

NEW WATER MITE SPECIES (ACARI: HYDRACARINA) FROM NEW ZEALAND

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SYSTEMATICS
HYDRACARINA
NEW ZEALAND

SUMMARY: Two new species in the new genus *Stellulathyas*, *S. magnifica* and *S. lundbladi*, and one in a previously named genus, *Paramideopsis regalis* are described from New Zealand. The species of *Stellulathyas* were collected in terrestrial situations. The anomalous zoogeographic distributions of these two genera are discussed.

SYSTEMATIQUE
HYDRACARINA
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RÉSUMÉ: Deux espèces nouvelles de Nouvelle Zélande du nouveau genre *Stellulathyas*, *S. magnifica* et *S. lundbladi*, ainsi qu'une espèce du genre *Paramideopsis regalis* sont décrites. Les espèces de *Stellulathyas* ont été récoltées dans des ambiances terrestres. Les irrégularités de la distributions zoogéographique de ces deux genres sont discutées.

INTRODUCTION

In general, the water mite taxa found in New Zealand are those expected based on former Gondwana faunal connections, with sister groups present either in Australia or austral South America. The three species treated here are exceptions, having relatives in either the oriental or holarctic regions but none in the other southern land masses. Two of the species belong to a distinctive new genus in the family Ctenothyadidae. The type and only other species in this family, *Ctenothyas verrucosa* Lundblad, is based on specimens collected in Java. The other new species is a member of the Nudomideopsidae, which with the exception of New Zealand, is known only from the holarctic region. At present four species of the latter group are known from both Europe and North America, and 19 from Japan.

Water mites from the regions between New Zealand and Asia are still incompletely known and it is possible that these gaps are only artifacts due to insufficient collecting. However, enough sampling has

been done in Australia that, if members of these two families were present, it is likely they would have been collected. The Ctenothyadidae, as members of the primitive superfamily Hydryphantoidea, very likely date to Pangaeon times. Ian SMITH (personal communication) considers the Nudomideopsidae to be among the more primitive members of the Arrenur-oidea and so could have been extant at the time all continents were interconnected. It is therefore possible that the present distributions are the result of either a partial extinction of taxa which were widespread on Pangaea or the result of dispersal after the breakup of the supercontinent. However, the extreme isolation of New Zealand, plus the fact that the bulk of the water mite fauna of the islands are closely related to forms in other southern continents, suggests vicariance is the most likely explanation.

Measurements (in micrometres) of the holotype and allotype are given first. If paratypes are available, the size variation is given in parentheses following measurements of the primary types. The primary types are deposited in the National Museum, Wellington. We wish to thank Graeme RAMSAY for permitting us to include material from his collections.

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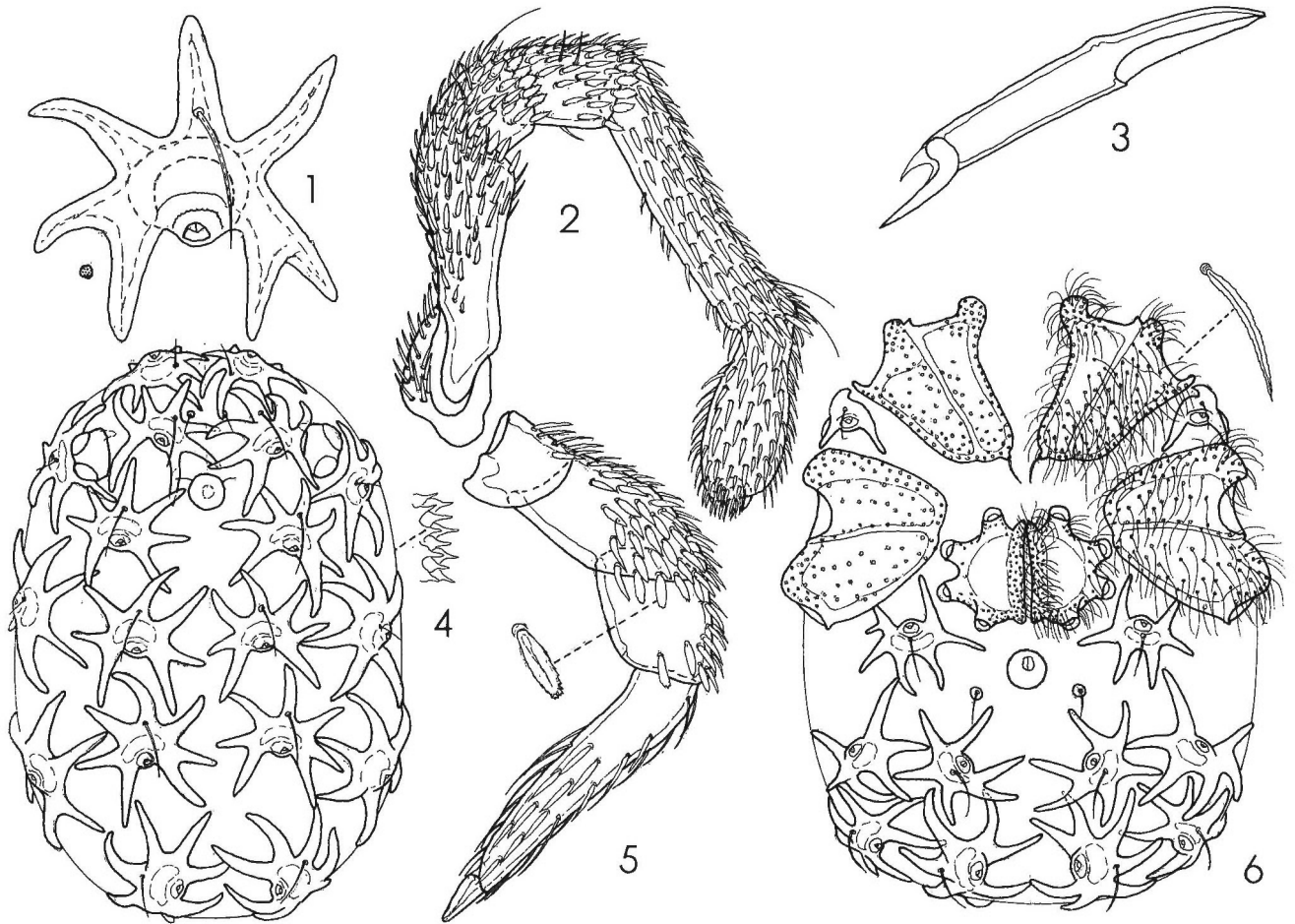
Family CTENOTHADIDAE Lundblad

Two new species belonging to a distinctive new genus necessitate a revision of the family diagnosis given by Cook (1974).

Revised diagnosis: Integument soft with well developed papillae, these varying from rounded (fig. 10) to pointed (fig. 4) and are even longer in the type species, *C. verrucosa*; dorsalia and ventralia absent, the muscle attachment sites are little more than small rounded points as indicated at lower left on figure 1; glandularia either lying free in the integument or

surrounded by stellate sclerites (fig. 10); lateral eyes in capsules; median eye unpigmented, with the postocularia lying near its anterolateral edges; coxae in four groups and bearing few to numerous setae; genital field consisting of paired genital flaps which bear three to five pairs of acetabula on the outer margins (fig. 6); capitulum and chelicera similar to those of the Hydryphantidae; palp not chelate and bears numerous short stocky setae (figs. 5, 7); legs without swimming setae, but covered by numerous short heavy setae (figs. 2, 11); claws simple.

Discussion: At least the New Zealand members of the Ctenothyadidae appear to have been successful in



FIGS. 1-6: *Stelulathyas lundbladi*, new species, female, dorsal glandularium and muscle attachment apophyses.
1. — Dorsal. 2. — First leg. 3. — Chelicera. 4. — Dorsal view. 5. — Medial view of palp. 6. — Ventral view.

reinventing the terrestrial habitat. One of the species was found crawling on mosses on a tree, the other was taken in the grasses of a swampy area near (but not in) a stream. LUNDBLAD (1936) in his description of *Ctenothyas verrucosa* listed the collection site as flowing water, but mentioned the legs were much like those of terrestrial mites. LUNDBLAD did not collect the specimens: they were taken by a non-specialist, along with members of the genera *Calonyx*, *Sperchon* and *Torrenticola* from a single site. The latter three genera were certainly taken from the stream, but it is possible that the specimens of *Ctenothyas* were actually taken along the edge of the water.

Members of other water mite groups have secondarily become somewhat terrestrial, most noticeably a majority of the Tyrrelliinae and certain Thyadinae such as *Trichothyas* and some *Panisus*. These are often found in seepage areas with only a thin film of moisture. Although the mechanism is presently unknown, their integument attracts water and a positive meniscus is present (rather than the negative meniscus typical of hydrachnid species which always remain submerged). When mites with a positive meniscus move into films of water thinner than their height, the liquid moves up onto their bodies. This keeps them wet but also creates a strong downward pressure on these small animals and forms such as *Tyrrellia* or *Trichothyas* have evolved short thickened legs and a powerful coxal musculature to counter this pressure. Whether the integument of the Ctenothyadidae induces a positive or negative meniscus is unknown, but the relatively long leg segments and comparatively small coxal musculature contrasts with the condition in *Tyrrellia* and *Trichothyas*, suggesting the Ctenothyadidae are not generally subjected to the forces created by a positive meniscus. The proportions of the leg segments and especially the chaetotaxy are more like those of many terrestrial Parasitengona. It is tempting to speculate that the ctenothyadids are as truly terrestrial as the Johnstoniidae, and can thrive in situations where the humidity remains continually high. The Ctenothyadidae are members of the "red water mites", a group of primitive families in which the larvae are generally aerial and only rarely have become secondarily aquatic. It therefore seems possible the whole life cycle of ctenothyadids could be passed away from the actual waters

of a pond or stream. Although it must remain only speculation, the structure of the legs and information on collection sites of the New Zealand species suggests that members of this family have become the most terrestrial of any hydrachnid group. The presence of typical water mite acetabula (although unusually arranged) and typical water mite glandularia indicate without doubt they evolved from some aquatic hydrachnid ancestor, and not from an independent line of evolution from some terrestrial parasitengonan stock.

Stellulathyas, new genus

Diagnosis: Characters of the family Ctenothyadidae; dorsum and venter with a series of stellate sclerites surrounding the glandularia (figs. 4, 6); these sclerites do not function as muscle attachment sites; dorsoglandularia with seven projections, lateroglandularia and most glandularia of the venter with six projections; only the central portion of the glandularia sclerites (as indicated by the circular broken lines in figure 1) joined to the integument; the associated projections lie close to the integument but are free; coxae with numerous setae; genital field with four or five pairs of acetabula placed on outer margins of genital flaps, with four pairs the most typical number.

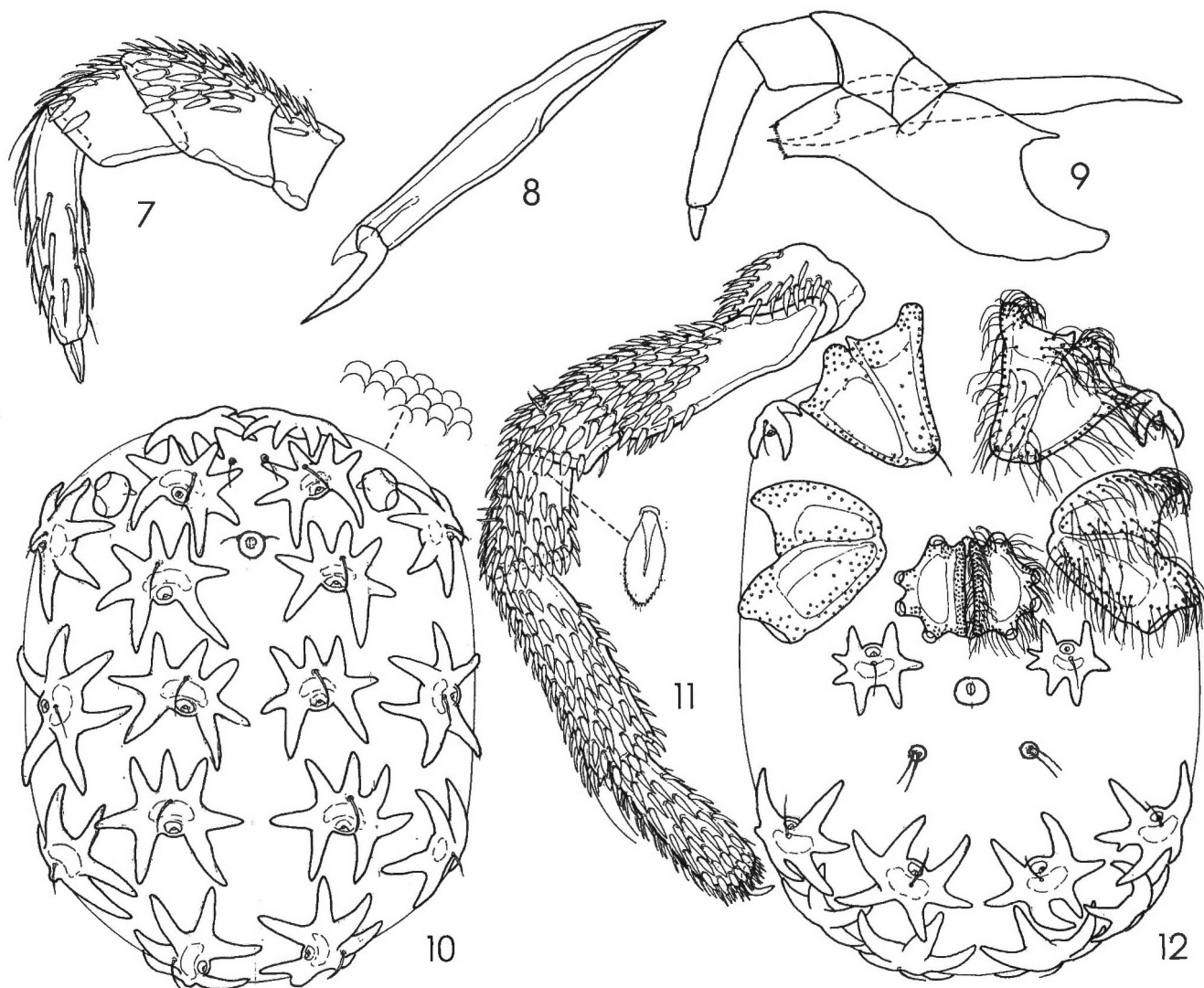
Type species: *Stellulathyas magnifica*, new species.

Discussion: Any of the above characteristics will separate the new genus from *Ctenothyas*. The unusual morphology of the sclerites surrounding the glandularia is puzzling. Terry GLEDHILL, after recently examining specimens of *Stellulathyas*, noted the similarity of the glandularia sclerite projections to the recumbent spines of certain cacti which he grows. These spines in the cacti serve to trap and retain moisture and he suggested the glandularia sclerites might serve the same purpose in these terrestrial or semiterrestrial hydrachnids.

Stellulathyas magnifica, new species

(Figs. 7-12)

Female: Length of body 2000 (1885-1980), width 1445 (1245-1370); integument soft but with rounded papillae as indicated in the detail of figure 10; lateral



FIGS.7-12: *Stelulathyas magnifica*, new species (female).

7. — Medial view of the palp. 8. — Chelicera. 9. — Lateral view of capitulum, chelicera and palp (setae not indicated). 10. — Dorsal view. 11. — First leg. 12. — Ventral view.

eyes in capsules; median eye unpigmented and surrounded by a rounded sclerite 98 (83-91) in diameter; postocularia placed close to anterolateral margins of located close together on very small sclerites medial to dorsoglandularia 2; dorsalia and ventralia absent; muscle attachment sites are very small apophyses flanking the glandularia sclerites; glandularia projections relatively more stocky than in the following species; coxae in four groups and bearing numerous setae; a pair of more thickened setae on small papillae at posteromedial corners of first coxae; greatest

dimension of anterior coxal group 532 (456-470); greatest dimension of posterior coxal group 548 (471-502); coxoglandularia 1 and 2 surrounded by stellate sclerites; genital field located between the posterior coxal groups; genital field 354 (334-350) in length, 517 (458-470) in width; four to five pairs of genital acetabula located on outer margins of genital flaps, with four pairs most common; numerous fine setae present on both inner and outer margins of genital flaps; excretory pore on a small rounded sclerite somewhat posterior to the genital field; a pair of

small sclerites, typically each with two setae, somewhat posterolateral to the excretory pore; dorsal lengths of the palpal segments: P-I, 85 (78-81); P-II, 183 (167-185); P-III, 118 (104-113); P-IV, 281 (259-273); P-V, 52 (50-52); palp with numerous setae as indicated in figure 7; capitulum 562 (486-517) in length; chelicera 684 (593-608) in length; figure 9 illustrates a lateral view of the capitulum, chelicera and palp; dorsal lengths of the segments of the first leg: I-Leg-1, 167 (144-152); I-Leg-2, 228 (221-243); I-Leg-3, 161 (141-146); I-Leg-4, 213 (194-198); I-Leg-5, 365 (334); I-Leg-6, 273 (243-259); I-Leg-6 not noticeably expanded at distal end; legs with numerous short thickened setae, the arrangement of which are better illustrated (fig. 11) than described; claws simple; proportions and chetotaxy of second and third legs similar but segments, somewhat longer relative to height; fourth leg with segments relatively (and actually) much longer than the first leg; swimming setae absent.

Male: Very similar to female, the only obvious differences being that it is somewhat smaller and possessing the ejaculatory complex and only measurements are given; length of body 1700 (1535-1560), width 1200 (1125-1140); median eye sclerite 91 (76) in diameter; greatest dimension of anterior coxal group 456 (380-440); greatest dimension of posterior coxal group 455 (395-440); genital field 319 (304-319) in length, 424 (410-456) in width; dorsal lengths of the palpal segments: P-I, 74 (67-74); P-II, 170 (152-163); P-III, 104 (89-96); P-IV, 259 (229-240); P-V, 54 (45-52); capitulum 500 (410-456) in length; chelicera 557 (532) in length; dorsal lengths of the segments of the first leg: I-Leg-1, 152 (135-138); I-Leg-2, 228 (210-212); I-Leg-3, 137 (122-134); I-Leg-4, 182 (160-180); I-Leg-5, 349 (297-323); I-Leg-6, 243 (206-228).

Types: Holotype female, allotype male, 2 paratype males, 1 paratype female, collected by C. J. HORNING at the boat harbor on the south side of Snares Island (off the southern tip of South Island), New Zealand, 26 March 1972; 1 paratype female, collected by Charlotte E. HOLMES at Station Cove on Snares Island, 22 November 1974. This latter specimen was taken at night crawling on moss attached to the bark of *Olea-ria lyallii*.

Discussion: See under the following species

Stellulathyas lundbladi, new species

(Figs. 1-6)

Female: Length of body 1580, width 1230; integument soft but with pointed papillae as shown in the subfigure of figure 4; lateral eyes in capsules; median eye unpigmented and surrounded by a rounded sclerite 84 in diameter; postocularia placed at anterolateral margins of median eye; preocularia close together on very small sclerites medial to dorsoglandularia 2; dorsalia and ventralia absent; muscle attachment sites are very small apophyses flanking the glandularia sclerites; projections on the glandularia sclerites relatively long and slender compared to the previous species; coxae in four groups and bearing numerous setae; structure of these setae indicated in the detail of figure 6; a pair of more thickened setae on small papillae at posteromedial corners of first coxae; greatest dimension of anterior coxal group 418; greatest dimension of posterior coxal group 426; coxoglandularia 1 and 2 surrounded by stellate sclerites; genital field located between the posterior coxal groups; genital field 312 in length, 456 in width; four pairs of genital acetabula, these located on outer margins of genital flaps; numerous fine setae on both the lateral and medial margins of genital flaps; excretory pore on a small rounded sclerite somewhat posterior to the genital field; a pair of small sclerites, each with a single seta, located somewhat posterolateral to the excretory pore; dorsal lengths of palpal segments I-V, 74, 170, 96, 281, 59; palp not chelate and with numerous short heavy setae as indicated in figure 5; palpal segments proportionally longer and thinner than in the previous species; dorsal lengths of segments 1-6 of the first leg: 132, 266, 130, 175, 384, 221; I-Leg-6 distinctly swollen distally; all legs with numerous short heavy setae as indicated in figure 2; claws simple; proportions of second and third legs rather similar to those of the first, but the sixth segment not swollen; segments of fourth leg proportionally (and actually) much longer than those of the first leg; swimming setae absent.

Male: Differs from the female only in being smaller and possessing an ejaculatory complex and only measurements are given; length of body 1320 (1410), width 1030 (1140); median eye sclerite 76 (62) in diameter; greatest dimension of the anterior coxal

group 358 (350); greatest dimension of posterior coxal group 349 (364); genital field 289 (304) in length, 380 (364) in width; dorsal lengths of the palpal segments: P-I, 59 (61); P-II, 140 (144); P-III, 89 (82); P-IV, 237 (233); P-V, 52 (48); capitulum 410 (395) in length; chelicera 502 (471) in length; dorsal lengths of the segments of the first leg: I-Leg-1, 122 (118); I-Leg-2, 213 (228); I-Leg-3, 99 (110); I-Leg-4, 152 (144); I-Leg-5, 334 (320); I-Leg-6, 197 (193).

Types: Holotype female, allotype male, 1 paratype male, collected from a grassy area in a swamp in Pretty Bridge Valley near Nelson, South Island, New Zealand, 9 November 1966 (G. RAMSAY, collector).

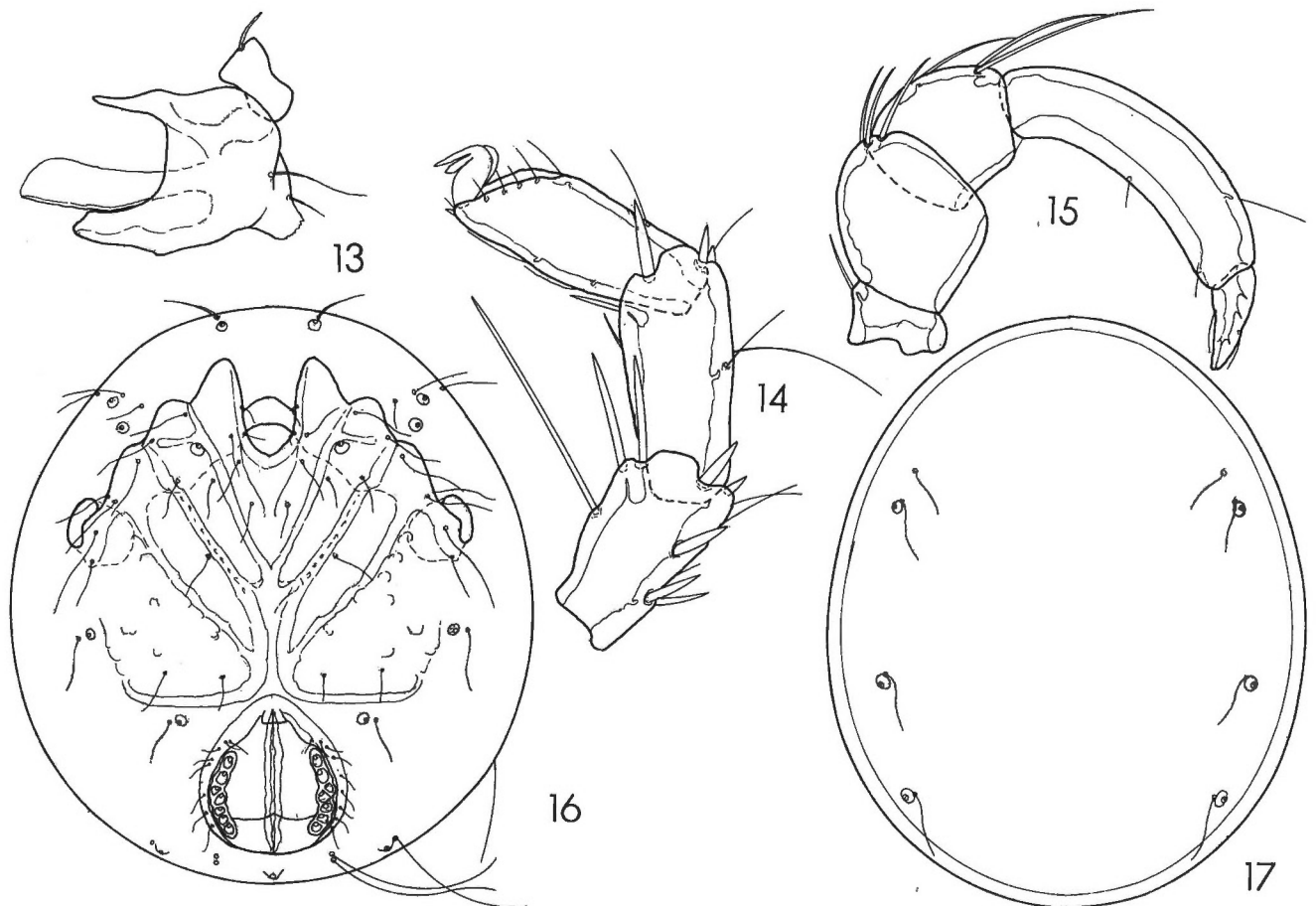
Discussion: *S. magnifica* and *C. lundbladi* are closely related species but differ as follows: *S. lundbladi* is noticeably smaller and the integumental papillae

are pointed (fig. 4) rather than rounded (fig. 10). The projections of the stellate glandularia sclerites are proportionally longer and thinner in *lundbladi*. The proportions of the legs and palp are different, with P-IV and I-Leg-5 proportionally longer and I-Leg-6 more swollen in *lundbladi*.

Family NUDOMIDEOPSIDAE Smith

Paramideopsis regalis, new species (figs. 13-17)

Female: Dorsal and ventral shields present; ventral shield distorted during slide making so that accurate length and width measurements cannot be made;



FIGS. 13-17: *Paramideopsis regalis*, new species (female).
13. — Capitulum. 14. — Distal segment of the first leg. 15. — Medial view of palp. 16. — Ventral shield. 17. — Dorsal shield.

dorsal shield 714 (623) in length, 547 (486) in width; dorsal shield oval and bearing the postocularia and three pairs of glandularia, the placement of which are better illustrated (fig. 17) than described; first coxae not projecting beyond anterior edge of ventral shield; coxoglandularia 1 shifted far forward on the second coxae to near the line between the first and second coxae; coxoglandularia 2 widely separated from each other, the distance being greater than width of genital field; posterior margins of fourth coxae straight and extending at right angles to long axis of the body; gonopore 155 (155) in width; seven pairs of genital acetabula, these fused into a narrow sclerite on their respective sides; gonopore closely flanked by 6-9 pairs of small setae; dorsal lengths of the palpal segments: P-I, 24 (22); P-II, 41 (44); P-III, 47 (49); P-IV, 96 (100); P-V, 29 (34); P-IV somewhat bowed and of nearly uniform height along entire length; one of the two ventral setae on this segment placed near middle, the other near distal end; figure 15 illustrates a medial view of the palp; capitulum with slightly developed rostrum and is 104 in length; Capitulum with two pairs of setae dorsal to the rostrum, the more proximal pair of which are relatively long (fig. 13); chelicera 83 in length; dorsal lengths of the distal segments of the first leg: I-Leg-4, 72 (66); I-Leg-5, 86 (76); I-Leg-6, 93 (86); figure 14 illustrates these segments; swimming setae absent.

Male: Unknown.

Types: Holotype female, from a limnocrone spring in the Mangakotukutuku Valley, somewhat north of Wellington, North Island, New Zealand, 18 November 1966; 1 paratype female, from a helocrone spring in a forest near the type locality, 2 July 1963. Both specimens collected by C. HOPKINS.

Discussion: The present species is only tentatively assigned to the genus *Paramideopsis*. It shares the polyacetabulate condition of the type species, *P. susanae*, described by SMITH (1983) from North America (Oregon, British Columbia). However, except for possessing numerous acetabula (six pairs in *susanae*,

seven pairs in *regalis*) the present species seems more closely related to the triacetabulate New Zealand species, *Nudomideopsis forkensis* Imamura, 1977, the latter redescribed by COOK (1983). The palps of the two New Zealand species, with their long P-IV and one of the two ventral setae of this segment located near the distal end, are very similar. P-IV is much shorter and has both ventral setae of this segment located near the middle of the ventral side in *susanae*. Also, the deep capitular bay and widely separated coxoglandularia 2 are similar in the New Zealand species and contrast with the condition in the North American species. There is therefore a distinct possibility that the present species has independently evolved from some triacetabulate ancestor. COOK (1992) assigned a New Zealand ground water species, *kyphus*, to the genus *Paramideopsis*. It differs in many characteristics, the most obvious being its possession of five pairs of acetabula, a nearly circular body, and a pronounced humping of the dorsal shield.

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