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***Austrodytes plateni* sp.n., and a faunal analysis of the Hydradeephaga of the Pilbara region, Western Australia**

(Coleoptera: Dytiscidae, Gyrinidae, Haliplidae)

L. HENDRICH

Abstract

Austrodytes plateni sp.n. (Coleoptera: Dytiscidae), the second species of the genus, is described from the Pilbara in Western Australia. The habitat and its water beetle coenosis are described in detail. Additional distributional and ecological notes for all Hydradeephaga of the Pilbara region are given. In the present study a total of 33 species were collected. They belong to the following families (species numbers in parantheses): Haliplidae (1), Gyrinidae (3) and Dytiscidae (29). The fauna is dominated by Torresian faunal elements. Thirteen species (39 % of the total fauna recorded in the Pilbara) are mainly distributed in the tropical parts of north-western and northern Australia. Four of the five endemic species appear to be restricted to permanent springs, streams and rock pools in hilly regions and deep gorges.

Key words: Coleoptera, Hydradeephaga, Dytiscidae, Gyrinidae, Haliplidae, *Austrodytes*, new species, faunistics, zoogeography, Pilbara, Western Australia.

Introduction

Australia has a rich and diverse water beetle fauna. The taxonomy and classification of Australian Hydradeephaga were studied in several papers. For many groups suitable identification keys exist: Dytiscidae (WATTS 1978), Gyrinidae (OCHS 1949), Haliplidae (VAN VONDEL, 1995), Hygrobiidae (BRITTON 1981), and several additional contributions to various genera have made it possible to identify most adults to species level (e.g. OCHS 1956; WEWALKA 1975, 1979; BRANCUCCI 1983; BISTRÖM 1982, 1996; HENDRICH 1997, 1999, 2001a, 2001b; WATTS 1997a, 1997b, 2000, 2002; WATTS & PINDER 2000). There are, however, very few references to the ecology and faunistics of Australian species (LARSON 1993, 1997).

Adult water beetles were collected during a three-week faunal survey of the Pilbara region in Western Australia in August and September 2002. This area had not been investigated for Hydradeephaga until June 2001 when Chris H.S. Watts (Adelaide) visited the area for two weeks. Not surprisingly, the results of this fieldwork provided a number of new and remarkable regional records.

The aim of this paper is to describe a new species of *Austrodytes* WATTS, 1978, and to provide a faunal analysis of the Hydradeephaga of the Pilbara.

The study area

The Pilbara is a region in central Western Australia. With uplands and associated drainage systems of the Ashburton, Fortescue and DeGrey Rivers, it has the highest mountains in the western part of the continent (Hamersley Range) with Mt. Meharry (1,250 m) the highest point. To the east the ranges grade into low ridges, surrounded increasingly by sandy plains. The most

characteristic type of aquatic habitat is that provided by intermittently flowing streams or rivers. The hills are incised by deep gorges, often carrying permanent water holes (e.g. Kalamina, Knox, Hancock, Weano Gorge). To the northwest, gently rolling hills end in a flat coastal plain of varying width. Waters, for the most part, are fresh, but some rivers draining off the Western Australian Plateau may be saline.

The climate is generally arid and subtropical, though a more Mediterranean climate prevails in the southern part of the Pilbara. Rainfall is low and unreliable; nowhere is the median annual value in excess of 400 mm. In the north, rain is usually associated with summer cyclones or monsoons, whereas in the south it is usually associated with winter low pressure systems.

A complex vegetation pattern of *Triodia* grassland and *Acacia aneura* woodland occurs on the flood plains. *Triodia* grassland with an open tree layer of *Eucalyptus leucophloia* is typical of the stony hills of this region. Fringing forests of the river and creek-lines are dominated by *E. camaldulensis* and *E. coolabah*. Despite a very low, uncertain rainfall and nutrient-poor soils, the landscape texture is varied and there is a high species richness of both perennial shrubs and ephemeral grasses and forbs (BRIDGEWATER 1987, WILLIAMS & ALLEN 1987).

Material and methods

Specimens mentioned in this work are deposited in several collections which are abbreviated in the text as follows:

ANIC	Australian National Insect Collection, Canberra, Australia
CLH	Collection Lars Hendrich, Berlin, Germany
NMW	Naturhistorisches Museum, Wien, Austria
NHML	The Natural History Museum, London, England
OXUM	Hope Entomological Collections, Oxford, England
SAMA	South Australian Museum, Adelaide, South Australia, Australia
WAM	Western Australian Museum, Perth, Western Australia, Australia

The beetles were studied with a Leitz MS 5 binocular at 10-50x. Drawings were made with the aid of a camera lucida. Digital images were obtained using the digital imaging system at the Natural History Museum in London. The style of the descriptive notes follows WATTS (1978).

Field work was carried out from 24th August to 15th September 2002. The survey area of this study includes most aquatic habitat types of the region (Fig. 1). Those sites appearing to offer the greatest potential for finding new and undescribed species were most intensively sampled (e.g. springs and pools of intermittent creeks).

All 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, and were fixed in 70% alcohol.

Localities sampled

Loc. WA 1/165: Pilbara, De Grey River, River Crossing Hwy. No. 1, 72 km E of Port Hedland, 20 m a.s.l., 24.VIII.2002, 20°10'S 119°11'E, leg. Hendrich. Riverside with dense mats of floating vegetation and shaded by old River Gums (*Eucalyptus camaldulensis* and *E. coolabah*). Bottom consisting of sand and a thin layer of rotten plant debris.

Loc. WA 2/166: Pilbara, Yule River, River Crossing Camping Area at Hwy. No. 1, 53 km SW of Port Hedland, 20 m a.s.l., 24.VIII.2002, 20°41'S 118°17'E, leg. Hendrich. Isolated and mainly exposed pools in almost dry river bed.

Rich in submerged vegetation (e.g. *Chara* sp.). Bottom consisting of sand, larger stones and a thin layer of rotten plant debris.

Loc. WA 3/167: Pilbara, Millstream Chichester National Park, McKenzie Springs, 200 m a.s.l., 25.VIII.2002, 21°18'S 117°12'E, leg. Hendrich. Isolated and half-shaded spring fed pool (6 m², up to 1.5 m depth) rich in aquatic vegetation (*Typha orientalis*, sedges and mats of *Chara* sp.). Bottom consisting of rocks, stones and sand, with a layer of rotten plant debris (Fig. 15).

Loc. WA 4/168: Pilbara, Millstream Chichester National Park, Portland River, Roeburne-Wittenoom Road, 25.VIII.2002, 21°29'S 117°10'E, leg. Hendrich. Isolated, eutrophic and shallow pool (cattle hole, 10 m²) in a temporary and partly shaded creek (*Eucalyptus camaldulensis* and *E. coolabah*). No aquatic vegetation. Bottom in some parts with a layer of rotten leaves and twigs.

Loc. WA 5/169: Pilbara, Millstream Chichester National Park, Palm Pool at Fortescue River Crossing, 26.VIII.2002, 21°33'S 117°03'E, leg. Hendrich. Slow flowing stream with seasonally inundated old *Melaleuca* woodland on fringe. Numerous isolated, shallow, shaded and pools (up to 20 cm depth) in the river bed. Aquatic vegetation: Different sedges, *Potamogeton* sp. and mats of other floating vegetation. Bottom consisting of sand and in some pools rotten plant debris.

Loc. WA 5a/169a: Pilbara, Millstream Chichester National Park, irrigation channels at Visitor Centre, 26.VIII.2002, 21°34'S 117°03'E, leg. Hendrich. Perennial, slow flowing ditches rich in aquatic vegetation (Indian Water Fern, *Nymphaea* sp.), shaded by introduced African palms and native old River Gums. Bottom consisting of sand and a thin layer of rotten leaves.

Loc. WA 6/170: Pilbara, Millstream Chichester National Park, Fortescue River side branch, SE Visitor Centre, 26.VIII.2002, 21°37'S 117°07'E, leg. Hendrich. Isolated, eutrophic and shallow pool (cattle hole, 10 m²) in a temporary and partly shaded creek (*Eucalyptus camaldulensis* and *E. coolabah*). Without any aquatic vegetation. Bottom in some parts with a layer of rotten leaves and twigs.

Loc. WA 7/171: Pilbara, Hamersley Range, Hamersley Gorge, 400 m a.s.l., 27.VIII.2002, 22°15'S 117°59'E, leg. Hendrich. Different rocky pools (2 - 20 m²) in the main stream bed (up to 1 m depth). Aquatic vegetation: *Potamogeton* sp., dense mats of *Chara* sp., in smaller pools green and red algae.

Loc. WA 8/172: Pilbara, Hamersley Range, Wittenoom Gorge, Wittenoom "Town Pool", 400 m a.s.l., 27.VIII.2002, 22°15'S 118°19'E, leg. Hendrich. Different halfshaded pools (10 - 20 m², up to 1 m depth) surrounded by *Eucalyptus camaldulensis* and *E. coolabah*. Aquatic vegetation: Sedges and mats of floating vegetation (e.g. *Chara* sp. and *Potamogeton* sp.). Bottom consisting sand with a thin layer of mud and plant debris.

Loc. WA 9/173: Pilbara, Hamersley Range, 17 km S Auski Roadhouse, Fig Tree Crossing, 400 m a.s.l., 28.VIII.2002, 22°32'S 118°44'E, leg. Hendrich. Different isolated and halfshaded pools (10 - 20 m², up to 1.5 m depth) of an intermittent stream. Aquatic vegetation: Sedges and mats of floating vegetation (e.g. *Chara* sp. and *Potamogeton* sp.). Bottom consisting sand and stones, with a thin layer of mud and plant debris.

Loc. WA 10/174: Pilbara, Hamersley Range, Karijini National Park, Dales Gorge [Fortescue Falls and Circular Pool], 400 m a.s.l., 28.VIII.2002, 22°29'S 118°35'E, leg. Hendrich. Slow flowing stream and halfshaded rocky pools (10 - 20 m², up to 1.5 m depth). Aquatic vegetation: Sedges, *Typha orientalis* and mats of floating vegetation (e.g. *Chara* sp., *Nymphaea* sp. and *Potamogeton* sp.). Bottom consisting of rocks, sand and larger stones, with a thin layer of mud and plant debris.

Loc. WA 11/175: Pilbara, Hamersley Range, Karijini National Park, Kalamina Gorge, 450 m a.s.l., 29.VIII.2002, 22°25'S 118°23'E, leg. Hendrich. Slow flowing stream and exposed and shallow rocky pools (10 - 20 m², up to 0.5 m depth). Aquatic vegetation: Sedges, *Typha orientalis* and mats of floating vegetation (e.g. *Chara* sp.). Bottom consisting of rock, sand and larger stones, with a thin layer of mud and plant debris.

Loc. WA 12/176: Pilbara, Hamersley Range, Karijini National Park, Knox Gorge, 450 m a.s.l., 29.VIII.2002, 22°21'S 118°18'E, leg. Hendrich. Exposed and deep rocky pool (100 m², up to 1.5 m depth). Aquatic vegetation: Sedges and green algae. Bottom consisting of rock, sand and larger stones, with a thin layer of mud and plant debris (Fig. 16).

Loc. WA 13/177: Pilbara, Hamersley Range, Karijini National Park, Weano Gorge, 450 m a.s.l., 29.VIII.2002, 22°21'S 118°17'E, leg. Hendrich. Shaded, cold and deep rocky pools (20 m², up to 0.6 m depth) without any vegetation. Bottom consisting of rocks, sand and larger stones.

Loc. WA 14/178: Pilbara, Hamersley Range, Karijini National Park, Hancock Gorge, 450 m a.s.l., 30.VIII.2002, 22°21'S 118°16'E, leg. Hendrich. Shaded, cold and deep rocky pools (20 m², up to 0.6 m depth) without any vegetation. Bottom consisting of rocks, sand and larger stones (Figs. 17, 18).

Loc. WA 14a/178a: Pilbara, Hamersley Range, Karijini National Park, Hancock Creek Crossing, Weano Road, 5 km S Weano Campsite, 450 m a.s.l., 30.VIII.2002, 22°27'S 118°10'E, leg. Hendrich. Exposed, eutrophic and deep sandy pools (100 m², up to 1.5 m depth). Aquatic vegetation: Sedges, *Typha orientalis* and green algae. Bottom consisting of sand and larger stones, with a thin layer of mud and plant debris.

Loc. WA 15/179: Pilbara, Hamersley Range, Karijini National Park, 30 km S Tom Price, Bellary Creek 1st Crossing on Tom Price Road, 30.VIII.2002, 22°57'S 117°51'E, leg. Hendrich. Exposed, eutrophic and deep sandy pools (20 m², up to 0.5 m depth). Aquatic vegetation: Sedges (*Baumea* sp. ?) and *Typha orientalis*. Bottom consisting of sand and larger stones, with a thin layer of mud and plant debris.

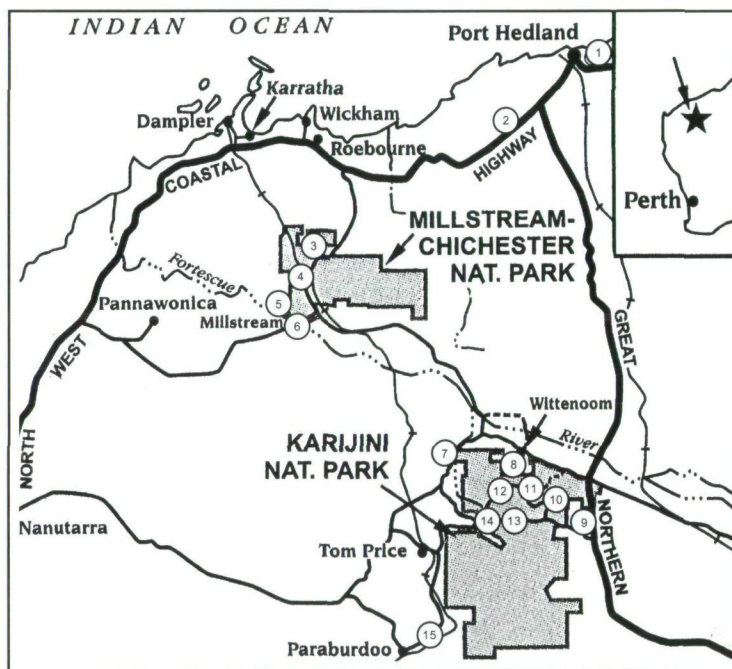


Fig. 1: Localities sampled in the Pilbara.

Taxonomy

The Australian species of the tribe Cybistrini SHARP, 1882 were revised by WATTS (1978), who redescribed all the species then known. Four genera, i.e. *Austrodytes* WATTS, 1978, *Cybister* CURTIS, 1827, *Homoeodytes* RÉGIMBART, 1878, and *Spencerhydrus* SHARP, 1882 occur in Australia (WATTS 1978, HENDRICH 1997).

The following species of the tribe Cybistrini are known from Australia:

<i>Austrodytes insularis</i> (HOPE, 1843)	NT, N QLD, N WA
<i>Austrodytes plateni</i> sp.n.	WA (Pilbara)
<i>Cybister godeffroyi</i> (WEHNCKE, 1876)	New Guinea, N QLD, N WA
<i>Cybister loxidiscus</i> WILKE, 1919	New Guinea, NT, N QLD, N WA



Figs. 2 - 5: Habitus of *Austrodytes* spp.: 2) *A. plateni* sp.n., ♂, 3) *A. plateni* sp.n., ♀, 4) *A. insularis*, ♂, 5) *A. insularis*, ♀. Scale = 1 cm.

<i>Cybister tripunctatus</i> (OLIVIER, 1795)	Oriental and Australasian Realms
<i>Cybister weckwerthi</i> HENDRICH, 1997	NT (Kakadu National Park)
<i>Cybister yulensis</i> GUIGNOT, 1956	New Guinea, NT, N QLD, N WA
<i>Onychohydus atratus</i> (FABRICIUS, 1801)	New Guinea, NT, N QLD, N WA
<i>Onychohydus scutellaris</i> (GERMAR, 1848)	SW WA, SA, VIC, NSW, TAS
<i>Spencerhydus latecinctus</i> SHARP, 1882	SA, VIC, TAS
<i>Spencerhydus pulchellus</i> SHARP, 1882	SW WA

Abbreviations: N = northern; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; SW = southwestern; TAS = Tasmania; VIC = Victoria; WA = Western Australia.

The distribution map (Fig. 14) is based on the locality data published by WATTS (1978), MCKENZIE et al. (1991), LARSON (1993, 1997), WEIR (1998) and unpublished records from the author.

Austrodytes WATTS, 1978

Small, greenish, oval, rather flattened Cybistrini. Characterized by the presence of metacoxal lines, and large and small punctures on the elytra. Metatarsus with two claws in both sexes (WATTS 1978). Two Australian species, *Austrodytes insularis* (HOPE, 1842) in the tropical north, and one endemic in the Pilbara.

The habitat of both species is unique in the tribe Cybistrini. According to our current knowledge, all related Oriental and Australasian genera (e.g. *Cybister*, *Onychohydus*, *Spencerhydus*) prefer more or less lentic habitats, occurring in well vegetated permanent lakes, swamps or larger forest pools. In contrast, both species of the genus *Austrodytes* inhabit permanent, clear and cold streams, and spring-fed rock pools in hilly regions (Figs. 15-18) in the tropical north of Australia (e.g. LARSON 1993, 1997).

Austrodytes insularis (HOPE, 1843)

Cybister insularis HOPE, 1842: 427; SHARP 1882: 771.

Homoeodytes insularis (HOPE, 1842): ZIMMERMANN 1920: 255.

Austrodytes insularis (HOPE, 1842): WATTS 1978: 137; LAWRENCE et al. 1987: 358; MCKENZIE et al. 1991: 313; LARSON 1993: 49; LARSON 1997: 272, 276; NILSSON 2001: 86-87; WATTS 2002: 30-31.

TYPE LOCALITY: Port Essington, Northern Territory, Australia.

TYPE MATERIAL: **Lectotype** of *Austrodytes insularis* (HOPE, 1842) [WATTS 1978 designated]: ♀: "*insularis* Hope P. Ess [= Port Essington]", "lectotype *Trogus insularis* Hope Det. C. Watts 1972", "Type Hope *Trogus insularis* Proc. Ent. Soc. 1842 p.47" [green label], "Type COL: 152 1/2 *Cybister insularis* Hope HOPE DEPT. OXFORD", "*Austrodytes insularis* (Hope) Det. C. Watts 1977" (OXUM).

Paralectotype of *Austrodytes insularis* (HOPE, 1842): ♀: "P. Ess", "Co-Type Hope *Trogus insularis* Proc. Ent. Soc. 1842 p.47" [green label], "Type COL: 152 2/2 *Cybister insularis* Hope HOPE DEPT. OXFORD", "Paralectotype *Austrodytes insularis* (Hope) Det. L. Hendrich 2003" [red label] (OXUM).

ADDITIONAL MATERIAL EXAMINED:

AUSTRALIA: 1 ♀, "New Holland" [= Australia] (NHML); WESTERN AUSTRALIA: 2 ♂♂, 1 ♀, Shire of Wyndham - East Kimberley, Gibb River Road, Dawn Creek Crossing, 300 m, 13.-14.VI.1999, Hendrich leg./ Loc. 7/107 (CLH); 2 ♀♀, Shire of Wyndham - East Kimberley, Gibb Range, Gibb River Road, Russ Creek Crossing, 380 m, 14.VI.1999, Hendrich leg. / Loc. 8 /108 (CLH); 1 ♂, Shire of Wyndham - East Kimberley, Mitchell Plateau, Mitchell Falls Camping Area, 300 m, 14.-15.VI.1999, Hendrich leg./ Loc. 11/111 (CLH); 2 ♀♀, East Kimberley Mitchell Plateau, Port Warrender Road/Kalumburu Road, Lowya Creek, 290 m, 18.VI.1999, Hendrich leg./ coll. Loc. 13/113 (CLH); 1 ♂, East Kimberley, East Gibb River Road, Barnett River

Gorge, 450 m, 19.VI.1999, Hendrich leg./ Loc. 17/117 (CLH); 1 ♂, Shire of Derby - West Kimberley, Gibb River Road, King Leopold Range, 500 m, 5 km NW Mount Bell, intermittent creek, 23.VI.1999, Hendrich leg./ Loc. 22/122 (CLH); NORTHERN TERRITORY: 1 ♂, Kakadu N.P., Nourlangie District, Gubara, 50 m, 25.X.1996, 12°50.101'S 132°52.501'E, Hendrich leg./ Loc.1 (CLH); 2 ♂♂ and 1 ♀, Kakadu N.P., Jim Jim District, Barramundie Gorge, Maguk, 50 m, 31.X.1996, 13°18.823'S 132°26.198'E, Hendrich leg. / Loc. 9 (CLH); 1 ♀, Litchfield N.P., Florence Falls Camping Area, 120 m, 4.XI.1996, 13°06.705'S 130°47.220'E, Hendrich leg./ Loc. 16 (CLH); 1 ♂, 1 ♀, Old Stuart Hwy, Scenic Drive, Robin Falls, Creek, 50 m, 7.VII.1999, Hendrich leg./ Loc. 37/137 (CLH); 2 ♀♀, Pt. Essington (NHML); QUEENSLAND: 1 ♂, 1 ♀, Queensland, Coen, G. Bryant Coll. 1919-147 (NHML).

DISTRIBUTION: Tropical northern Australia, from the Kimberley region to northern Queensland. (Fig. 14).

Austrodytes plateni sp.n.

TYPE LOCALITY: Springfed pool, McKenzie Springs, Millstream Chichester National Park, Pilbara, Western Australia.

TYPE MATERIAL: **Holotype:** ♂: "AUSTRALIA, WA Pilbara, Millstream Chichester N.P., McKenzie Springs, 200m, 25.8.2002, 21°18'S 117°12'E, Hendrich leg./ Loc. WA 3/167" (WAM).

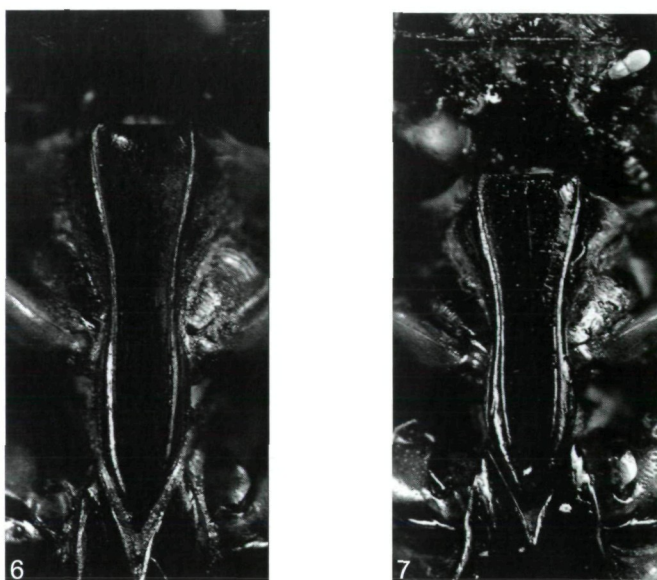
Paratypes: 44 exs., 5 ♂♂, 16 ♀♀, same label data as holotype (coll. ANIC, CLH, NHML, NMW, SAMA, WAM); 5 ♂♂, 3 ♀♀, "AUSTRALIA, WA Pilbara, Hamersley Range, Hamersley Gorge, 400m, 27.8.2002, 22°15'S 117°59'E, Hendrich leg./ Loc. WA 7/171" (CLH); 3 ♂♂, "AUSTRALIA, WA Pilbara, Hamersley Range, 17 km S Auski Roadhouse, Fig Tree Crossing, 400m, 28.8.2002, 22°32'S 118°44'E, Hendrich leg./ Loc. WA 9/173" (CLH); 4 ♂♂, 2 ♀♀, "AUSTRALIA, WA Pilbara, Hamersley Range, Karijini N.P., Dales Gorge [Fortescue Falls and Circular Pool], 400m, 28.8.2002, 22°29'S 118°35'E, Hendrich leg./ Loc. WA 10/174" (CLH); 1 ♂, 1 ♀, "AUSTRALIA, WA Pilbara, Hamersley Range, Karijini N.P., Kalamina Gorge, 450m, 29.8.2002, 22°25'S 118°23'E, Hendrich leg./ Loc. WA 11/175" (NHML); 2 ♀♀, "AUSTRALIA, WA Pilbara, Hamersley Range, Karijini N.P., Knox Gorge, 450m, 29.8.2002, 22°21'S 118°18'E, Hendrich leg./ Loc. WA 12/176" (CLH); 1 ♂, "Fortescue River Millstream WA: 22 Feb. 1977 M.S. & B.J. Moulds", "076" [ex. coll. Walford-Huggins] (CLH); 1 ♀, "Millstream WA 27 11 74 coll. K.F. Walker" (SAMA).

DIAGNOSIS: Oval, greenish, rather flattened, widest behind middle where elytron noticeably flanged.

DESCRIPTION: Measurements (N = 10). Total length of beetle 20.0 – 20.1 mm (holotype 20.0 mm); length without head 18.0 – 18.5 mm (holotype 18.0 mm); greatest width of beetle 10.5 – 11.0 mm (holotype 10.5 mm).

Colour (Figs. 2, 3). Head dark greenish; clypeus rufo-testaceous on anterior part. Pronotum dark greenish; lateral margins of pronotum broadly yellowish. Elytra dark greenish, lateral margins with broad yellow band. Width of band up to 1/5 of elytral width. Ventral surface black; epipleuron black rufo-testaceous. Legs mainly black; protibia, protarsus, pro- and mesotrochanter rufo-piceous.

Sculpture. Elytron and pronotum mat, with a fine but visible microreticulation, and with moderately dense, minute punctures and numerous deeply impressed large punctures. Head with larger punctures only, mainly joined by quite well marked grooves. Sides of pronotum rather rugose, with partial network of shallow grooves. Disc of elytra with rows of small, weak blisters. Three rows of serial punctures on elytron well marked. Metacoxal plate impunctate, with some weak, shallow scratches forming a loose network. Prothoracic process broad, strongly ridged at sides, apex sharply pointed, ventral surface distinctly concave basally, the anterior margin thus also appearing concave (Fig. 6). Metacoxal lines short, well separated in middle, diverging rapidly in anterior and posterior thirds, posterior lobe of metacoxa weakly notched. Inner posterior angle of metafemur weakly spinose. Caudal margin of metatrochanter broadly rounded.



Figs. 6 - 7: Prosternal process of 6) *Austrodytes plateni* sp.n., 7) *A. insularis*. Scale = 1 mm.

Male. Median lobe (Figs. 8, 9) and paramere (Fig. 10). Sucker on protarsus widely oval; strongly developed fringing setae behind, shorter at sides and anteriorly; with about 40 narrowly oval palettes in four rows on medium stalks often overlapping. Anterior claw of pro- and mesotarsi somewhat larger than other. Protarsal and mesotarsal claws noticeably bent at tip. Metatarsus with two claws.

Female. Protarsus simple; anterior claw longer than posterior. Metatarsus with two claws. Metatibia and -tarsus with ventral setal fringes present.

ETYMOLOGY: Named after the keen arachnologist and ecologist Dr. Ralph Platen (Berlin, Germany).

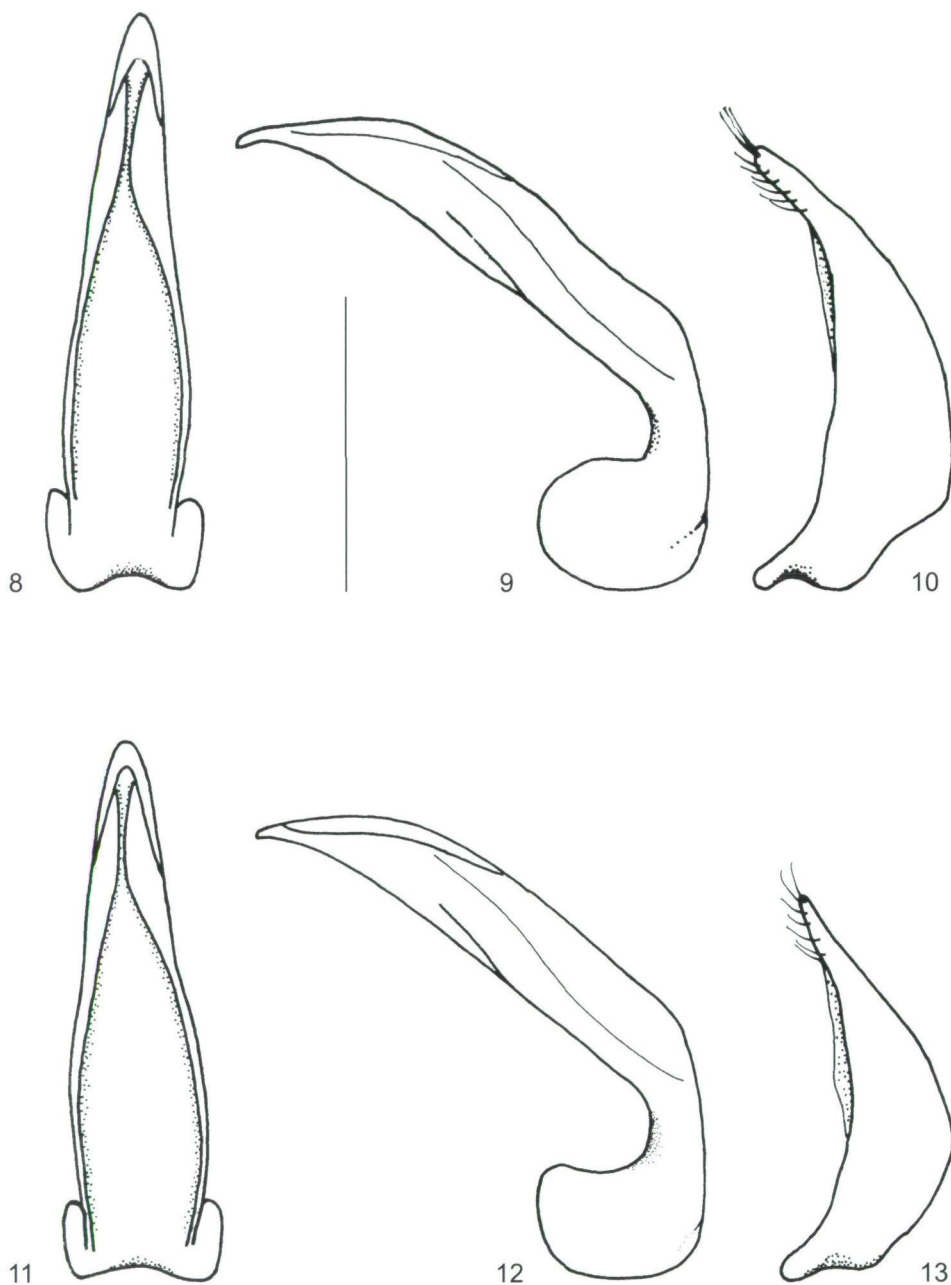
DISTRIBUTION: Pilbara, Western Australia (Fig. 14).

AFFINITIES: *Austrodytes plateni* can easily be separated from *A. insularis* by its larger size [length of beetle 20.0 – 20.1 mm versus 17.0 mm – 18.5 mm], the microreticulate and mat surface [shiny and without visible microreticulation in *A. insularis* (Figs. 4, 5)], the concave prothoracic process [ventral surface flat, anterior margin straight in *A. insularis* (Fig. 7)], and the form of the median lobe of the aedeagus and of the parameres (Figs. 8-13).

Faunistic results and discussion

In the present study a total of 33 species of predaceous water beetles were collected from the Pilbara in Western Australia (Table 1). They belong to the following families (species numbers in parantheses): Dytiscidae (29), Gyrinidae (3), and Haliplidae (1).

TABLE 1: HYDRADEPHAGA OF THE PILBARA		Loc. 1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 5a	Loc. 6	Loc. 7	Loc. 8	Loc. 9	Loc. 10	Loc. 11	Loc. 12	Loc. 13	Loc. 14a	Loc. 14	Loc. 15	DISTRIBUTION	HABITAT
HALIPLIDAE																			N-Australia	lentic, permanent
Haliphys watissi VONDEL, 1995						2														
DYTISCIDAE																			Australia	lentic (lotic)
Allodessus bistrigatus (CLARK, 1862)		4	17	10	3	3			8		3	6	2	2	5		1		Pilbara, endemic !	lotic (lentic)
Austrodytes plateni sp.n.				22		3		103											N-Australia	lotic (lentic)
Bidessodes denticulatus (SHARP, 1882)																			N-Australia	lentic, temporary
Copelatus irregularis MACLEAY, 1871		2	15	1	28	6	2	3	1		1	2	2	1	1				N- and C- Australia	lentic
Copelatus nigrolineatus SHARP, 1882		7	5	5	6				1		5	1	1	1		1			Orientalis, Australis	lentic, permanent
Cybister tripunctatus (OLIVIER, 1795)					1														Australia	lentic
Eretes australis (ERICHSOHN, 1842)		6	5		2	2	2		11		2	3		1					Orientalis and N-Australia	lentic
Hydaticus consanguineus AUBE, 1838																			N-Australia	lentic/lotic
Hydaticus daemeli SHARP, 1882		1		41															N-Australia	lentic, permanent
Hydaticus quadrivittatus BLANCHARD, 1853		14			6			1		5								1	Pilbara, endemic !	lotic (lentic)
Hydroglyphus basalis (MACLEAY, 1871)			50	45	10	2	4							14				1	N-Australia	lentic
Hydroglyphus orthogrammus (SHARP, 1882)		1	10	1	3			1											N-Australia	lentic
Hydroglyphus grammopterus (ZIMMERMANN, 1928)																			N-Australia	lentic
Hydroglyphus leai (GUIGNOT, 1939)		10																	N-Australia	lentic
Hydrovatus rufoniger polius SHARP, 1882																			N-Australia	lentic
Hydrovatus weiri BISTRÖM, 1996																			N-Australia	lentic
Hyphedrus elegans (MONTROUZIER, 1860)					8	1	4			1	3	4	44	1					Australia	lentic/lotic
Hyphedrus lyraeus lyraeus SWARTZ, 1808		8	12	2	11	2	4	1	1	3	1	3	2	5	1				Orientalis, N- and C- Australia	lentic
Laccophilus sharpi RÉGIMBART, 1889		50	37	8	2	3	4	4	1	4	3	2	5	1				3	Orientalis, N- and C- Australia	lentic/lotic
Limbedossoma compactus (CLARK, 1862)				10	1			5		1		4	9	10		2			Orientalis and N-Australia	lentic (lotic)
Necterosoma regulare (SHARP, 1882)					2	18	12		2	1								2	N- and C- Australia	lentic, permanent
Onychohydus atratus (FABRICIUS, 1801)				2	1														N-Australia	lotic
Platynectes decemmaculatus (FABRICIUS, 1775) s.l.				2	3				3		3	1	34	4		1			Australia	lentic
Rhanitacus congeatus (KLUG, 1833)				4															Aethiopsis, Orientalis, Australis	lentic
Rhanitacus suturalis (MACLEAY, 1825)					1														Palaeartidis, Orientalis, Australis	lentic
Sternoporus sp.n. HENDRICH & WATTS (in press)				6	2				11				1						Pilbara, endemic !	lotic (lentic)
Tiporus alatairi (WATTS, 1978)				12					1										S-Kimberley, Pilbara	lotic (lentic)
Tiporus lachlani WATTS, 2000				4						19						1			Pilbara, endemic !	lotic (lentic)
Tiporus lambreyi (WATTS, 1978)				2	3	1			60					1	1				Pilbara, endemic !	lotic (lentic)
GYRINIDAE																				
Dineutes australis (FABRICIUS, 1775)			47	1		1	2		4		2		13	3	6		1		Australia	lotic
Macrogyrus darlingtoni OCHS, 1949												4		24					N-Australia	lotic
Macrogyrus fuscus OCHS, 1925									14		33		1	6	2		1		N-Australia	lotic
Species: 33		10	10	20	4	22	6	10	7	8	12	12	11	15	4	4	4	5		
Specimens: 1241		103	222	194	14	107	12	141	43	81	79	35	110	80	13	5	4	10		



Figs. 8 - 13: Aedeagus of *Austrodytes* spp.: 8) dorsal view of median lobe of aedeagus of *A. plateni* sp.n., 9) same, lateral view, 10) lateral view of paramere of *A. plateni* sp.n., 11) dorsal view of median lobe of aedeagus of *A. insularis*, 12) same, lateral view, 13) lateral view of paramere of *A. insularis* sp.n. Scale = 2 mm.

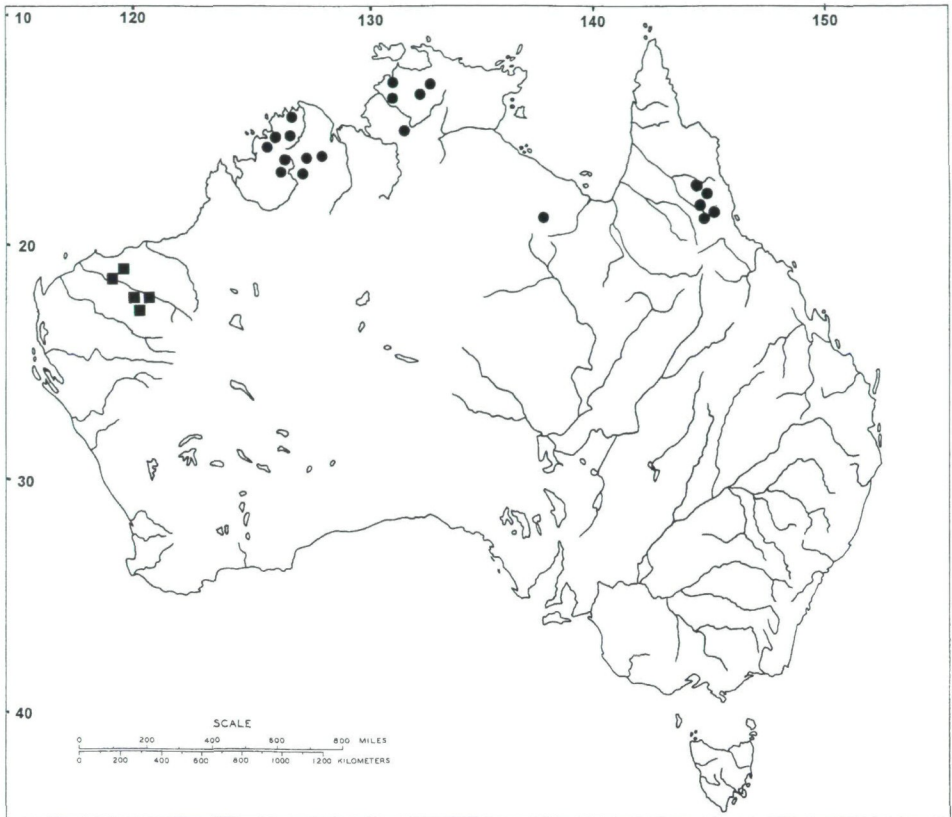


Fig. 14: Geographical distribution of *Austrodytes insularis* (black dots), and *A. plateni* sp.n. (black squares).

The water beetle fauna of the Pilbara is dominated by Torresian faunal elements. Thirteen species, 39 % of the total fauna recorded in the Pilbara, are mainly distributed in the tropical parts of northwestern and northern Australia. Just five species are endemic [*Austrodytes plateni* sp.n., *Hydroglyphus orthogrammus* (SHARP, 1882), *Sternopriscus* sp.n. (HENDRICH & WATTS in press), *Tiporus lachlani* WATTS, 2000 and *Tiporus tambreyi* (WATTS, 1978)], almost restricted to permanent, mainly lotic habitats in the Pilbara. Only two species, *Copelatus nigrolineatus* (SHARP, 1882) and *Necterosoma regulare* (SHARP, 1882), are widespread in northern and central Australia, and five species [*Allodessus bistrigatus* (CLARK, 1862), *Dineutes australis* (FABRICIUS, 1775), *Eretes australis* (ERICHSON, 1842), *Hyphydrus elegans* (MONTROUZIER, 1860) and *Platynectes decempunctatus* (FABRICIUS, 1775) sensu WATTS (1978)] are widely distributed in Australia. At least six species are widespread in the Palearctic and/or Oriental and Australasian realms [*Cybister tripunctatus* (OLIVIER, 1795), *Hydaticus consanguineus* (AUBÉ, 1838), *Hyphydrus lyratus* SWARTZ, 1808, *Laccophilus sharpi* RÉGIMBART, 1889, *Rhantaticus congestus* (KLUG, 1833) and *Rhantus suturalis* (MACLEAY, 1825)].

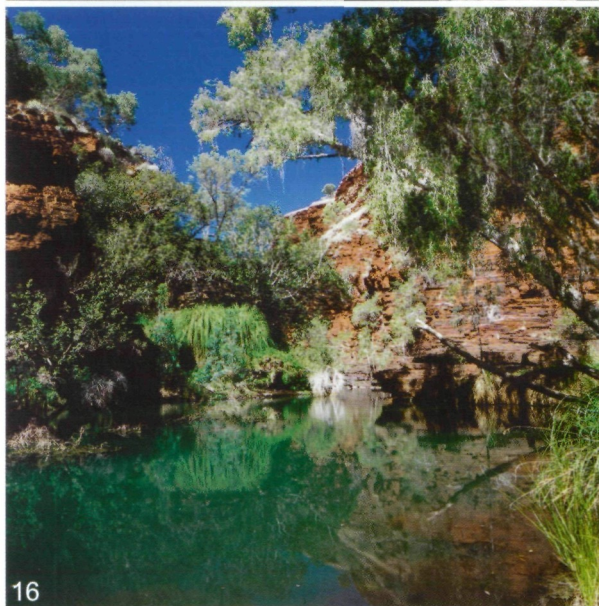
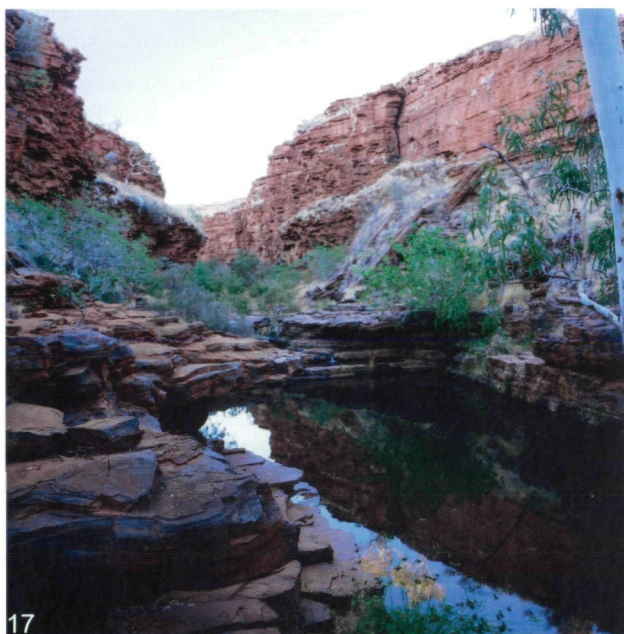


Fig. 15: Loc. WA 3/167: Pilbara, Millstream Chichester National Park, McKenzie Springs. The habitat of 20 species of hydradephagan beetles including all but one endemic species of the Pilbara (e.g. *Austrodytes plateni* sp.n., *Hydroglyphus orthogrammus*, *Tiporus lachlani* and *Sternopriscus* sp.n.), and *Tiporus alastairi*. (Photo: I. Weckwerth)

Fig. 16: Loc. WA 12/176: Pilbara, Hamersley Range, Karijini N.P., Knox Gorge. This is the habitat of 15 species, including *Austrodytes plateni* sp.n., *Tiporus tambreyi*, *Laccophilus sharpi*, *Hydrovatus weiri*, and all three Gyrinidae. (Photo: I. Weckwerth)



Figs. 17 - 18: Loc. WA 14/178: Pilbara, Hamersley Range, Karijini N.P., Hancock Gorge. Shaded, cold and rocky pools without aquatic macrophytes. Habitat of *Austrodytes plateni* sp.n. and *Platynectes decempunctatus*. (Photos: I. Weckwerth)

The greatest diversity was encountered in the Palm Pool at Fortescue River Crossing (loc. 5: 22 species/ 66 %) and McKenzie Springs (loc. 3: 20 species/ 60 %). Both localities, situated within the Millstream Chichester National Park, supported all the endemic species of the Pilbara.

According to VONDEL (1995), the finding of the rarely collected and recently described *Haliphus watti* VONDEL, 1995 is the first record of the family Haliplidae for the Pilbara. The species was known before from the Kimberley region, the Northern Territory, and north coastal Queensland only. Other interesting beetles are the rarely collected *Hydroglyphus orthogrammus*, only the type material [north-western Australia, NHML] and one additional specimen [Marillana Station, eastern Pilbara, SAMA] being known (WATTS 1978, Hendrich vid.); and *Tiporus alastairi* (WATTS, 1978), a rare species, distributed in the southern Kimberley region (WATTS 2000), and recorded for the first time in the Pilbara.

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, 13 species (40 %) are restricted to lentic sites, while 10 (30 %) are found only in lotic situations. However, in some cases this division is difficult as different habitats often merge one into another, especially in the dry winter period when the study took place and many creeks and small streams started to dry out. A good example are the dytiscids *Bidessodes denticulatus* (SHARP, 1882) and *Sternopriscus* sp.n., which occur in stagnant rest pools of intermittent creeks as well as in slow flowing streams. Just a few third instar larvae belonging to the species: *Cybister tripunctatus*, *Eretes australis* and *Hyphydrus lyratus* were caught during the survey. At least 10 species (30 %) were found in both lotic and lentic habitats. All but three species (90 %) were collected in permanent water bodies only. Only three species occur in both permanent and temporary habitats.

In general, isolated deep shaded and well vegetated pools with clear water support a speciose fauna, whereas unshaded warm and eutrophic water bodies are inhabited by fewer, usually common, widespread and eurytopic species. The deep, cold and often connected pools in the gorges, without or with little emergent vegetation and plant debris houses a rich fish and dragonfly fauna while their water beetle fauna is rather poor. Predation by dragonfly nymphs, and fish seems to have a significant effect on the distribution and abundance of Australian water beetles, especially their larval stages.

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Dr. Lars HENDRICH

Mörchinger Straße 115 A, D-14169 Berlin, Germany (hendrich1@aol.com)

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