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A REDESCRIPTION OF NOTASPIS ANTARCTICA MICHAEL, 1903 (Acari: Oribatei)

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Abstract: The species *Notaspis antarctica* is redescribed from recent collections from Antarctica. The species is sexually dimorphic, both sexes showing strong neotrichy on coxisternal region III/IV; the ♂♂ also showing strong aggenital neotrichy which is lacking in ♀♀. The species is also characterised by the possession of a broadly rounded tectum which forms the anterior margin of the notogaster, long thickened interlamellar setae, clavate sensillus and 28 short notogastral setae. The systematic position of the species is reviewed in the light of comparisons with *Podacarus Auberti* Grandj., *Notaspis marina* Lohmann, *Notaspis belgicae* Mich. and *Alaskozetes coriaceus* Hammer, and as a result the combination *Halozetes antarctica* (Mich.) is discarded in favour of a new combination, *Alaskozetes antarctica* (Mich.).

I. INTRODUCTION

The systematic position of *Notaspis antarctica* Michael is in some doubt for the genus *Notaspis* is no longer a valid designation, and the original description of this species is insufficient to allow comparisons with other related species such as *Podacarus Auberti* Grandj. 1955 and *Notaspis belgicae* Michael 1903. In an attempt to correct this situation, I have prepared a redescription of the species based on collections from Antarctica and the sub-Antarctic Islands made by R. E. & T. S. Leech during 1960 and 1961. These collections are housed at Bishop Museum, and have been loaned to me through the kindness of Dr. Gressitt and Dr. N. Wilson.

The collections confirm the observation made by Dalenius & O. Wilson (1958) that *N. antarctica* is a widely distributed species in the Antarctic region. It may be recognized readily by the long interlamellar setae, the broadly rounded anterior margin of the notogaster and by the chaetotaxy of the ventral surface. The species is sexually dimorphic; males can be recognized at first glance by the relatively small genital aperture and by strong aggenital neotrichy. Other authors (Grandjean 1955, Balogh 1961) have noted as an important character the possession of three secondary setae on the anterior margin of each anal plate. These setae were never observed in the present work.

N. antarctica is a very variable species. The same is true of the related species *Podacarus Auberti* Grandj. In presenting this redescription, I have made an attempt to define the limits of variability and in this respect I have followed the pattern used by Grandjean (1955) in his description of *P. Auberti*. In addition, morphological variability is considered in terms of geographical distribution and finally a discussion of the systematic position of the species is given.

II. DESCRIPTION OF THE SPECIES

Material examined: 53 adults (27 ♂♂, 26 ♀♀), 50 tritonymphs, 42 deutonymphs, 20 protonymphs and 3 larvae. The material is in the form of slide preparations mounted in Hoyers' medium. In a number of cases specimens have been damaged due to pressure exerted by the cover slip on the mite. Specimens for detailed study, description and illustration were selected from material which had not suffered in this way.

The species is sexually dimorphic. Males possess a relatively smaller genital aperture than ♀♀; neotrichy of coxisternal region III/IV is present in both sexes, but usually is more strongly developed in ♂♂ than in ♀♀. Aggenital neotrichy is strongly developed in ♂♂, absent in ♀♀.

Measurements: Males: average length: 1059.5 μ (range: 970.2 μ – 1124.2 μ); average width: 733.0 μ (range: 646.8 μ – 785.4 μ). Females: average length: 1088.8 μ (range: 985.6 μ – 1185.8 μ); average width: 763.8 μ (range: 662.2 μ – 831.6 μ).

Cerotegument: The dorsal surface of body and legs is covered with a granular cerotegument. In many specimens this covering has been lost, at least in part, fragments remaining only on the femora of the legs and the humeral and posterior regions of the notogaster. This cerotegument consists of a grayish matrix in which are embedded dark irregularly-shaped granules; the granules are smaller and more closely packed over the prodorsum. Dorsal setae project through perforations in the cerotegument.

Cuticle: The body surface is brown in color; older specimens are darker brown than recently emerged ones. The surface is smooth for the most part; dorsal and lateral margins of prodorsum and the legs have a fine punctate microsculpture.

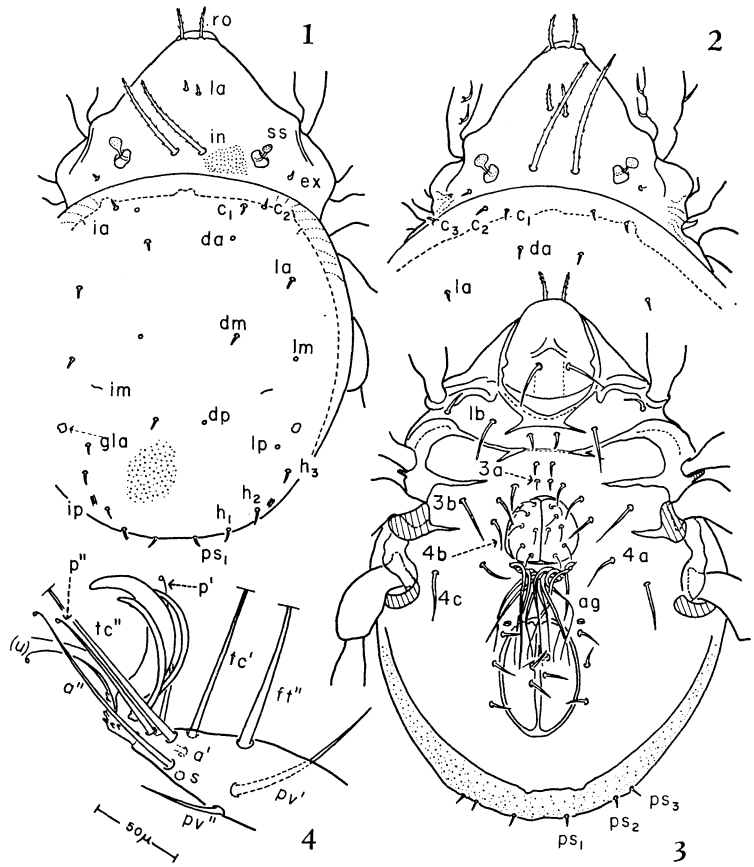
Prodorsum: The rostrum is produced into a thin tectum which forms the rounded anterior margin. Rostral setae are inserted on prominent apophyses immediately posterior to the tectum; the setae are located close together, thickened structures, with surface roughened or barbed distally, almost 2× as long as their mutual distance, tinted brown in color. The length of the rostral setae does not vary appreciably from specimen to specimen.

Lamellar setae are inserted at mid-distance between rostral tectum and posterior border of prodorsum. These setae are variable in length, sometimes developed as short spines (fig. 1); in other cases they are as long as rostral setae and strongly barbed (fig. 2). Variations in length may occur in the same specimen. The setae are brown in color and frequently are inserted asymmetrically, with one seta located anterior to the other. Interlamellar setae are very long, thickened, barbed structures, brown in color; they are approximately 3× longer than their mutual distance; their length does not vary appreciably from specimen to specimen. An exopseudostigmatic seta is present (*ex*), located lateral to the pseudostigma on each side (figs. 1 & 2); this seta is extremely short. Each pseudostigma is a chitinized pouch, rounded in appearance, with slit-like aperture directed laterad. Sensillus is short and clavate, the head being somewhat flattened and granular in appearance.

In the majority of specimens the prodorsum is devoid of ridges except for a pair located laterally on the exopseudostigmatic region (these ridges are also present in *Podacarus Auberti* and are designated *cs* by Grandjean). A single specimen (♀) bears a pair of well developed lamellae; no trace of these ridges was noted in any other specimen. Occasionally a transverse thickening is present immediately anterior to the insertions of the interla-

mellar setae; this thickening is conspicuous in flattened specimens and may be an artefact produced by the folding of the cuticle in this region. In lateral view a strong depression is seen immediately anterior to the interlamellar setae; this depression runs transversely across the prodorsum. Flattening of specimens due to the pressure of the cover slip would fold the cuticle in this region producing a transverse thickening. Other features of the prodorsum are shown in figs. 1 & 2.

Notogaster: In lateral view the notogaster is somewhat flattened; the dorsal contour is only weakly arched. From the dorsal aspect (fig. 1) the notogaster is broadly circular in shape, the anterior margin being rounded and produced into a distinct tectum which covers the prodorsal-hysterosomal junction. Specimens from the Antarctic Peninsula fre-



Figs. 1–4. *Notaspis antarctica* Mich., adult. 1, ♂ specimen from Penguin Isle, dorsal view; 2, ♀ specimen from Base Gonzales Videla, prodorsum, dorsal view; 3, ♂ specimen from Penguin Isle, ventral view; 4, leg IV, paraxial view. (ro=rostral setae; la=lamellar setae; ss=sensillus; ex exopseudostigmatic setae; in=interlamellar setae; c_1, c_2, c_3, da, dm, dp, la, lm, lp, h_1, h_2, h_3, ps_1, ps_2, ps_3=notogastral setae; ia, im, ip=notogastral fissures; 1b, 3a, 3b, 4a, 4b, 4c=coxisternal setae; ag=aggenital setae; ft, tc, a, pv, p, u, s=tarsal setae.)

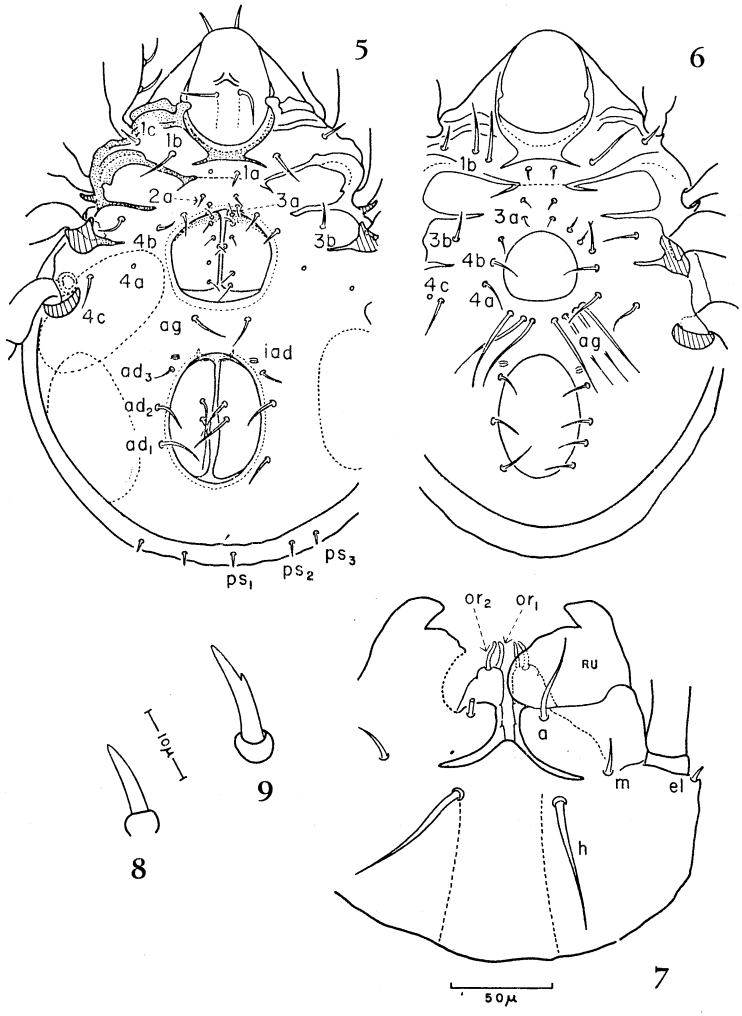
quently show only a slight development of the tectum compared with the more extreme cases from the sub-Antarctic islands. Lateral margins of the notogaster are also produced into a tectum which covers the basal parts of legs III and IV. The cuticle of the humeral region is occasionally pleated, but more often is smooth. Characteristically there are 28 notogastral setae; these are the same as those possessed by *P. Auberti* and the notation of unideficience can be applied (fig. 1); a further similarity between the 2 species is the occasional presence of humeral seta c_3. Setae are generally short and inconspicuous. Anterior setae are frequently more strongly developed in ♀♀ than in ♂♂ (compare figs. 8 & 9). The variation in length of notogastral setae from specimen to specimen is of the order of 5–10 μ. Notogastral fissures *im* and *ip* are seen clearly in dorsal view, as is also the aperture of the lateral abdominal gland; fissure *ia* is distinct in some specimens, hardly visible in others. The positions of these structures are shown in fig. 1.

Anal region: Anal aperture is ovoid. Each plate bears 2 spine-like setae on the paraxial margin; these setae are tinted brown in color and are sparsely and minutely barbed. Anal neotrichy is absent. Adanal setae are similar in form to the anal setae, although slightly longer with tapering tips. As a general rule there are 3 pairs of adanal setae flanking the anal aperture; 2 specimens (♂♂) show adanal neotrichy, one having an additional pair of setae, the other having an additional seta present on one side only. Lengths of anal and adanal setae are variable, although the variations are not appreciable. Frequently the tapering tips of the adanal setae are broken off. The adanal fissure is crescent-shaped, located antero-laterally to the anal aperture.

Genital-aggenital region: Genital aperture is relatively smaller and more strongly rounded in ♂♂ than in ♀♀ (compare figs. 3 & 5). Each genital plate bears 6 spine-like setae. A single pair of aggenital setae is a constant feature of ♀♀. Males are characterized by strong aggenital neotrichy in which the number of setae on each side varies from specimen to specimen, the minimum number being 3, the maximum 6. Fig. 3 shows the most extreme case observed in which the distribution is 5 : 6. The setae are strongly thickened proximally, long and smooth, with fine tapering points which easily break off. There is considerable variation in the length of aggenital setae; most frequently they extend posteriad to the level of the more anterior pair of anal setae; occasionally they are shorter and may extend only as far as the anterior margin of the anal aperture. Aggenital setae in ♀♀ are usually shorter than those in ♂♂. Some of the variation in length of these setae may be caused by damage to the delicate tapering tips. As noted above, these tips frequently break off and as a consequence it is difficult to observe the true development of the setae. The subject of aggenital neotrichy will be considered in more detail in Section III.

Ventral region of podosoma: Coxisternal ridges I are continuous with the posterior border of the camerostome. The ventro-sejugal ridge and ridges II and III are distinct; ridges II are continuous in the mid-line although this junction is more weakly chitinized than the lateral parts of the ridges. Coxisternal ridge IV is lacking. The chaetotaxy of coxisternal regions I and II is, with one exception, normal, the formula being (3-1). The one exception is a ♂ specimen in which seta *1b* is duplicated on one side (fig. 6). Seta *1b* is always relatively long and terminates in a fine tip; setae *1a*, *1c* and *2a* are short thick spines. Coxisternal regions III and IV are continuous on each side and show neotrichy to varying degrees. Males always show stronger neotrichy than ♀♀. This neotrichy

most frequently involves the presence of additional setae on coxisternal region III. The pattern is similar to, although generally more strongly developed than, that in *P. auberti*. Moreover, in *P. auberti* the additional setae are arranged in a transverse row, whereas in the present species the additional setae are arranged in an oblique row which parallels the lateral margin of the genital aperture. If we can assume that the basic chaetotaxy for this region is (2–3) as in *P. auberti*, an assumption which appears reasonable for seta *3c* is lacking in both species, it may be noted that neotrichy is always present, although vari-



Figs. 5–9. *Notaspis antarctica* Mich., adult. 5, ♀ specimen from Penguin Isle, ventral view; 6, ♂ specimen (diagrammatic) to show variations in ventral chaetotaxy; 7, ♀ specimen, gnathosoma, ventral view; 8, ♂ specimen, notogastral seta c_1; 9, ♀ specimen, notogastral seta c_1. (ad_1, ad_2, ad_3= adanal setae; iad=adanal fissure; or_1, or_2=adoral setae; RU=rutellum; h, m, a=infracapitular setae; el=palpal spine.)

able in degree, in ♂♂ and ♀♀ of *N. antarctica.* Further discussion of this character will be given in Section III. The chaetotaxy of this region is illustrated in figs. 3 & 5.

Gnathosoma: Details of this region are given in fig. 7. The labio-genal articulation is incomplete. The rutellum has a basal expansion (atelebasic). The 2 pairs of adoral setae are thickened, barbed, with tips strongly curved dorsad. Infracapitular setae *h*, *m* and *a* are smooth. In all these respects this region is similar to that of *P. Auberti.*

Palp: The chaetotaxy is normal, the formula being (0–2–1–3–9).

Legs: These were examined in detail and appear to be similar in all respects to those of *P. auberti.* The chaetotaxy for true setae on legs I–IV is: I (1–4–3–4–18–3); II (1–4–3–4–15–3); III (2–3–1–3–15–3); IV (1–2–2–3–12–3). The distribution of solenidions on genu, tibia and tarsus is: I (1–1–2); II (1–1–2); III (1–1–0); IV (0–1–0). Setae on femoral, genual and tibial segments are thickened blunt structures, with barbed surface; setae on the tarsi are generally slender with fine tapering points. Tarsal setae (*u*) are remarkable in being expanded and strongly granular basally, their tips being filiform and strongly curved. Tarsal setae (*tc*), (*p*), (*a*) and (*u*) are looped terminally (fig. 4), as in *P. auberti.* Lateral claws are slender and each bears a small tooth on the inner surface. The basal segments of legs III and IV in ♂ specimens are relatively larger and longer than those in ♀♀.

Nymphs and larva: The general course of development as exemplified by larva, proto-, deuto- and tritonymphal stages bears a very strong resemblance to that of *P. auberti* (Grandjean 1955). All stages are characterized by the possession of larger sclerites bearing porose areas, and these are well developed on prodorsum and hysterosoma. Outside these porose areas the cuticle covering the hysterosoma and ventral surface (with the exception of the coxisternal plates and infracapitulum) is strongly pleated. Lamellar and interlamellar ridges are frequently present on the prodorsum of nymphal forms. The various developmental stages are considered briefly below.

Tritonymph. The lamellar setae, although variable in length and position, are generally quite short and strongly barbed; they are very rarely longer than their mutual distance. Interlamellar setae are always long, as in the adult. Hysterosomal setae are short and smooth. Aggenital neotrichy was not observed in any specimen. Neotrichy of coxisternal region III is weak but relatively constant, one additional seta being present on each side, in most individuals examined. There are 3 pairs of genital suckers, 5 pairs of genital setae, 2 pairs of anal setae and 3 pairs of adanal setae.

Deutonymph. This stage can be recognized by the presence of 2 pairs of genital suckers, 3 pairs of genital setae and 3 pairs of adanal setae; the anal plates are glabrous. In the large majority of cases examined coxisternal region III/IV showed the basic pattern of chaetotaxy (i. e. 2–3), there being no additional setae present. One pair of aggenital setae is present. Interlamellar setae are long.

Protonymph. This stage possesses 1 pair of genital setae and 1 pair of genital suckers. There are no aggenital, anal or adanal setae; paraproctal plates are glabrous. Setae flanking the anal region are the pseudoanal setae, a single pair (ps_3) being located lateral to the anus on each side, the other 2 pairs being inserted posterior to the anal region. The coxisternal setal formula is (3–1–2–1). Interlamellar setae are long.

Larva. The ventral surface of the larva is very similar to that of *P. Auberti.* Paraproctal plates are glabrous; the setae h_2 and h_3 flank the anus on each side; setae h_2

(posterior) are considerably longer than setae h_3. Setae h_1 and *1p* on the posterior region of the hysterosoma are appreciably longer and thicker than the remaining hysterosomal setae. The interlamellar setae are long thickened structures.

III. NEOTRICHY

As indicated above, neotrichy of the ventral surface is an important feature of this species; the extent to which it is developed is a secondary sexual character. In summarizing the various expressions of neotrichy observed in 50 adults (25 ♂♂, 25 ♀♀) of *N. antarctica*, I have followed the general outline given by Grandjean (1955) for *P. auberti*, although the characters considered here are not necessarily the same as those used by that author. In *N. antarctica* ventral neotrichy may be expressed in 13 different ways, as opposed 7 in *P. auberti*. A brief description is given below of each of these characters. Fig. 6 presents a diagrammatic representation of most of these.

Character 1. The presence of an additional seta on coxisternal region III between setae *3a* and *4b*. This condition is shown on the left side in fig. 6; it is also shown on both sides in fig. 5.

Character 2. Duplication of seta *4c*. This condition is identical to that in *P. auberti*. It is illustrated on the left side in fig. 6.

Character 3. Duplication of the aggenital seta (*ag*). This condition is not present in the specimens examined but is included for the purposes of comparison with *P. auberti*, and also because it represents a logical step in the development of the more extreme cases of neotrichy described below.

Character 4. The presence of 2 additional aggenital setae (i. e. a total of 3 aggenital setae). The insertions of these setae are close together and are arranged in a linear manner. This condition is shown on the left side in fig. 6.

Character 5. The presence of 2 additional setae in the region of seta *4c*. This condition was not observed, but the character is included for the purposes of comparison with *P. Auberti*.

Character 6. The presence of 2 additional setae on coxisternal region III between setae *3a* and *4b*. The 4 setae in this region are aligned obliquely with respect to the long axis of the body and parallel to the lateral margin of the genital aperture. This condition is very common in ♂♂ and is shown on both sides in fig. 3.

Character 7. The presence of 3 additional setae on coxisternal region III between setae *3a* and *4b*. This character is shown on the right side in fig. 6.

Character 8. The presence of 3 additional aggenital setae (i. e. a total of 4 aggenital setae). These setae are close together and are arranged in a linear manner. The condition is shown on the right in fig. 6.

Character 9. The presence of 4 additional aggenital setae (i. e. a total of 5 aggenital setae). These setae are close together and are arranged in a linear manner. The condition is shown on the left in fig. 3.

Character 10. The presence of 5 additional aggenital setae (i. e. a total of 6 aggenital setae). These setae are close together and are arranged in a linear manner. The condition is shown on the right side in fig. 3.

Character 11. The presence of an additional adanal seta. This seta is located between ad_2 and ad_1; these setae are not contiguous. The condition is shown on the right side in fig. 6.

Character 12. Duplication of seta *3b*. The additional seta is inserted lateral to seta *3b*; the insertions of these two setae are not contiguous. It is possible that this additional seta is the primitive seta *3c*. This condition is rare, being observed in only 2 specimens (♀♀). The character is not included in fig. 6 which depicts the ventral surface of a ♂.

Character 13. Duplication of seta *1b*. The additional seta is located near seta *1b* and is the same length. This condition, which was observed in one specimen only, is shown on the left in fig. 6.

In following Grandjean's method of presentation it is possible to tabulate these 13 characters and their distribution in the 25 ♂♂ and 25 ♀♀ examined. The additional setae listed above may be distributed asymmetrically (i. e. present on one side of the midline only) or symmetrically (i. e. distributed on each side). Table 1 shows the results of these observations, the characters being listed as symmetrical or asymmetrical. The numbers in the asymmetrical column denote the number of asymmetrical setae, and thus the number of individuals involved. Numbers in the symmetrical column have been obtained by counting 2 for each individual possessing symmetrically arranged additional setae.

The following conclusions may be drawn from table 1.

1. Neotrichy is more strongly developed in ♂♂ than in ♀♀.
2. Aggenital neotrichy is particularly well developed in ♂♂, absent in ♀♀.
3. Neotrichy of coxisternal region III is common in ♂♂ and ♀♀.

Table 1. Distribution of 13 secondary setae in 25♂♂ and 25♀♀.

Character No.	25 ♂♂			25 ♀♀		
	Asymm.	Symm.	Total	Asymm.	Symm.	Total
1	1	2	3	4	32	36
2	2	0	2	2	2	4
3	0	0	0	0	0	0
4	5	0	5	0	0	0
5	0	0	0	0	0	0
6	3	42	45	4	10	14
7	2	0	2	0	0	0
8	13	20	33	0	0	0
9	9	2	11	0	0	0
10	1	0	1	0	0	0
11	1	2	3	0	0	0
12	0	0	0	2	0	2
13	1	0	1	0	0	0

Table 2. Distribution of 13 degrees of neotrichy in 25♂♂ and 25♀♀.

Degree of neotrichy	Numbers of individuals	
	♂♂	♀♀
0	0	0
1	0	0
2	0	14
3	0	4
4	0	6
5	0	0
6	0	1
7	0	0
8	0	0
9	6	0
10	8	0
11	9	0
12	0	0
13	2	0
Total	25	25

4. The presence of an additional adanal seta, the duplication of seta *3b* and the duplication of seta *1b* are rare characters; their significance is questionable in view of their infrequent appearance.

The secondary sexual nature of the neotrichous condition of the coxisternal region III/IV and the aggenital region is emphasised if the degree of neotrichy in ♂♂ and ♀♀ is compared. The degree of neotrichy is expressed as the number of secondary setae present in any given individual. Characters 11 and 13 are not considered in this computation. In the specimens examined the number of additional setae present varied from 2 to 13, i. e. neotrichy was expressed to some degree in all individuals. The numbers of individuals showing each degree of neotrichy are given in table 2. It can be seen from this table that no ♂ possesses less than 9 additional setae; no ♀ possesses more than 6.

IV. GEOGRAPHICAL DISTRIBUTION

The specimens examined were collected from several different localities. In view of the rather large amount of variability within the species it is desirable to examine the geographical distribution in an effort to detect morphological trends in subspeciation. The individuals collected at each locality are discussed briefly below.

1. Antarctic Peninsula: Base Gonzales Videla (Chile). Four separate collections were made in or near this locality on the dates: 2 and 3 Jan. 1961, 18 Feb. 1961 and 4 Mar. 1961. Total numbers of specimens in these collections are: 21 adults (11 ♂♂, 10 ♀♀), 13 tritonymphs, 9 deutonymphs, 10 protonymphs and 3 larvae. There is considerable variation in the development of lamellar setae in these collections. This variability is not restricted to adults; it was also observed in nymphal stages, particularly among tritonymphs and deutonymphs. These setae are generally appreciably longer than their mutual distance in adults. Occasionally they are considerably shorter than usual, resembling the condition shown in fig. 1. In a number of cases the setae are asymmetrically distributed and unequal in length in the same individual. Interlamellar setae generally show little variation in length; one ♀ from the collection of 18 Feb. has interlamellar setae which are 5× longer than their mutual distance. The development of prodorsal ridges is variable; these are generally lacking in adults, although one ♀ from this locality has a well developed lamellae. Lamellar ridges were observed in several instances in tritonymphs.

2. Penguin I., South Shetland Group. Only 4 specimens (2 ♂♂, 2 ♀♀) were taken from this locality. These are of considerable interest for they apparently represent 2 distinct but closely related species. Three of the specimens (2 ♂♂, 1 ♀) resemble those collected from Base Gonzales Videla having short lamellar setae. The fourth specimen (♀) differs from the other 3 and from the Base Gonzales Videla collections in having longer, thicker and more conspicuously barbed setae on the posterior margin of the notogaster. This form may correspond to the subspecies *grandjeani* described by Dalenius and Wilson (1958). The difference between this specimen and the other 3 collected with it is probably sufficient to warrant the creation of a new species. The specimen has not been considered in the foregoing description for this reason. The same is true for 2 specimens collected on Macquarie Island. Both these specimens (1 ♂, 1 ♀) possess notogastral setae with similar structural characteristics to those possessed by the specimen from Penguin Is-

land, but differ from this specimen in having relatively short interlamellar setae; these setae, although strongly thickened and barbed, are only slightly longer than their mutual distance.

3. F. I. D. S. Base, Admiralty Bay, King George I., South Shetland Group. Total numbers of specimens examined from this locality are: 16 adults (4 ♂♂, 12 ♀♀), 18 tritonymphs and 3 deutonymphs. These specimens generally resemble those from Base Gonzales Videla; adults have lamellar setae which are appreciably longer than their mutual distance.

4. Livingston I., South Shetland Group. Four adults (3 ♂♂, 1 ♀) and 2 tritonymphs were examined from this locality. Two of the 3 ♂♂ resemble those from Penguin Island in having very short lamellar setae; the third ♂ specimen has lamellar setae which are unequal in length, although both setae are appreciably longer than those of the other ♂ specimens.

5. Deception I., South Shetland Group. Collections made at this locality were as follows: British Base (2 adult ♂♂, 1 tritonymph); 200 yds W. Neptune (1 adult ♂, 1 tritonymph); Base P. A. Cerda (11 tritonymphs, 27 deutonymphs, 8 protonymphs). The variations shown by these specimens fall within the normal range as described above.

6. A few specimens were examined from other localities. These individuals do not differ significantly from those already described. The collection from Ross Island is a record for one of the southernmost wintering land animals, the locality being nearly 78° S. Lat. The collections are listed below:

Palmer Peninsula (1 adult ♂, 1 deutonymph).
Ross I., Pass between Scott and McMurdo (1 adult ♀).
Isle de la Fuente (1 adult ♂, 1 adult ♀).
Torre I., South Shetland Group (1 adult ♂, 1 tritonymph).
Base Arturo Prat, Greenwich I. (1 adult ♂, 3 tritonymphs, 2 deutonymphs, 2 protonymphs).

In summary, there appears to be no clear cut subspecific grouping in a geographical sense in the collections examined. The morphological variability is considerable, and a statistical treatment of larger collections than are presently available will be necessary to pursue this line of enquiry further. The length of lamellar setae may be a useful character in this connection. It is also recognized that 2 closely related species occur in the localities sampled; the 2 species are distinguished by the character of the posterior notogastral setae. The more common of these 2 species and the one described in detail in Sections II and III above is believed to be *Notaspis antarctica* Michael. A discussion of the systematic position of this species will now be given.

V. SYSTEMATIC POSITION OF N. ANTARCTICA MICH.

The specimens examined in the present work have been identified as *N. antarctica* firstly from drawings of Michael's type made by Dr. D. Macfarlane and published in the paper by Dalenius and Wilson (1958), secondly from the characteristically long interlamellar setae and thirdly from the distributional records which accord with previous reports of the species in Antarctica. There are slight differences between the specimens I have examined and the drawings of Macfarlane; these differences involve the length of ventral

setae. As stated above, these setae are variable in length, and the differences are not great enough, in my opinion, to warrant the creation of a new species. Some importance has been attached to the presence of neotrichal setae on the anterior margins of the anal plates in Michael's type (Grandjean 1955, Balogh 1961). The drawings of Macfarlane do not depict this feature clearly, and its significance is questionable.

Clearly, *N. antarctica* and *P. Auberti* are similar in many respects and belong in the same family, the Podacaridae Grandj. In both species the qualitative expression of sexual dimorphism is similar, and involves coxisternal and aggenital neotrichy in the adult. The chaetotaxy of the legs, structure of the gnathosoma, form of the sensillus and chaetotaxy of the notogaster are similar in the adults of both species. The pattern of development is similar in both cases, although differences of a minor nature involving the length of posterior hysterosomal setae occur. Common developmental features include the presence of sclerites bearing porose areas on prodorsum and hysterosoma, paraproctal atrichosy at 3 levels and a genital formula expressed as (1–3–5–6) for proto-, deuto-, tritonymph and adult stages. Despite these similarities the 2 species are quite distinct. *N. antarctica* can be recognized by the long, thickened interlamellar setae, the broadly rounded tectum which forms the anterior margin of the notogaster and which is also produced laterally over the basal segments of legs III and IV, and by the stronger ventral neotrichy, particularly in ♂♂. Of these features the form of the anterior margin of the notogaster is important from the generic point of view, for this character separates *N. antarctica* not only from *P. Auberti* but also from other Antarctic species such as *Notaspis belgicae* Mich. and *Notaspis marina* Lohmann. These 3 species are characterised by the possession of anacuminate (i. e. pointed) anterior notogastral margin; this anterior margin is not produced to form a tectum. On the basis of this charater it is considered that *N. antarctica* is not congeneric with *P. Auberti*, *N. belgicae* or *N. marina*.

N. antarctica has been placed in the genus *Halozetes* Berl. (Dalenius & Wilson 1958). Unfortunately a good deal of confusion has been caused by Berlese's original designation of the genus *Halozetes*. Berlese (1916) nominated *Notaspis marina* Lohmann 1908 as the type for this, indicating at the same time that he considered *N. antarctica* Mich. 1903 as a synonym. Berlese realized this error the following year when he attempted to substitute *antarctica* for *marina* as the type for the genus *Halozetes*. Dalenius and Wilson (1958) have accepted Berlese's intention and have placed *antarctica* in the genus *Halozetes*; *N. marina* was then placed in a new genus, *Anarea*. Grandjean (1955) has pointed out, however, that the type for the genus *Halozetes* must remain *N. marina* Lohmann as Berlese originally designated it; this interpretation is adopted herein. As a consequence *N. antarctica* must be referred to another genus for, as indicated above, this species is not considered to be congeneric with *N. marina*. In addition, this interpretation would place the genus *Anarea* in synonymy with *Halozetes* provided that the type for this genus, *A. macquariensis* Dalenius, is truly congeneric with *N. marina*. *N. antarctica* is referred to the genus *Alaskozetes* Hammer 1955.

A comparison between *N. antarctica* and *A. coriaceus* Hammer, the type for the genus *Alaskozetes*, shows a striking similarity in appearance of the dorsal surface. Particularly important in this respect is the broadly rounded anterior margin of the notogaster and the dorsal chaetotaxy. Several details of the ventral surface of *A. coriaceus* are lacking in Hammer's description but despite this, the 2 species are obviously closely related and, on the basis of the shape of the notogaster, are considered to be congeneric. Accordingly it

is proposed that *Notaspis antarctica* Mich. be re-designated **Alaskozetes antarctica** (Mich.) n. comb. and placed in the family Podacaridae.

VI. SUMMARY

The species *Notaspis antarctica* Michael 1903 is redescribed from recent collections from the Antarctic and sub-Antarctic islands. The species is sexually dimorphic, both sexes showing strong neotrichy on coxisternal region III/IV; the ♂♂ also showing strong aggenital neotrichy which is lacking in ♀♀. The species is also characterized by the possession of a broadly rounded tectum which forms the anterior margin of the notogaster, long, thickened interlamellar setae, clavate sensillus and 28 short notogastral setae. The systematic position of the species is reviewed in the light of comparisons with *Podacarus Auberti* Grandj., *Notaspis marina* Lohmann, *Notaspis belgicae* Michael and *Alaskozetes coriaceus* Hammer, and as a result the combination *Halozetes antarctica* (Mich.) is discarded in favor of a new combination, *Alaskozetes antarctica* (Mich).

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