CONTRIBUTIONS TO THE KNOWLEDGE OF THE PREDACIOUS WATER BEETLE FAUNA OF THE SOUTHERN PEATLANDS AND SHRUBLANDS OF SOUTHWESTERN AUSTRALIA

(Coleoptera: Haliplidae, Hygrobiidae, Dytiscidae and Gyrinidae)

Report prepared for

Department of Conservation and Land Management (CALM)

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Lars Hendrich

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PRELIMINARY REPORT

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(Coleoptera: Haliplidae, Hygrobiidae, Dytiscidae and Gyrinidae)

by

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INTRODUCTION

Australia has a rich and diverse hydradephagan beetle fauna. For many groups suitable identification keys exist. The revisions of the Australian Dytiscidae (WATTS, 1978), Gyrinidae (OCHS, 1949), Haliplidae (WATTS, 1988; VAN VONDEL, 1995), Hygrobiidae (BRITTON, 1981), and several additional contributions to various genera (e.g. OCHS, 1956, WEWALKA, 1975 & 1979, BRANCUCCI, 1983, BISTRÖM, 1982 & 1996, WATTS, 1997) have made it possible to identify most adults to species level. In spite of this work, there are very few references to the ecology and faunistics of Australian species. In 1993 and 1995 Larson published the first comprehensive papers, analyzing habitat and community patterns, natural history and distribution of northern Queensland species.

Adult water beetles were collected during a four-week faunal survey of the Southwestern part of Western Australia in December 1999 and January 2000. The area has not been well investigated previously for water beetles, therefore the study provided a number of new regional records.

Water beetles are an important animal group in Australian freshwaters. They inhabit virtually every kind of fresh- and brackish water habitat, from the smallest puddles up to large lakes and swamps and from streams to irrigation ditches and reservoirs. Due to their diversity in terms of species numbers, variation in size and ecological niche they represent an ideal group for environmental impact assessments (EIAs), conservation assessments and biodiversity studies in a wider sense.

In wetland management, water beetles prove to be an important biomonitoring group. The aquatic habitats of the SW North Coastal Heathlands, the streams, springs and seasonal swamps in the South West and Jarrah Forest of South Western Australia have not been well investigated previously for these insects. As a consequence the results of this fieldwork provided a number of new and valuable regional records.

Furthermore the numerous planned publications form much needed contributions to the taxonomy, ecology and distribution of many highly endemic Southwestern species, and will prove useful for technicians monitoring the biological health of rivers and wetlands.

COLLECTING PROCEEDURES

Most of the specimens were collected using different kinds of aquatic dip nets and metal kitchen strainers. Diameters of meshes varied from 500 to 1000 µm. Leaf litter and aquatic vegetation were swept heavily; the material obtained was then placed on a white 1m x 1m nylon sheet. Specimens were sorted with forceps and/ or an aspirator.

Less active species or individuals are traced by carefully sorting the substrate. Beetles from springs, small puddles and streams can frequently be directly sampled with an aspirator or a pair of forceps. Specimens of Hydrophilidae and Hydraenidae were frequently collected by washing leaf litter and grass mats at the edge of a water body. The beetles, which usually cling to the substrate, are thus released and float on the water surface, where they can then easily be picked up with an aspirator. Also, some specimens were obtained by operating a Black light trap and 10 small bottle traps baited with fish (fig. 1).

Fig. 1: Bottle trap operating in Nalyrin lake.

Specimens collected were fixed in 70-90% alcohol, and brought to the South Australian Museum, Adelaide (South Australia) and the Free University of Berlin (Germany) for further processing and setting. Reference specimens will be deposited in the Museum of Perth.

LOCALITIES SAMPLED

Field work was carried out from 23rd December 1999 to 15th January 2000. The survey area of this study includes most aquatic habitat types of Southwestern Australia. Those sites appearing to be of particular interest for the likelihood of finding new and undescribed species were most intensively sampled (e.g. peatland swamps and intermittent creeks).

Loc. WA 1/148: 20 km W Gingin, Gingin Brook East, 10 m, 26.12.1999, 31°18´S 115°41´E, Hendrich leg. Exposed and semishaded pools and ditches in a summerdry swampy peatland area. Ditch without any aquatic vegetation. The bottom consisted of mud, peat and rotten twigs (fig. 2).

Loc. WA 2/149: Darling Range, Serpentine River, 5 km NNE North Bannister, Albany Hwy, 200 m, 28.12.1999, 32°18´S 116°25´E, Hendrich leg. Isolated and shallow pool in a temporary and partly shaded (*Leptospermum* spec.) creek. Without any aquatic vegetation. Bottom in some parts with a thick layer of rotten leaves and twigs (fig. 3).

Loc. WA 4/151: Darling Range, Lane Poole Conservation Reserve, Nalyerin Lake, 300 m, 29. & 30.12.1999, 33°8.51´S 116°22.15´E, Hendrich leg. Freshwater *Baumea*/sedge seasonal peatland swamp, with a permanent central water body (up to 1 m depth). Maximum area of wetland inundated (ha): 63. Aquatic vegetation: *Ruppia* (floating plant), thin sedges over most of lake area and a large area of *Baumea articulata*. *Melaleuca* on fringe then eucalypt woodland. Bottom consisted of mud and rotten plant debris (fig. 4).

Loc. WA 5/152: Darling Range, Lane Poole Conservation Reserve, Boundary Road Bridge, 300 m, 29. & 30.12.1999, 33°10´S 116°16´E Hendrich leg. Exposed and deep pool without any vegetation in a complete dry stream bed.

Loc. WA 6/153: Nannup, Balingup-Nannup Road, Revelly Bridge, 130 m, 31.12.1999, 33°57´S 115°46´E, Hendrich leg. I. Small (5 – 6 sqm) and shallow (20 – 40 cm) pools in the floodzone of the Blackwood River. Bottom consisted of sand with a thin layer of rotten leaves and algae. Partly shaded by old Rivergum trees. II. Among floating roots and rotten leaves in shallow water of protected embayments of the slow flowing river (fig. 5).

Loc. WA 7/154: Vasse Hwy, 20 km S Nannup, intermittent creek, 160 m, 1.1.2000, 34°08´S 115°45´E, Hendrich leg.

Loc. WA 8/155: Vasse Hwy, 4 km W Beedelup National Park, Carey Brook/Bridge, 100 m, 1.1.2000, 34°24´S 115°48´E, Hendrich leg. Slow flowing and shallow (5-20 cm) stream with gravely and sandy bottom, shaded by old mixed Karri Forest.

Loc. WA 10a/156: 5 km S Northcliffe, 50 m, 2.1.2000, 34°38´S 116°06´E, Hendrich leg. *Melaleuca* freshwater swamp forest with black acid water. Seasonal flooded area with a permanent central water body. Vegetation: Large stands of sedges and aquatic vegetation. Partly shaded by *Melaleuca* and *Leptospermum*. Depth up to 30 cm. Bottom consisted of sedge peat, twigs and rotten leaves (fig. 6).

Loc. WA 10b/156: D´Entrecasteaux N.P., 20 km south of Northcliffe, Windy Harbour Road, 50 m, 3.1.2000, 34°46´S 116°04´E, Hendrich leg. *Melaleuca* blackwater swamp with few thin

sedges and floating aquatic vegetation. Depth up to 20 cm. Bottom consisted of peat, twigs and rotten leaves (fig. 7).

Loc. WA 10c/156: D´Entrecasteaux N.P., 15 km south of Northcliffe, Windy Harbour Road, 50 m, 3.1.2000, 34°42´S 116°05´E, Hendrich leg. Shallow (up to 60 cm depth) pond (10 sqm) without any vegetation. Partly shaded by old Eucalypt forest. Bottom consisted of sand with a thin layer of rotten leaves (fig. 8).

Loc. WA 11/157: Albany Hwy, Muir Lakes Nature Reserve, SW part of Byenup Lagoon, 4.& 5.1.2000, 34°29´S 116°44´E, Hendrich leg. Freshwater *Melaleuca rhaphophylla* sedge swamp. Rich in aquatic vegetation (e.g. *Baumea articulata*, *Montia australasica*, *Utricularia* spec.) and mats of native floating grasses. Surrounding vegetation Jarrah/Marri woodland. Depth up to 30 cm.

Loc. WA 12/158: 1 km N Cuthbert, 15 km W Albany, 6.1.2000, 35°00´S 117°46´E, Hendrich leg. Swampy pool (200 sqm) with salty water, completely covered with dense stands of sedges. Depth up to 25 cm. Bottom consisted of silt and rotten debris.

Loc. WA 13/159: Albany, 3 km ENE Manypeaks, Lake Pleasant Nature Reserve, 7.1.2000, 34°49´S 118°10´E, Hendrich leg. Large exposed sesonal flooded area with some permanent water bodies. Completely covered with thin sedges and smaller areas of *Baumea articulata*. Depth up to 30 cm. Bottom consisted of mud and rotten plant debris.

Loc. WA 14/160: 70 km E of Heyden, Mallee, 300m, 9.1.2000, 32°24´S 119°34´E, Hendrich leg. Shallow and exposed roadside puddle, without any vegetation and plant debris (fig. 9).

Loc. WA 15/161: 30 km SSE Marvel Loch, Mallee, 300m, 9.1.2000, 31°41´S 119°34´E, Hendrich leg. Exposed, large (10 sqm), deep (1 m) and temporary roadside pool without any vegetation. Depth up to 30 cm. Bottom consisted of sand and silt.

Loc. WA 16/162: Great Eastern Hwy, 80 km WSW Coolgardie, „Scenic Lookout", sandstone hill, Mallee, 12.1.2000, 31°10´S 120°31´E Hendrich leg. Exposed, small (1-2 sqm), shallow (up to 5 cm) rock pools on a sandstone hill. The bottom consisted of sand and stones with some detritus. All puddles were filled up after unseasonal rainfalls two weeks and two days before (fig. 10).

Loc. WA 17/163: Dyott Range, 30 km WNW Beverley, 13.1.2000, 32°03´S 116°40´E, Hendrich leg. Different exposed and/or partly shaded pools of an almost dry sandy creek bed. All pools without any vegetation and up to 30 cm depth. The bottom consisted of sand with a thin layer of rotten leaves and twigs.

Loc. WA 18/164: Dyott Range, 50 km WNW Beverley, Helena River East Branch, 13.1.2000, 31°55´S 116°29´E, Hendrich leg. Shaded puddle (4 sqm) at the edge of a dry creek bed. Partly shaded by *Melaleuca* and *Eucalyptus*. The bottom consisted of sand, small stones, few algae and a thin layer of rotten plant debris.

RESULTS AND DISCUSSION

In the present study a total of 33 species of predacious water beetles were collected from the Southwestern part of Western Australia (**table**, **fig. 13**). They belong to the following families (species numbers in parantheses): Haliplidae (1), Hygrobiidae (1), Gyrinidae (1), Dytiscidae (30). In the present study at least 3 species are new to science and will be described shortly (HENDRICH in prep.).

The majority of the 33 species (20 species/ 60 %) are endemics, restricted to the Southwestern part of Western Australia. Five species (15 %) were found in coastal peatland swamps only (*Antiporus spec.*, *Sternopriscus minimus*, *Rhantus simulans* and *Spencerhydrus pulchellus*) whereas one species is restricted to seasonal rockpools in the Mallee zone. Thirteen species were collected in most parts of the South Western corner. Only 5 species are widespread in Southern and Central Australia, and just two species (*Eretes australis* and *Hyphydrus elegans*) occur in most parts of Australia. At least one species is widespread in the Palaeartic, Oriental and Australasian realms (*Rhantus suturalis*).

Fig. 11: Sternopriscus browni

The greatest diversity (18 species / 54 %) was met in the freshwater *Melaleuca rhaphophylla* sedge swamps of Byenup Lagoon, situated in the Muir-Unicup wetlands system. This „hot spot" of Australian water beetle diversity housed almost all highly endemic peatland species of the Southwest.

A small sensation is the discovery of a new *Hygrobia* species. The family Hygrobiidae is of interest on several counts. It is comprised of only one genus with five species in the world. The species exhibit a highly disjunct distribution, with one species in Europe and Northern Africa, one in western China, and three in Australia. The wide separation of such closely allied species suggests that they are relicts of a wider distribution (BRITTON, 1981). The undescribed sixth species seems to be a true relict taxon, restricted to permanent and large peatland swamps, south of a line from Bunbury to Albany (HENDRICH in prep.).

The other interesting beetle is *Rhantus simulans*, a large species (13.5-14.5 mm) extremely rarely collected, and of which only a few hitorical specimens were known (BALKE, 1993; WATTS, 1978). This rarity is reflected by the fact that *Rhantus simulans* was omitted from the *Guide to Wetland Invertebrates of Southwestern Australia* (DAVIS & CHRISTIDIS, 1997) [See BALKE et al., in press].

Results of the survey have permitted the detection of some tendencies reflecting habitat selection for most of the species. Of the 33 species recorded here, 24 species (72 %) are

restricted to lentic sites, while 2 species (6 %) are found in lotic (*Allomatus nannup* and *Macrogyrus australis*) situations only.

Fig. 12: Allomatus nannup

However, in some cases this division is difficult as different habitats often merge into one another, especially in the dry summer period when the study took place and many creeks and small streams started to drawn. A good example is the dytiscid *Sternopriscus marginatus* which occurs in stagnant rest pools of intermittent creeks as well as in slow flowing streams in the Jarrah and Karri Forests.

At least 6 species (18 %) were found in both lotic and lentic habitats.

Over half (19) of the 33 species (57 %) are restricted to undisturbed habitats in more or less forested areas. Most of the species which are now thought to be endangered by peatland swamp drainage (DAVIS & CHRISTIDIS, 1997; CLEWS, 1999) and dramatic increases in salinity (*Hygrobia spec., Uvarus pictipes*, *Sternopriscus* spec., *Rhantus simulans* etc.), belong to this group. Fifteen species (45 %) were collected in both open, cultivated or disturbed farmland and forested sites.

Twelve species (36 %) were collected in permanent water bodies only. Some 15 species (45 %) occur in both permanent and temporary habitats, and just one species (*Paroster michaelseni*) is restricted to ephemeral water-filled rock pools of sandstone areas in the Mallee zone.

In general, deep and non-acid permanent water bodies (e.g. resevoirs, drainage ponds) without or with little emergent vegetation and plant debris housed a rich fish and dragonfly fauna while their water beetle fauna was rather poor. Predation by dragonfly nymphs, freshwater fishes and crayfish seems to have a significant effect on the distribution and abundance of Australian water beetles, especially their larval stages.

The larval instars and life cycles of many Southwestern water beetles remain unknown (e.g. *Allomatus*, *Hygrobia*, *Paroster*). Just a few third instar larvae belonging to the species: *Eretes sticticus*, *Lancetes laneceolatus*, *Rhantus suturalis*, *Spencerhydrus* and *Homoeodytes*, could be obtained during the short field trip.

ACKNOWLEDGEMENTS

Dr Chris H. Watts is warmly thanked for an invitation to South Australian Museum (November-December 1999) under financial support of the "Museum Board Fellowship" where this work was initiated, and to Stephan Gottwald (Berlin, Germany) for his assistance and enthusiatic encouragement in the field. The author thanks Adrian Pinder (CALM, Perth) and Rod Simmonds (CALM, Manjimup) for valuable information concerning field studies in SW Australia. The Department of Conservation and Land Management is acknowledged for giving permission to conduct scientific research in Kodjinup Nature Reserve [Permit numbers: SF 003017 and NE 002348].

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FIGURES

Fig. 2: Loc. WA 1/148

Fig. 3: Loc. WA 2/149

Fig. 4: Loc. WA 4/151

Fig. 5: Loc. WA 6/153

Fig. 6: Loc. WA 10a/156

Fig. 7: Loc. WA 10b/156

Fig. 8: Loc. WA 10c/156

Fig. 9: Loc. WA 14/160

Fig.10: Loc. WA 16/162


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SPECIES	Distribution	Ecology	Loc.	15	12	10	3	15	3	1	9	5	13	18	3	8	4	6	2	13	9
Haliplidae																					
Haliplus gibbus (CLARK)	S-Australia	lentic, permanent	Loc.	+																	
Hygrobiidae																					
Hygrobia spec. nov.	SW-endemic	lentic, permanent (Peatlands !)	Loc.		+	+								+							
Dytiscidae																					
Hyphydrus elegans (MONTROUZIER)	Australia	lentic	Loc.	+																	
Uvarus pictipes (LEA)	SW-endemic	lentic, permanent (Peatlands !)	Loc.			+															
Allodessus bistrigatus (CLARK)	SW-endemic	lentic, permanent/temp.	Loc.	+	+	+															
Liodessus dispar (SHARP)	SW-endemic	lentic/lotic, permanent	Loc.	+	+																
Liodessus inornatus (SHARP)	SW-endemic	lentic/temporary	Loc.																		
Paroster michaelseni WATTS	S-Australia	lentic/permanent/temp.	Loc.	+	+																
Antiporus femoralis (BOHEMAN)	S- and C- Australia	lentic/permanent/temp.	Loc.																		
Antiporus gilberti (CLARK)	SW-endemic	lentic, permanent (Peatlands !)	Loc.																		
Antiporus hollingsworthi WATTS	SW-endemic	lentic, permanent (Coastal peatlands !)	Loc.																		
Antiporus spec. nov.	SW-endemic	lentic, perm./temp.	Loc.																		
Sternopriscus browni SHARP	SW-endemic	lotic, permanent	Loc.																		
Sternopriscus marginatus WATTS	S- and C- Australia	lentic, perm./temp.	Loc.																		
Sternopriscus multimaculatus (CLARK)	SW-endemic	lentic, permanent/t (Coastal peatlands !)	Loc. 1																		
Sternopriscus minimus LEA	SW-endemic	lentic (lotic), permanent	Loc. 1																		
Sternopriscus wattsi PEDERZANI	SW-endemic	lentic, perm./temp. (Coastal peatlands !)	Loc. 1																		
Sternopriscus spec. nov.	SW-endemic	lentic (lotic)	Loc.																		
Nectersoma darwini (BABINGTON)	S- and C- Australia	lentic, permanent	Loc.																		
Nectersoma penicillatus (CLARK)	SW-endemic	lentic, perm./temp.	Loc.																		
Megaporus howitti (CLARK)	SW-endemic	lentic, perm./temp.	Loc.																		
Megaporus solidus (SHARP)	SW-endemic	lotic, permanent	Loc.																		
Copelatus ater SHARP	S-Australia	lentic, perm/temp.	Loc.																		
Allomatus nannup WATTS	SW-endemic	lotic, perm/temp.	Loc.																		
Platynectes aenescens (SHARP)	SW-endemic	lentic, perm. (temp.) (Coastal peatlands !)	Loc.																		
Platynectes ocularis RÉGIMBART	Pal., Oriental, Australia	lentic (lotic), perm./temp.	Loc.																		
Rhantus simulans RÉGIMBART	S- Australia	lentic (lotic), perm./temp.	Loc.																		
Rhantus suturalis (MACLEAY)	Australia	lentic, perm./temp.	Loc.																		
Lancetes lanceolatus (CLARK)	SW-endemic	lentic, perm. (Coastal peatlands !)	Loc.																		
Eretes australis ERICHSON	S-Australia	lentic, perm.	Loc.																		
Spencerhydrus pulchellus SHARP																					
Homeodytes scutellaris (GERMAR)	S-Australia	lotic, permanent	Loc.																		
Gyrinidae																					
Macrogyrus australis CLARK																					
33 species				15	12	10	3	15	3	1	9	5	13	18	3	8	4	6	2	13	9

Fig. 13: Checklist of water beetles from Southwestern Australia, with data on their ecology and distribution [temp. - temporary habitats; perm. – permanent habitats].

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New Zealand Journal of Zoology, 2000, Vol. 27: 223–227
0301–4223/00/2703–0223 $7.00/0 © The Royal Society of New Zealand 2000

Rediscovery of the New Zealand diving beetle *Rhantus plantaris* Sharp, and notes on the south west Australian *R. simulans* Régimbart, with an identification key (Coleoptera: Dytiscidae)

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Abstract The New Zealand diving beetle *Rhantus plantaris* Sharp, 1882 (Coleoptera: Dytiscidae), although comparatively large (10.0–10.5 mm), has not been reported since its description. Until this publication, only the male holotype was known. It has been questioned whether this species was a part of the New Zealand fauna. The rediscovery of the species is reported, based on a small series collected from near Christchurch. The specimens were taken from a roadside pond at about sea level. Collection details and distributional notes are given for the rare south western Australian species *Rhantus simulans* Régimbart, 1908 which appears to be a peatland swamp specialist. An illustrated key to the New Zealand and Australian *Rhantus* species is included.

Keywords Dytiscidae; *Rhantus plantaris*; rediscovered; *Rhantus simulans*; new records; New Zealand; Australia; key to species

INTRODUCTION

Rhantus plantaris Sharp was described from one male specimen from Dunedin, New Zealand. According to Sharp (1882) this individual was collected by, or received from E.L. de La Porte (Castelnau) in the 1860s (Ordish 1966: 253). This comparatively large species (10.0–10.5 mm) has not been reported since, and doubts have arisen about its true geographical origin (Ordish 1966; and letter to M. Balke 27.ix.1989). Balke (1993) noted that the median lobe of the aedeagus of *R. plantaris* resembles that of representatives of the South American *Rhantus signatus*-group (definition: Peck & Balke 1993). However, he could not then provide additional material which could have helped to clarify the geographical status of the species.

After more than 100 years, however, *Rhantus plantaris* has been rediscovered. It is clear now that this is in fact a New Zealand species.

The south western Australian *Rhantus simulans* is a large species (13.5–14.5 mm) extremely rarely collected, and only a few historical specimens are known (Balke 1993; Watts 1998). This rarity is reflected by the fact that *Rhantus simulans* was omitted from the *Guide to Wetland Invertebrates of Southwestern Australia* (Davis & Christidis 1997). Here we report five recent collections.

We provide a map of the distributions of the New Zealand and Australian representatives of *Rhantus* (Fig. 1) and an illustrated identification key (Fig.2) to ease species identification.

Z99024
Received 8 July 1999; accepted 14 February 2000

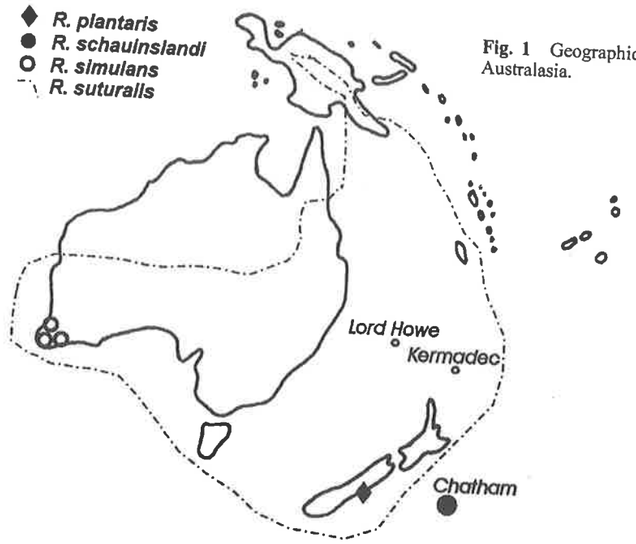

Fig. 1 Geographic distribution of *Rhantus* species in Australasia.

SYSTEMATICS

Rhantus plantaris Sharp

Rhantus plantaris Sharp, 1882: 608; Broun 1893: 1333; Zimmermann 1920: 204; Balfour-Browne 1939: 137; Ordish 1966: 253, 1967: 6, 1989: 184; Balke 1993: 45.
Rhantus plantarus [sic!] Sharp: Ordish 1966: 250 (mistyped).

TYPE LOCALITY: Dunedin, New Zealand.

DISTRIBUTION: Dunedin and Christchurch, South Island, New Zealand (Fig. 1).

MATERIAL STUDIED: 2 males, 3 females, New Zealand, South Island, 25 km south of Christchurch, at about sea level, 26 Feb. 1986, D. Kovac (Senckenberg Museum). The holotype, in the Natural History Museum, London, has been examined by Balke (1993).

NOTES: The exact locality was 25 km south of Christchurch, west side of Banks Peninsula, on state highway 75 from Christchurch to Akaroa, north of Lake Ellesmere, by roadside.

The sampled site was a perennial pond with clear water and a muddy bottom. The water surface had a diameter of approximately 5 m, the water depth was some 30–40 cm at edge, deeper in the middle. The edge of the pond was covered with emergent and/or submerged vegetation.

Four other species of Dytiscidae were found, i.e., *Rhantus suturalis* (MacLeay), *Antiporus strigulosus* (Broun), *Liodessus plicatus* (Sharp) and *Lancetes lanceolatus* (Clark).

Rhantus simulans Régimbart

Rhantus simulans Régimbart, 1908: 313; Watts 1978: 114, 1985: 25; Balke 1993: 63.
Rhantus impar Guignot, 1956: 491; Watts 1985: 25; Balke 1993: 63.

TYPE LOCALITIES: Of *R. simulans* Albany, Western Australia; of *R. impar* Rockingham, Western Australia.

DISTRIBUTION: South Western Australia. Coastal plains and swamps south west of a line from Perth to Albany. Old records (Balke 1993) from Rockingham and Swan River near Perth. Recent records from D'Entrecasteaux National Park, Muir Unicup Lake Area (Kodjinup Reserve) and near Albany (Fig. 1).

MATERIAL STUDIED: 1 female, Western Australia, 5 km south of Northcliffe, at about sea level, 27 Nov. 1996, L. Hendrich (L. Hendrich collection, Berlin, Germany); 1 female, Western Australia, 21 km west of Albany, north of Torbay, at about sea level, 28 Nov. 1996, L. Hendrich (L. Hendrich collection, Berlin, Germany); 2 individuals, Western Australia, 10 km S of Northcliffe, 3 Dec. 1998, F. Pederzani (F. Pederzani collection, Ravenna, Italy); 2 individuals, Western Australia, 5 km south of Northcliffe, at about sealevel, 3 Jan. 2000, L. Hendrich (L. Hendrich collection, Berlin, Germany); 24 individuals, Western Australia, 15 km south of Northcliffe, at about sea level, 4 Jan. 2000, L. Hendrich (L. Hendrich and M. Balke collections, Berlin, Germany; South Australian Museum Adelaide; Western Australian Museum Perth); 15 individuals, Lake Muir Nature Reserve, Byenup Lagoon, 50 m, 6 Jan. 2000, L. Hendrich (L. Hendrich collection, Berlin, Germany; Western Australian Museum Perth).

NOTES: One of Lars Hendrich's localities (27 November 1996 and 3 January 2000) is a semi-exposed, large riverine *Melaleuca* swamp. This site is up to 30 cm deep, densely covered with sedges and other emergent vegetation. The bottom consists of sand covered by a thin layer of peat on which there was some mud and some sedge detritus. Seven other spe-

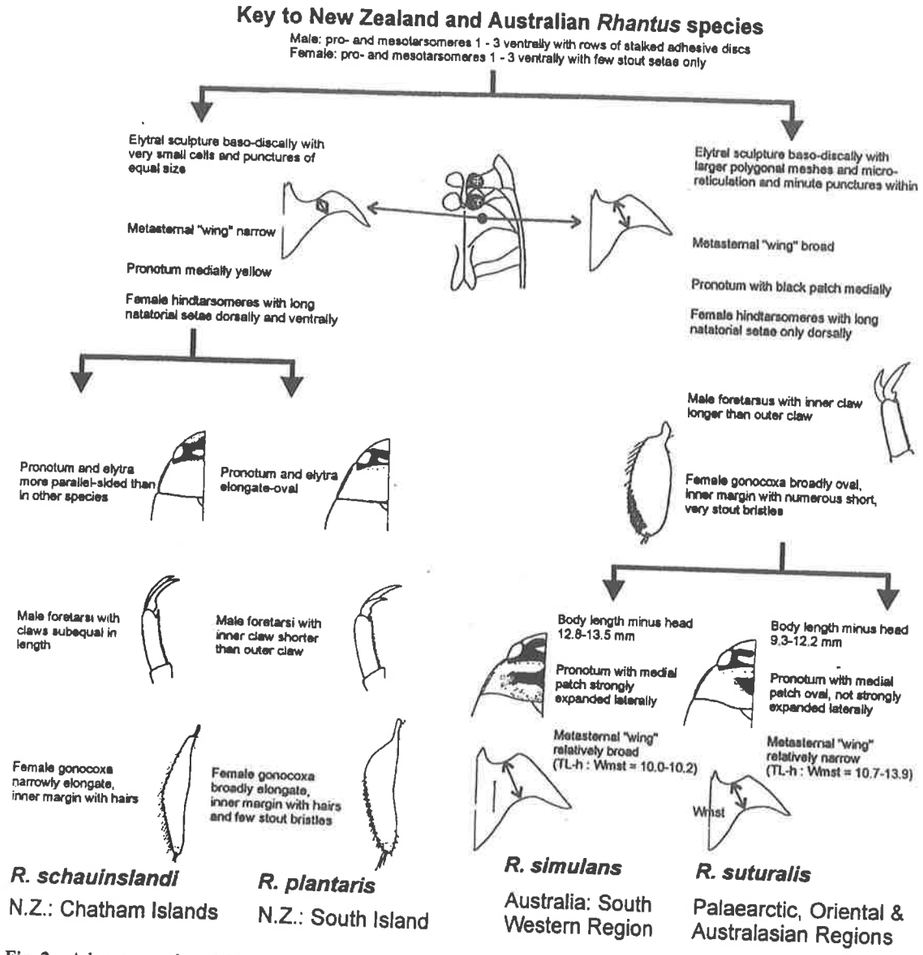

Fig. 2 A key to species of *Rhantus* in New Zealand and Australia.

cies of Dytiscidae were collected: *Rhantus suturalis* (MacLeay), *Liodessus inornatus* (Sharp), *Antiporus femoralis* (Boheman), *Sternopriscus browni* Sharp, *S. minimus* Lea, *Megaporus solidus* (Sharp) and *Spencerhydrus pulchellus* Sharp. Numerous freshwater crabs were present.

Hendrich's second locality (28 November) is a muddy, exposed roadside pond almost lacking higher vegetation. The total water surface area is some 20 m^2, the maximum depth 20 cm. The Dytiscidae coenosis included two species, *Rhantus suturalis* (MacLeay) and *Platynectes aenescens* (Sharp).

The locality 15 km south of Northcliffe (4 January) is a pool (10 m^2) in a coastal wetland area, without any vegetation and partly shaded by shrubs and old Eucalypt trees. The bottom consisted of sand, with a thin layer of rotten leaves and twigs. Depths up to 50 cm. Ten other species of Dytiscidae were collected: *Platynectes aenescens* (Sharp), *Rhantus suturalis* (MacLeay), *Lancetes lanceolatus* (Clark), *Sternopriscus minimus* Lea, *S. browni* Sharp, *Megaporus howitti* (Clark), *M. solidus* (Sharp), *Liodessus dispar* (Sharp), *L. inornatus* (Sharp), *Copelatus ater* Sharp and *Necterosoma darwini* (Babington).

Byenup Lagoon (6 January) is a huge peaty swamp, covered with dense stands of large sedges and partly shaded by *Melaleuca rhaphiophylla*. The bottom consisted of mud and peat, rich in various plant debris. Aquatic vegetation: Mats of floataing grasses and *Montia australasica*. Depths up to 30 cm. The rich Dytiscidae community included the following 15 species: *Platynectes aenescens* (Sharp), *Lancetes lanceolatus* (Clark), *Rhantus suturalis* (MacLeay), *Antiporus femoralis* (Boheman), *Sternopriscus minimus* Lea, *S. browni* Sharp, *S.* spec., *Megaporus howitti* (Clark), *M. solidus* (Sharp), *Uvarus pictipes* (Lea), *Liodessus inornatus* (Sharp), *Copelatus ater* Sharp, *Necterosoma darwini* (Babington), *Spencerhydrus pulchellus* Sharp and *Homoeodytes scutellaris* (Germar).

Pederzani's locality is a sun-exposed pond with muddy bottom on rocky ground. The Dytiscidae community there was rather species rich, consisting of eleven species besides of *R. simulans*: *Rhantus suturalis* (MacLeay), *Liodessus inornatus* (Sharp), *Antiporus femoralis* (Boheman), *A. hollingsworthi* Watts, *Sternopriscus browni* Sharp, *S. marginatus* Watts, *S. minimus* Lea, *Megaporus solidus* (Sharp); *Lancetes lanceolatus* (Clark), *Copelatus ater* Sharp, *Necterosoma darwini* (Babington).

ACKNOWLEDGMENTS

We thank R.G. Ordish, R. Palma and S. Superville (Museum of New Zealand), J.W.M. Marris (Lincoln University, New Zealand), R.M. Emberson (Lincoln University, New Zealand), F. Pederzani (Ravenna, Italy), C.H.S. Watts (Adelaide, Australia), Stefan Gottwald (Berlin, Germany) and I. Weckwerth (Berlin, Germany) for information and/or support in the field. Lars Hendrich thanks Adrian Pinder (CALM, Perth) and Rod Simmonds (CALM, Manjimup) for valuable informations concerning the field studies in SW Australia. The Department of Conservation and Land Management is thanked for giving permission to conduct scientific research in Kodjinup Nature Reserve. Permit numbers: SF 003017 and NE 002348. Michael Balke thanks the "Studienstiftung des deutschen Volkes" for financial support and Prof. Dr. W. Sudhaus (Freie Universität Berlin) for providing facilities in his lab.

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