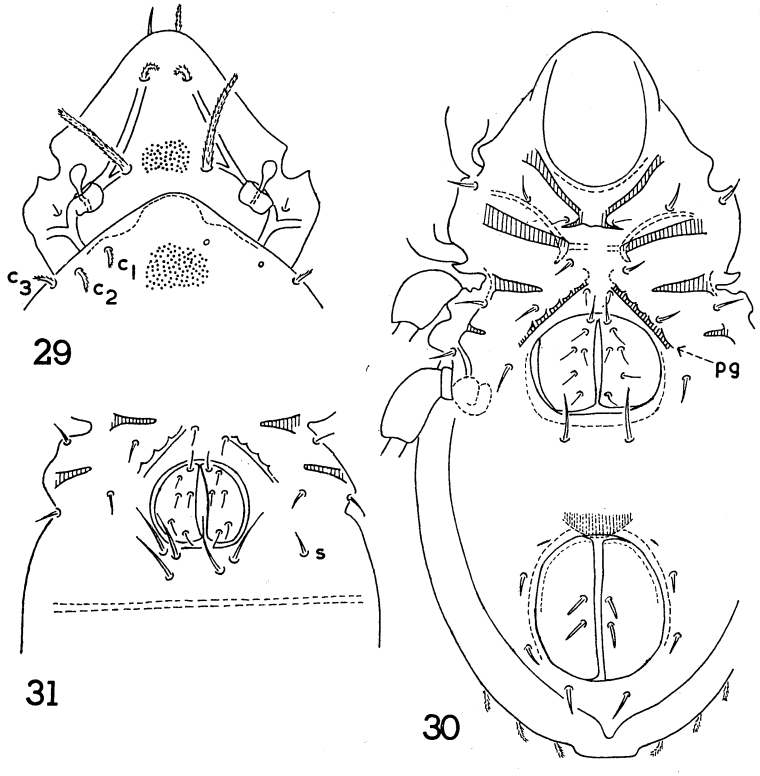
Prodorsum: Characteristic appearance of this region given in fig. 29. Some individual variations occur which affect mainly chaetotaxy and development of prodorsal ridges. Rostral setae as long as their mutual distance, slightly curved, occasionally tapering to a fine point apically, but usually barbed or tufted; the 2 conditions shown in fig. 29. Lamellar setae relatively constant in appearance although distance between them variable; usually shorter than their mutual distance, strongly barbed or tufted (fig. 40), curved mediad, frequently lying close to surface of prodorsum; in this position sometimes difficult to locate and this may have accounted for Richters' inability to describe them. Interlamellar setae strongly thickened for whole of length, and conspicuously barbed; they do not taper distally and usually are longer than their mutual distance, although their length does not attain 2× that of their mutual distance. In some individuals these setae very short; this condition present in a sample from Caroline Valley and may represent a subspecific variation. Pseudostigmata are deep cups opening antero-laterally; sensillus has a slender stem and expanded head covered with fine granules. Exopseudostigmatic setae (*ex*) short and inconspicuous, inserted postero-lateral to pseudostigmata. Development of lamellar and inter-

lamellar ridges variable; frequently weakly developed (in case of lamellae) or absent (in case of interlamellar ridge); occasionally both strongly developed. Pseudostigmatic ridge curves posteromediad immediately posterior to pseudostigma.

Notogaster: Usually oval in shape, with posterior margin strongly indented; occasionally truncate posteriorly. Anterior border complete in most cases, narrowing, almost pointed in the mid-dorsal line; occasionally the prodorsal/notogastral separation weakly developed mid-dorsally. Humeral region ridged in some cases. Pattern of chaetotaxy characteristically that of unideficience; seta c_3 present in majority of cases. Presence or absence of this seta determined in 36 ♂♂ and 34 ♀♀. The following conditions were observed:

1. Seta c_3 present on both sides (symmetrical). Frequency: ♂♂: 78%; ♀♀: 68%.
2. Seta c_3 present on one side only (asymmetrical). Frequency: ♂♂: 22%; ♀♀: 26%.
3. Seta c_3 lacking on both sides. Frequency: ♂♂: 0%; ♀♀ 6%.

Form of notogastral setae variable; always short, frequently conspicuous owing to dark pigmentation, usually strongly barbed or tufted (fig. 38); occasionally only weakly barbed or with roughened surface. There is little size difference between the various setae; occasionally setae ps_1 may be slightly longer than the other setae in this series.



Figs. 29–31. *Halozetes crozetensis* (Richters), adult. 29, ♀, prodorsum; 30, ♀, ventral view; 31, ♂, genital region.

Genito-anal region: Adanal setae (3 pairs) and anals (2 pairs) usually smooth and flagelliform, although they may be short and smooth or finely barbed. Aggenital setae located immediately posterior to genital aperture and directed forwards. Aggenital neotrichy usually present in ♂♂ and represented by symmetrical duplication of aggenital seta, in most cases; neotrichy usually lacking in ♀♀. In an examination of 51 ♂♂ and 48 ♀♀ the following conditions of neotrichy were observed:

1. Neotrichy lacking on both sides (*i. e.* 1 pair of aggenital setae present). Frequency: ♂♂ : 8 %; ♀♀ : 88 %.

2. Aggenital seta duplicated on one side only (*i. e.* 3 aggenital setae arranged asymmetrically). Frequency: ♂♂ : 21 %; ♀♀ ; 6 %.

3. Aggenital seta duplicated on both sides (*i. e.* 4 aggenital setae arranged symmetrically). Frequency: ♂♂ : 61 %; ♀♀ : 0 %.

4. Aggenital seta triplicated on one side, duplicated on the other (*i. e.* 5 aggenital setae asymmetrically arranged). This condition shown in fig. 31. Frequency: ♂♂ : 10 %; ♀♀ : 0 %.

5. Aggenital seta lacking on one side (*i. e.* only one aggenital seta present). Frequency: ♂♂ : 0 %; ♀♀ : 6 %.

Six genital setae inserted on each genital plate (figs. 30–31); seta *G6* (anterior) slightly longer than the remainder and directed forwards. Positions of genital setae relatively constant in the specimens examined. Genital aperture of ♀♀ (fig. 30) appreciably larger than that of ♂♂ (fig. 31).

Ventral region of podosoma: Coxisternal ridges IV lacking; remaining coxisternal ridges developed as shown in fig. 30; ridges II may be continuous in mid line, although this connection variously developed or absent. Apodemata II (indicated by broken lines in fig. 30) strongly curved and reflexed medially. Sejugal and ridges III do not extend to mid line, former being more strongly developed than latter. A pair of pre-genital ridges developed in all individuals of both sexes examined. These ridges (*p-g*) originate near antero-lateral margin of genital aperture and are strongly convergent; they may occasionally be confluent, although the most usual condition is that shown in fig. 30. Outer margin of each pre-genital ridge has an irregular contour. Coxisternal setal formula is (3–1–2–3); setae *3a* usually inserted within the confines of pre-genital ridges (although positions variable), and always at a level posterior to that of setae *2a*; setae *4c* always present. One ♂ specimen shows an asymmetrical duplication of seta *2a*; in another case an additional seta is present on coxisternal field IV (seta *s* in fig. 31). Coxisternal setae generally short and smooth with fine tips; occasionally with roughened surface.

Gnathosoma: Labio-genal articulation complete and extends laterally to base of palp on each side. Rutellum has a basal expansion. Infracapitular setae *h*, *m* and *a* smooth. Dorsal cheliceral seta thickened and barbed; lateral seta less strongly developed and unilaterally barbed.

Legs: All tarsi tridactyle, median claw being more strongly developed than the 2 laterals. Setae *ft'* and (*it*) lacking on tarsus IV. Setae (*u*) expanded and notched basally.

DISTRIBUTION: Garden Cove (ex *Colobanthus muscoides*); Garden Cove (ex green algae, coastal rocks); Garden Cove (ex *Poa hamiltoni*); Garden Cove (ex rockhopper nest material); Garden Cove (ex *Stilbocarpa* litter); North Head (ex algae, rocks, Royal rookery); North Head (ex *Poa hamiltoni*); North Head (ex crevices in rookery rocks); North

Head (ex *Agrostis magellanica* and soil); North Head (ex rockhopper debris, cave rookery); North Head (ex Royal rookery mud); North Head (ex windswept feathers); Wireless Hill (ex *Festuca erecta*); Wireless Hill (ex *Poa foliosa*, dung); Wireless Hill (ex *Stilbocarpa* litter); Wireless Hill (ex moss); Nuggets Point (ex *Colobanthus muscoides* and *Cotula plumosa*); Nuggets Point (ex green algae, coastal rocks); Nuggets Point (ex *Puccinellia macquariensis*); Brothers Point (ex cave scrapings); Aerial Cove (ex cormorant nest material); Aerial Cove (ex *Puccinellia macquariensis*); Aerial Cove (ex *Colobanthus muscoides*); Handspike Point (ex *Stilbocarpa* litter and wanderer nest material); Caroline Valley (ex *Poa hamiltoni*); Buckles Bay (ex *Cotula plumosa*); Buckles Bay (ex green algae, coastal rocks); Camp Hill (ex *Colobanthus muscoides*); Camp Hill (ex *Poa annua*); Camp Hill (ex sheep dung, soil); Isthmus (ex *Puccinellia macquariensis*); Lambing Gully (ex *Stilbocarpa* litter); Plateau (ex lichen, moss, soil); Plateau (ex herbfield plants); Langdon Point (ex *Stilbocarpa* litter); Hasselborough Bay (ex *Stilbocarpa* leaves); Sub-plateau (ex *Stilbocarpa* litter); Catch-me Point (ex *Poa foliosa* soil); North Head (ex *Azorella*); North End (ex debris); North End, West Head (ex *Azorella*); North End (ex *Poa* roots, moss, soil); Bauer Bay (ex dead rabbit); North-East Coast (ex tussock); North End (NW) (ex *Pleurophyllum* debris).

Remarks: Dalenius (1958) named a species, *Pertorgunia colobanthi*, which he regards as closely related to *H. crozetensis* but not conspecific with it. The differences between these 2 groups are not sufficient, in my opinion, to warrant a separate species; *P. colobanthi* is placed in synonymy with *H. crozetensis*.

The species *Halozetes crozetensis* may be characterized as follows: 1. Lamellar setae short, curved mediad, strongly tufted. 2. Interlamellar setae thickened, not tapering apically, strongly barbed, usually longer than their mutual distance. 3. Prodorsal/notogastral separation complete. 4. Notogaster strongly ovoid in shape, posterior margin indented. 5. Notogastral seta c_3 usually present. 6. Notogastral setae conspicuously barbed. 7. Notogastral setae in series *ps* usually all the same length. 8. Pre-genital ridges developed in both sexes, convergent but usually not confluent. 9. Coxisternal setal formula (3–1–2–3). 10. Aggenital setae located immediately posterior to genital aperture. 11. Aggenital neotrichy, usually represented by duplication of seta *ag*, present in ♂♂; neotrichy generally lacking in ♀♀.

The ♂♂ of this species may be distinguished immediately from those of *H. intermedius* on the basis of aggenital neotrichy. Females of the 2 species are more difficult to separate, but many of the characters listed above may be used in this connection; in particular characters (1), (6) (c.f. figs. 37 & 38), (8), (9) and (10) serve to distinguish ♀♀ of *H. crozetensis* from *intermedius*.

The immature stages of the 2 species are readily separated by the form of the hysterosomal setae. These are all short in *H. crozetensis* (see Wallwork 1962b), long and conspicuously barbed in *intermedius* (see above).

It is of interest to note that Dalenius (1958) records this species as infrequent, having seen it only in a sample from Hasselborough Bay. The distribution given above indicates that it is, in fact, a very widely distributed species on Macquarie. In some localities (including Hasselborough Bay) it is poorly represented, but forms large breeding populations in many other localities, such as the caves at Brothers Point, litter at Handspike Point, Caroline Valley, Buckles Bay, Aerial Cove and Camp Hill. The species is obviously tole-

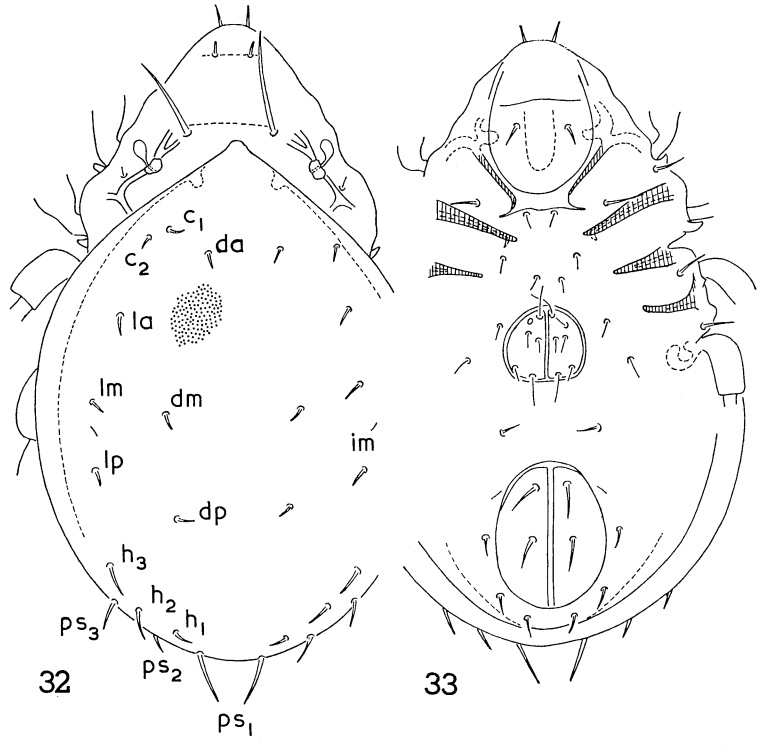
rant of a much wider range of environmental conditions than *H. marinus* or *intermedius*.

Halozetes macquariensis (Dalenius) Figs. 32–33, 39, 41.

Pertorgunia macquariensis Dalen., 1958.

The description of this species (Dalenius 1958) is, unfortunately, incorrect. The ♂♂ and ♀♀ selected for the original description (Dalenius 1958, fig. 3 a–d) belong to 2 separate and distinct species, both of which are represented by ♂♂ and ♀♀ in the collections examined in the present work. Furthermore the "hooked" condition of the notogastral setae, referred to by this author, appears to be a transient phenomenon present only in newly emerged adults. To clarify this rather confused situation it is proposed to retain the name *macquariensis* for the ♀ in Dalenius' description, for this has page priority over that of the ♂. The ♂ considered by Dalenius to belong to this species belongs, in fact, to a subspecies of *Halozetes belgicae* (Mich.); this latter group, which appears to be distinct from the nominate form, will be described as a new subspecies later in this paper. The re-description of *H. macquariensis* given below includes a re-description of the ♀ and a description of the ♂; it is also necessary to designate an allotypic ♂ for reference purposes.

MATERIAL EXAMINED: 30 adults (15 ♂♂, 15 ♀♀).



Figs. 32–33. *Halozetes macquariensis* (Dalenius), adult ♂. 32, dorsal view; 33, ventral view.

Measurements: ♂♂: Average body length: 832.3 μ (range: 791.8 μ–877.4 μ); average width of body (at widest part of notogaster): 482.3 μ (range: 428 μ–535 μ). ♀♀: Average length of body: 881.7 μ (range: 856 μ–930.9 μ); average width of body (at widest part of notogaster): 526.4 μ (range: 481.5 μ–588.5 μ).

Sexual dimorphism present, but weakly developed. Males generally smaller in body size than ♀♀ and have a relatively smaller genital aperture. The following account is applicable to both sexes unless stated otherwise.

Cerotegument: Granular in appearance; granules closely packed and generally smaller (maximum diameter: 3 μ) than those of *H. crozetensis*.

Integument: Generally smooth and brown in color. Anterior 1/2 of notogastral shield often ornamented with light areas of weak chitinization; these are circular or polygonal in shape, with a diameter of 15–20 μ. Similar fenestrations, rather smaller in diameter, also present on coxisternal regions, although more difficult to detect.

Prodorsum: Rostral setae smooth, or occasionally with slightly roughened surface, pointed apically, as long as their mutual distance. Lamellar setae short, stout, dark spines (fig. 41), smooth or finely barbed, rising erect from faint transverse ridge on which they are inserted, slightly divergent, appreciably shorter than rostrals, shorter than their mutual distance. There is some variation in length of interlamellar setae; generally as long as or slightly longer than their mutual distance, occasionally slightly shorter; strongly thickened, finely barbed and dark-colored, tapering slightly towards tip; rising erect from surface of prodorsum and slightly divergent. Pseudostigmata are deep cups with aperture directed laterally. Sensillus clavate, as in *H. crozetensis*. Exopseudostigmatic seta is a short dark spine located posterior to pseudostigma on each side. Pseudostigmatic, lamellar and interlamellar ridges weakly developed; of these 3 ridges, pseudostigmatic is most conspicuous; interlamellar ridge may be represented by a short curved chitinized bar which does not extend laterally to attain insertions of interlamellar setae.

Notogaster: Anterior border strongly peaked in mid-dorsal line; apex of peak extends forwards almost to level of insertions of interlamellar setae. Cerotegument of prodorsum and notogaster may be clearly confluent in this region, although the true anterior border appears to be complete, but weakly developed in some cases. This condition is more reminiscent of that in *H. intermedius* than that in *crozetensis*. Notogastral setae smooth or with roughened surface, spine-like, dark-colored (fig. 39). Setae in series *c* show some variability, 5 conditions being observed as follows: 1. Setae present symmetrically. Frequency: c_1: 6%; c_2: 86%; c_3: 0%. 2. Seta present on one side only, represented on the other side by insertion. Frequency: c_1: 15%; c_2: 14%; c_3: 0%. 3. Seta present on one side only; not represented by insertion on other side. Frequency: c_1: 33%; c_2: 0%; c_3: 0%. 4. Setae lacking symmetrically, but represented on each side by insertions. Frequency: c_1: 6%; c_2: 0%; c_3: 0%. 5. Setae and insertions lacking completely on both sides. Frequency: c_1: 40%; c_2: 0%; c_3: 100%.

These observations, carried out on 15 individuals, demonstrate the complete regression of setae c_3; seta c_1 is also lacking frequently; seta c_2 shows much less tendency to regress than the others in this series, in the sample considered. Number of notogastral setae varies from 25–28; the extreme condition involving the simultaneous lack of all 3 setae in the *c* series on both sides was not encountered.

A characteristic feature of the notogastral chaetotaxy of this species is the development of setae ps_1; these are appreciably longer than the other notogastral setae.

It may be noted that the interlamellar and notogastral setae of newly emerged adults (as judged by lack of pigmentation in the setae) are strongly curved apically, producing the "hooked" condition noted by Dalenius. These forms do not differ in any other respect from the description given above.

Genito-anal region: Anal setae (1 pair on each plate) are strong, smooth spines, anterior setae being located far forwards on anal plates. Three pairs of smooth, spine-like adanal setae less strongly developed than anals. A single pair of aggenital setae present in both sexes, *i. e.* aggenital neotrichy lacking. These setae inserted at mid distance between genital and anal fields, a condition reminiscent of *H. intermedius*. Genital aperture relatively smaller in ♂♂ than in ♀♀. Each genital plate bears 6 setae of which the most anterior, *G6*, and the most posterior, *G1*, are the longest (fig. 33). Pre-genital ridge, forming a continuous arch anterior to genital field, present in ♀♀, lacking in ♂♂.

Ventral region of podosoma: Coxisternal ridges and their associated apodemes developed in a manner very similar to that described above for *H. intermedius* and *H. crozetensis*. Coxisternal setal formula is (3–1–2–3); setae *3a* are usually inserted at a level posterior to that of setae *2a* in ♂ specimens; in ♀♀ the greater size of the genital aperture results in the displacement anteriorly of setae *3a* which lie almost level with setae *2a*. One ♂ specimen possesses an additional seta between setae *3a* and *4b*, on one side only; this condition is reminiscent of the coxisternal neotrichy in *Podacarus auberti* and *Alaskozetes antarcticus*. All ventral setae smooth or with roughened surface, rather variable in length although generally short with fine tips; setae *1b* usually well developed.

Gnathosoma: This is very similar to that of other members of the genus.

Legs: All tarsi are tridactyle, heterodactyle. Tarsus IV has 12 setae; *ft'* and (*it*) are lacking.

DISTRIBUTION: Aerial Cove (ex *Colobanthus muscoides*); North Head (ex soil, Royal rookery); North Head (ex rookery rocks); North Head (ex *Poa hamiltoni*); North End (ex debris); Caroline Valley (ex *Poa hamiltoni*).

This species is apparently not very common and does not occupy a wide range of habitats. Its absence from marine littoral samples indicates that it is intolerant of this situation; it appears to prefer habitats in soil and vegetation which are not directly influenced by marine conditions. In this respect it differs ecologically from *H. marinus*, *H. intermedius* and *H. crozetensis*.

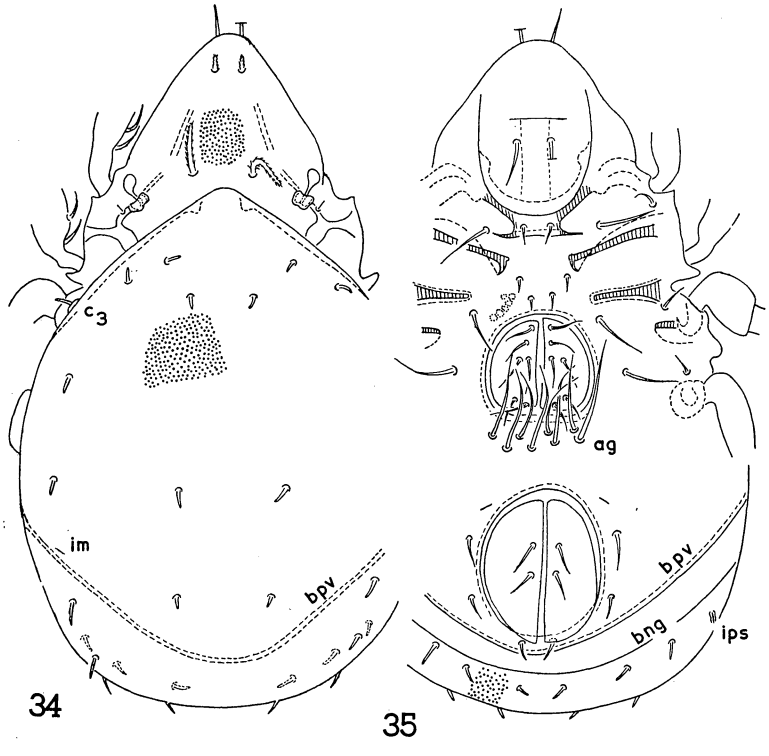
Remarks: This species is the largest one so far encountered in this genus and shows a superficial resemblance to *Podacarus auberti*. It may be distinguished from the latter by the absence of coxisternal and aggenital neotrichy, the insertion pattern of the genital setae, the length of interlamellar setae and the condition of the labio-genal articulation of the gnathosoma (Wallwork, in press). *H. macquariensis* can be separated from *intermedius* and *crozetensis* by the body size and also by the much longer notogastral setae ps_1. It differs from *H. marinus* in the length of prodorsal setae, form of the sensillus and length of notogastral setae ps_1. The following combination of characters may be used to define the species *H. macquariensis*. Lamellar setae short, straight, smooth or finely barbed. Interlamellar setae finely barbed, tapering slightly. Prodorsal/notogastral separation apparently

complete, but weakly developed in some specimens. Anterior margin of notogaster strongly peaked. Notogastral setae c_1 and c_3 usually absent. Notogastral setae with smooth or slightly roughened surface; setae ps_1 appreciably longer than the others. Pre-genital ridges developed in ♀♀ only; these ridges are confluent forming an arc anterior to genital field. Coxisternal setal formula (3–1–2–3). Aggenital setae located mid distant between genital and anal fields. Aggenital neotrichy lacking in both sexes.

Halozetes belgicae (Mich. 1903) **brevipilis** Wallwork, n. subsp. Figs. 34–35, 42–43.

Notaspis belgicae was described and figured by Michael from specimens collected in the de Gerlache Strait region of Antarctica. Representatives of this species were made available to me from the collections of Dr. J. L. Gressitt; these specimens, which were collected in the de Gerlache Strait region, have been discussed previously under the name *Pertorgunia belgicae* (Wallwork 1962b). The species is also present on Macquarie; these specimens differ from the nominate form in certain small but constant morphological features and are considered below as a new subspecies.

MATERIAL EXAMINED: 45 adults (28 ♂♂, 17 ♀♀).



Figs. 34–35. *Halozetes belgicae* (Mich.) ssp. *brevipilis* n. ssp., adult ♂. 34, dorsal view; 35, ventral view.

Measurements: ♂♂: Average length of body: 523.6 μ (range: 476 μ–560 μ); average width of body (measured at widest part): 279.2 μ (range: 252 μ–324.8 μ). ♀♀: Average

length of body: 555.4 μ (range: 532 μ–588 μ); average width of body (measured at widest part): 319.5 μ (range: 280 μ–352.8 μ).

Sexual dimorphism present; ♂♂ smaller than ♀♀ on the average (although there is considerable overlap); aggenital neotrichy strongly developed in ♂♂, lacking in ♀♀; genital aperture relatively smaller in ♂♂ than in ♀♀; pre-genital ridge well developed in ♀♀, lacking in ♂♂. The following description is applicable to both sexes unless stated otherwise.

Cerotegument: This envelope well developed, particularly on dorsal surface; granular in appearance.

Integument: Generally smooth, pale brown in color, weakly fenestrated in coxisternal regions. When viewed by transmitted light the whole animal is paler in color than *H. crozetensis.*

Prodorsum: Rostral setae slender, usually tapering apically with fine flagelliform tip, finely barbed or apparently smooth. Setae at least as long as their mutual distance, frequently longer. Lamellar setae generally very short, thickened, barbed or with surface roughened, dark in color, rising erect from surface of prodorsum; rather variable in length, usually shorter than their mutual distance (fig. 34), occasionally rather longer, but never as long as corresponding setae in nominate form (see Dalenius 1958, fig. 5a). Length of interlamellar setae variable, but again never attaining length of those in nominate form; usually shorter than their mutual distance and frequently very short (*i. e.* less than 1/2 length of mutual separation); strongly thickened, conspicuously barbed, dark in color (except in newly emerged adults), rising erect from surface of prodorsum. Pseudostigmata with usual cup-shaped form; sensillus consists of a slender stem and strongly rounded head. Pseudostigmatic ridge well developed posterior to pseudostigma, but not extending for any distance anterior to this structure. Lamellae weak (indicated by broken lines in fig. 34) and not attaining level of insertions of lamellar setae; interlamellar ridge generally lacking, occasionally present connecting insertions of interlamellar setae, as in nominate form. A short, spine-like exopseudostigmatic seta inserted on pseudostigmatic ridge immediately posterior to pseudostigma, on each side.

Notogaster: Anterior margin forms a peak in mid-dorsal line; peak broader than that in *H. macquariensis.* Anterior margin slopes strongly and a slight humeral "wing" is developed. Posteriorly notogaster becomes narrower so that general shape of shield is ovoid; this shape may be obscured to a considerable degree by ventral flexure of posterior part of shield, and in this condition posterior contour (but not posterior limit) may appear truncate; this condition shown in type specimen (fig. 34) and also in Michael's description (Michael 1903, pl. II, fig. 12). True posterior margin of notogaster (*bng*) and well chitinized ventral plicature (*bpv*) are shown in fig. 35. Ventral plicature may be weakly indented in mid-ventral line in some specimens. Notogastral setae short, thickened spines, dark in color, with occasional short barbs (fig. 43). Centro-dorsal setae slightly shorter and more slender than latero-dorsals and may be without barbs. Pseudoanal setae (ps_{1-3}) usually slightly longer than latero-dorsals, occasionally appreciably longer (*i. e.* 2× as long). Number of notogastral setae varies from 28–30; variability results from presence or absence of seta c_3 on one or both sides. Three conditions observed; frequencies of occurrence of these conditions in 28 ♂♂ and 16 ♀♀ are given below: 1. Seta c_3 present on both sides. Frequency: ♂♂: 43 %; ♀♀: 19 %. 2. Seta c_3 present on one side only. Frequency:

♂♂ : 7 %; ♀♀ : 25 %. 3. Seta c_3 lacking on both sides. Frequency: ♂♂ : 50 %; ♀♀ : 56 %. Other details of this region are given in figs. 34–35.

Genito-anal region: Anal aperture ovoid, slightly narrower anteriorly than posteriorly. Anal setae (2 pairs) and adanals (3 pairs) smooth with fine tips. Variations from basic pattern of chaetotaxy of this region are few and affect number of anal setae; occasionally anal setae have a 2 : 3 distribution instead of a 2 : 2 condition, this variation being present in 5 specimens (2 ♂♂, 3 ♀♀) out of 45 examined; 1 ♂ has 3 pairs of anal setae, and another individual shows a 2 : 1 distribution. Adanal fissure (*iad*) conspicuous as a straight slit oriented transversely or slightly inclined on each side of anal aperture in an antero-lateral position. Aggenital setae located nearer to genital field than to anal; slender, relatively long, with delicate flagelliform tips. Single pair of these setae present in ♀♀; this condition relatively constant in ♀♀, varying only to extent that 1 seta may be lacking (frequency: 12 %) or both may be lacking (frequency: 6 %). Aggenital neotrichy not observed in any of the ♀♀ examined. Males characterized by strong aggenital neotrichy (fig. 35), the number of setae varying between 2 and 6 on each side. The following conditions were observed in 28 ♂♂ : Aggenital formula 2 : 4 (frequency 7 %); 3 : 3 (3 %); 3 : 4 (3 %); 4 : 4 (35 %); 4 : 5 (25 %); 5 : 5 (21 %); 4 : 6 (3 %); 5 : 6 (3 %).

Genital aperture ovoid, being relatively larger in ♀♀ than in ♂♂; genital setae (6 pairs) smooth, with flagelliform tips; most posterior pair slightly longer than remainder. Distribution of genital setae follows a pattern similar to that of other members of genus; one departure from this pattern observed, namely presence of 7 setae instead of 6 on 1 plate, other plate being normal; this condition occurred in a ♂ specimen, additional seta being located on posterior 1/2 of plate. A pre-genital ridge is a constant feature of ♀♀; lacking in ♂♂. Ridge in form of a single curved chitinized bar paralleling anterior margin of genital aperture; coxisternal setae *3a* usually contained within arc of this ridge.

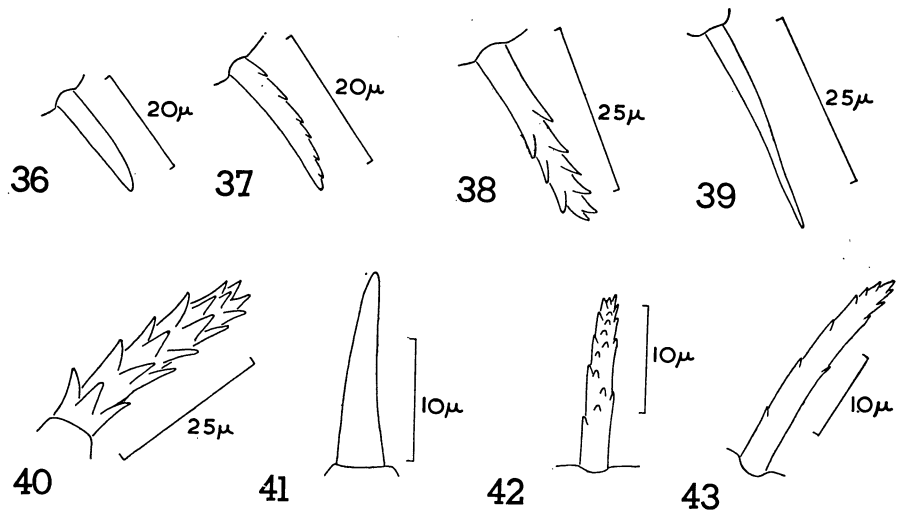
Ventral region of podosoma: Coxisternal ridges I, II, III and sejugal present; development of these ridges and their associated apodemes shown in fig. 35. Coxisternal ridges IV lacking. All coxisternal setae smooth; setae *1b*, *4a* and *4b* have long flagelliform tips; the remaining setae shorter and spine-like. Setae *4b* displaced anteriorly as in other members of family. Coxisternal setal formula is (3–1–2–3); coxisternal neotrichy lacking as a rule; exceptions to this are 2 ♂ specimens in which seta *4a* is duplicated on one side only. The weakly fenestrated integument in the coxisternal region has been noted earlier; fenestrations usually restricted to coxisternal regions II, III/IV and sternal region antero-lateral to genital aperture.

Gnathosoma and legs: Details of these regions essentially similar to those in other members of the genus.

DISTRIBUTION: North Head (ex algae, Royal penguin rookery): holotype and allotype from this locality; North Head (ex *Agrostis magellanica* and soil); North Head (ex Royal rookery mud); North Head (ex algae, rocks); North Head (ex *Poa hamiltoni* litter); Aerial Cove (ex *Colobanthus muscoides*); Aerial Cove (ex *Puccinellia macquariensis*); Camp Hill (ex *Poa annua*); Camp Hill (ex *Colobanthus muscoides*); Camp Hill (ex sheep dung, soil); Garden Cove (ex *Colobanthus muscoides*); Garden Cove (ex green algae, coastal rocks); Garden Cove (ex rockhopper nest material); Wireless Hill (ex moss); Brothers Point (ex cave scrapings); Isthmus (ex *Puccinellia macquariensis*); Nuggets Point (ex *Puccinellia macquariensis*); Nuggets Point (ex *Colobanthus muscoides* and *Cotula plu-*

mosa); Buckles Bay (ex *Cotula plumosa*); Mt. Hamilton (ex *Azorella*, moss and soil); Caroline Valley (ex *Poa hamiltoni*).

Remarks: Subspecies *brevipilis* may be distinguished immediately from the nominate form by the shorter lamellar and interlamellar setae. From an examination of Michael's specimens at the British Museum and Bishop Museum collections from de Gerlache Strait I have noted other differences, most of which are of a minor nature, between the 2 forms. These differences are of doubtful diagnostic value when used alone for the characters involved show some variability. The most significant of these from an evolutionary point of view is the difference in degree of aggenital neotrichy between the 2 forms. Aggenital neotrichy is well developed in ♂♂ of both forms and appears to be stronger in the nominate subspecies (number of aggenital setae varies between 5 and 9 on each side) than in *brevipilis* (number varies between 2 and 6 on each side). A detailed analysis of the frequency distribution of the various combinations of aggenital setal patterns has not been made as yet for the nominate form. Such an analysis will reveal the extent to which the 2 forms have diverged with respect to this character. It is of interest to note in this



Figs. 36–43. Body setae. 36, *Halozetes marinus* (Lohmann), adult, seta ps_2; 37, *Halozetes intermedius* n. sp., adult, seta ps_2; 38, *Halozetes crozetensis* (Richters), adult, seta ps_2; 39, *Halozetes macquariensis* (Dalenius), adult, seta ps_2; 40, *Halozetes crozetensis* (Richters), adult, lamellar seta; 41, *Halozetes macquariensis* (Dalenius), adult, lamellar seta; 42–43; *Halozetes belgicae* (Mich.) ssp. *brevipilis* n. ssp., adult, lamellar seta and seta ps_2 respectively.

connection that weak aggenital neotrichy is occasionally present in ♀♀ of the nominate form, but appears to be lacking in this sex in *brevipilis*. Another point of difference between the 2 forms involves the relative length of pseudoanal setae on the posterior region of the notogaster; these setae are longer and more strongly thickened than the remaining notogastral setae in Michael's specimens, whereas the pseudoanal setae do not differ appreciably from the other setae in *brevipilis*, as a rule. Rostral setae may be thickened and barbed in the nominate form, slender and flagelliform in *brevipilis*. All ventral setae are

usually smooth and flagelliform in *brevipilis*, adanal setae appear to be thickened and barbed in the nominate form. It may be noted that the 2 forms do not differ in the character of the aggenital, genital and coxisternal setae; these are generally smooth and flagelliform in both sexes.

The distribution pattern of *brevipilis* on Macquarie indicates that this is a relatively tolerant species, although it is rather poorly represented in the marine littoral region.

Previously I have compiled a list of differences between *H. crozetensis* and *H. belgicae* (see Wallwork 1962b). The description of a new subspecies from Macquarie extends the morphological conception of *belgicae* and necessitates a revision of the previous list. Thus distinctions based on the characteristic form of rostral, ventral and pseudoanal setae can no longer be made, for *brevipilis* resembles *crozetensis* in this respect. The 2 species differ in body size, *crozetensis* being slightly larger, on the average, than *belgicae*. Males of the 2 species are separated readily on the basis of the degree of aggenital neotrichy; as far as I have been able to ascertain, no ♂ of *crozetensis* has a total number of aggenital setae exceeding 5; no ♂ of *belgicae* has a total of less than 6 aggenital setae. The commonest distribution of aggenital setae in *crozetensis* is 2 : 2, compared with 4 : 4 in *belgicae* subsp. *brevipilis*; the commonest pattern for the nominate form of *belgicae* has not been established but appears to be higher than that for the subspecies *brevipilis*. The ♀♀ of the 2 species are more difficult to separate. As a general rule the following criteria may be used: ♀♀, of *belgicae* are smaller, paler in color and more strongly rounded in appearance than those of *crozetensis*. Lamellar setae may be short and barbed in both species, but in *crozetensis* they are "tufted" in appearance and curved, whereas in *belgicae* they are minutely barbed and straight (lamellar setae of the nominate form of *belgicae* are much longer than those of *crozetensis*). Notogastral setae are more conspicuously barbed in *crozetensis* than in *belgicae*. Pre-genital ridge is a continuous, chitinized arc which parallels the anterior rim of genital aperture in ♀♀ of *belgicae*; pre-genital ridge is interrupted in the mid line in *crozetensis*, resulting in the formation of a pair of convergent ridges which are not confluent. Aggenital setae are spine-like, without flagelliform tips in *crozetensis*, long and flagelliform in *belgicae*.

Immature forms of *H. belgicae* subsp. *brevipilis* were not identified. Comparisons between Michael's specimen of a nymph of *belgicae* (see Dalenius 1958, fig. 5d) and the tritonymph of *crozetensis* (see Wallwork 1962b, fig. 1) indicate a close resemblance in the form of porose sclerites in the 2 species. Immature forms of *belgicae* can be distinguished by the longer and thicker setae on posterior region of hysterosoma.

In summary, the species *H. belgicae* may be characterized as follows. Lameller setae may be very short (ssp. *brevipilis*) or moderately long (nominate form); they are straight and may be finely barbed or with roughened surface. Interlamellar setae thickened, barbed, shorter (ssp. *brevipilis*) or longer (nominate form) than their mutual distance. Prodorsal/notogastral separation complete. Notogaster rounded in shape, posterior part frequently reflexed ventrally. Frequency of occurrence of notogastral seta c_3 is about 50%. Notogastral setae finely barbed. Notogastral setae in series *ps* usually all the same length. These setae may be similar in length to other notogastral setae (ssp. *brevipilis*) or may be appreciably longer (nominate form). Pre-genital ridge developed in ♀♀ as a continuous arc; ridge lacking in ♂♂. Coxisternal setal formula is (3–1–2–3). A very slight tendency

to coxisternal neotrichy (duplication of seta *4a*) may be present in ♂♂. Aggenital setae located nearer to genital field than to anal. Aggenital neotrichy strongly developed in ♂♂. Aggenital neotrichy may be lacking (subsp. *brevipilis*) or occasionally developed (nominate form) in ♀♀.

The genus *Halozetes* Berl.: A list of the characteristics of this genus may now be compiled on the basis of the foregoing descriptions. Further discussion of the status of the genus and its relationship to others in the family is given elsewhere (Wallwork, in press).

Nymphs with pleated integument; hysterosomal porose sclerites consist of 6 pairs and an unpaired posterior sclerite. Nymphs unideficient; adults usually bideficient, occasionally uni- or tri-deficient. Anterior margin of notogaster of adults narrowing to a peak in mid-dorsal line. This border may be interrupted in the mid line or complete. Pedotecta I and II present. Coxisternal neotrichy generally lacking. Aggenital neotrichy may be present or absent in ♂♂; usually absent in ♀♀. Labio-genal articulation of gnathosoma is complete. Cerotegument granular in texture. Notogaster pycnonotic. Tarsi monodactyle in immature stages, tridactyle in adult. Setae *fi'* and (*it*) are lacking on tarsus IV.

Genus **Alaskozetes** Hammer 1955

The species *Notaspis antarctica* Michael 1903 has been re-described recently (Wallwork 1962a) from specimens collected on the Antarctic Peninsula and the South Shetland Is. The species was placed tentatively in the genus *Alaskozetes* Hammer, a genus described from a single ♀ specimen collected in Alaska. More recently I have been able to examine Michael's specimens and the single specimen of *Alaskozetes coriaceus* Hammer at the British Museum. It is evident that the specimens from the Bishop Museum collections are conspecific with Michael's material and that *Notaspis antarctica* is congeneric with *A. coriaceus*. The combination *Alaskozetes antarcticus* is thus confirmed. The differences between this species and *coriaceus* are considered in more detail elsewhere (Wallwork, in press).

Dalenius (1958) has noted the presence of a different subspecies, *A. antarcticus* subsp. *grandjeani*, on Macquarie. Although this description is very brief, I have assigned to this subspecies the representatives of this species from Macquarie examined in the present work.

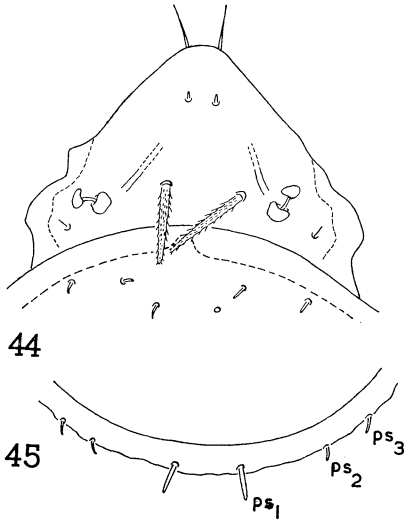
Alaskozetes antarcticus subsp. **grandjeani** (Dalenius), n. comb. Figs. 44–45.

Halozetes antarctica subsp. *Grandjeani* Dalenius, 1958.

The subspecies *grandjeani* differs from the nominate form in possessing shorter interlamellar setae (fig. 44). These setae are strongly thickened and barbed, in most cases shorter than their mutual distance, occasionally as long as or slightly longer than this, but never attaining length of corresponding setae in nominate form. Dalenius (1958) has distinguished the nominate subspecies from the Macquarie subspecies on the basis of length of posterior notogastral setae. In general the Macquarie I. forms have thicker and longer pseudoanal setae (ps_{1-3}) and in particular setae ps_1 are usually conspicuously longer and thicker than ps_2 and ps_3 (fig. 45). Occasionally this distinction is not evident and the condition resembles that in the nominate subspecies.

Other features of the subspecies *grandjeani* include the form of the rostral setae which are barbed and usually tapering to a fine point distally; apex occasionally blunt. Lamellar

setae are very short spines. Ventral setae flagelliform, except for short coxisternal setae inserted in sternal region. The degree of neotrichy on coxisternal region III/IV and aggenital region differs in ♂♂ and ♀♀, being more strongly developed in ♂♂. Males possess 2 additional setae between coxisternal setae *3a* and *4b* on each side, in most cases, and usually have 4 pairs of aggenital setae. There is some variability in aggenital chaetotaxy in ♂♂, distribution patterns 4 : 5 (frequency: 17 %), 3 : 4 (frequency: 7 %) and 3 : 3 (frequency: 7 %) being observed. Females show some variation in chaetotaxy of coxisternal regions III/IV; commonly a single additional seta is present on each side (frequency: 58 %); frequently an asymmetrical distribution, 1 : 2, is present (frequency: 32 %); very occasionally neotrichy is expressed by a single additional seta on one side only, or a condition occurs resembling that in ♂♂, in which 2 additional setae are present on each side. Aggenital neotrichy generally lacking in ♀♀; one individual shows asymmetrical duplication of aggenital seta, a condition not previously encountered in this species. Variations in coxisternal and aggenital neotrichy may be summarized by computing degree of neotrichy (*i.e.* number of additional setae) for each individual, and by tabulating numbers of individuals showing each degree of neotrichy. Results from 20 ♂♂ and 28 ♀♀ are shown in Table 1. Males, with one exception, have 8–11, ♀♀ 1–4 additional setae on coxisternal and aggenital regions. The single ♂ exception has only 4 additional setae and does not show aggenital neotrichy; this unusual condition has not been observed previously and may possibly be an indication of gynandromorphism. Comparing the results given in Table 1 with similar results for the nominate subspecies (Wallwork 1962a, p. 876, Table 2) it is noted that there is an indication of slightly weaker development of neotrichy in both sexes in *grandjeani*. Similarly the range of expression of neotrichy (as evidenced by the number of numerical categories involved) is slightly less in *grandjeani*, indicating a greater constancy in this form.



Figs. 44–45. *Alaskozetes antarcticus* (Mich.) ssp. *Grandjeani*, adult. 44, prodorsum; 45, posterior margin of notogaster, ventral view.

Anal neotrichy occurs in 5 of the 48 individuals examined. This condition, not observed previously in this species, involves a single additional anal seta inserted on the median margin of the anal plate directly in line with the other 2 anal setae. The condition was asymmetrical in the 5 cases observed. Adanal neotrichy not observed.

Subspecies *grandjeani* is slightly smaller than the nominate subspecies, on the average, the measurements being: ♂♂: average length of body: 994.9 μ (range: 924 μ–1052.8 μ); average width of body (measured at widest part): 644 μ (range: 588 μ–700 μ); ♀♀: average length of body: 1028.7 μ (range: 940 μ–1097.6 μ); average width of body (measured at widest part): 662 μ (range: 588 μ–772.8).

Specimens collected at Aerial Cove differ slightly from those collected at other loca-

Table 1. Distribution of degrees of neotrichy in ♂♂ and ♀♀ of *Alaskozetes antarcticus* subsp. *grandjeani*.

Degrees of neotrichy	Individuals ♂♂ Numbers	%	♀♀ Numbers	%
0	0	0	0	0
1	0	0	1	4
2	0	0	16	58
3	0	0	8	29
4	1	5	3	11
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	1	5	0	0
9	3	15	0	0
10	11	55	0	0
11	4	20	0	0
Total	20		28	

lities in that the interlamellar setae are longer than their mutual distance. These setae may be 2× as long as their mutual distance, but never as long as those in the nominate form. It is of interest to note that Dalenius (1958) recorded the nominate subspecies from Macquarie. This was not discovered in the present work; possibly Dalenius' observations refer to the intermediate condition noted above from Aerial Cove.

Nymphs: A tritonymph and a protonymph were identified. These are similar in many respects to the corresponding stages in the nominate form, the main difference being the length of interlamellar setae. These setae are 2× as long as their mutual distance in protonymph, equal in length to their mutual distance in tritonymph. They are then relatively shorter than those in the nominate subspecies. Posterior hysterosomal setae show differentiation similar to the adult; in the tritonymph setae ps_1 slightly more strongly developed than the other posterior hysterosomal setae; in the protonymph setae ps_1 longer than ps_2 and ps_3 and as long as setae h_{1-3}. Both nymphal forms possess well developed porose sclerites on hysterosoma.

DISTRIBUTION: North End (ex moss); North Head (ex algae, *Azorella*); North Head (ex *Colobanthus muscoides*); North Head (under stones); North Head (ex soil and mud, Royal penguin rookery); North Head (ex cave rookery debris); North Head (ex *Poa hamiltoni*); Aerial Cove (ex cormorant nest material); Aerial Cove (ex *Puccinellia macquariensis*); Aerial Cove (ex *Colobanthus muscoides*); Garden Cove (ex coastal rocks); Catch-me Point (under stones); Buckles Bay (ex green algae, coastal rocks); Green Gorge (ex crevices in coastal rocks); Hurd Point (under rocks); Nuggets Point (ex *Stilbocarpa* litter and feathers); Gadget Gully ex spider egg case); Handspike Point (ex albatross nest material); Caroline Valley (ex *Poa hamiltoni*).

In a previous paper (Wallwork 1962a) I have drawn attention to 2 specimens, one from Penguin Island, the other from Macquarie, which I considered to belong to the subspecies *grandjeani*. Further study suggests that the specimen from Penguin I. must be assigned to the nominate form of *Alaskozetes antarcticus* on the basis of its long interlamellar

setae; the other specimen is included in the subspecies *grandjeani.*

Podacarus auberti Grandjean, 1955

This species was described from the island of Kerguélen. It has been recorded from Macquarie previously (Dalenius 1958). Its distribution in the collections examined in the present work is given below:

Hasselborough Bay (ex *Poa foliosa* leaves); Tent Hill (ex *Poa foliosa* leaves); Camp Hill (ex *Poa annua* and *Poa foliosa*); Aerial Cove (ex cormorant nest material); Langdon Bay (ex *Poa foliosa* leaves); Gadget Gully (ex *Stilbocarpa* litter); Aerial Cove (ex *Puccinellia macquariensis*); Aerial Cove (ex *Colobanthus muscoides*); North Head (ex *Poa hamiltoni* litter); North Head (ex feathers); North Head (ex *Colobanthus muscoides*); Catch-me Point (under stones, rockhopper rookery); Garden Cove (ex green algae); Plateau (ex nest material); Buckles Bay (ex *Cotula plumosa*); Caroline Valley (ex *Poa hamiltoni*).

Superfamily CERATOZETOIDEA Balogh 1961

Family MYCOBATIDAE Grandjean 1954

The family is represented by 2 genera, both apparently new, in the Macquarie I. collections. Both are characterized by their small body size, the possession of an anterior notogastral tectum covering the posterior part of prodorsum, clavate sensilli and well developed lamellae with freely projecting cusps. The pteromorphs are curved ventrad and are incompletely hinged. The 2 genera, *Cryptobothria* and *Neomycobates* are described below.

Genus **Cryptobothria** Wallwork, n. gen.

This is rare on Macquarie and possesses a number of unusual characters. The anterior extension of the notogaster is very well developed and covers completely the posterior part of prodorsum, the pseudostigmata and sensilli. Number of genital setae is reduced to 3 pairs, and all tarsi are monodactyle. A full list of generic characters is given after the description of the type species, *Cryptobothria monodactyla* n. sp.

Cryptobothria monodactyla Wallwork, n. sp. Figs. 46–47.

MATERIAL EXAMINED: 10 adults.

Measurements: Average body length: 371.7 μ (range: 352.8 μ–392.0 μ); average body width (measured at widest part of notogaster): 226.1 μ (range: 201.6 μ–240.8 μ).

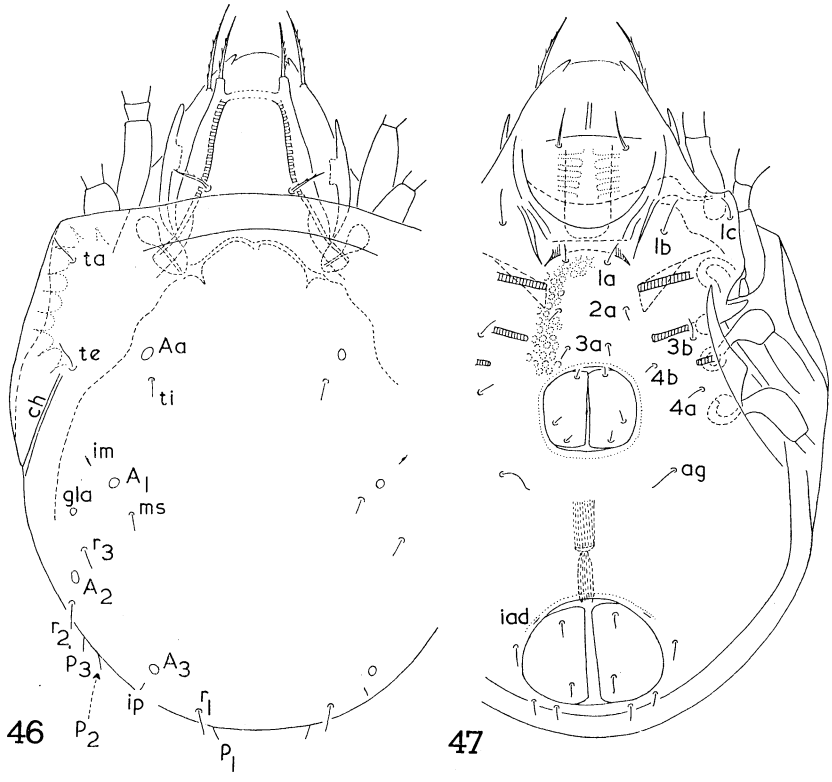
Sexual dimorphism is lacking.

Integument: Cuticle generally smooth, brown in color. A weakly granular cerotegument present on underside of pteromorphs and notogastral tectum; this covering not observed on any other part of body.

Prodorsum: Rostrum indented, with median rounded lobe flanked by a pair of lateral teeth. Rostral setae inserted on latero-dorsal margins of rostrum at anterior extremities of a pair of chitinized ridges which appear to be extensions of tutoria. Rostral setae gently curved, barbed, thickened basally, terminating in fine tips, about as long as their mutual

distance, extending in front of rostrum for a distance equal to 1/2 their lengths. Each lamella consists of a thickened basal portion attached to prodorsum, and a vertical blade-like extension ornamented with striae. Anteriorly the lamella projects above prodorsum in a relatively short free cusp bearing the insertion of lamellar seta. Incipient translamella present at bases of lamellar cusps: incomplete in mid line, broadly curved anteriad. Lamellar setae thinner and shorter than rostrals and finely barbed: not extending as far anteriorly as tips of rostrals. Interlamellar setae variable in length, generally relatively short, barbed, inserted just median to each lamella on posterior part of prodorsum; directed vertically and slightly curved; usually shorter than lamellar setae, but occasionally as long as these. Tutorium well developed on each side, terminating anteriorly in a free pointed cusp. Pedotecta I and II present, the former being strongly developed. An extension of anterior margin of notogaster, a tectum, covers posterior part of prodorsum including posterior parts of lamellar and tutorial ridges, pseudostigmata, sensilli and prodorsal/hysterosomal suture. Each pseudostigma large, broadly triangular in shape. Sensillus consists of a short stem hardly extending beyond rim of pseudostigma and a relatively large, hollow, globular head. Basal portion of lamella continuous with rim of pseudostigma. Exopseudostigmatic setae not observed.

Notogaster: Dorsal shield strongly convex; anterior tectum covering posterior part



Figs. 46–47. *Cryptobothria monodactyla* n. gen. n. sp., adult. 46, dorsal view; 47, ventral view.

of prodorsum has a slightly undulating contour and is continuous on each side with pteromorph. Lateral and posterior margins of notogaster strongly rounded. Pteromorphs well developed, strongly curved ventrad, hinged incompletely, humeral region of each ornamented with a pattern of radiating striae. Surface of notogaster generally smooth. Four pairs of areae porosae present (fig. 46): rounded and easily overlooked. Ten pairs of fine notogastral setae; they appear to be finely barbed and frequently terminate in flagelliform tips, particularly lateral and posterior setae: distribution shown in fig. 46. Fissures *ia*, *im* and *ips* noted; aperture of lateral abdominal gland (*gla*) small and rounded.

Genito-anal region: Anal and adanal setae very finely barbed; setae ad_2 and ad_1 situated very close together posterior to anal field; setae ad_3 located lateral to anal field. Anal setae usually terminate in abbreviated flagelliform tips. Anal aperture almost pentagonal in shape, being narrower anteriorly. Adanal fissure (*iad*) is a slit located close to rim of anal aperture on each side. Pre-anal organ strongly chitinized (fig. 47). Single pair of flagelliform aggenital setae located postero-lateral to genital field. Genital aperture almost square, somewhat rounded anteriorly. Each genital plate bears 3 fine setae, the most anterior of which is located near anterior margin of plate; remaining 2 setae located in posterior 1/2 of plate.

Ventral region of podosoma: Integument covering this region weakly fenestrated (fig. 47). Coxisternal ridges not continuous in mid line, corresponding ridges on each side being broadly separated sternally. Ridges II and sejugal show strongest development; ridges III only slightly developed; ridges IV lacking. All coxisternal setae are fine, delicate structures; antiaxial setae *1b* and *3b* longer than remainder and flagelliform. Eight coxisternal setae on each side as a general rule (setae *4b* lacking on one side in the holotype; this is regarded as an anomalous development), the formula being (3–1–2–2); setae *3c* and *4c* lacking in all specimens. Ventro-laterally a circum-pedal ridge extends, on each side, from insertion of leg II, where it is joined to the custodium, to a point posterior to insertion of leg IV. Discidium and pedotecta I and II are developed.

Gnathosoma: Hysterostome U-shaped, ornamented with a series of porose areas. A single pair of flagelliform hysterostomal setae (*h*). Infracapitular setae *m* (1 pair) and *a* (1 pair) relatively long and thickened; setae *m* finely barbed. Labio-genal articulation complete and diarthral.

Legs: Chaetotaxy not examined in detail. All tarsi monodactyle, the single claw being strongly developed. A ventral keel is strongly developed on trochanter and femur of leg IV.

DISTRIBUTION: Douglas Point (ex *Stilbocarpa* and *Pleurophyllum* litter) (type locality); Plateau (ex herbfield plants); Garden Cove (ex *Colobanthus muscoides* litter).

The genus *Cryptobothria*: A tentative list of generic characters may be compiled on the basis of the above description. It is realised, however, that such a list, based upon one species only, will need revision if and when future collections from sub-Antarctic regions reveal the presence of other species belonging in the genus.

Rostrum with 2 incisions, a median lobe and a pair of lateral teeth. Lamellar cusps relatively short, freely projecting. Translamella incomplete in mid line. Pseudostigmatic region completely covered by notogastral tectum. Pteromorphs strongly curved ventrad, incompletely hinged. Ten pairs of fine notogastral setae. Notogaster poronotic. Coxisternal setal formula (3–1–2–2). Three pairs of genital setae. All tarsi monodactyle.

The strong regression of genital setae distinguishes this genus from others in the family. The monodactylous condition of the tarsi indicates that *Cryptobothria* may be rather specialized morphologically; the extreme development of notogastral tectum supports this view.

The new genus appears to show the greatest similarity to *Minunthozetes* Hull 1916. It resembles the latter in the indented form of the rostrum, the reduction of interlamellar setae and the monodactylous condition of the tarsi. Although it cannot be determined at this time how much of this resemblance is due to convergence or parallelism, the placement of *Cryptobothria* close to *Minunthozetes* appears reasonable.

Genus **Neomycobates** Wallwork, n. gen.

This genus appears to be very similar in general appearance to the previous one. The type species, *Neomycobates tridentatus*, differs from *C. monodactyla* in having a less pronounced notogastral tectum, longer lamellar cusps, a larger number of genital setae and tridactyle tarsi. On the basis of these differences *Neomycobates* is judged to be distinct from *Cryptobothria*, although related to it. The former genus appears to show more primitive characters than the latter.

Neomycobates tridentatus Wallwork, n. sp. Figs. 48–49.

MATERIAL EXAMINED: 42 adults.

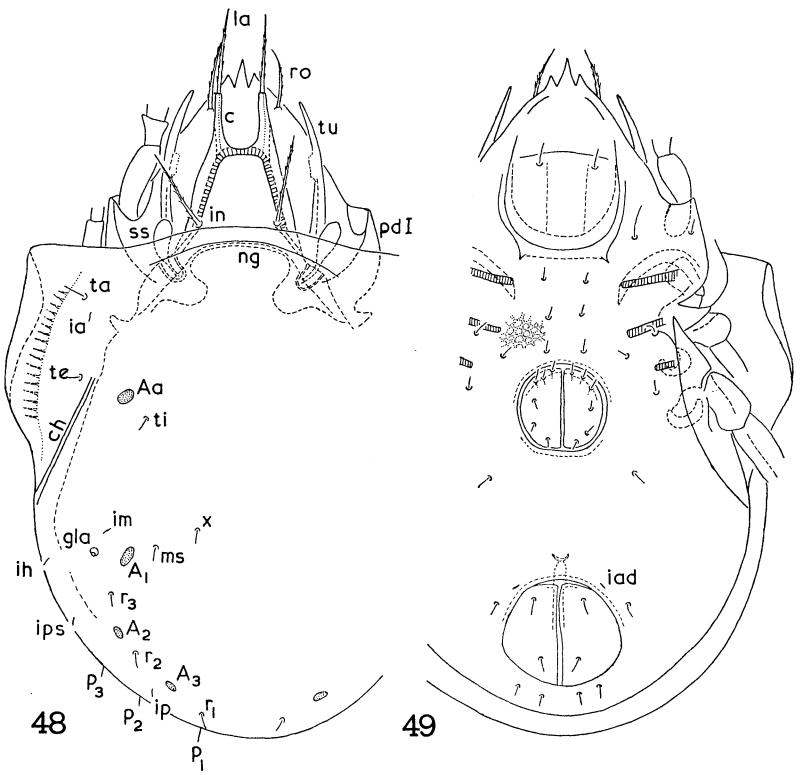
Measurements: Average body length: 443.4 μ (range: 392 μ–492.8 μ); average body width (measured at widest part of notogaster): 278.1 μ (range: 257.6 μ–324.8 μ).

Sexual dimorphism lacking.

Integument: Color pale brown; paler in color than *C. monodactyla*; integument generally smooth. Cerotegument present on underside of pteromorphs and notogastral tectum; it was not observed on any other part of the body.

Prodorsum: Rostrum markedly tridentate, central tooth being longer and more slender than 2 laterals. Rostral setae inserted on short apophses on dorso-lateral margins of rostrum, thickened, barbed, broadly curved mediad, as long as their mutual distance, projecting beyond rostrum for a distance equal to 1/2 their length. Lamellae very similar in form to those of *C. monodactyla*, but with relatively longer cusps; cusps 2× as long as breadth of translamella, each terminating in a truncate apex bearing insertion of lamellar seta. From this insertion a fine canal runs back along length of cusp; a similar canal is present in *Permycobates bicornis* (see Strenzke 1954). Base of lamella attached to surface of prodorsum and continuous with translamella. Base also branched posteriorly, giving rise to a short median ridge extending to insertion of interlamellar seta; this interlamellar ridge is sometimes poorly developed. Vertical blade of lamella does not appear to be ornamented. Translamella complete in mid line and consists of a thin, distinct ridge joining bases of lamellar cusps. Basal chitinization of lamella produced back to pseudostigma and confluent with rim of this structure; lamellar blade divides into 2 branches just anterior to pseudostigma; these branches pass on either side of the pseudostigma and enclose the latter. Lamellar setae not much longer than rostrals; thickened, barbed, directed straight forwards. Interlamellar setae slightly variable in length, being generally longer than lamellar setae; thickened, barbed, almost straight, directed vertically, inserted just median to each lamella

on posterior part of prodorsum. Tutorium strongly developed on each side and scoop-shaped: projects freely over lateral margins of prodorsum as a pointed cusp for almost 1/2 its length. Pedotectum I similar in form to tutorium and aligned almost parallel to latter. Pseudostigmatic region almost completely covered by notogastral tectum. Each pseudostigma is a chitinized pocket, with a broad aperture directed antero-laterally. Sensillus large, with a short stem and expanded head which is rather more elongate than corresponding structure in *C. monodactyla*. Almost 1/2 of head of sensillus projects beyond rim of notogastral tectum. Exopseudostigmatic setae not observed.



Figs. 48–49. *Neomycobates tridentatus* n. gen. n. sp., adult. 48, dorsal view; 49, ventral view.

Notogaster: Strongly convex, lateral and posterior margins strongly rounded. Pteromorphs well developed and curved ventrad: appearing to be incompletely hinged; each shoulder ornamented with a pattern of radiating striae. Anterior margin of notogaster extends as a tectum over posterior part of prodorsum; this extension is continuous with the pteromorphs and forms a bridge between them. Anterior contour of notogastral tectum slightly undulating; pteromorphs not extending anteriorly beyond anterior limit of tectum. Prodorsal/hysterosomal suture can be seen below tectum as a bow-shaped chitinization (*ng*). There are normally 10 pairs of notogastral setae arranged as shown in fig. 48; the holotype has an additional unpaired seta (*x*) paraxial to seta *ms*; this condition was not observed

in any other individual. Four pairs of areae porosae are more conspicuous than the corresponding structures in *C. monodactyla*; they are slightly variable in shape, being either rounded or ovoid; the anterior porose area (*Aa*) is usually slightly larger than the rest. Fissures *ia*, *im*, *ih*, *ip* and *ips* noted (fig. 48). Fissure *im* and aperture of lateral abdominal gland (*gla*) strongly chitinized.

Ventral region: Very similar in many respects to that of *C. monodactyla*, shown in fig. 49. All ventral setae fine, with tapering tips; length somewhat variable, but never barbed. Integument fenestrated in coxisternal region. Anal/adanal setal formula is 2/3; only variation noted was the lack of adanal seta ad_3 on one side in one individual. A single pair of aggenital setae present, located posterolateral to genital field. Genital setae variable in number, the following conditions being observed: Six pairs of genital setae. Frequency: 60 %. Genital setae distributed 5 : 6. Frequency: 25 %. Five pairs of genital setae. Frequency: 10 %. Genital setae distributed 5 : 4. Frequency: 5 %.

In the normal condition (*i. e.* a 6 : 6 distribution) location of genital setae follows the pattern illustrated in fig. 49; 3 setae inserted on anterior margin of plate; remaining 3 setae distributed at regular intervals on posterior 1/2 of plate. Seta *G5* occasionally displaced from anterior margin, a condition resembling that described for *Permycobates bicornis* (see Strenzke 1954).

Coxisternal ridges I continous with posterior border of camerostome; terminal spurs shorter than in *C. monodactyla*. Ridges II and sejugal more conspicuous than ridges III; ridges IV lacking. Coxisternal setal formula (3–1–2–2); usual distribution pattern of coxisternal setae given in fig. 49; variations from this pattern are slight; setae *2a* variable in position with respect to each other; in one individual seta *4a* displaced anteriorly to level of *4b*, on one side only.

Circum-pedal ridge conspicuous: anteriorly joins the pointed custodium. Discidium strongly chitinized and angular in contour. Proximal angle of ventral ridge of trochanter IV fits neatly into posterior concavity of discidium. Pedotectum II present.

Gnathosoma: Not examined in detail, but appears to be very similar to that of *C. monodactyla*.

Legs: All tarsi tridactyle, heterodactyle. Ventral ridge developed on trochanter and femur of leg IV. Trochanter III of unusual shape, being broadly indented on its anterior face so that it fits neatly into the posterior convexity of pedotectum II. Ventral ridges also developed on femora I, II and III; these are less strongly chitinized than ventral ridges on femur IV.

DISTRIBUTION: Hasselborough Bay (ex *Poa foliosa* leaves): type locality; Tent Hill (ex *Poa foliosa* leaves); Garden Cove (ex green algae, coastal rocks).

The genus *Neomycobates*: The differences between this genus and *Cryptobothria* are given above. The following list of characters will serve to define the genus: Rostrum markedly tridentate. Lamellar cusps longer than breadth of translamella, freely projecting. Translamella complete in mid line. Sensilli only partly covered by notogastral tectum. Pteromorphs strongly curved ventrad, incompletely hinged. Ten pairs of fine notogastral setae. Notogaster poronotic. Coxisternal setal formula (3–1–2–2). Usually 6 pairs of genital setae, although number varies from 4 to 6 on each plate. All tarsi tridactyle.

The tendency towards regression of genital setae is of particular interest in view of

the extreme condition shown by the related genus *Cryptobothria*. The sequence in which various genital setae are lost in *Neomycobates* could not be determined, for not enough samples of each regression stage are available.

Neomycobates is judged to be more advanced or specialized morphologically than other genera in the family Mycobatidae (with the exception of *Cryptobothria*) in view of the well developed notogastral tectum and the disposition towards genital regression. Nevertheless, it may have some affinities with *Permycobates* Strenzke and *Punctoribates* Berl.

As an addendum to the above the species *Oribata affinis* described by Tragardh (1908) from the Falkland Is. may be mentioned. This species is not present in the Macquarie collections; it resembles *Cryptobothria* and *Neomycobates* in possessing a notogastral tectum covering the pseudostigmatic region. Tragardh's species differs from the Macquarie I. forms in being much larger and having very long interlamellar setae. *O. affinis* probably belongs in the family Mycobatidae, and may have affinities with *Mycobates* Hull and *Humerobates* Selln.

Superfamily GALUMNOIDEA Balogh 1961

Family PARAKALUMMIDAE Grandjean 1936

Genus **Sandenia** Oudemans 1917

This genus, described by Oudemans (1914, 1917) from the type species, *S. georgiae*, is known only from the sub-Antarctic region of South Georgia, as far as I am aware. It is of considerable interest to discover the genus represented in the Macquarie I. fauna by a species very similar in many respects to the type. The differences between the 2 species and a list of generic characters are given after the following description.

Sandenia rotunda Wallwork, n. sp. Figs. 50–55.

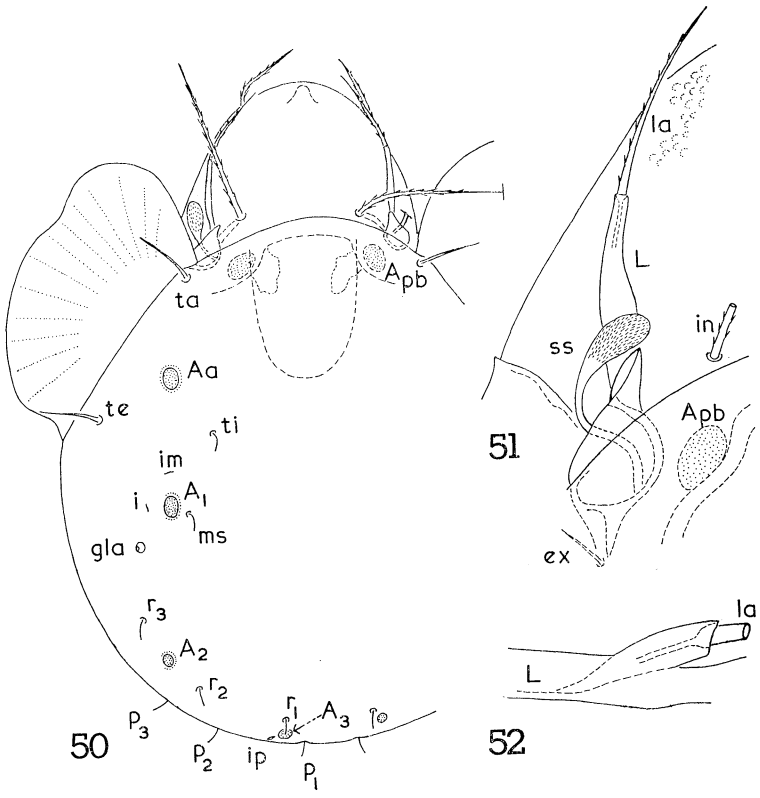
MATERIAL EXAMINED: 14 adults.

Measurements: Average body length: 572.7 μ (range: 537 μ–620.6 μ); average body width (measured at widest part of notogaster): 407.9 μ (range: 374.5 μ–428 μ).

Sexual dimorphism lacking.

Integument: Thin granular cerotegument covers body, but conspicuous only on pteromorphs and antero-lateral margins of prodorsum. Cuticle beneath cerotegument generally smooth, dark in color except for anterior mid-dorsal region of notogaster which is much paler in color.

Prodorsum: Prodorsal margins broadly arched and rounded. Mid-dorsal surface of rostral tectum with a shallow groove (fig. 50). Rostral setae inserted some distance behind anterior tip on lateral margins; setae thickened, barbed, strongly curved mediad, about 1/2 as long as their mutual distance. Lamellae are well chitinized ridges located laterally, each with a short projecting cusp terminally; shorter than 1/2 length of prodorsum (figs. 50, 51). Form of lamella very similar to that in *Neoribates* and *Parakalumma*. Lamellar seta inserted at apex of each lamellar cusp; seta long, thickened and barbed, extending in a broadly curved manner following the dorsal contour almost as far anteriorly as tip of rostrum. Interlamellar setae at least 2× as long as their mutual distance, thickened,



Figs. 50–52. *Sandenia rotunda* n. sp., adult. 50, dorsal view; 51, pseudostigmatic region viewed latero-dorsally; 52, lamellar cusp, lateral view.

barbed, appreciably longer than other dorsal setae. A chitinized interlamellar ridge may connect insertion of each interlamellar seta with anterior rim of pseudostigma on each side; this ridge present in holotype, but frequently lacking in other specimens. Each pseudostigma has a broad rim produced into an anterior lip. Sensillus has a short stem, hardly emerging from pseudostigma, and a rounded-oval head beset with minute bristles. Posterior margin of prodorsum covered by an anterior extension of notogaster which covers the base of each pseudostigma. Exopseudostigmatic seta inserted posterior to each pseudostigma and also covered by notogastral tectum at junction between this and pteromorph (fig. 51); some dissection is necessary before exopseudostigmatic seta can be identified. A large rounded porose area (*Apb*), associated with each pseudostigma, located postero-medially to this structure and likewise covered by notogastral tectum. No areae porosae associated with interlamellar setae were observed.

Notogaster: Dorsal shield strongly convex, posterior margin strongly rounded, dark in color, except for a large pale region anteriorly and dorsally; this non-pigmented region is indicated by U-shaped broken lines in fig. 50. Notogastral tectum broadly rounded anteriorly; prodorsal/hysterosomal suture covered by this tectum. Ten pairs of fine notogastral setae to which notation of multideficience is applied in fig. 50. Setae *ta* and *te*

longer than remainder and have flagelliform tips. No setae inserted on pteromorphs. Setae p_1 inserted in slight indentations of posterior region. Four pairs of rounded areae porosae, distributed as shown in fig. 50; darkly colored and conspicuous. Fissures *im* and *ip* identified together with an additional fissure (*i*) located antiaxial to area porosa A_1; aperture of lateral abdominal gland also present. The pteromorph, broadly hinged to humeral region of notogaster, has the usual galumnid form; it is rounded anteriorly and posteriorly, ventral margin distinctly indented. Each pteromorph bears a faint ornamentation of radiating striae.

Genito-anal region: Anal aperture narrower anteriorly than posteriorly; each anal plate usually with 2 long slender setae; one individual has an additional anal seta on one plate. Adanal setae (3 pairs) shorter than anals; setae ad_3 inserted postero-laterally on each side, behind level of adanal fissure. Fissure *iad* located close to rim of anal aperture, parallel to long axis of body. Areae porosae postanalis lacking. Aggenital setae generally lacking; one individual possesses a single aggenital seta on one side only. Genital plates usually with 5 fine setae which may be finely barbed, inserted as shown in fig. 53. One individual (the one possessing a single aggenital seta) has 6 genital setae on one plate, 5 on the other.

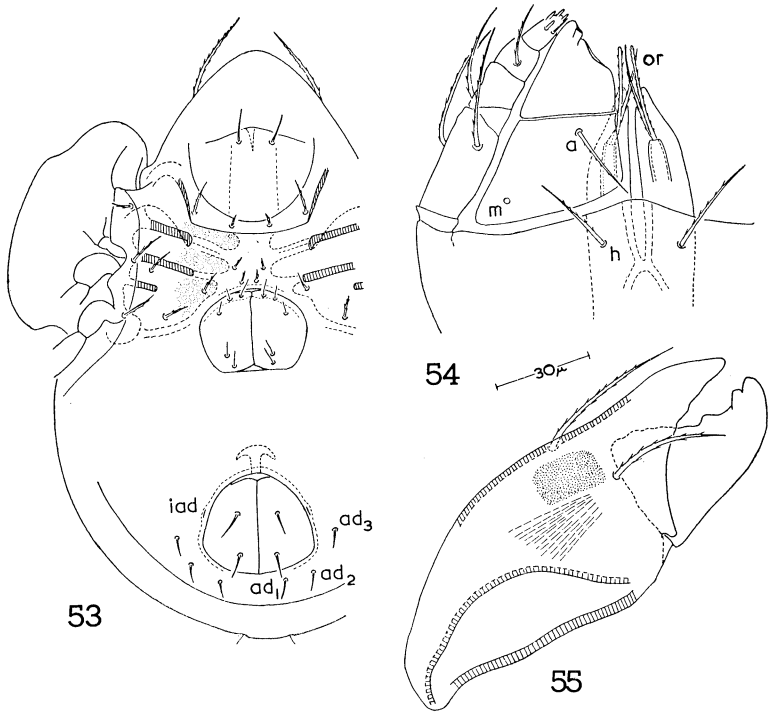
Ventral region of podosoma: Coxisternal region fenestrated, except sternally. Apodemes I, II, sejugal and III not continuous in mid line, although ridges associated with them are (except for ridge III which is only as long as its apodeme). Apodemes IV lacking; coxisternal ridge IV present on each side, extending from insertion of leg IV to genital field which it surrounds anteriorly in common with the sternal thickening. Coxisternal setae more strongly thickened than genitals and conspicuously barbed. Setae *1b*, *3c* and *4c* longer than the remainder. Coxisternal setal formula is (3–1–3–3); seta *1c* short and thickened, inserted on outer face of pedotectum I; setae *3c* and *4c* difficult to see, being inserted on lateral margins of podosoma. Circum-pedal ridge well developed and extends anteriorly to join the ventral contour of pedotectum I. Pedotectum II smaller than pedotectum I. Custodium and discidium present.

Gnathosoma: Details of this region shown in fig. 54. Hysterostomal plate normal, without large tectal extension anteriorly. Hysterostomal setae (one pair, designated *h*) rather slender. Labio-genal articulation complete and diarthral. Rutellum has a basal expansion (pantelebasic). Infracapitular setae *a* thickened and barbed; only insertions of setae *m* were observed. Two pairs of thickened, strongly barbed adoral setae. Chelicera normal (fig. 55); body of chelicera covered by porose ornamentation. Palpal setal formula is (0–2–1–3–9); seta *acm* fused with the solenidion on the palpal tarsus.

Legs: All femora greatly swollen and rounded in appearance. All tarsi tridactyle; claws equal in size. Chaetotaxy of legs not attempted here.

DISTRIBUTION: Nuggets Point (ex *Puccinellia macquariensis*): type locality; Aerial Cove (ex *Colobanthus muscoides*); Aerial Cove (ex *Puccinellia macquariensis*); North Head (ex *Poa hamiltoni*); North Head (ex algae); Garden Cove (ex rockhopper nest material); Garden Cove (ex *Colobanthus muscoides*); Buckles Bay (ex green algae); Wireless Hill (ex *Stilbocarpa* litter); Caroline valley (ex *Poa hamiltoni*).

Comparison with *S. georgiae*: The description of the type species (Oudemans 1917) lacks certain details of notogastral and coxisternal chaetotaxy but is sufficient for a general comparison with *S. rotunda*. The 2 species are closely related and may be distinguished



Figs. 53–55. *Sandenia rotunda* n. sp., adult. 53, ventral view; 54, gnathosoma, ventral view, partly dissected to show adoral region; 55, chelicera.

from each other by the following characters: Body shape more elongate in *georgiae* (width : length ratio 1 : 1.6) than in *rotunda* (width : length ratio 1 : 1.4). Prodorsal contour angular in *georgiae*, evenly rounded in *rotunda*. Interlamellar setae short in *georgiae*, very long and thickened in *rotunda*. A translamella present in *georgiae*, lacking in *rotunda*. A light area of weak chitinization mid-dorsally on notogaster present in *rotunda*, lacking in *georgiae*.

Systematic position of the genus *Sandenia*: This genus is placed in the family Parakalummidae for it shares with other genera in the family the characteristic form of the lamellae, the possession of 5 pairs of genital setae and the normal form of the hysterostome. These 3 characters are sufficient to distinguish *Sandenia* from genera of the family Galumnidae, although the genus shows several primitive characters reminiscent of this family. In particular the form of the pteromorphs, the form and distribution of notogastral areae porosae and the position of adanal setae ad_3 approximate galumnid conditions. The slight disposition towards a more primitive type of genital chaetotaxy (*i. e.* 6 genital setae on each plate) shown by *rotunda* is further evidence of galumnid affinities. Oudemans' (1917) definition of *Sandenia* may be expanded to include the additional information provided by the discovery of *S. rotunda*, as follows: Pteromorphs galumniform, rounded anteriorly. Lamellae present, with free terminal cusp. Notogaster with a pair of slight indentations posteriorly. All notogastral setae (10 pairs) inserted on dorsal shield proper. Five pairs of genital setae. Hysterostome (=hypostome) normal. Adanal setae ad_3 located postero-

lateral to fissure *iad*. Aggenital setae lacking. Four pairs of rounded notogastral areae porosae. One pair of areae porosae on prodorsum. Anal aperture trapezoidal in shape, narrowing anteriorly. Fissure *iad* aligned parallel to long axis of body, close to rim of anal aperture.

Sandenia appears to be most closely related to *Neoribates*, but differs from the latter in several respects, notably in the form of the pteromorphs (strongly indented ventrally in *Sandenia*, weakly indented or entire in *Neoribates*), the position of adanal setae ad_3 (posterior to level of adanal fissure in *Sandenia*, anterior to this level in *Neoribates*), the form of the sensillus (clavate in *Sandenia*, weakly fusiform in *Neoribates*) and the development of notogastral areae porosae (strongly developed in *Sandenia*, weakly developed and apparently undergoing regression in *Neoribates*).

Superfamily ORIBATULOIDEA Woolley 1956

Family HAPLOZETIDAE Grandjean 1936

Genus **Totobates** Hammer 1961

The type species for this genus, *T. discifer* Hammer, was described from Peru. Subsequently (Hammer 1962a & b) several other species of the genus were described from various parts of South America. The genus is closely related to *Protoribates* and is characterized by strongly developed pteromorphs, which are usually curved ventrad and may be completely or incompletely hinged, a weak prodorsal/notogastral separation, 10 pairs of notogastral setae, 3 pairs of notogastral areae porosae, 3 pairs of genital setae and monodactyle tarsi.

The Macquarie collections contain 2 forms belonging to this genus. The 2 forms differ principally in body size and may represent different growth expressions within the same species. For the present, however, I have chosen to distinguish between the 2 forms at the specific level for both can be identified with previously described species; the larger form is that described by Dalenius (1958) as *Liebstadia anareensis*; the smaller form appears to be very similar to *T. elegans* (Hammer 1958).

Totobates anareensis (Dalenius), n. comb.

Liebstadia anareensis Dalen., 1958.

MATERIAL EXAMINED: 22 adults.

The species possesses true, downwardly-curving pteromorphs which appear to be hinged, and 3 pairs of genital setae. *T. anareensis* is probably closely related to *T. pterygoides* Hammer, but differs from this latter species in having a more pointed rostrum and shorter notogastral setae. The 2 forms are similar in body size. Four specimens collected at the Isthmus are appreciably larger than those collected at other localities on Macquarie; these large specimens also differed from the remainder in having very long prodorsal setae. These differences may reflect a differential growth effect caused by more favorable conditions at this one locality, and may represent a trend in morphological subspeciation. More information is required before this effect can be analyzed in detail. The specimens considered below as *T. elegans* may represent the lower end of a broad size range; specific

differences involving the lengths of body setae or size of such structures as the areae porosae could then be explained on the basis of positive allometric growth. The separate identity of the 2 species, *T. elegans* and *anareensis* would be difficult to maintain morphologically in the presence of such a graded series of size differences.

DISTRIBUTION: Garden Cove (ex *Colobanthus muscoides*); Wireless Hill (ex *Poa foliosa* litter and dung); Wireless Hill (ex *Stilbocarpa* litter); Handspike Point (ex *Stilbocarpa* litter); Catch-me Point (ex *Poa foliosa*); Isthmus (ex *Puccinellia macquariensis*); Aerial Cove (ex *Puccinellia macquariensis*); Handspike Point (ex nest material); Camp Hill (ex *Colobanthus muscoides*); Camp Hill (ex sheep dung, soil); Camp Hill (ex *Poa annua*); Nuggets Point (ex soil with feathers); Nuggets Point (ex *Colobanthus muscoides*); North Head (ex *Agrostis magellanica*, soil); North Head (ex algae); Langdon Point (ex *Stilbocarpa* litter); Green Gorge; Caroline Valley (ex *Poa hamiltoni*); Sub-plateau (ex *Stilbocarpa* litter); Plateau (ex *Azorella*); Scoble Lake (ex *Stilbocarpa* litter); Lambing Gully (ex *Stilbocarpa*).

Totobates elegans (Hammer)

MATERIAL EXAMINED: 7 adults.

The small forms differ slightly from Hammer's description in having relatively shorter lamellar setae which extend anteriorly only as far as insertions of rostral setae; notogastral setae fine and flagelliform; setae r_1 inserted an appreciable distance in front of most posterior pair of areae porosae. This form is paler in color than the large form discussed above and has shorter prodorsal setae and smaller areae porosae.

DISTRIBUTION: Handspike Point (ex *Stilbocarpa* litter); Plateau (ex herbfield plants); Handspike Point (ex wandering albatross nest material).

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