Two Subterranean Species of the Ortheziidae
Found in Tea Gardens in Japan
(Coccoidea : Ortheziidae)

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Two subterranean species of the Ortheziidae found in tea gardens in Shizuoka-ken, Japan, are described. One of these species, *Newsteadia kanayana* (n. sp.), is close to *Newsteadia minima* from North America but distinct in the spine band pattern. The other species, *Nipponorthezia ardisiae*, which was recorded as a root-feeder on *Ardisia Japonica* and citrus, is recorded from tea for the first time.

Eighteen species of scale insects have been known to infest the tea plants in Japan (MINAMIKAWA, 1959). These species mostly occur on the aerial parts of host plants. Recently, the authors have found two species of the Ortheziidae living in soil around the roots of tea plants. One of these species belongs to the genus *Newsteadia* GREEN and is described as new in the present paper; this is the first record of the occurrence of *Newsteadia* in Japan. The other is *Nipponorthezia ardisiae* KUWANA, of which a redescription is also given in order to present some characters adopted in recent taxonomy of the family.

The type specimens are deposited in the Entomological Institute of the Hokkaido University, Sapporo and in the Tokyo Agricultural Experiment Station, Tachikawa, Tokyo.

***Newsteadia kanayana* n. sp.**

(Jap. name : Kanaya-hakama-kaigaramushi), (Figs. 1: A—F, 2, 4: A)

Adult female : As mounted on the slide, body stout elliptical, 1.0–1.3 mm long. Derm moderately sclerotized throughout body. Antenna 7-segmented, but usually segments III and IV, and occasionally also V and VI fused, basal segment enlarged; the length of segments and apical setae are given in Table 1. Antennal setae not numerous, other than 1 apical and 2 fleshy setae all small and stiff, with apex blunt. Eyestalk large and conspicuous, a curved cone with rounded apex, placed close to the base of antenna, basal diameter about 34 μ , height about 24 μ . Three pairs of legs well developed, approximately same in shape, the posterior pair somewhat larger than the others; tibia and tarsus tightly fused together, without any distinct constriction between them. The lengths of the parts of posterior legs; femur about 430 μ , tibio-tarsus 550 μ , claw 45 μ ; the claw without denticles; claw digitules extremely small, sharply pointed apically; leg setae stout, blunted apically on coxa and femur,

TABLE 1. THE LENGTHS (IN MICRA) OF SEGMENTS AND APICAL SETAE OF *Newsteadia kanayana*, n. sp.

Individual	I	II	III	Segment IV	V	VI	VII	Apical seta
1	188	100	110		46	50	191	80
2	183	108	125		50	58	189	81
3	179	105	113		53	48	204	80
4	181	88	100		50	41	188	78
5	190	106	111		53	50	185	83
6	198	103	118		48	50	185	80
7	195	100	123		48	44	184	79
8	205	100	125		51	48	190	78
9	196	103	56	56	44	45	190	78
10	208	100	69	64	75		178	78

gradually sharper towards the tip of tarsus. Beak stout, about 1.5 times as long as wide, about 160 μ in length; a few rather long (up to 60 μ) setae near the apex. Two pairs of thoracic spiracles situated just latero-caudad of bases of anterior and middle legs; 5 pairs of abdominal spiracles present on the 1st to 5th abdominal segments near the body margin; each opening simple, with neither disc pores nor spines associated, presenting no distinctive characters. Dermal gland pores consisting of 2 quadrilocular types; the flat type scattered in the furrows or interspaces between the spine clusters or bands, abundant on the venter especially along the outside of the ovisac band and in the area enclosed by the ovisac band; the tubercular type sparse, restricted to the mid-thoracic region of the venter, somewhat variable in shape and size. Dorsally 9 marginal clusters of body spines present on each side, the clusters of the 2nd to 5th abdominal segments running together to form a continuous series; 10 transverse dorsal bands or clusters not interrupted medially. Venter with a pattern of rather loose clusters or narrow bands of spines on the anterior portion of the body; with the transverse anterior section of the ovisac band well developed, and with the lateral sections incomplete, reduced to a series of spine clusters toward the end of the body; no spines across the area enclosed by the ovisac band. Body spine clusters or bands composed of 2 types of the spines: One of them enlarged and more or less expanded at base, tapering to bluntly rounded or truncated apex, about 14–18 μ long; the other cylindrical or somewhat constricted near middle and slightly swollen at apex, about 6–8 μ long, interspersed among the clusters of the former and not nearly so numerous. Anal ring cellular, close to the apex, with 6 setae subequal in length, being about 45 μ , and bluntly rounded apically.

Specimens examined: Kanaya, Shizuoka-ken, collected from the ground litter of tea gardens.

This species is evidently very close to *N. minima* MORRISON, which was originally described from specimens collected in North America in pine litter on clay, but may be distinguishable from *minima* by the dorsal abdominal spine bands never interrupted on the midline.

The known species of the genus *Newsteadia* have been often obtained with Berlese funnels or on decaying vegetable matter or curious plants such as dead grass, for-

Fig. 1. *Newsteadia kanayana*, n. sp. Adult female.

A : Body; B : Beak; C : Marginal spine cluster of 4th abdominal segment; D : Anterior median section of ovisac band; E : Anterior portion of vulvar opening; F : Anal ring.
qp-f : Quadrilocular pore, flat type; qp-t : Quadrilocular pore, tubercular type.

Fig. 2. *Newsteadia kanayana*, n. sp. Adult female. External appearance to show waxy secretions.

est litter, packing sphagnum, leaf mold, moss, etc. (TAKAHASHI, 1929; MORRISON 1952), so that their feeding plants have not been confirmed in many cases.

Nipponorthezia ardisiae KUWANA

(Jap. name : Yabukôji-hakama-kaigaramushi), (Figs. 3: A—F, 4: B),

Nipponorthezia ardisiae KUWANA, 1916, p. 150; MORRISON, 1952, p. 72.

Adult female: As mounted on the slide, stout elliptical, 1.3–1.5 mm long. Derm moderately sclerotized, minutely wrinkled or with scaly granulations scattered throughout. Eyestalk large, cone-shaped, height about $25\ \mu$, placed near the base of antenna. Antenna 3-segmented, about $460\ \mu$ in length, terminal segment enlarged, over twice as long as segment II, with 3 fleshy setae. Three pairs of legs well developed, approximately same in shape, the posterior pair larger than the others; tibia and tarsus tightly fused, without any distinct constriction between them. The lengths of the parts of posterior legs; femur $380\text{--}410\ \mu$, tibio-tarsus $440\text{--}500\ \mu$, claw $56\text{--}66\ \mu$; the claw without denticles; claw digitules minute, conical, sharply pointed apically. Antennal and leg setae numerous, consistently short, stiff, with apex acute. Beak elongate, distinctly 2-segmented, $220\text{--}250\ \mu$ in length. Two pairs of thoracic and 6 pairs of abdominal spiracles present along the body margin; the thoracic spiracles with 5–7 quadrilocular disc pores associated. Body spines well uniformed, elongate, about $12\text{--}20\ \mu$ long, tapering to rounded or truncated apex. Dorsally marginal spine clusters practically surrounding marginal area in a narrow band interrupted by intersegmental furrows; head to 1st abdominal segment with a pair of longitudinal, segmentally interrupted bands of spines medially, the thoracic and 1st abdominal clusters more or less crescent; 2nd abdominal segment medially at most with a few spines (at times absent); 3 submedio-submarginal bands present on 3rd to 5th, reducing in number towards the submarginal area, on the 3rd the submarginal spines almost

Fig. 3. *Nipponorthesia ardisiae* KUWANA. ♀ Adult female.

A : Body; B : Beak; C : Posterior thoracic spiracle; D : Anterior median section of ovisac band; E : Anterior portion of vulvar opening; F : Anal ring. qp : Quadrilocular pore; qp-c : Quadrilocular pore, cruciform type; mp : Multilocular pore.

Fig. 4. First instar larvae. A : *Newsteadia kanayana*, n. sp. B : *Nipponorthesia ardisiae* KUWANA.

lacking; 2 transverse median bands present on 6th and 7th, not interrupted on the midline, the band of 6th abdominal segment fused with marginal band turning continuously to the venter. The ventral side of body with transverse anterior section of the ovisac band well developed, but the lateral sections interrupted, made up of 3 to 4 narrow overlapping spine bands; spines lacking in the thoracic region and the area enclosed by ovisac band. Quadrilocular pores occur throughout body, few and sparsely scattered on both surface of thoracic region, numerous and arranged in single rows between the spine bands or clusters, strewn among the spines of the ovisac band and also along the outer margin of the lateral section of the ovisac band; these pores scarcely sclerotized on the rim, cruciform or butterfly-shaped. Many quadrilocular and multilocular pores present in the area enclosed by ovisac band, in front of the vulva especially abundant and mingled with many small setae; the quadrilocular pores of this area are circular or at times slightly quadrate, surrounded by a weakly sclerotized rim, loculi arranged in a square. Anal ring cellular, close to the apex, with 3 pairs of setae; anterior pair largest, about 55–60 μ in length, stout, slightly tapering and frayed at the tip; intermediate pair much smaller than the others, acute

at apex; posterior pair essentially same in shape with the anterior.

Specimens examined: Kikugawa and Kanaya, Shizuoka-ken, on the roots of *Thea sinensis*.

This species was originally described from Yokohama, Japan on the root of *Ardisia Japonica*, and later recorded in Shizuoka-ken as a feeder of citrus root (YOSHIDA and KUBOTA, 1962).

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