

THE RHAPHIDOPHORIDAE (Orthoptera) OF AUSTRALIA. PART II.

New Species from the Bass Strait Islands and Tasmania

By Aola M. Richards¹

Abstract: Two new species of *Parvotettix* Richards are described. *P. whinrayi* n. sp. lives in caves and under boulders on islands in the Kent Group, Bass Strait, and *P. fortescuensis* n. sp. occurs under logs, stones and in mine tunnels in SE Tasmania. A new species of *Cavernotettix* Richards, *C. craggiensis* n. sp., is described from under boulders on Craggy Island, Bass Strait. A new species of *Micropathus* Richards, *M. kiernani* n. sp., is described from a cave in SE Tasmania. Keys and new locality records are given for all species of *Parvotettix*, *Cavernotettix* and *Micropathus*. The distribution and relationships of *Parvotettix* and *Cavernotettix* are discussed.

With continuing exploration of limestone caves, mine adits and rock shelters throughout Tasmania and the Bass Strait islands, the range of the raphidophorid genera *Micropathus* Richards, *Parvotettix* Richards and *Cavernotettix* Richards has been further extended (Richards 1964a, 1967, 1968, 1970, 1971). Four new species have recently been discovered, two belonging to *Parvotettix* and one to each of the other two genera. *M. kiernani* n. sp. and *P. fortescuensis* n. sp. occur in SE Tasmania, while *P. whinrayi* n. sp. and *C. craggiensis* n. sp. occur on islands in Bass Strait. *C. craggiensis* lives on Craggy Island, and *P. whinrayi* occurs on several islands in the Kent Group.

The new distribution records confirm that *Micropathus* is primarily a subterranean genus. *Cavernotettix* and *Parvotettix* however are equally distributed in subterranean and epigeal habitats provided they are cool, moist and dark. They have been found in caves, mine adits, animal burrows, under logs and boulders, and inside houses.

Rhaphidophoridae appear to be well distributed throughout the Bass Strait region, and they have been found on all islands that have been searched. Isolation of crickets on Craggy Island, and on islands in the Furneaux Group and Kent Group has, in each case, led to speciation.

Craggy Island is about 19.32 km to the NW of Flinders Island. It is about 1.1 km long and 0.5 km wide and is uninhabited. It consists of four large eroded granite towers surrounded by talus slopes of rocks and boulders. Many of the large boulders form overhangs and rock shelters, and fairy penguins, prions and petrels live in burrows beneath them. Oatmeal and yeast trails at the entrance and just inside several of these rock shelters attracted a number of *C. craggiensis*. It is assumed the crickets live in the burrows during the day while the birds are absent, and forage for food at night, as is the case with certain raphidophorids in New Zealand (Richards 1954, 1958, 1964b).

The Kent Group is about 80 km SE of Wilson's Promontory and 64 km NW of Flinders Island. It consists of five main islands — Deal, Erith, Dover and North East all close together, with South West some distance away. Deal, the largest, is the only inhabited island in the Group. Through use of oatmeal trails, *P. whinrayi* has been found on Deal, Erith, Dover and North East Islands. Its presence on South West Island has yet to be confirmed. On three of the islands it has been found close to high water level. On Deal

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Island it occurred under boulders, on Erith Island inside a limestone cave, and on Dover Island inside a granite cave.

As with other raphidophorids, *P. whinrayi* is a scavenger. Between 2100 and 2300 hours from 5 to 12 December 1972, up to 40 crickets were observed in an old house at Brown's Bay, Deal Island, feeding on scraps of fresh meat, dried up pieces of meat previously used to bait rat traps, on layer pellets used to feed fowls, on a cashew nut, and on the remains of a dead cricket (Whinray, pers. comm.).

Genus *Parvotettix* Richards

Parvotettix Richards, 1968, *Pacif. Ins.* **10**: 168.

The genus *Parvotettix* contains four species, *P. goedei* Richards from caves, mines and houses in northern Tasmania, and rain forest in southern Tasmania; *P. rangaensis* Richards from caves on Flinders Island and Cape Barren Island; *P. domesticus* Richards from Hobart houses; and *P. maydenaensis* Richards from caves and rain forest in southern Tasmania. Two further species are described here, one from caves and under boulders on islands in the Kent Group, Bass Strait, and the other from under logs and stones on Tasman Peninsula and Forestier Peninsula, and in mines near Mt Cygnet in SE Tasmania. The six species may be distinguished by the following key.

KEY TO SPECIES OF *Parvotettix*

1. Prominent dark setae on abdominal segments.2
 Prominent light brown setae on abdominal segments.**maydenaensis** Richards
2. Subgenital plate in ♀ with distal margin not emarginate. Male styli less than 1.2 length of sternite IX.3
 Subgenital plate in ♀ with distal margin emarginate. Male styli 1.2 length of sternite IX.**whinrayi** n. sp.
3. Prominent dark setae on first 9 abdominal segments. Subgenital plate in ♀ with distal margin not truncate. Male styli less than 0.7 length of sternite IX.4
 Prominent dark setae on first 8 abdominal segments. Subgenital plate in ♀ with distal margin truncate. Male styli 0.7 length of sternite IX.**rangaensis** Richards
4. Ovipositor armed with 7 teeth. Subgenital plate in ♀ with acute apex. Subgenital plate in ♂ with distal margin not truncate.5
 Ovipositor armed with 8 teeth. Subgenital plate in ♀ with rounded apex. Subgenital plate in ♂ with distal margin truncate.**goedei** Richards
5. Subgenital plate in ♀ with acute apex not chitinized. Subgenital plate in ♂ with distal margin emarginate. Neither plate grooved medianly.**domesticus** Richards
 Subgenital plate in ♀ with acute apex chitinized. Subgenital plate in ♂ with distal margin rounded. Both plates grooved medianly.**fortescuensis** n. sp.

Parvotettix goedei Richards

Parvotettix goedei Richards, 1968, *Pacif. Ins.* **10**: 168-170, fig. 1, table 1; 1970, *Pacif. Ins.* **12**: 2-3; 1971, *Pacif. Ins.* **13**: 576.

New locality records of this species have recently been obtained from northern Tasmania.

NEW RECORDS. TASMANIA: Baldocks Cave, Mole Creek, 20.II.1972, coll. A. Goede; in bath and bedroom of farm house, Blackwell Road, approximately 1 km SE of Exeter,

West Tamar, altitude 80 m, 14.V.1972, coll. N. White & M. Vermeulen; on ground outside same farm house SE of Exeter, West Tamar, 27.VI.1972, coll. N. White & H. Cummings; unnamed cave (MU3), Montagu, NW Tasmania, 17.II.1973, coll. K. Kiernan.

Parvotettix domesticus Richards

Parvotettix domesticus Richards, 1970, *Pacif. Ins.* **12**: 5-7, fig. 2, table 2; 1971, *Pacif. Ins.* **13**: 577.

Two new records of this species have been obtained, but it is still confined to human habitation in the vicinity of Hobart.

NEW RECORDS. TASMANIA: Under fire wood, 43 Seaview Avenue, Taroona, Hobart, 12.VI.1971, coll. S. Stephens; front lawn of house Blackmans Bay, 10 road miles (16 km)S of Hobart, altitude 30 m, 31.X.1972, coll. T. Goede.

Parvotettix maydenaensis Richards

Parvotettix maydenaensis Richards, 1971, *Pacif. Ins.* **13**: 577-579, fig. 1, table 1.

Fresh material has recently been collected under logs, in SE Tasmania.

NEW RECORDS. TASMANIA: Under logs on left bank Huon River just upstream from Tahune Bridge, approx. 18 km WNW of Geeveston, altitude 60 m, 29.IV.1972, 1.X.1972, coll. A. & T. Goede.

Parvotettix whinrayi Richards, new species Text-figure 1 (Figs. 1-6).

Colour. Head light brown mottled with dark brown; pronotum, mesonotum and metanotum dark brown mottled with light brown; abdominal terga ochreous mottled with dark brown and mid

Table 1. Variability in number of linear spines on the legs of *Parvotettix whinrayi* n. sp.

		Mean		Number specimens		Standard deviation		Range	
		L	R	L	R	L	R	L	R
Hind Tibia	Prolateral	13.1	13	20	20	1.8	1.8	11-19	9-17
Superior	Retrolateral	13.4	13.9	20	20	1.7	1.4	11-18	11-17
Hind Tarsus	Prolateral	1.1	1.2	20	20	0.2	0.4	1-2	1-2
1 Superior	Retrolateral	0.3	0.3	20	20	0.5	0.4	0-1	0-1

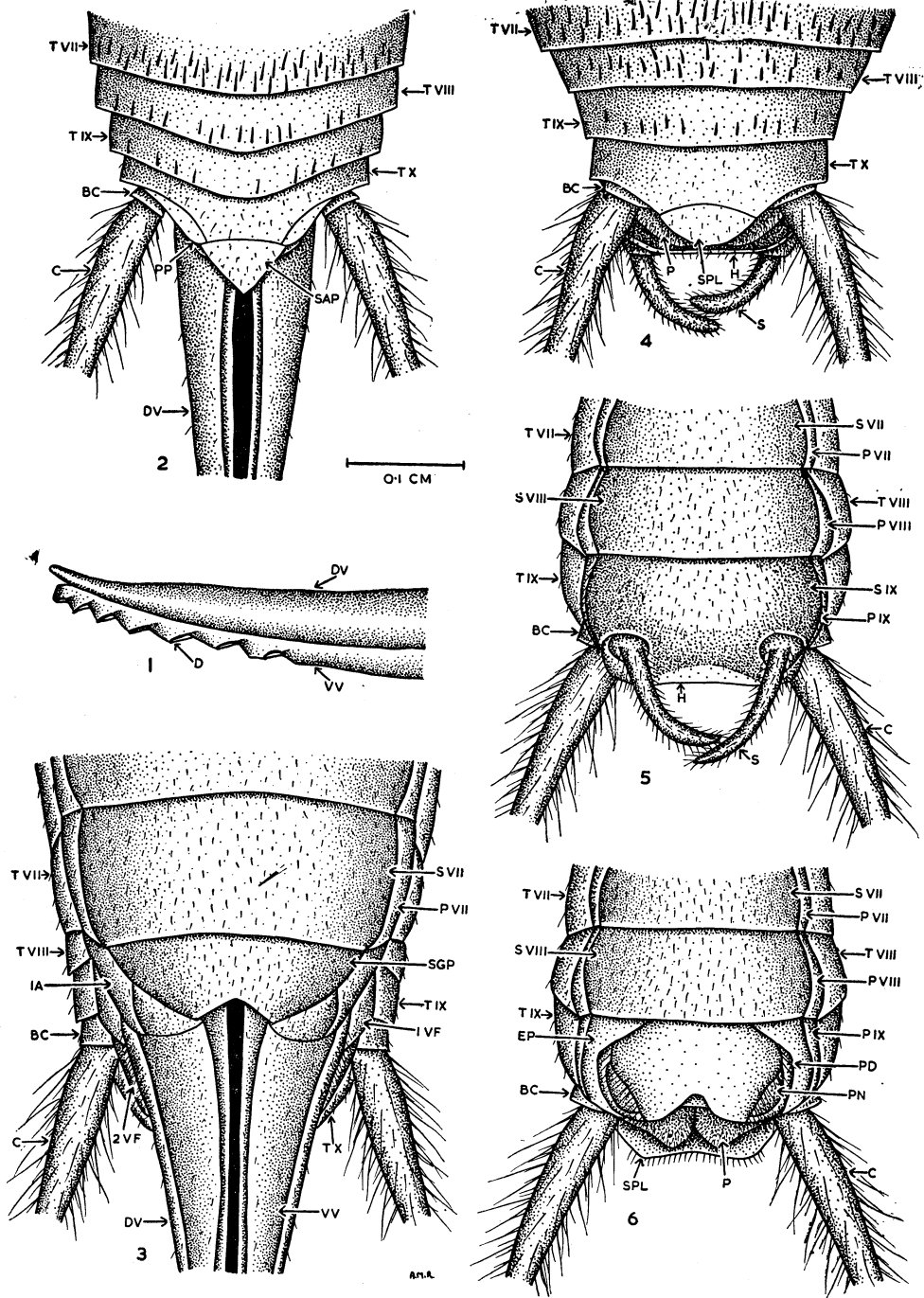
L=left leg; R=right leg.

brown; femora and tibiae mottled or banded with dark brown, light brown and ochreous, tarsi light brown; antennae mid brown; ovipositor light reddish brown.

Body. Length 11 mm in ♂, and 11 to 12 mm in ♀. Antennae broken. First 9 abdominal terga with prominent proximally directed dark brown setae. Ovipositor 0.6 length of body; ventral valves armed distally 0.4 of total length to apex with 7 well developed teeth (Fig. 1).

Antennae. As in generic description. Third segment on both dorsal and ventral aspects 3× as long as pedicel. Sexual dimorphism absent. No spines present on flagella of ♂ or ♀.

Legs. Fore and middle legs subequal in length, with hind leg 1.7 length of fore and middle legs. Sexual dimorphism absent. All legs thickly clothed with short setae. Hind tibiae and proximal segment of hind tarsus armed with variable number of linear spines (Table 1). No linear spines on fore, middle and hind femora, or fore and middle tibiae and tarsi. Apical spines constant in number, as in generic description. Length of proximal segment of hind tarsus subequal with other 3 segments together. Ratio of length of legs to length of body: fore leg 1.4 : 1; middle leg 1.4 : 1. hind leg 2.4 : 1.



Text-figure 1. *Parvotettix whinrayi* n. sp. 1. Distal portion of ovipositor showing teeth on ventral valve. 2. ♀ genitalia, dorsal view. 3. ♀ genitalia, ventral view. 4. ♂ genitalia, dorsal view. 5. ♂ genitalia, ventral view. 6. ♂ genitalia, ventral view, subgenital plate removed to expose structures beneath.

Genitalia. ♀: Suranal plate, Fig. 2 (SAP), triangulate, tapering to an acute apex, whole plate sparsely clothed with setae. Subgenital plate, Fig. 3 (SGP), convex laterally, distal margin emarginate, whole plate 0.3 as long as wide and clothed with setae. ♂ Suranal plate, Fig. 4 (SPL), triangulate, concave laterally tapering to a rounded distal margin; distal margin clothed with setae, rest of plate sparsely clothed with setae. Subgenital plate, Figs. 4, 5 (H), rectangulate, approximately 1.9 as wide as long, convex laterally, distal margin slightly emarginate. Plate raised proximomedianly, then sloping towards margins; whole plate clothed with setae, more thickly towards lateral margins. On ventral surface plate curved over anteriorly, Fig. 4 (H). Two styli, Figs. 4, 5 (S), elongate, sickle-shaped, thickly clothed with short bristles, length of styli being 1.2 length of sternite IX (S IX). Parameres, Fig. 6 (P), elongate, rounded at apex, 1.6 as long as wide, distal portion thickly clothed with setae. Pseudosternite, Fig. 6 (PD), twice as wide as long, distal margin slightly emarginate, greater portion of dorsal lobe covers penis, lateral margins of dorsal lobe bearing numerous long setae. Penis, Fig. 6 (PN), 2-lobed, each lobe 1.3 longer than wide. Para-procts absent.

LOCALITY. KENT GROUP. Main limestone cave, West Cove, Erith Island (type locality), 14.XII.1971, 15.XII.1971, coll. J.S. Whinray; granite cave, Myrmidon Bay, Dover Island, 15.XII.1971, coll. J.S. Whinray; under granite boulders near boulder beach, Myrmidon Bay, Dover Island, 15.XII.1971, coll. J.S. Whinray; under granite boulders, South East Cove, North East Island, 30.XI.1971, coll. J.S. Whinray; under granite boulders near beach East Cove, Deal Island, 6.XII.1971, 7.XII.1971, 22.XII.1971, coll. J.S. Whinray; in lighthouse keeper's workshop, Deal Island, 24.XII.1971, coll. F. Armstrong; in old house, Brown's Bay, Deal Island, 3.XII.1972, coll. J.S. Whinray.

TYPES. Holotype ♂, allotype ♀ and 4 paratypes, 2 ♂♂ and 2♀♀, in Australian National Insect Collection, C.S.I.R.O., Canberra. Two paratypes, ♂ and ♀, in Australian Museum, Sydney. Four paratypes, 2 ♂♂ and 2♀♀, in British Museum (Nat. Hist.), London. Two paratypes, ♂ and ♀, in Tasmanian Museum, Hobart.

REMARKS. Very closely related to *P. rangaensis*. Separated from other species by several characters.

1. Shape of subgenital plate of ♀.
2. Very long, sickle-shaped styli of ♂.
3. Shape of ♂ pseudosternite.
4. Long setae on lateral margins of dorsal lobe of pseudosternite.
5. Longer legs.

Named for John Whinray who has made an invaluable contribution to the study of the Raphidophoridae from the Bass Strait islands.

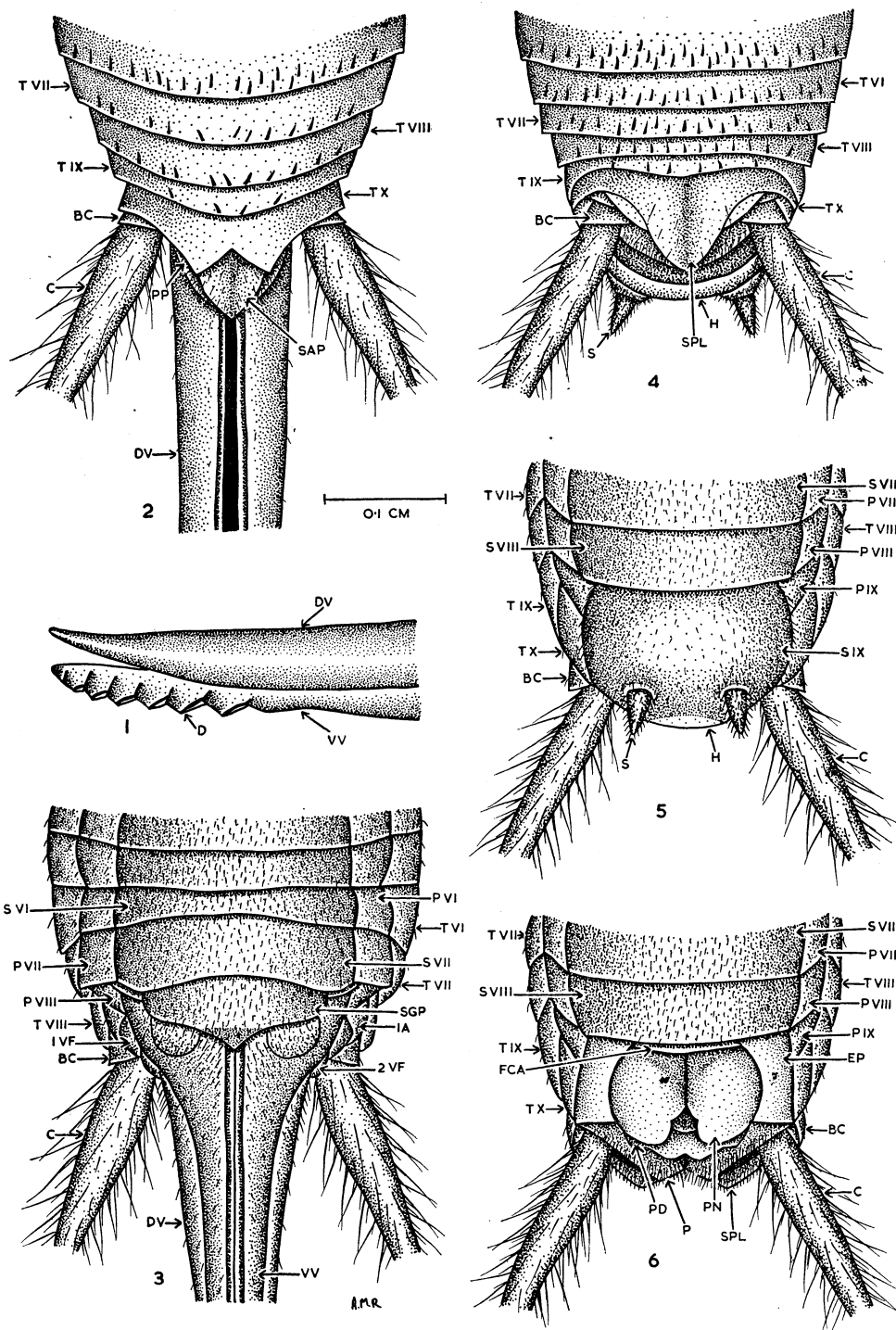
Parvotettix fortescuensis Richards, new species Text-figure 2 (Figs. 1-6).

Colour. Head mid brown, pronotum, mesonotum, metanotum and abdominal terga dark brown mottled with mid brown and light brown; femora and tibiae mottled or banded with mid brown and light brown, tarsi light brown; antennae mid brown; ovipositor reddish brown.

Body. Length 11 mm in ♂, and 9 to 11 mm in ♀. Antennae broken. First 9 abdominal terga with prominent proximally directed mid brown setae. Ovipositor 0.5 length of body; ventral valves armed distally 0.5 of total length to apex with 7 well developed teeth (Fig. 1).

Antennae. As in generic description. Third segment in ♂ with both dorsal and ventral aspects 3× as long as pedicel; in ♀ with dorsal aspect 2.2× as long as pedicel, and ventral aspect 2.6× as long as pedicel. No spines present on flagella of ♂ or ♀.

Legs. Fore and middle legs subequal in length, with hind leg in ♂ 1.8 and in ♀ 1.9 length of fore and middle legs. Sexual dimorphism slightly developed with fore, middle and hind legs of ♀



Text-figure 2. *Parvotettix fortescuensis* n. sp. 1. Distal portion of ovipositor showing teeth on ventral valve. 2. ♀ genitalia, dorsal view. 3. ♀ genitalia, ventral view. 4. ♂ genitalia, dorsal view. 5. ♂ genitalia, ventral view. 6. ♂ genitalia, ventral view, subgenital plate removed to expose structures beneath.

0.9 as long as σ . All legs thickly clothed with short setae. Hind tibiae and proximal segment of hind tarsus armed with variable number of linear spines (Table 2). No linear spines on fore, middle and hind femora, or fore and middle tibiae and tarsi. Apical spines constant in number, as in generic description. Length of proximal segment of hind tarsus subequal with other 3 segments together. Ratio of legs to length of body: fore leg 1.1 : 1; middle leg 1.1 : 1; hind leg 2 : 1.

Table 2. Variability in number of linear spines on the legs of *Parvotettix fortescueensis* n. sp.

		Mean		Number specimens		Standard deviation		Range	
		L	R	L	R	L	R	L	R
Hind Tibia	Prolateral	12.2	12.3	20	20	1.1	1.5	10-14	10-16
Superior	Retrolateral	11.4	11.6	20	20	1.3	1.8	9-14	9-15
Hind Tarsus	Prolateral	0.8	0.6	20	20	0.7	0.6	0-2	0-2
1 Superior	Retrolateral	0	0	20	20	0	0	0	0

L=left leg; R=right leg.

Genitalia. ♀: Suranal plate, Fig. 2 (SAP), triangulate, tapering to an acute apex, plate grooved medianly, whole plate sparsely clothed with setae. Subgenital plate, Fig. 3 (SGP), triangulate, tapering to an acute apex which is slightly chitinized, whole plate 0.4 as long as wide, thickly clothed with setae. ♂: Suranal plate, Fig. 4 (SPL), triangulate, convex laterally, tapering to a rounded apex, plate grooved medianly, whole plate sparsely clothed with setae. Subgenital plate, Figs. 4, 5 (H), rectangulate, 1.6 as wide as long, convex laterally, distal margin rounded. Plate raised proximomedianly, then slopes towards margins; whole plate clothed with setae, more thickly towards lateral margins. On ventral surface plate curved over anteriorly, Fig. 4 (H). Two styli, Figs. 4, 5 (S), short conical, thickly clothed with short setae, length of styli being 0.3 length of sternite IX (IX). Parameres, Fig. 6 (P), elongate, rounded at apex, twice as wide as long, distal portion thickly clothed with setae. Pseudosternite, Fig. 6 (PD), 1.3 as wide as long, convex laterally, produced distally into 4 small rounded lobes, 2 median ones slightly longer than lateral lobes. Most of pseudosternite covered by penis. Penis, Fig. 6 (PN), 2-lobed, each lobe 1.3 longer than wide. Paraprocts absent.

LOCALITY. TASMANIA: Under logs Fortescue Bay Road, Tasman Peninsula (type locality), 10.IV.1971, 20.VI.1971, 18.VII.1971, coll. T. Goede; under logs, 0.8 km N of Eaglehawk Neck, Forestier Peninsula, 10.IV.1971, 20.VI.1971, coll. T. Goede; under stones, convict ruins, Port Arthur, 4.IX.1971, 12.IX.1971, coll. A. & T. Goede; mine adit, Mt Cygnet, 29.VI.1969, coll. T. Goede; mine adit Albert Road, Mt Cygnet, 2 km E of Gardners Bay, altitude 140 m. Grid reference (metric): 5124E, 52189N, D'Entrecasteaux 1:100,000, sheet 8311 (edition 1), 4.I.1973, coll. A. Goede; mine tunnel, Tcbys Hill Road, 3.3 km ENE of Mt Cygnet, altitude approx. 140 m. Grid reference (metric): 5085E, 52219N, D'Entrecasteaux 1:100,000, sheet 8311 (edition 1), 4.III.1973, coll. A. Goede.

TYPES. Holotype ♂, allotype ♀ and 2 paratypes, ♂ and ♀, in Australian National Insect Collection, C.S.I.R.O., Canberra. Three paratypes, 2 ♂♂ and 1 ♀, in Australian Museum, Sydney. Four paratypes, 2 ♂♂ and 2 ♀♀, in British Museum (Nat. Hist.), London.

REMARKS. Very closely related to *P. domesticus*. Separated from other species by several characters.

1. Shape of ♀ subgenital plate and its slightly chitinized apex.
2. Shape of suranal plate of ♂ and ♀.

3. Shape of ♂ pseudosternite.

Genus *Micropathus* Richards

Micropathus Richards, 1964, *Pacif. Ins.* **6**: 217-218.

The genus *Micropathus* contains four species, *M. tasmaniensis* Richards from caves, mines and rain forest in southern Tasmania, *M. cavernicola* Richards from caves and mines in central-western and northern Tasmania, *M. fuscus* Richards from caves in northern and NW Tasmania, and *M. montanus* Richards from caves and surface in central-western Tasmania. A fifth species from a cave in SE Tasmania is described here. The five species may be distinguished by the following key.

KEY TO SPECIES OF *Micropathus*

1. Hind femora without linear spines.2
Hind femora armed with linear spines.3
2. Basic colour pale brown; subgenital plate of ♀ with lobes at least 0.6 total length of plate; suranal plate of ♂ with 2 processes on distal margin. **tasmaniensis** Richards
Basic colour dark brown; subgenital plate of ♀ with lobes less than 0.6 total length of plate; suranal plate of ♂ with 4 processes on distal margin. **kiernani** n.sp.
3. Basic colour pale brown; suranal plate of ♂ bearing spines on distal margin; subgenital plate of ♀ with lobes less than 0.4 total length of plate.4
Basic colour dark brown; suranal plate of ♂ without spines on distal margin; subgenital plate of ♀ at least 0.4 total length of plate. **fuscus** Richards
4. Suranal plate of ♂ with 4 spines on distal margin; suranal plate of ♀ with distal margin rounded. **cavernicola** Richards
Suranal plate of ♂ with 8 spines on distal margin, suranal plate of ♀ with distal margin notched medianly and produced into 2 rounded lobes. **montanus** Richards

Micropathus tasmaniensis Richards

Micropathus tasmaniensis Richards, 1964, *Pacif. Ins.* **6**: 218-220, fig. 1, table 1; 1968, *Pacif. Ins.* **10**: 171; 1971, *Pacif. Ins.* **13**: 580.

This species has recently been collected from several new cave localities in different parts of southern Tasmania.

NEW RECORDS. TASMANIA: Florentine River Cave, Florentine Valley, 17.IV.1971, coll. T. Goede; unnamed cave, Mt Anne area, 18.IX.1971, coll. W. Lehmann; Damper Cave (PB1), Precipitous Bluff, altitude close to sea level. Grid reference (metric) 4663E, 51855N Huon 1:100,000, sheet 8211 (edition 1), 15-22.I.1973, coll. G. Middleton; 16.I.1973, coll. K. Kiernan, Reece Cave (PB207), Precipitous Bluff, altitude close to sea level. Grid reference (metric) 4663E, 51850N, Huon 1:100,000, sheet 8211 (edition 1), 15-22.I.1973, coll. G. Middleton; 18.I.1973, coll. K. Kiernan.

Micropathus cavernicola Richards

Micropathus cavernicola Richards, 1964, *Pacif. Ins.* **6**: 220-223, fig. 2, table 2; 1968, *Pacif. Ins.* **10**: 171; 1971, *Pacif. Ins.* **13**: 580.

Recent collecting in the central-west of Tasmania has extended the range of this species to three new localities.

NEW RECORDS. TASMANIA: Unnamed cave, Nelson River area, 30.V.1971, coll.

A. Goede; unnamed cave (LS3), Lake Spicer area, altitude 580 m. Grid reference (metric): 3878E, 53510N (approx.), Sophia 1:100,000, sheet 8014 (edition 1), 27.I.1973, coll. A. Goede; mine adit, SE of Lake Rolleston, altitude 800 m. Grid reference (metric): 3867E, 53567N, Sophia 1:100,000, sheet 8014 (edition 1), 26.I.1973, coll. A. Goede.

***Micropathus montanus* Richards**

Micropathus montanus Richards, 1971, *Pacif. Ins.* **13**: 580-583, fig. 2, table 2.

Fresh material has recently been collected from a new locality in SW Tasmania. It considerably extends the range of this species. The low altitude is of great interest, as *M. montanus* had been known only from relatively high altitudes in the centre of the glacial region.

NEW RECORD. TASMANIA: Unnamed cave, Nicholls Range, 4 km ESE of junction of Gordon and Olga Rivers, altitude 40 m. Grid reference (metric): 4030E, 52720N, Olga 1:100,000, sheet 8012 (edition 1), 8.III.1972, coll. B.R. Collin.

***Micropathus kiernani* Richards, new species** Text-figure 3 (Figs. 1-6).

Colour. Basis colour dark brown with pronotum, mesonotum, metanotum and abdominal terga irregularly mottled with mid brown and light brown; femora and tibiae mottled or banded with dark brown, mid brown and light brown, tarsi light brown; antennae dark brown; ovipositor light reddish brown.

Body. Length 18 mm in ♂, 18 to 19 mm in ♀. Dorsal surface of body sparsely clothed with setae, ventral surface thickly clothed with setae. Antennae broken. Fastigium as high as long. Ovipositor 0.55 length of body; ventral valves very weakly armed distally 0.2 of total length to apex with 6 small teeth gradually decreasing in size toward apex (Fig. 1).

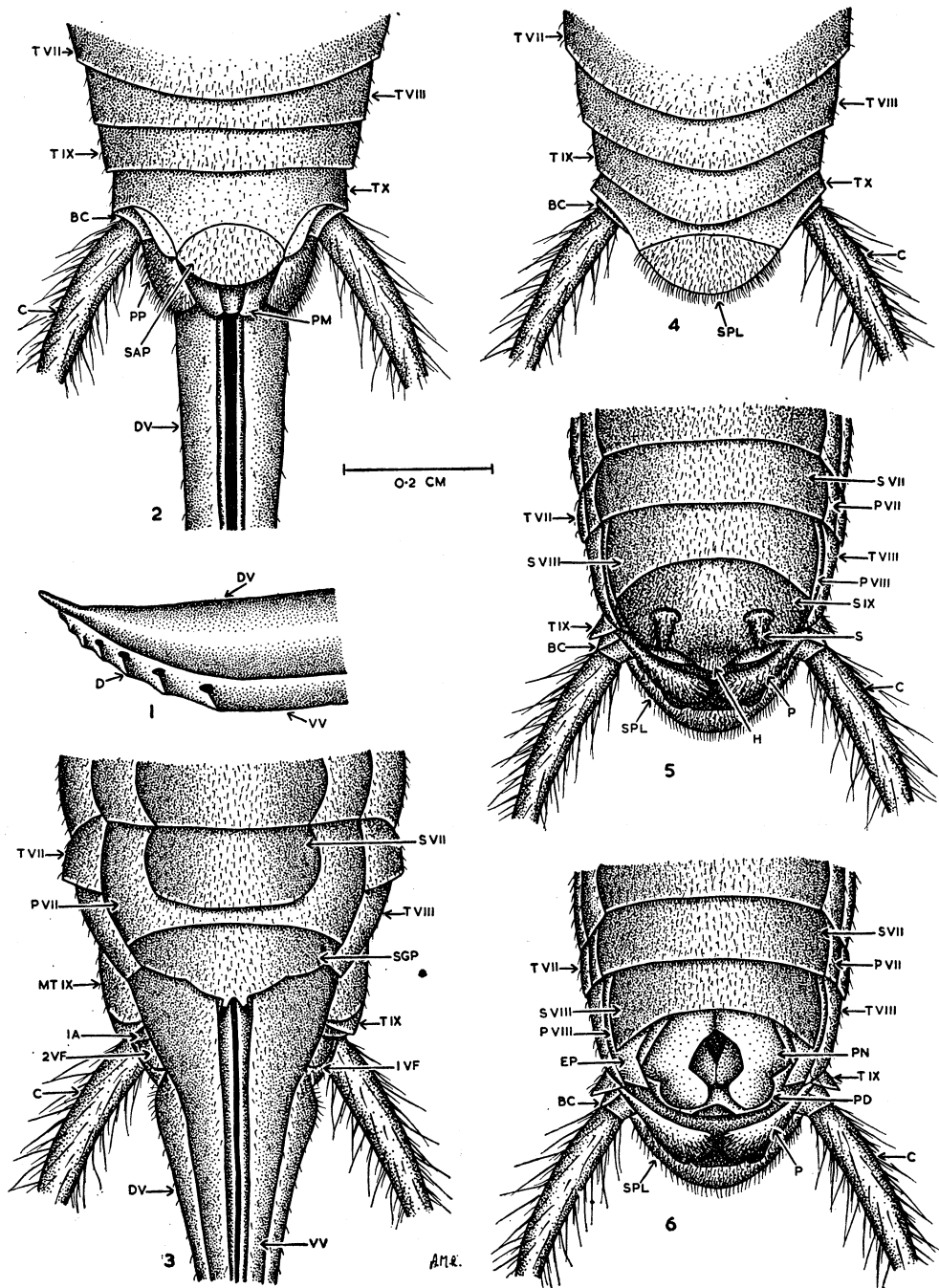
Antennae. As in generic description. Third segment on dorsal aspect twice as long as pedicel, and on ventral aspect 1.7 × as long. Sexual dimorphism absent. No spines present on flagella of ♂ or ♀.

Table 3. Variability in number of linear spines on the legs of *Micropathus kiernani* n. sp.

		Mean		Number specimens		Standard deviation		Range	
		L	R	L	R	L	R	L	R
Fore Tibia	Prolateral	3.8	3.9	20	20	0.4	0.4	3-4	3-4
	Inferior Retrolateral	3.7	3.9	20	20	0.4	0.4	3-4	3-4
Mid Tibia	Prolateral	3.9	3.8	20	20	0.4	0.4	3-4	3-4
	Inferior Retrolateral	3.9	3.9	20	20	0.4	0.4	3-4	3-4
Hind Tibia	Prolateral	26.7	26.2	20	20	3.6	3.0	22-35	22-32
	Superior Retrolateral	28.0	28.6	20	20	3.2	2.8	21-34	24-35
Hind Tarsus	Prolateral	2.2	1.6	20	20	1.0	0.7	1-5	0-3
	1 Superior Retrolateral	2.0	1.8	20	20	0.9	0.7	1-4	1-3
Hind Tarsus	Prolateral	1.7	1.6	20	20	0.5	0.7	1-2	0-2
	2 Superior Retrolateral	1.1	1.2	20	20	0.4	0.5	0-2	0-2

L = left; R = right leg.

Legs. Fore and middle legs subequal in length, with hind leg 1.8 length of fore and middle legs. Sexual dimorphism absent. All tibiae and proximal 2 segments of hind tarsi armed with variable numbers of linear spines (Table 3). No linear spines occur on fore, middle and hind femora, and fore and middle tarsi. Apical spines constant in number as in generic description.



Text-figure 3. *Micropathus kiernani* n. sp. 1. Distal portion of ovipositor showing teeth on ventral valve. 2. ♀ genitalia, dorsal view. 3. ♀ genitalia, ventral view. 4. ♂ genitalia, dorsal view. 5. ♂ genitalia, ventral view. 6. ♂ genitalia, ventral view, sub-genital plate removed to expose structures beneath.

Ratio of length of legs to length of body: fore leg 1.5 : 1; middle leg 1.5 : 1; hind leg 2.7 : 1.

Genitalia. ♀: Suranal plate, Fig. 2 (SAP), convex laterally, distal margin rounded; distal margin thickly clothed with setae, rest of plate rather sparsely clothed with setae. Subgenital plate, Fig. 3 (SGP), lateral margin convex, but indented medianly; disto-medianly plate is produced into 2 small lobes each with a strongly chitinized apex, lobes 0.2 total length of plate, whole plate 0.4 as long as wide, thickly clothed with setae. ♂: Suranal plate, Fig. 4 (SPL) rounded laterally and distally; distal margin curved under ventrally bearing 4 anteriorly directed processes, 2 lateral ones well developed and 2 latero-median ones poorly developed; whole plate including distal margin thickly clothed with setae. Subgenital plate, Fig. 5 (H), triangulate, 1.7 wider than long, convex laterally changing to concave and tapering distally to a rounded apex; whole plate thickly clothed with setae. On ventral surface plate curved over anteriorly. Two styli, Fig. 5 (S), short, broad, conical, thickly clothed with setae, length of styli being 0.3 length of sternite IX (S IX). Parameres, Figs. 5, 6 (P), elongate, rounded at apex, 4 × longer than wide, distal portion thickly clothed with setae. Pseudosternite, Fig. 6 (PD), 1.4 wider than long, lateral margin convex, distal margin emarginate. Penis, Fig. 6 (PN), 2-lobed, each lobe 1.3 longer than wide. Paraprocts absent.

LOCALITY. TASMANIA: Small cave in sandstone, Francistown, near Dover (type locality), 20.II.1973, 12.V.1973, coll. K. Kiernan; 12.V.1973, coll. A. Goede.

TYPES. Holotype ♂, allotype ♀ and 2 paratypes, ♂ and ♀, in Australian National Insect Collection, C.S.I.R.O., Canberra. Two paratypes, ♂ and ♀, in Australian Museum, Sydney. Two paratypes, ♂ and ♀, in British Museum (Nat. Hist.), London.

REMARKS. Very closely related to *M. tasmaniensis*. Separated from it by several characters.

1. Basic colour dark brown.
2. Fewer linear spines on hind tibia.
3. Shape of suranal plate of ♂.
4. Four anteriorly directed processes on distal margin of suranal plate of ♂.
5. Shape of subgenital plate of ♀.
6. Shape of pseudosternite.

Named for Kevan Kiernan, who over the last few years had made a valuable contribution to Tasmanian biopseology.

Genus *Cavernotettix* Richards

Cavernotettix Richards, 1966, *Pacif. Ins.* 8: 619.

The genus *Cavernotettix* contains four species, *C. montanus* Richards and *C. wyanbenensis* Richards from limestone caves on the Southern Highlands of New South Wales; *C. buechanensis* Richards from limestone caves almost at sea level just north of Lakes Entrance in eastern Victoria; and *C. flindersensis* (Chopard) from a limestone cave and wombat burrows on Flinders Island, and a limestone cave on Cape Barren Island, Bass Strait. A fifth species from under boulders on Craggy Island, Bass Strait, is described here. The new species differs from the generic description in the absence of a spine on the fore coxa. However it agrees in all other generic characters, and because of its affinities with *C. wyanbenensis* and *C. buechanensis* I am of the opinion that it belongs to this genus. The five species may be distinguished by the following key.

KEY TO SPECIES OF *Cavernotettix*

1. Presence of retrolateral spine on fore coxa.2
- Absence of retrolateral spine on fore coxa.*craggiensis* n. sp.

2. Fore and middle femora without linear spines.3
Fore and middle femora with linear spines.**flindersensis** (Chopard)
3. Suranal plate of ♂ with distal membrane; suranal plate of ♀ sparsely clothed with setae.4
Suranal plate of ♂ without distal membrane; suranal plate of ♀ thickly clothed with setae.
.....**buchanensis** Richards
4. Lateral lobes of suranal plate of ♂ thickly clothed with setae; retrolateral linear spines on
hind femur of ♀ over 30.**wyanbenensis** Richards
Lateral lobes of suranal plate of ♂ sparsely clothed with setae; retrolateral linear spines on
hind femur of ♀ under 27.**montanus** Richards

Cavernotettix montanus Richards

Cavernotettix montanus Richards, 1966, *Pacif. Ins.* **8**: 619-622, table 2.

A new record of this species has been obtained from another cave at Yarrangobilly in the Southern Highlands of New South Wales.

NEW RECORD. NEW SOUTH WALES: Unnamed cave (Y7), Yarrangobilly, 29.III.1970, coll. J.W. Lowry.

Cavernotettix wyanbenensis Richards

Cavernotettix wyanbenensis Richards, 1966, *Pacif. Ins.* **8**: 622-624, table 3.

This species has recently been collected from a new cave locality on the eastern side of the Great Dividing Range in the Southern Highlands of New South Wales, and from a beach cave near Batemans Bay, New South Wales.

NEW RECORDS. NEW SOUTH WALES: Main Cave, Bendethra, 35°49'S, 149°45'E, 31.VIII.1971, coll. L. Hall; cave off beach, North Durras, N of Batemans Bay, 21.VIII.1969, coll. D.J. Morgan.

Cavernotettix flindersensis (Chopard)

Cavernotettix flindersensis (Chopard), Richards, 1967, *Proc. Linn. Soc. N.S.W.* **92**: 152-156, fig. 1, tables 1, 2; 1971, *Pacif. Ins.* **13**: 583.

This species is already known from two of the Furneaux Islands in Bass Strait. Its distribution is now extended to two more islands in this group.

NEW RECORDS. FURNEAUX ISLANDS: On wall inside shed near mutton bird rookery, N side of Little Dog Island, altitude 3 m, 27.I.1973, coll. J.S. Whinray; west point Babel Island, 15.III.1950, coll. T.G. Campbell.

Cavernotettix craggiensis Richards, new species Text-figure 4 (Figs. 1-6).

Colour. Head light brown mottled with ochreous and mid brown; pronotum, mesonotum and metanotum mid brown irregularly mottled with light brown and ochreous; abdominal terga light brown irregularly mottled with mid brown and ochreous; femora and tibiae mottled or banded with light brown, mid brown and ochreous; tarsi ochreous; antennae light brown; ovipositor reddish brown.

Body. Length 17 to 18 mm in ♂, and 17 to 19 mm in ♀. Surface of body clothed with setae. Antennae broken. Fastigium longer than high. Ovipositor 0.7 length of body; ventral valves armed distally 0.2 of total length to apex with 8 small teeth gradually decreasing in size towards apex (Fig. 1).

Antennae. As in generic description. Segment 3 in ♂ on dorsal aspect 1.5 as long as pedicel, and on ventral aspect 1.3 as long; in ♀ on dorsal aspect 1.7 as long as pedicel, and on ventral aspect 1.4 as long. Sexual dimorphism poorly developed. No spines present on flagella of ♂ or ♀.

Legs. Fore and middle legs subequal in length, with hind leg 1.9 length of fore and middle legs. Sexual dimorphism shown by fore, middle and hind legs of ♀ being 0.7 as long as ♂. All legs thickly clothed with short setae. Hind femur, all tibiae and proximal 2 segments of hind tarsus armed with variable numbers of linear spines (Table 4). Apical spines constant in number as in generic description except for an occasional very small retrolateral spine on hind femur. Ratio of length of legs to length of body: Fore leg, ♂ 1.7 : 1; ♀ 1.4 : 1. Middle leg, ♂ 1.8 : 1; ♀ 1.4 : 1. Hind leg, ♂ 3.4 : 1; ♀ 2.7 : 1.

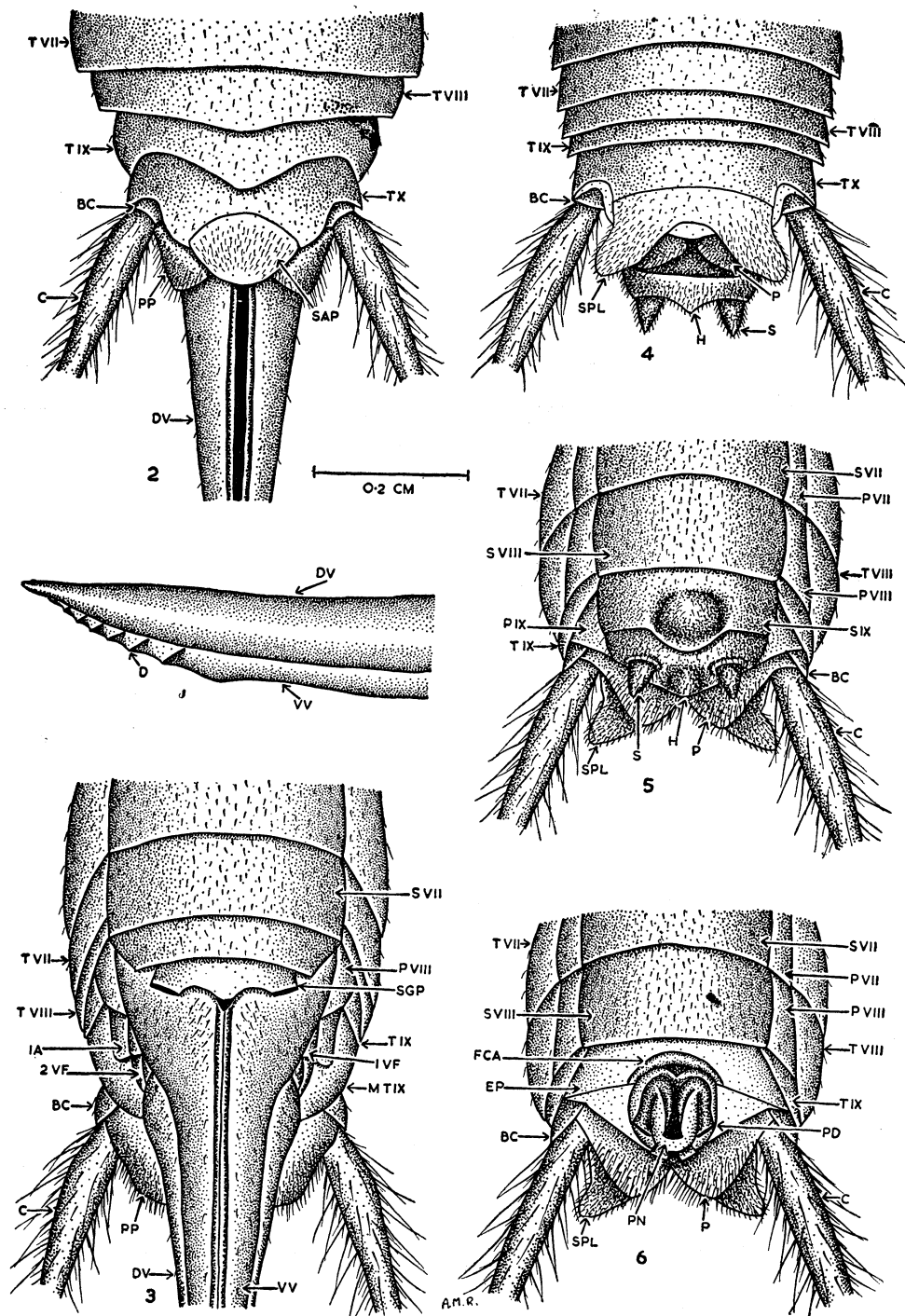
Table 4. Variability in number of linear spines on the legs of *Cavernotettix craggiensis* n. sp.

		Mean		Number specimens		Standard deviation		Range	
		L	R	L	R	L	R	L	R
Fore Tibia	Prolateral	3.2	3.1	20	20	0.5	0.2	3-5	3-4
Inferior	Retrolateral	3.1	3.1	20	20	0.3	0.2	3-4	3-4
Mid Tibia	Prolateral	3	3	20	20	0	0	3	3
Inferior	Retrolateral	3	3	20	20	0	0	3	3
Hind Femur	Prolateral	41.6	44.1	9	9	6.8	8.8	31-53	33-59
Inferior ♂	Retrolateral	58.3	64.7	9	9	7.1	8.7	48-69	50-79
Hind Femur	Prolateral	24.1	24.1	11	11	4.6	3.7	18-35	19-32
Inferior ♀	Retrolateral	34.4	35.7	11	11	6.5	5.9	25-48	26-47
Hind Tibia	Prolateral	39.9	39.7	20	20	3.5	3.3	32-46	34-47
Superior	Retrolateral	41.8	42.9	20	20	3.9	3.8	34-48	36-51
Hind Tarsus	Prolateral	2.7	2.6	20	20	0.8	0.8	1-4	1-4
1 Superior	Retrolateral	3.7	3.7	20	20	0.7	0.6	2-5	3-5
Hind Tarsus	Prolateral	1.7	1.6	20	20	0.7	0.7	1-3	1-3
2 Superior	Retrolateral	1.8	2.1	20	20	0.6	0.5	1-3	1-3

L = left leg; R = right leg.

Genitalia. ♀. Suranal plate, Fig. 2 (SAP), distal margin rounded and glabrous, rest of plate thickly clothed with setae. Subgenital plate, Fig. 3 (SGP), 3× wider than long, distal margin trilobed, 2 lateral lobes truncate, median lobe with an acute apex; median lobe 0.6 longer than lateral lobes; whole plate glabrous; distal margin of lateral lobes heavily chitinized, apex of median lobe chitinized in some specimens. ♂: Suranal plate, Fig. 4 (SPL), concave laterally; distal margin produced into 2 lateral lobes thickly clothed with short setae, medianly membranous, deeply emarginate and glabrous; lobes thickly clothed with setae, rest of plate sparsely clothed with setae. Subgenital plate, Fig. 5 (H), 1.1 wider than long, convex proximo-laterally changing to slightly indented 0.4 up from distal margin, then slightly convex; distal margin tapering to a rounded apex; plate raised medianly into a small tubercle, disto-medianly plate raised into a second smaller tubercle; disto-laterally and distally plate thickly clothed with setae, rest of plate sparsely clothed with setae, median and apical tubercles thickly clothed with setae. On ventral surface plate curves over anteriorly and pseudosternite and penis located beneath this flap. Two styli, Figs. 4, 5 (S), short, conical, thickly clothed with short setae, length of styli being 0.2 length of sternite IX (S IX). Parameres, Figs. 4, 5, 6 (P), elongate with rounded apex, twice as broad as long, distal portion thickly clothed with long and short setae. Pseudosternite, Fig. 6 (PD), 0.9 as long as wide, distally produced into 2 small lobes, laterally partly covering each lobe of penis. Penis, Fig. 6 (PN), 2-lobed, each lobe 2.5 longer than wide. Paraprocts absent.

LOCALITY. CRAGGY ISLAND. Under boulders, on northern, eastern and SE sides of island (type locality), 30.III.1972, 14.VI.1972, 15.VI.1972, 16.VI.1972, 19.VI.1972, coll. J.



Text-figure 4. *Cavernotettix craggiensis* n. sp. 1. Distal portion of ovipositor showing teeth on ventral valve. 2. ♀ genitalia, dorsal view. 3. ♀ genitalia, ventral view. 4. ♂ genitalia, dorsal view. 5. ♂ genitalia, ventral view. 6. ♂ genitalia, ventral view, subgenital plate removed to expose structures beneath.

S. Whinray; 15.VI.1972, 16.VI.1972, 18.VI.1972, 19.VI.1972, coll. M.H. Christie.

TYPES. Holotype ♂, allotype ♀ and 3 paratypes, 1 ♂ and 2 ♀♀, in Australian National Insect Collection, C.S.I.R.O., Canberra. Three paratypes, 1 ♂ and 2 ♀♀, in Australian Museum, Sydney. Three paratypes, 1 ♂ and 2 ♀♀, British Museum (Nat. Hist.), London. Two ♀ paratypes in Tasmanian Museum, Hobart.

REMARKS. Most closely related to *C. wyanbenensis* and *C. buehnerensis*. Separated from other species by several characters.

1. Absence of retrolateral spine on fore coxa.
2. Linear spines on hind femora intermediate in number between *C. buehnerensis* and *C. wyanbenensis*.
3. Greater number of teeth on ventral valves of ovipositor.
4. Shape of subgenital plate of ♀.
5. Development of prominent lateral lobes on suranal plate of ♂ thickly clothed with setae.
6. Shape of subgenital plate of ♂.
7. Shape of pseudosternite, which is closest to that in *C. flindersensis*.

ORIGINS AND AFFINITIES OF BASS STRAIT RHAPHIDOPHORIDAE

The Raphidophoridae of the Bass Strait islands are of great interest because of the land bridge connections which existed between Wilson's Promontory and NE Tasmania during the Pleistocene and up till about 8,500 to 15,000 years ago (Jennings 1971). It has already been postulated (Richards 1970, 1971) that *Cavernotettix* and *Parvotettix* probably used these land bridges, for while *Parvotettix* occurs throughout Tasmania and *Cavernotettix* occurs in SE Australia, the two genera both occur on the Furneaux Islands sometimes sharing the same habitat. Now new species belonging to these two genera have been found on other Bass Strait islands which form further remnants of the Wilson's Promontory to Flinders Island land bridge. As might be expected, the affinities of *P. whinrayi* from the Kent Islands are closest to *P. rangaensis* from the Furneaux Islands. In contrast to this, the affinities of *C. craggiensis* are with Mainland species rather than *C. flindersensis*, despite the fact that Craggy Island is only 20 km to the NW of Flinders Island. Further material is required from other islands forming remnants of the land bridges before the points of origin of these two genera can be established. At this stage the evidence still supports a Tasmanian origin for *Parvotettix* and a Mainland origin for *Cavernotettix*.

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|---|--|
| BC — basal segment of cercus. | PN — penis. |
| C — cercus. | PP — paraproct. |
| D — teeth. | S — stylus. |
| DV — dorsal valve. | S VI, S VII, S VIII, S IX — sternite VI, VII, VIII, IX. |
| EP — endoparamere. | SAP — suranal plate, ♀. |
| FCA — feebly chitinated arch. | SGP — subgenital plate, ♀. |
| H — subgenital plate, ♂. | SPL — suranal plate, ♂. |
| IA — intersegmental apodeme. | T VI, T VII, T VIII, T IX, T X — tergite VI, VII, VIII, IX, X. |
| MT IX — membrane of tergite IX. | 1 VF — 1st valvifer. |
| P — paramere (ectoparamere). | 2 VF — 2nd valvifer. |
| P VI, P VII, P VIII, P IX — pleurite VI, VII, VIII, IX. | VV — ventral valve. |
| PD — pseudosternite. | |