

A NEW SPECIES OF *Calvolia* (ACARIDAE, ACARINA) FROM THE SOUTH SANDWICH ISLANDS

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THE specimens of *Calvolia antarctica* n. sp. were collected by P. J. Tilbrook from Candlemas Island on 8 March 1964. Candlemas Island is one of the South Sandwich Islands group, which lie in an arc on the eastern extremity of the Scotia Ridge between lat. 56°18' and 59°28'S., and long. 26°14' and 28°11'W. These islands are all volcanic in origin, some of them still emitting steam from fumaroles, but nearly all of them have a certain amount of permanent ice cover and on some this is extensive. Large areas of snow-free ground are occupied by penguin colonies, the remainder being mainly bare ash or lava. Vegetation is sparse and the richest areas are found around the fumaroles.

Fifteen specimens of the *Calvolia* were found on rocks encrusted with lichen (probably *Lecodium* sp.). These rocks were situated in a chinstrap penguin (*Pygoscelis antarctica*) colony of several thousand birds on the north-east side of the headland which divides Sea Serpent Cove from the more westerly of the two lagoons. The whole slope was covered with rocks, but those examined were only 10–20 ft. (3·05–6·10 m.) above sea-level. The vesicular nature of these volcanic rocks provided innumerable depressions in which mites and Collembola (*Cryptopygus antarcticus*) were clustered, and the crustose lichens also offered a favourable protective habitat. Associated with the *Calvolia* were large numbers of other species of mite, such as *Alaskozetes antarcticus intermedius*, *Halozetes belgicae longiseta*, *Nanorchestes antarcticus* and *Protereunetes minutus*. One additional specimen of *Calvolia* was collected from the underside of a boulder nearer the beach in the same area.

ORDER ACARINA FAMILY ACARIDAE

Genus *Calvolia* *Calvolia antarctica* n. sp.

In adult and nymphal stages, the idiosoma is oval in shape with a transverse constriction between propodosoma and hysterosoma (Fig. 1). The cuticle is almost smooth and yellowish in colour in the preserved specimens. On the dorsal side of the propodosoma, the cuticle is more rigid and forms a colourless shield, in the antero-lateral corners of which is a pair of colourless corneae (Fig. 2). Adjacent to each cornea is a lateral sclerite which encircles the bases of the first pair of legs. At the anterior corners of this is Grandjean's organ—a tapering leaf-shaped structure—and more posterior in position is the supra-coxal seta whose base fits into a notch in the side of the lateral sclerite. In front of this is the supra-coxal fossa of Grandjean (1938).

Ventrally, the apodemes are well-developed, those of legs I meet to form a short sternum (Fig. 3), but those of II, III and IV end freely in the mid-line. There are two pairs of coxal setae and, in the adults, three pairs of genital setae encircle the genital opening.

The body setae are smooth and arranged in a pattern that is typical for the genus. Except for *sce*, *he*, *sai* and *pa*, they are short (less than 10 per cent of the idiosoma in length), the distances between the bases of d_1 and d_2 being more than twice the length of d_1 . *sce* are more than five times longer than *sci*, and *sci* are inserted into the cuticle nearer to *sce* than to each other. d_1 to d_4 are almost in linear series with one another, and *la* and *lp* are almost in the same transverse line as d_2 and d_3 , respectively. The dorsal and lateral setae, as well as *sce*, *hi* and *hv*, are all approximately the same length, whilst *he* are of similar length to *sce*. The two pairs of long posterior setae (*pa* and *sai*) project from the hind end of the body, *pa* being longer than *sai*.

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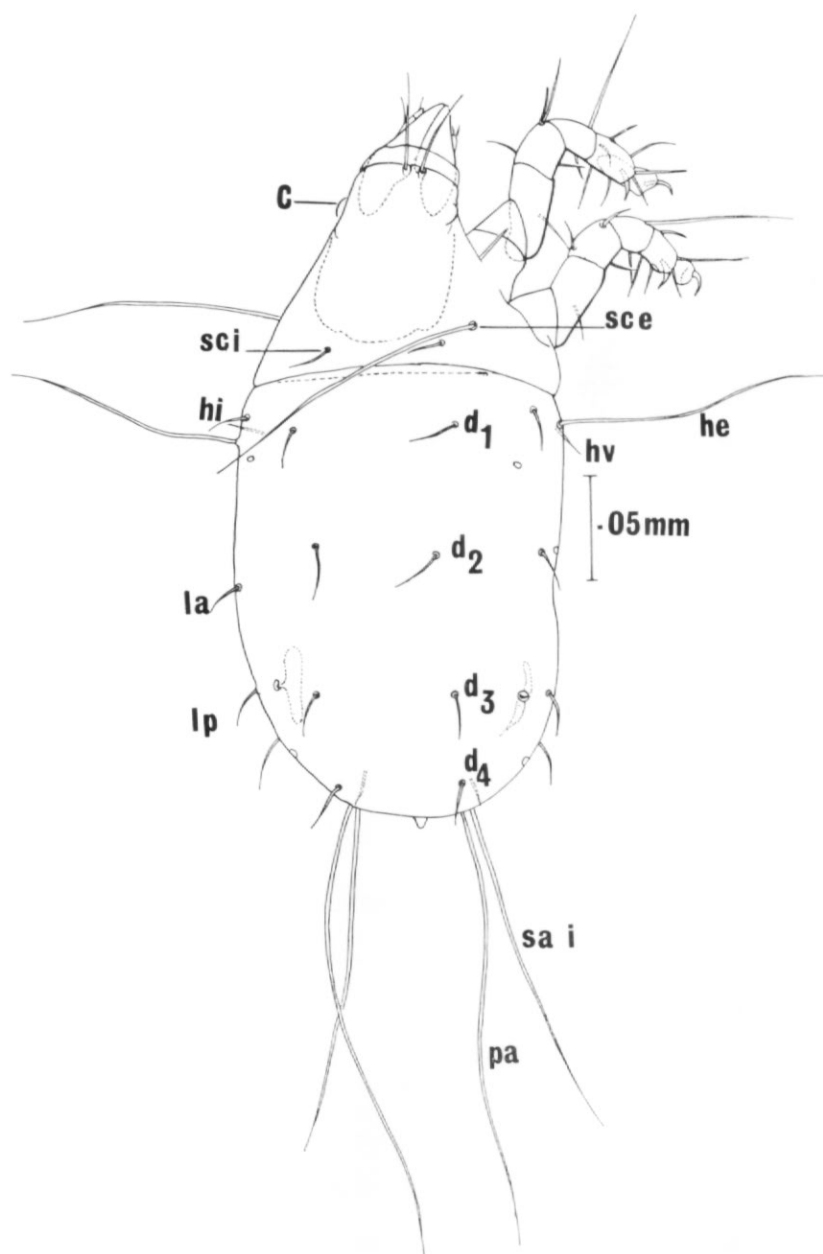


Fig. 1. *Calvolia antarctica* n. sp. Male. Dorsal view.
sce, *sci*, *he*, *hi*, *hv*, *d*₁ to *d*₄, *la*, *lp*, *sai*, *pa*. setae of the idiosoma; *c*. cornua.

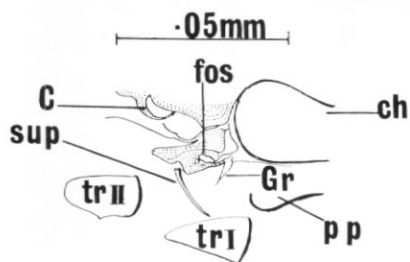


Fig. 2. *Calvolia antarctica* n. sp. Tritonymph. Lateral view of anterior region of propodosomal shield. *c.* cornea; *tr*I and *tr*II, trochanters I and II; *ch.* base of chelicera; *pp.* base of pedipalp; *sup.* supra-coxal seta; *Gr.* Grandjean's organ; *fos* supra-coxal fossa.

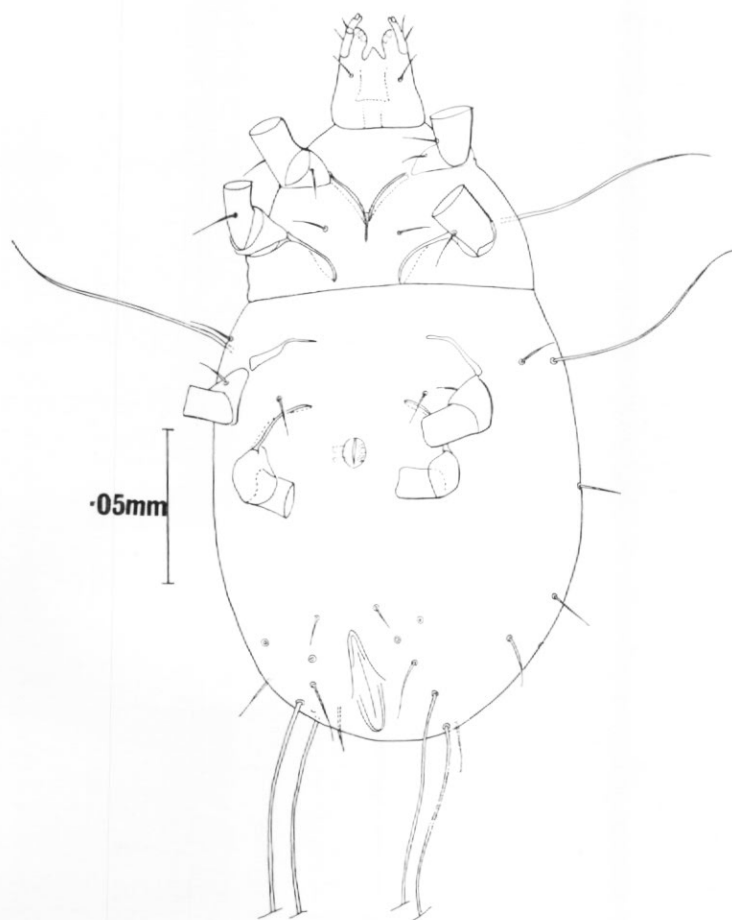


Fig. 3. *Calvolia antarctica* n. sp. Tritonymph. Ventral view.

The gnathosoma is of the usual acarid type, the chelicerae (Fig. 4) with from three to five distinct teeth on the fixed and movable digits. A short seta arises from the external surface of the fixed digit.

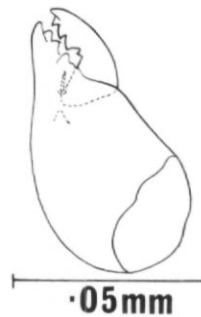


Fig. 4. *Calvolia antarctica* n. sp. Tritonymph. Internal view of chelicera.

The legs are thicker than in other species of the genus *Calvolia* and all end in a membranous pretarsus, into the distal end of which is inserted a well-developed claw. When fully expanded, a small sclerite can be seen embedded in the dorsal wall of the pretarsus (Fig. 5).

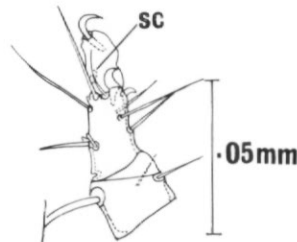


Fig. 5. *Calvolia antarctica* n. sp. Tritonymph. External view of tibia and tarsus of right leg I.
sc. sclerite.

Table I shows the chaetotactic formula according to Grandjean (1939). The figures in brackets give the number of setae and solenidia arising from tarsus, tibia, genu, femur and trochanter, respectively.

TABLE I. CHAETOTACTIC FORMULA

	<i>Leg I</i>	<i>Leg II</i>	<i>Leg III</i>	<i>Leg IV</i>
A. Setae				
Protonymph	(9.2.2.1.0)	(9.2.2.1.0)	(8.1.1.0.0)	(5.0.0.0.0)
Tritonymph	(9.2.2.1.1)	(9.2.2.1.1)	(8.1.1.0.1)	(8.1.0.1.0)
Adult ♂	(8.2.2.1.1)	(8.2.2.1.1)	(8.1.1.0.1)	(8.1.0.1.0)
Adult ♀	(9.2.2.1.1)	(9.2.2.1.1)	(8.1.1.0.1)	(8.1.0.1.0)
B. Solenidia				
Protonymph	(2.1.2.0.0)	(1.1.1.0.0)	(0.1.1.0.0)	(0.0.0.0.0)
Tritonymph	(3.1.2.0.0)	(1.1.1.0.0)	(0.1.1.0.0)	(0.1.0.0.0)
Adult ♂	(3.1.2.0.0)	(1.1.1.0.0)	(0.1.1.0.0)	(0.1.0.0.0)
Adult ♀	(3.1.2.0.0)	(1.1.1.0.0)	(0.1.1.0.0)	(0.1.0.0.0)

The arrangement of setae and solenidia is similar to that found in *Forcellinia wasmanni* (Grandjean, 1939) except that there is a reduction of setae and spines on the tarsi of all the legs. Thus *aa* and *ba* are never developed in any stage and the five ventral terminal spines at the base of the pretarsus are represented by three in the female and nymphs and two in the male. A similar reduction is shown by other species of *Calvolia* where the ventral spines are much more inconspicuous.

Ω_1 (ω_1) is a tapering structure, slightly longer on tarsus II than tarsus I. On tarsus I, it arises from the same cuticular depression as the famulus epsilon (ϵ) and is more distal in position than ω_2 which arises at about the same level as *wa* (Fig. 6). The origin of *ra* is distal to that of *wa*, and *ra* and *wa* are longer than *la*. On tarsi III and IV in the adult and tritonymph, these three setae are replaced by two: *r* and *w* (Fig. 7).

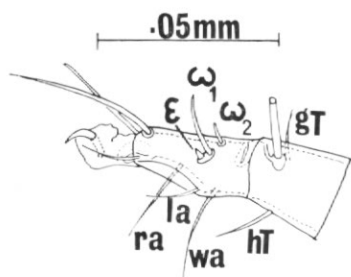


Fig. 6. *Calvolia antarctica* n. sp. Male. Dorsolateral view of right leg I. ω_1 , ω_2 . solenidia of tarsus; ϵ . famulus; *la*, *ra*, *wa*, *gT*, *hT*. setae of tarsus and tibia.

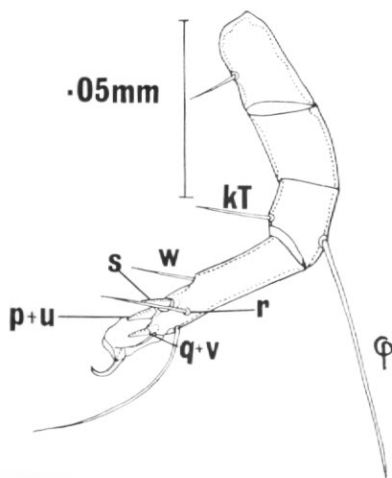


Fig. 7. *Calvolia antarctica* n. sp. Male. Internal view of right leg IV. *r*, *w*, *kT*, *p+u*, *q+v*, *s*. setae and spines of tarsus and tibia; ϕ . solenidium of tibia.

The long solenidium phi (ϕ) arises from each tibia in the adults and tritonymph, and it is always longer than the tarsus of the same leg and the two ventral setae *gT* and *hT*. These are represented by a single seta *kT* on tibiae III and IV. On genu I, σ_1 (σ_1) is less than twice as long as σ_2 (σ_2) (Fig. 8) and represented by a single solenidium on genua II and III which is about the same length as ω_1 . Two ventral setae arise from genua I and II and these are replaced by a single seta on genua III and are missing from genua IV. A single seta arises from femora I, II and IV.

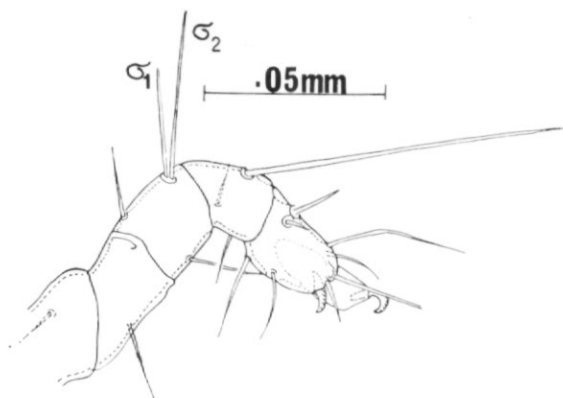


Fig. 8. *Calvolia antarctica* n. sp. Male. Lateral view of right leg I.
 σ_1 , σ_2 , solenidia of genu.

Male (Fig. 1). Length of idiosoma of two specimens = 380 and 390 μ . The male genitalia are extremely well developed and extend from the bases of legs III to midway between the bases of legs IV and the anus (Fig. 9). The penis *p* is a dagger-shaped tube arising from a basal

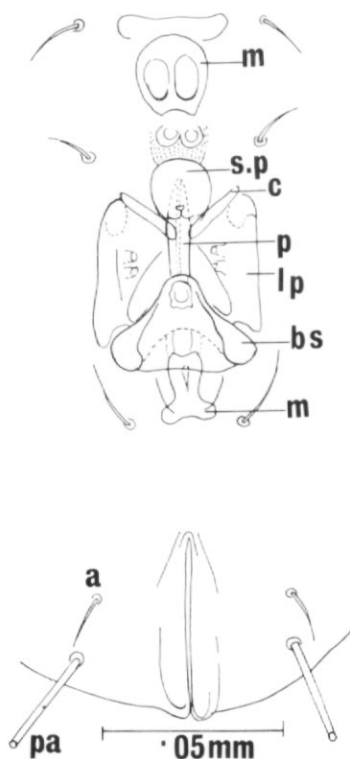


Fig. 9. *Calvolia antarctica* n. sp. Male. Ventral view of genitalia.
p, penis; *bs*, basal sclerite; *s.p.*, strongly sclerotized plate; *c*, cornu; *lp*, lateral plate; *m*, medial sclerites; *a*, *pa*, posterior setae.

sclerite (*bs*), its apex directed anteriorly and lying dorsal to a strongly sclerotized plate (*s.p*). The anterior edge of this plate is rounded, its posterior corners prolonged into two cornua (*c*) which articulate with lateral plates (*lp*) embedded in the body and flanking the penis. Additional medial sclerites (*m*), which are situated in front of and behind the penis and its supports, are probably struts from which originate muscles which move the penis. The penis is covered by a pair of genital folds, on the internal surface of which are the two pairs of genital sense organs.

There is a short pair of anal setae, in addition to the long post-anals.

The chaetotaxy of tarsi I and II is modified owing to the presence of thin unsclerotized areas or tarsal suckers at the ventral terminal ends of these segments (Figs. 10 and 11). These tarsal

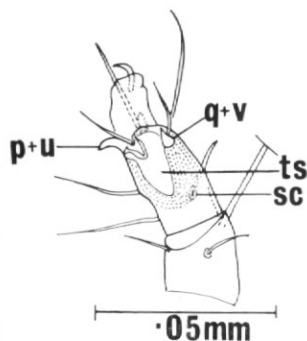


Fig. 10. *Calvolia antarctica* n. sp. Male. Ventral view of right tarsus and tibia I.
ts. tarsal sucker; *p+u*, *q+v*. tarsal spines; *sc.* scar.

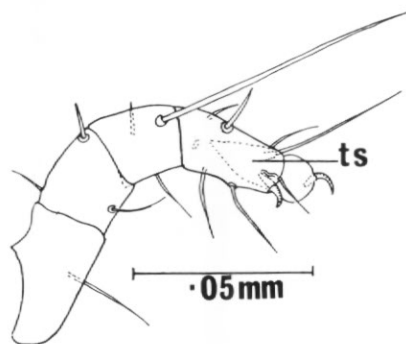


Fig. 11. *Calvolia antarctica* n. sp. Male. Lateral view of leg II.
ts. tarsal sucker.

suckers are encircled by a rough patch of cuticle and the three ventral terminal spines *p+u*, *q+v* and *sc* are represented by a large spine *p+u* with a deep root embedded in the cuticle, and a smaller *q+v* on the pre-axial side. *sc* is missing, possibly represented by a small oval scar (Fig. 10). The root of *p+u* may act as a muscle attachment and it is possible that it is movable. All three ventral terminal spines are present on tarsi III and IV (Fig. 7).

Female. Length of idiosoma of one specimen = 390 μ . This closely resembles the male.

The genital opening extends between coxae III and IV and is covered by genital folds whose anterior end is marked by an epigynium (Fig. 12). It is surrounded by three pairs of genital setae.

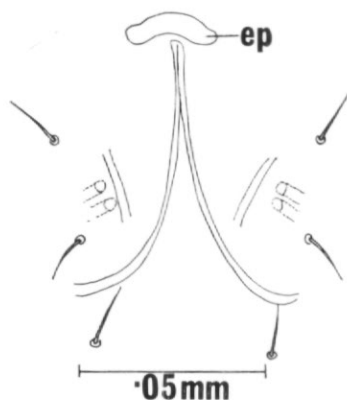


Fig. 12. *Calvolia antarctica* n. sp. Female. Genital opening.
ep. epigynium.

The anus is terminal, flanked by two pairs of anal and one long pair of post-anal setae.

The opening to the bursa copulatrix is surrounded by a circular sclerotized plate, a narrow duct connects this with the ovary (Fig. 13).

The chaetotaxy differs from that of the male in having three pairs of ventral terminal setae on the tarsi of all the legs. Of these, the post-axial $p+u$ are larger than the remaining ones (Fig. 14).

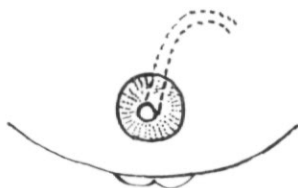


Fig. 13. *Calvolia antarctica* n. sp. Female. Bursa copulatrix.

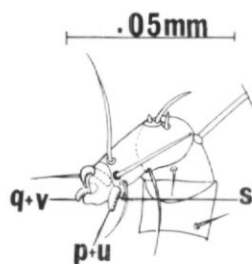


Fig. 14. *Calvolia antarctica* n. sp. Female. Terminal segments of left leg I.
 $p+u$, $q+v$, s . terminal spines.

Tritonymph (Fig. 2). Length of idiosoma of two specimens = 380 and 395 μ . This closely resembles the female, but it lacks genital setae.

Protonymph. Length of idiosoma of four specimens: 288, 290, 317, 320 μ . As in other Acaridae, the chaetotaxy of leg IV is reduced, only five setae being present on tarsus I.

DISCUSSION

The genus *Calvolia* was erected by Oudemans (1911) to include the deutonymph of *C. hagensis*, which is distinguished by having a pair of rostral corneae overlying a patch of pigment. In the case of *C. romanovae* Zakhvatkin, *C. kneissli* Krausse and *C. heterocomus* Michael, both adults and nymphs are known and it is possible to give a diagnosis of the adult (Zakhvatkin, 1941; Türk and Türk, 1957; Hughes, 1962). *C. antarctica* agrees with the diagnosis, except that it is distinguished by having well-developed ventral spines at the ends of the tarsi. It also has well-developed genitalia in the male. Since relatively few adults have been described and since *C. antarctica* has other characters in common with other species of *Calvolia* (e.g. relative lengths of scapular setae, corneae in adults and nymphs, position of genital opening and possession of an epigynium, suckers on tarsi I and II of male), it seems more satisfactory to include it in this genus rather than to create a new one. Furthermore, species of *Calvolia* tend to be associated with plants and *C. antarctica* was found on lichen-covered rocks.

TYPES

Holotype (male) is mounted on a slide in Berlese fluid; found on a lichen-covered rock on Candlemas Island and labelled accordingly. Deposited in the Arachnida Department of the British Museum (Nat. Hist.), London (catalogue number 1966.4.22.1).

Allotype (female), with the same label as the holotype, is also deposited in the British Museum (Nat. Hist.) (catalogue number 1966.4.22.2). The remaining paratypes, consisting of one male, two tritonymphs and five protonymphs, have been returned to the British Antarctic Survey Biological Unit, Department of Zoology, Queen Mary College, London.

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