

**Checklists and Guides to the
Identification, to Genus, of Adult and
Larval Australian Water Beetles of the
Families Dytiscidae, Noteridae,
Hygrobiidae, Haliplidae, Gyrinidae,
Hydraenidae and the Superfamily
Hydrophiloidea (Insecta: Coleoptera)**

Chris H. S. Watts

South Australian Museum, North Terrace, Adelaide SA 5000

Cooperative Research Centre for Freshwater Ecology

Identification and Ecology Guide No. 43

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Lake Hume, Via Albury NSW,
5 & 6th February 2002**

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Front Cover: Top *Batrachomatus wingi* Clark (Dytiscidae)
Bottom *Hydrophilus* sp. (Hydrophilidae)
Photographs by Karlie J. Hawking

Back Cover: *Hygrobia watti* Hendrich (Hygrobiidae)

Biodiversity. Article 12 of The *Convention on Biological Diversity* signed at Rio in June 1992
states that signatory states shall “[establish and maintain programmes for scientific and technical
education and training in measures for the identification, conservation and sustainable use of
biological diversity and its components.” MDFRC and CRCFE have been very active in the areas
of scientific and technical education and training in the identification of aquatic biodiversity in
Australian waterways.

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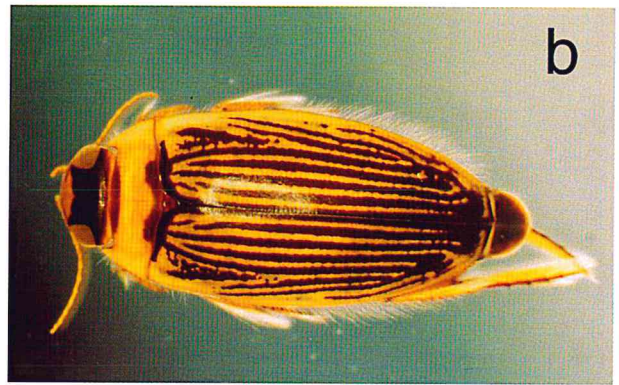
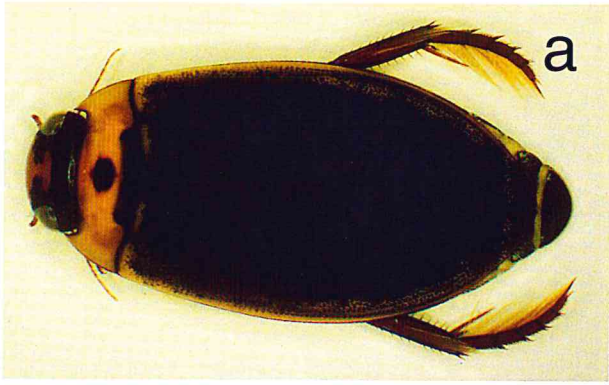


Plate 1. Coleoptera. (a-f) Dytiscidae: (a) *Rhantus suturalis*; (b) *Lancetes lanceolatus*; (c) *Onychohydrus scutellaris*; (d) *Onychohydrus scutellaris*, larva; (e) *Sternopriscus maedfooti*; (f) *Necterosoma regulare*; (g-h) Hydrophiloidea: (g) *Hydrochus* sp; (h) *Helochaeres tristis*.
Photographs: John Hawking

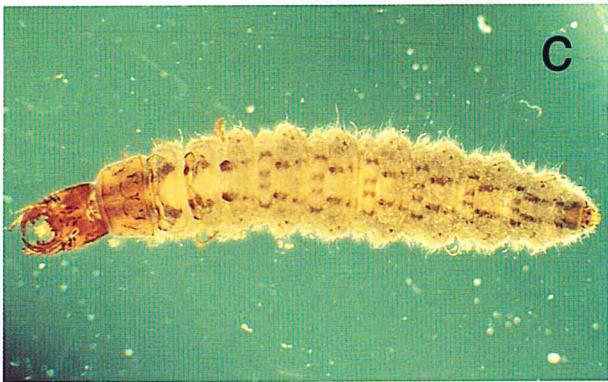
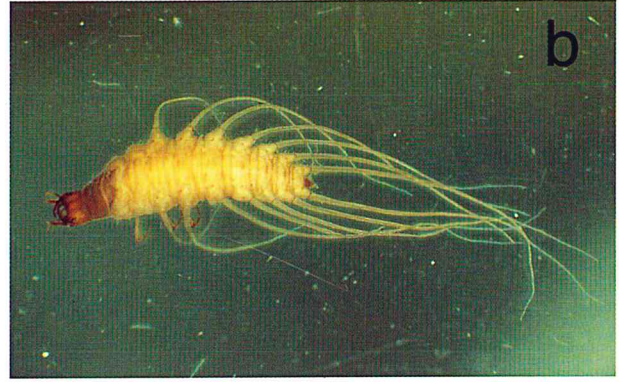


Plate 2. Coleoptera. (a-c) Hydrophilidae: (a) *Berosus majusculus*; (b) *Berosus majusculus*, larva; (c) *Enochrus* sp., larva; (d) *Spercheus* sp., larva, Spercheidae; (e) *Hygrobia australasiae*, Hygrobiidae; (f) *Haliplus* sp., Haliplidae; (g-h) Gyrinidae: (g) *Aulonogyryus strigosus*; (h) Gyrinid larva. Photographs: John Hawking



Plate 3. Coleoptera: (a-b) Hydraenidae: (a) *Hydraena ypsilon*;; (b) Hydraenid larva; (c-e) Noteridae: (c) *Hydrocanthus australasiae*; (d) *Neohydrocoptus subfasciatus*; (e) *Canthydrus bovillae*; (f-g) Haliplidae: (f) *Haliplus watti*; (g) *Haliplus alastaini* (h) Scirtid larva, Scirtidae.
Photographs: John Hawking (a, b, h)

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Family DYTISCIDAE

The aim of this guide is to enable the identification of Australian Dytiscidae to generic level as easily and quickly as possible. In the keys I have not used a strictly systematic approach but have used what, I think, are the easiest characters, be they size, locality or whatever. In doing this, the systematic groupings are often shattered. To some extent at least these can be recovered from the checklist.

To help go beyond the generic level I have given a reference to the most recent keys to the species in the brief generic accounts. If no reference is given there has been no further revision since my 1978 paper, which should be referred to.

The generic accounts are brief and generalised. They are meant as a guide only. They also include a lot of rather rough shorthand. Thus 'north' means anything north of about the tropic of Capricorn, 'south' anything south of about a line between Geraldton (WA) and Sydney. I am sure there will be many exceptions as knowledge increases, but it is unlikely that a 'northern' genus will turn up in Victoria (the converse is less true since several 'southern' species reappear in the Atherton Tableland region). 'Still', 'flowing', 'running', 'pond', 'river' etc are equally vague terms and in most cases refer to the habitat the genus is most often found in based on my perception of that habitat, but adults of most genera are occasionally found in most fresh water habitats. When known I have indicated the season when I have found larvae. Again this is very preliminary and is of very uneven quality.

At the generic level, larval Dytiscidae in Australia are well defined and relatively easily identified but our knowledge of them at the species level is still far too little for more than a few to be identified to species, although the series of papers by Yves Alarie and others are beginning to address this. Outside of the Bidessini, the larva of only one genus, *Austrodytes*, is unknown. In contrast, within the Bidessini the larvae of only a few are known and our knowledge of them is as yet too poor to delineate genera.

Dytiscidae have three larval instars which are aquatic (other than, presumably, the terrestrial *Terradessus*), followed by pupation in damp earthen cells on land. As far as I am aware no work on the lifecycle of any Australian species has been done. From my limited observations and from breeding them in the laboratory, the larval stage takes about a month and the pupal stage about a week in spring and summer. Some genera, eg *Barretthydrus*, are winter breeders and must take longer. Others may well aestivate over summer in the adult stage. Most seem to have a relatively well defined breeding season of two to three months, most frequently in late winter and spring in the south and during the wet season in the north.

Characters used in the key to larvae are, I think, self evident. All are clearly visible in spirit preserved specimens of all three instars.

In 1998 the first examples of subterranean Dytiscidae in Australia were collected from the Goldfields region of Western Australia. (Watts and Humphreys 1999). Since then (to December 2001) numerous further species have been collected and the total now stands at over thirty in five genera (although the distinction between two of the genera is becoming dubious) in the subfamily Hydroporinae- tribes Bidessini and Hydroporini- and Colymbetinae – tribe Copelatini. The species seem to be restricted to portions of near-surface aquifers where the formation of limestone (calcrete) has occurred. These areas are separated from each other along an aquifer by areas of non-cavernous rock such as sandstone, effectively isolating the fauna in each of the limestone areas which can be anything from a few hectares to several square kilometres in area. Where reasonable access is present, by means of wells and bores drilled for water extraction/monitoring or geological exploration, we have found that typically each separate limestone area has two species of Dytiscid, one large and one small. The other fauna is predominantly amphipod and syncarid crustacea, isopods, copepods and ostracods. Presumably these provide the food for the beetles. Potentially suitable aquifers in limestone areas exist over much of inland Western Australia and into the Northern Territory and South Australia. Similar regions do not seem to be present in the other States. So far we know that beetles are present from Mt Magnet in Western Australia to Central Mount Wedge just west of Alice Springs in the Northern Territory. Although there is a rich fauna in aquifers in the Pilbara region no Dytiscids have yet been found there. Many potentially suitable areas have yet to be sampled, suggesting that many additional species remain to be discovered.

This fauna is collected by means of a small, weighted, plankton net lowered into the water table on the end of a thin line attached to a fishing reel and drawn up through the water column several times. A range of net diameters allows access to bores and wells of different sizes.

All the specimens used in this study are from the South Australian Museum collection.

MORPHOLOGY

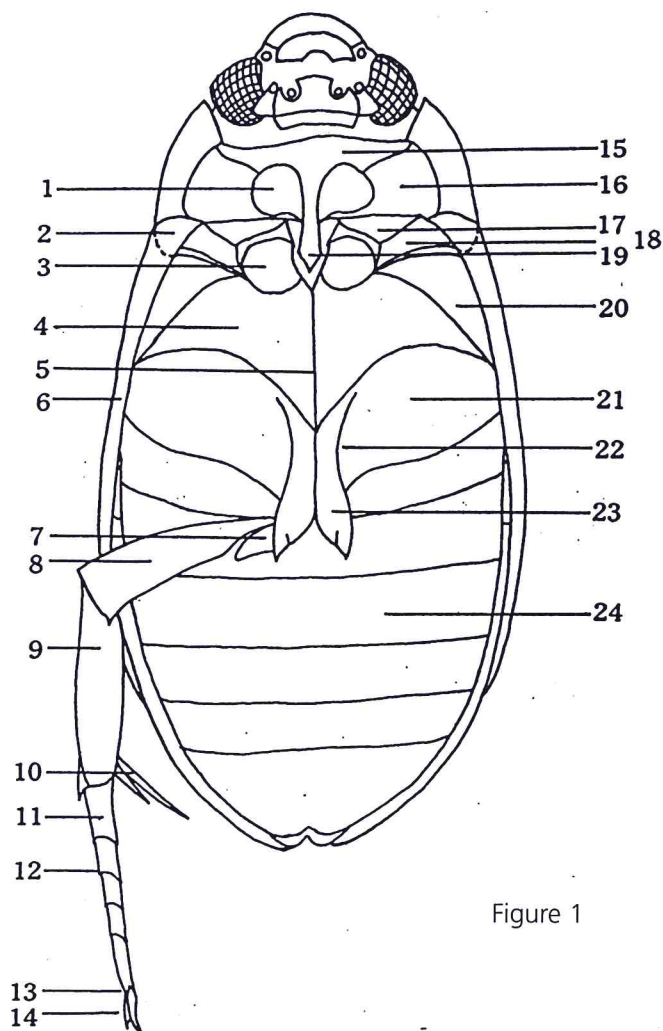


Figure 1

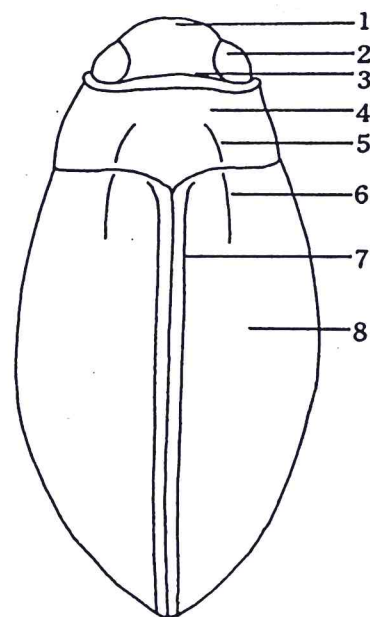


Figure 2

Fig. 1. Diagram of underside of adult dytiscid. 1, Procoxal cavity; 2, Epipleural pit (if present); 3, Mesocoxal cavity; 4, Metasternum; 5, Midline of metasternum, 6, Elytral epipleuron; 7, Metatrochanter; 8, Metafemur; 9, Metatibia; 10, Metatibial spines; 11, Basal segments of metatarsus; 12, Notch on posterior edge of segments of metatarsus; 13, Uniguclar cleft (if present); 14, Metatarsal claws; 15, Prosternum; 16, Empimeron of prosternum; 17, Mesoepisternum; 18, Mesoepimeron; 19, Prosternal process; 20, Metepisternum; 21, Metacoxal plate; 22, Metacoxal line; 23, Metacoxal process; 24, Abdominal sternite (3rd visible, 4th structural).

Fig. 2. Diagram of upper surface of a bidessine dytiscid. 1, Clypeus; 2, Eye; 3, Cervical stria; 4, Pronotum; 5, Pronotal stria; 6, Elytral stria; 7, Sutural stria on elytron; 8, Elytron. The striae may not be present on all specimens.

KEY TO ADULTS OF THE AUSTRALIAN GENERA OF DYTISCIDAE

- 1 Scutellum visible, (Fig. 3).....27
- Scutellum invisible < 8mm, (Fig. 4)2

- 2(1) Eyeless, < 5mm long3
- With eyes4

- 3(2) Terrestrial, mountain tops of North Queensland*Terradessus*
- Subterranean, Western Australia.....
Kintingka, Nirridessus, Nirripirti, Tjirtudessus
(Due to the rapid discovery of new taxa of subterranean Dytiscidae at the present time (late 2001) their taxonomy is unsettled and it is premature to try and key these genera.)

- 4(2) Dorsal surface finely reticulate, without punctures other than very small serial ones; first four segments of hind tarsi with large lateral lobe-like extensions on outside towards their apex (Fig. 5); hind leg with only one claw (Fig. 5)5
- Dorsal surface punctate; hind tarsi without lateral lobes on outside (Figs 6, 7); hind tarsi with one or two claws (Figs 6, 7)6

- 5(4) Base of pronotum sinuate (Fig. 8), metatibial spines bifid at tip; >3mm long; not in South-east.....*Laccophilus*
- Base of pronotum relatively straight (Fig. 9), metatibial spines not bifid; < 3mm long; mountain streams in South-east and Tasmania.....*Australphilus*

- 6(4) Hind leg with inner claw about a quarter or less the length of the outer (Fig. 6); body > 3.5mm long*Hyphydrus*
- Hind leg with two claws, the inner > half length of outer (Fig. 7); body 1.2-8.0mm long7

Fig. 5 from Pederzani (1994).

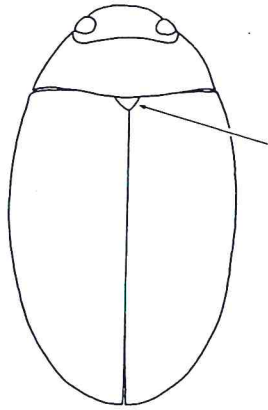


Figure 3

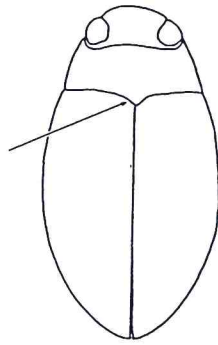


Figure 4

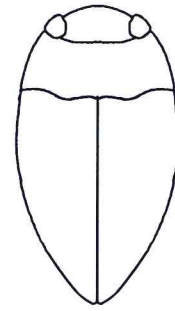


Figure 8



Figure 9

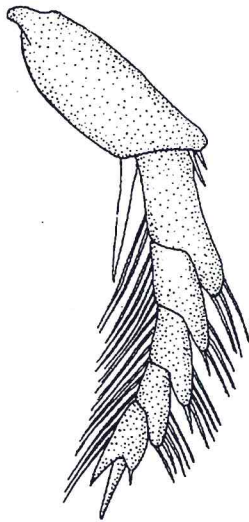


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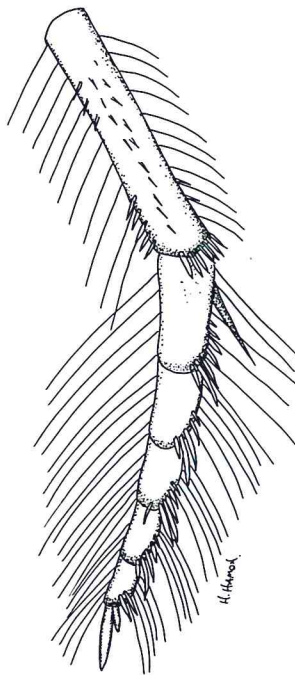


Figure 6

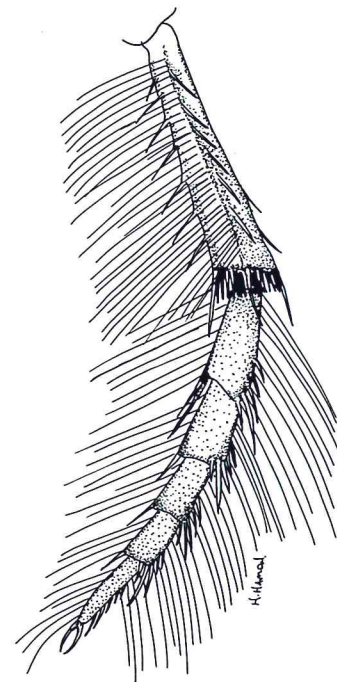


Figure 7



- 7(6) Each elytron with 4-5 longitudinal grooves (Fig. 10).....***Barretthydrus***
 (If your specimen has only two grooves on each elytron it is *Carabhydrus* (Fig. 11). You missed its scutellum in couplet 1.)
- Elytra without grooves except for sutural striae and short elytral plicae in some (Fig. 12).....**8**
- 8(7) Fore and middle tarsi clearly five segmented (Fig. 13)**9**
- Fore and mid tarsi with a very small fifth segment lying within lobes of fourth segment (Fig. 14), or with only three or four segments (Figs 26, 28).....**10**
- 9(8) Hind margin of metacoxal process indented in middle (Fig. 15), > 3mm long***Necterosoma***
- Hind margin of metacoxal process produced in middle (Fig.16), many species < 3mm long; males often with elaborately expanded antennae ...***Sternopriscus***
- 10(8) Pronotum with two grooves which are usually continued onto elytra (Fig. 12)**11**
- No grooves on either pronotum or elytra**20**
- 11(10) Elongate, subparallel sided, flattened, ventral surface densely punctate. Atherton region of North Queensland and Pilbara of Western Australia.....***Boongurrus***
- Not as above**12**
- 12(11) A thin sharply impressed line (cervical stria) between hind edges of eyes (Fig. 12).....**13**
- Without a cervical stria.....**17**

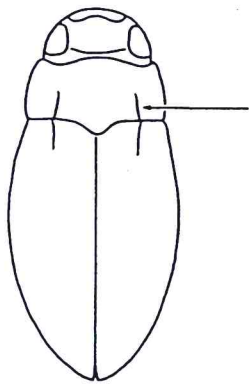


Figure 12

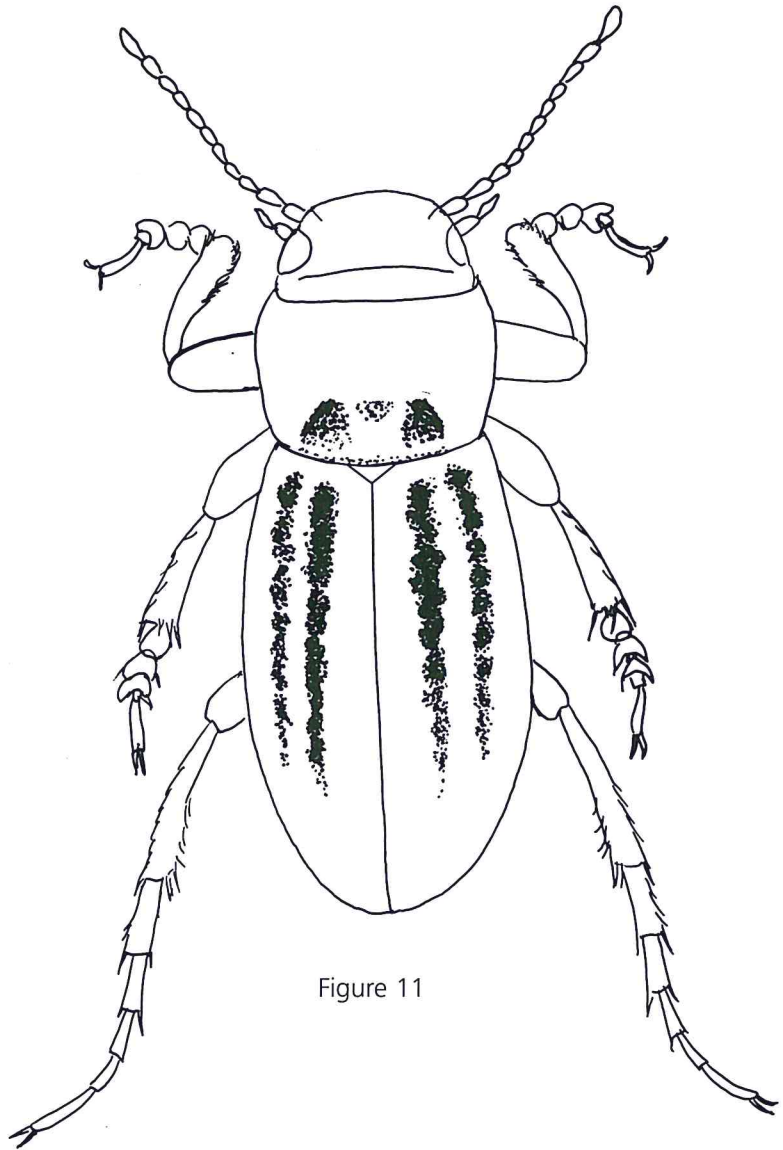


Figure 11

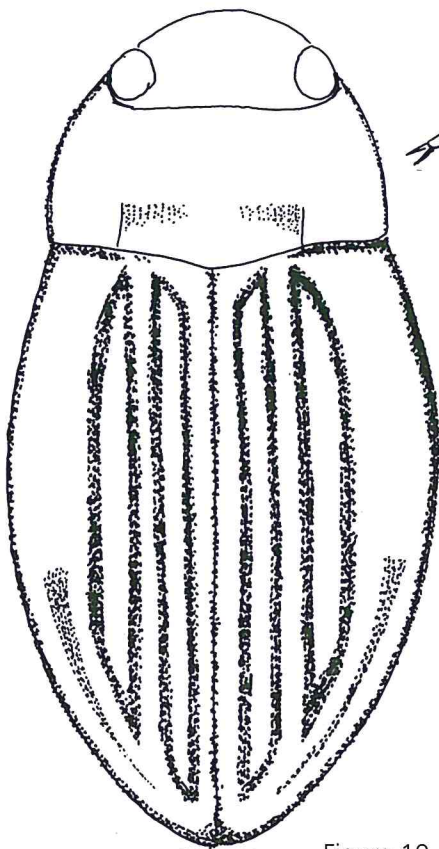


Figure 10

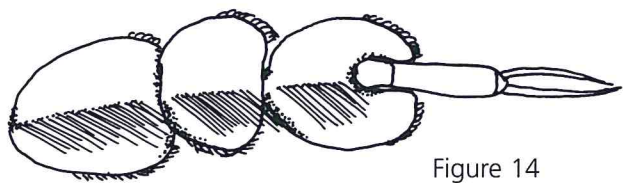


Figure 14



Figure 13

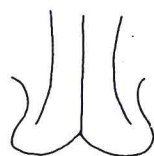


Figure 15



Figure 16

- 13(12) Elytral epipleuron with basal cavity which is bordered behind by a raised ridge (Fig. 18).....*Clypeodytes*
- Elytral epipleuron without basal cavity (Fig. 19)**14**
- 14(13) Front edge of head narrowly flanged; dorsal surface with distinct colour pattern; round, < 2mm long*Leiodytes*
- Front edge of head not flanged; dorsal surface with indistinct colour pattern; 1.5-4.0mm long, often elongate**15**
- 15(14) < 2.0mm.long. Metacoxal lines short, separated by about their own length (Fig. 20)*Gibbidessus*
- > 2.0mm.long. Metacoxal lines reaching nearly to metasternum, separated by < half their own width (Figs 21, 22)**16**
- 16(15) Metacoxal plates moderately punctate (Fig. 22); females with underside of abdomen testaceous contrasting with black thorax, males ventrally all black ...
.....*Allodessus*
- Metacoxal plates without punctures (Fig. 21), or with scattered small ones; ventral colour more uniform*Liodessus*
- 17(12) Elytron without a basal stria (Fig. 19), striae on pronotum very weak. Eastern and Northern Australia*Bidessodes* (in part)
- Elytron with a basal stria (Fig. 18), pronotum with well marked stria (Figs 12, 23).....**18**
- 18(17) Each elytron with a stria just inward from inner edge (sutural stria). (Fig. 23).
.....*Hydroglyphus*
- Elytron without a sutural stria**19**
- 19(18) Elytral epipleuron with a basal cavity bordered behind by a raised ridge (Fig.18)
.....*Limbodessus*
- Elytral epipleuron without a basal cavity (Fig.19); South-western Australia.....
.....*Uvarus*

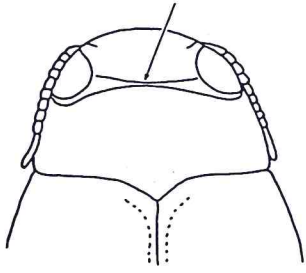


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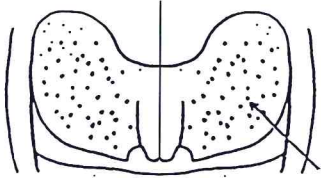


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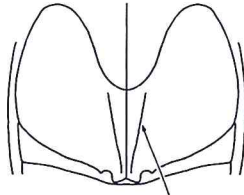


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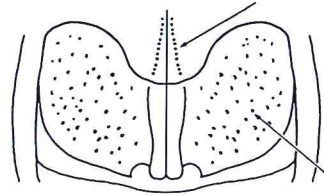


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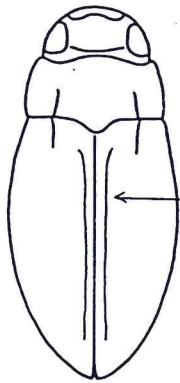


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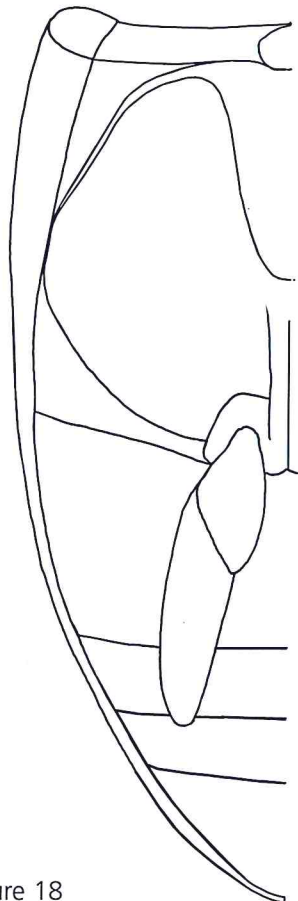


Figure 18

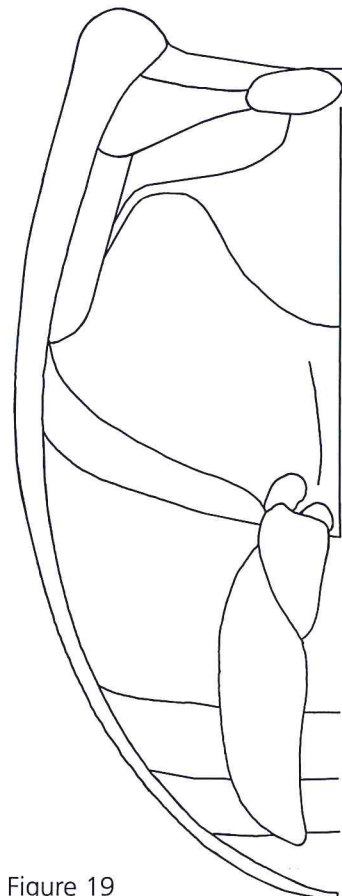


Figure 19

- 20(10) Hind tibiae evenly punctate (Fig. 24).....**21**
- Hind tibia without punctures except for a few setae-bearing rows of punctures (Fig. 25).....**23**
- 21(20) Segments of front tarsi asymmetrical with front lobes larger than hind lobes (Fig. 26). Lateral edge of elytra behind pronotum either in straight line with edge of pronotum (Fig. 29) or bends sharply before meeting it (Fig. 30); Northern ..**22**
- Lobes of front tarsi more or less similar in size (Fig. 27). Lateral edge of elytron curves smoothly upward before meeting pronotum (Fig. 31)***Antiporus***
- 22(21) Lateral edge of elytron and lateral edge of pronotum forming nearly continuous straight or slightly sinuate line in combination (Fig. 29). Males (recognised by having only one claw on front leg) with four-segmented front tarsi (Fig. 26) ...
.....***Sekaliporus***
- Lateral edge of elytron bends sharply before meeting pronotum. (Fig.30). Males with three-segmented front tarsi (Fig. 28).....***Tiporus***
- 23(20) Outer edge of hind tarsal segments with fringe of strong spines; elytral epipleura gradually narrowing (Fig. 32)**24**
- Outer edge of hind tarsal segments without fringe of spines; elytral epipleura narrowing abruptly and becoming very narrow in apical half of elytra (Fig. 33)**25**
- 24(23) Punctures on head minute, much smaller than those on pronotum; reticulation on head fine, regular, never with striations; 5-7 mm long.....***Megaporus***
- Punctures on head well marked, not much smaller than those on pronotum, or obscured by strong irregular striations; 2.6-6.0 mm long; if >5mm then pronotum black with narrow yellow margins and often also with yellow markings at base of elytra (*C. gigas*)***Chostonectes***
- 25(23) Elongate, pronotum and elytra covered with fine silky setae, often with well marked yellowish colour pattern on elytra***Bidessodes*** (in part)
- Dorsal surface with few setae, without well marked colour pattern**26**



Figure 24



Figure 25

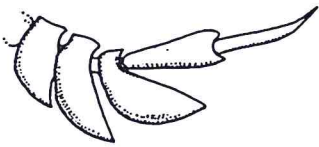


Figure 26



Figure 27



Figure 28

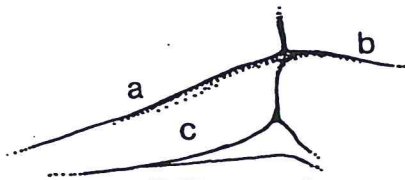


Figure 29

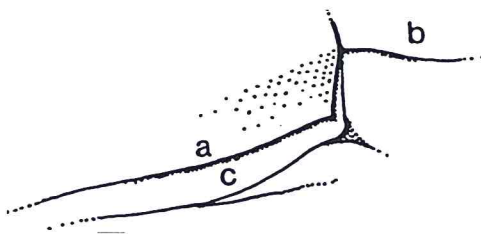


Figure 30



Figure 32



Figure 33

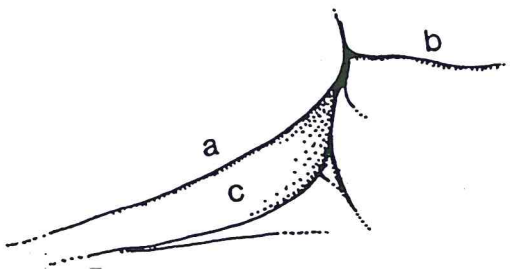


Figure 31

- 26(25) Prothoracic process ending in very broad, flat, triangular 'plate' (Fig. 34).....
.....*Hydrovatus*
- Prothoracic process narrow, carinate, sharply pointed (Fig. 35); southern.....
.....*Paroster*
- 27(1) Length < 4mm; elytron with two shallow elongate grooves (Fig. 11)
.....*Carabhydrus*
- Sharply incised lines.....**28**
- 28(27) Front of eye partly covered by backward extension of side of head (Fig. 36) ...
.....**29**
- Front of eye not so covered (Fig. 37).....**34**
- 29(28) Brownish beetle, elytra with light and dark stripes, 10-12mm long; southern...
.....*Lancetes*
- Elytra usually not striped, if striped smaller and predominantly black**30**
- 30(29) 11-14mm.long, brownish, pronotum red-brown with central dark spot
.....*Rhantus*
- < 11mm.long, black, or brown with some yellowish spots and stripes, never
with central dark spot on pronotum**31**
- 31(30) Prosternal process carinate or rounded in cross-section (Fig. 38)**32**
- Prosternal process grooved in cross-section (Fig. 39)**33**
- 32(31) A group of stout setae on inner apical angle of hind femur (Fig. 40)
.....*Platynectes*
- Lacking such setae*Copelatus*
- 33(31) Elytra with dense minute punctures*Batrachomatus*
- Elytra with a fine reticulation, without punctures*Allomatus*

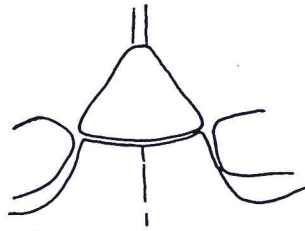


Figure 34

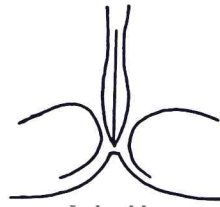


Figure 35

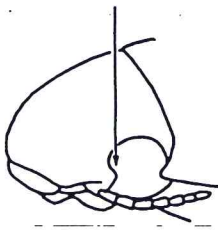


Figure 36

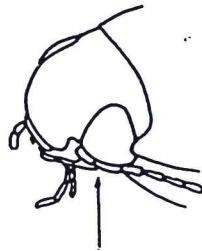


Figure 37



Figure 38



Figure 39

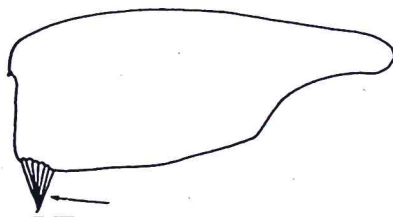


Figure 40

- 34(28) Elytra strongly and evenly punctured in strong contrast to minute punctures on pronotum *Eretes*
- Elytra and pronotum similarly punctured with minute punctures **35**
- 35(34) Posterior margins of first four segments of hind tarsi with a coarse fringe of flat, adpressed, golden-yellow setae (Fig. 41) **36**
- Posterior margins of first four segments of hind tarsi without such a fringe (Fig. 42) **38**
- 36(35) Tips of large apical spines on hind tibiae sharp; outer margin of metasternal wing straight (Fig. 44) *Hydaticus*
- Tips of large apical spines on hind tibiae bifid or truncated; outer margin of metasternal wing curved (Fig. 46) **37**
- 37(36) > 14mm long; dorsal surface black with distinct lighter colour pattern *Sandacottus*
- < 10mm long; dorsal surface red-brown with darker area in centre of elytra *Rhantaticus*
- 38(35) Hind tibia > 3x as long as wide; body black with sides of pronotum narrowly testaceous *Hyderodes*
- Hind tibia < 2x as long as wide; body black or olive green with sides of pronotum and elytra narrowly to quite broadly yellow **39**
- 39(38) Inner apical spine of hind tibia < 2x width of outer (Fig. 45), front edge of hind coxal plate relatively close to mid coxal cavity (Fig. 48) *Spencerhydrus*
- Inner apical spine of hind tibia >2x width of outer (Fig. 46), front edge of hind coxal plate relatively far from mid coxal cavities, the distance between them > length of mid trochanter **40**
- 40(39) Hind leg with inner claw either absent (m) or vestigial (f) (Fig. 49) . *Cybister*
- Hind leg with two claws, inner one at least half the length of outer (Fig. 50) **41**
- 41(40) Head with small punctures as well as minute punctures; hind coxal lines present *Austrodytes*
- Head with minute punctures only; hind coxal lines absent. *Onychohydrus*

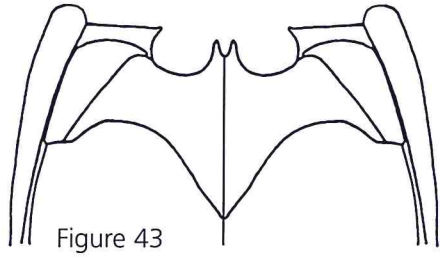


Figure 43

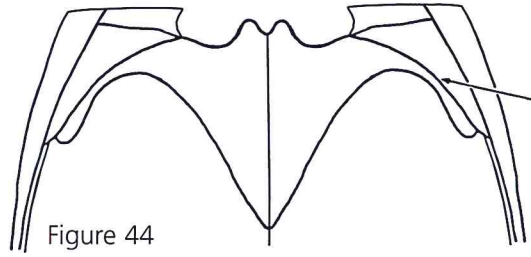


Figure 44

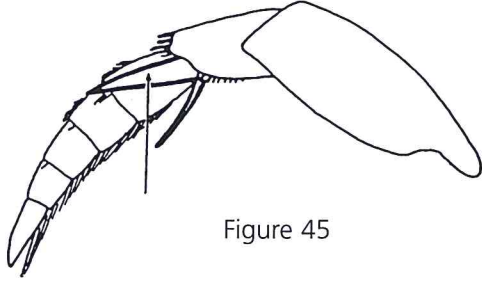


Figure 45

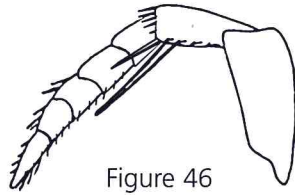


Figure 46

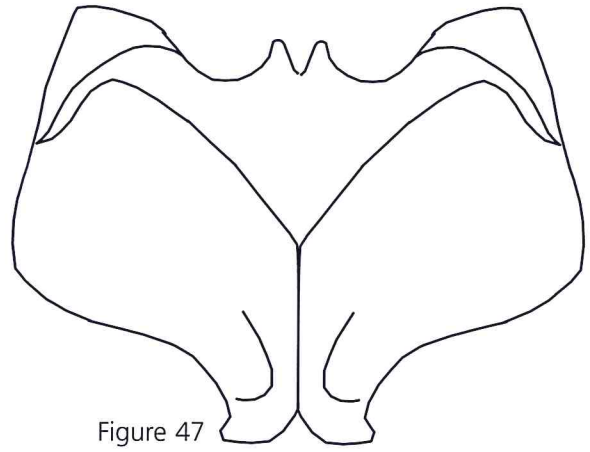


Figure 47

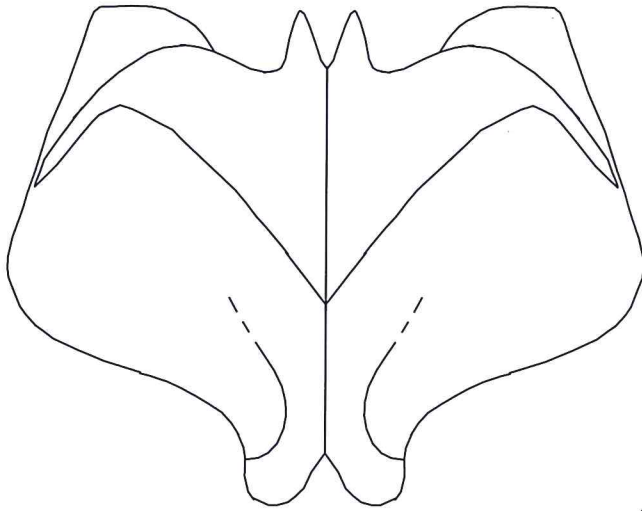


Figure 48

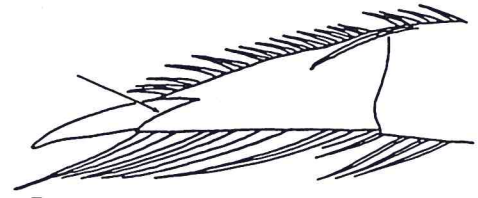


Figure 49

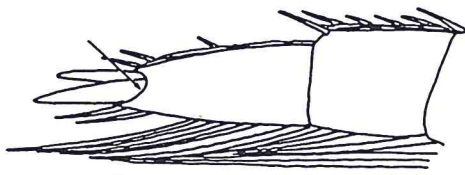


Figure 50

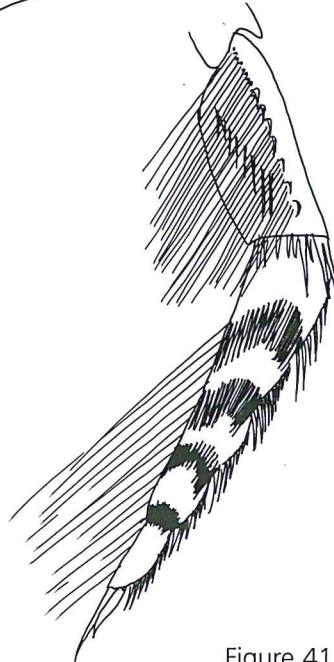


Figure 41

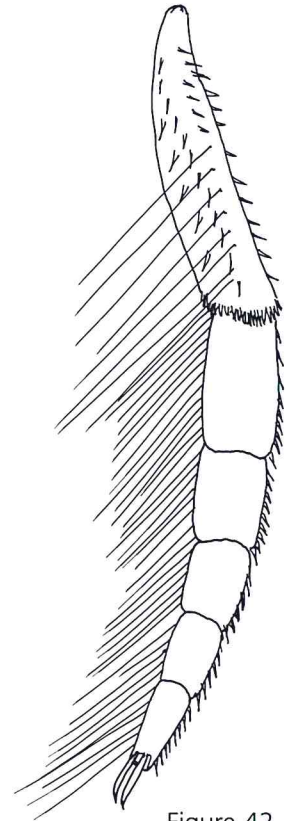


Figure 42



KEY TO THE LARVAE OF AUSTRALIAN GENERA OF DYTISCIDAE

[Other than *Austrodytes* (Small rivers and creeks in the north, relatively large, near *Cybister*), *Terradessus* (Very small, terrestrial, eyeless, mountain-tops in N-E Queensland.) and members of the tribe Bidessini.]

- 1 Head without frontal projection (Figs 1-3), 2mm-80mm long**2**
- Head with frontal projection (eg. Fig. 43), <12mm long.....**20**

- 2(1) Last two abdominal segments with dense fringe of long setae (swimming-hairs)(Figs 4-7)**3**
- Last two abdominal segments without swimming-hairs (eg Figs 23-25).....**10**

- 3(2) Cerci on last abdominal segment vestigial (Figs 4-5).....**4**
- Last abdominal segment with cerci (Figs 6-7).....**5**

- 4(5) Second last abdominal segment with sclerotization only in front half (Fig.4); mandibles without (except very weakly near base) inner lining of short setae; front of clypeus as in Fig. 3*Spencerhydrus*
- Second last abdominal segment with complete dorsal sclerotization ; mandibles with inner lining of short setae.....**6**

- 5(3) Row of long setae circling mandible near tip (held close to mandible and often abraded); row of marginal setae on lateral lobes of clypeus complete (Fig. 1)..*Cybister*
- Mandibles lacking circling band of setae near tip; row of marginal setae on lateral lobes of clypeus broken up into 4-6 bunches (Fig. 2)*Onychohydrus*

- 6(4) Cerci with swimming-hairs (Fig. 6)*Hyderodes*
- Cerci without swimming-hairs (Fig. 7).....**7**

- 7(6) Appendages on head short, length of antennae > half width of head (Fig. 8)..**8**
- Appendages on head relatively long, length of antennae about equal to width of head (Fig. 9)**9**

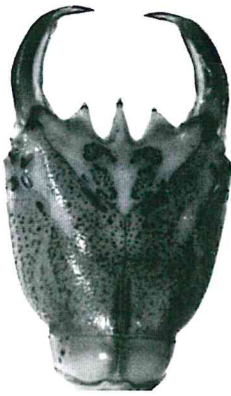


Figure 1 *Cybister*



Figure 2 *Onychohydrus*

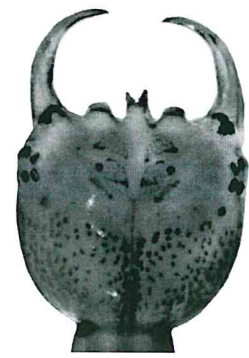


Figure 3 *Spencerhydrus*

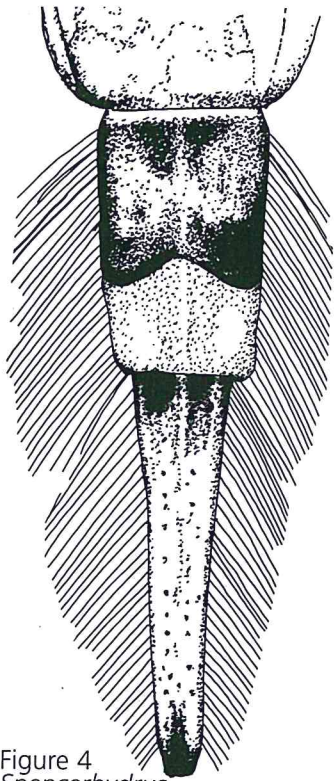


Figure 4
Spencerhydrus

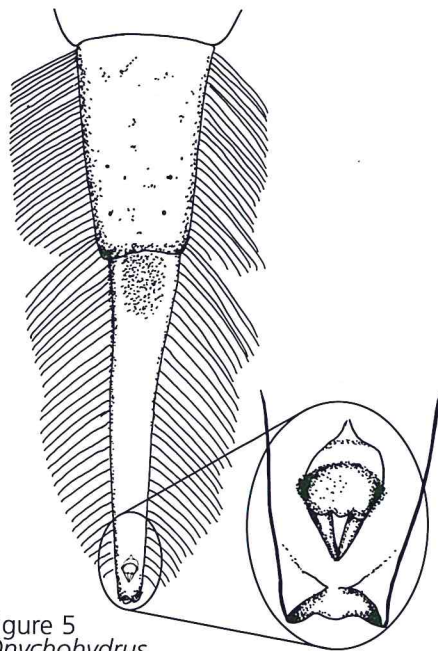


Figure 5
Onychohydrus
Ventral surface

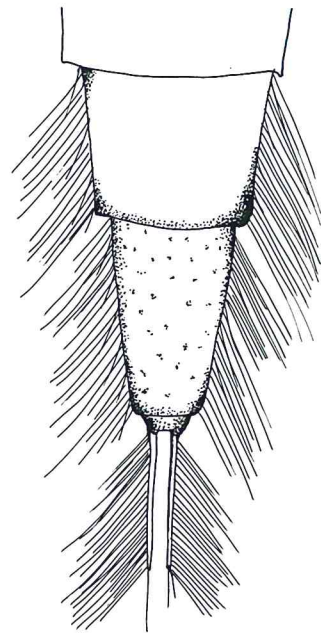


Figure 6
Hyderodes

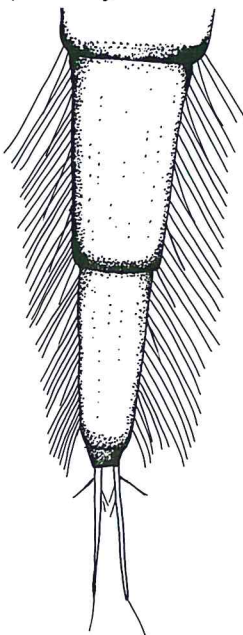


Figure 7 *Hydaticus*

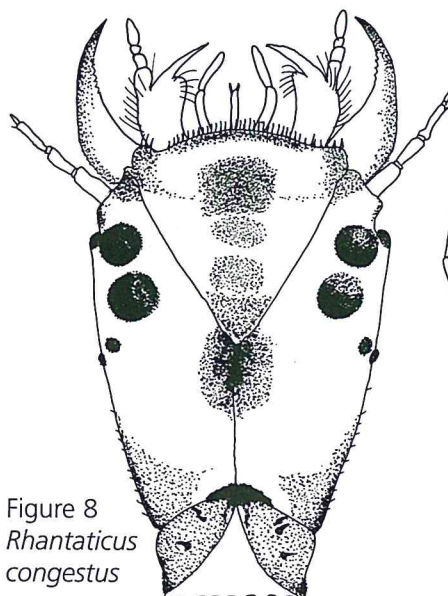


Figure 8
Rhantaticus
congestus

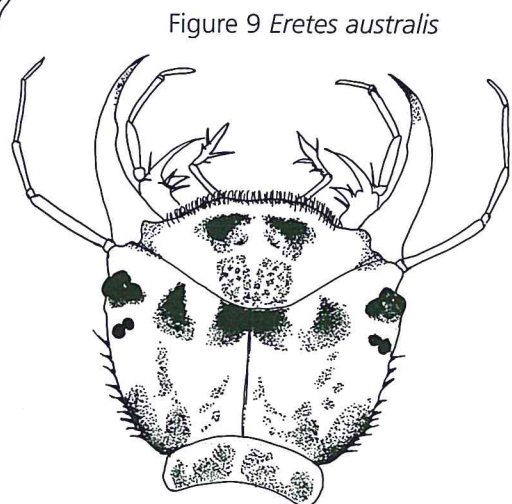


Figure 9 *Eretes australis*

- 8(7) Ligula with two apical spines, spines on shaft of ligula small (Fig. 10)
.....*Rhantaticus*
- Ligula with one apical spine, spines on shaft long (Fig. 11)*Sandracottus*
- 9(7) Front pair of 'eyes' (ocelli) about twice size of others (Fig. 9); apex of maxillary stipe with two strong spines (Fig. 12).....*Eretes*
- Front pair of eyes similar in size to rest (eg. Fig. 20); apex of maxillary stipe with one small spine (Fig. 13)*Hydaticus*
- 10(2) Tip of last abdominal segment elongated into short siphon, reaching well beyond bases of cerci (Fig. 14); <6mm long**19**
- Tip of last abdominal segment truncated, reaching not far past bases of cerci (Figs 15, 16); up to 20mm long**11**
- 11(10) Cerci about half the length of last abdominal segment, which is strongly granulated (Fig. 16).....*Copelatus*
- Cerci about as long as or longer than last abdominal segment which lacks granules (Fig. 15)12
- 12(11) Cerci arise from beneath last abdominal segment (Figs 23-25), head without small black spots, usually with pattern of paler areas.....**14**
- Cerci arise from end of last abdominal segment (Fig. 15), head with numerous small black spots (Figs 19, 20).....**13**
- 13(12) Basal segment of antenna with numerous short setae (Fig. 17); head capsule with covering of sparse small dark spots (Fig. 19)*Batracomatus*
- Basal segments of antenna with sparse setae (Fig. 18); head capsule with relatively dense small dark spots, many touching in second and third instars (Fig.20)*Allomatus*
- 14(12) Head without row of short, strong spines on each lateral edge (temporal spines). (First instars).....**15**
- Head with temporal spines (sometimes reduced to 2-3 on posterior lateral angle). (Second and third instars).....**17**

Fig. 11 from Vazirani (1971), Figs 17-20 from Allarie et al. (2001)

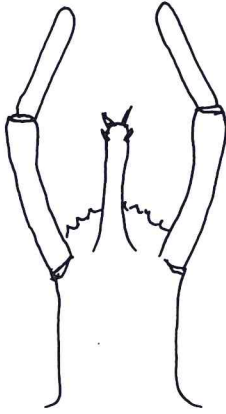


Figure 10

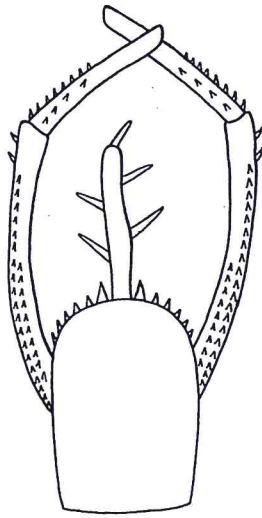


Figure 11

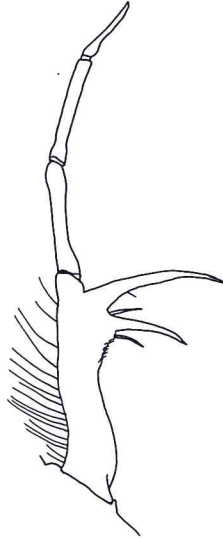


Figure 12

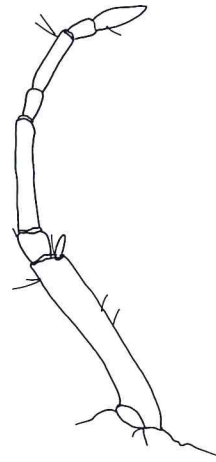


Figure 13

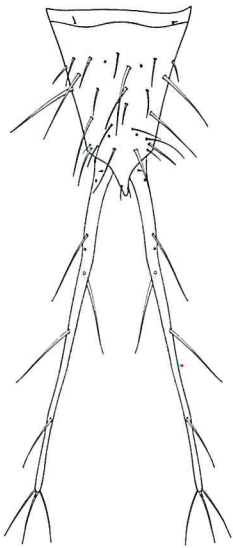


Figure 14

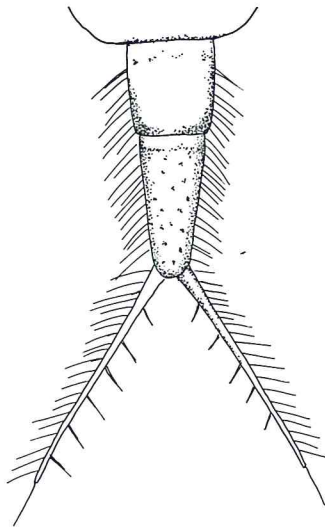


Figure 15

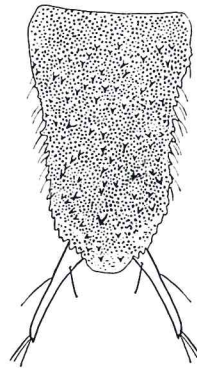


Figure 15

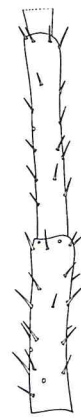


Figure 17

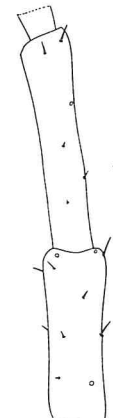


Figure 18

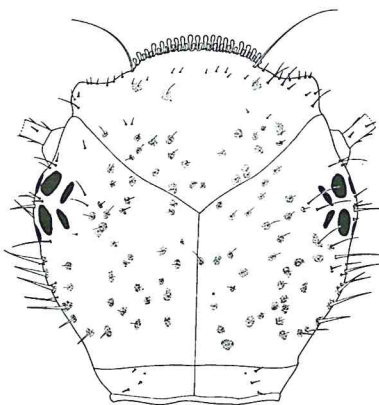


Figure 19
Batrachomatus

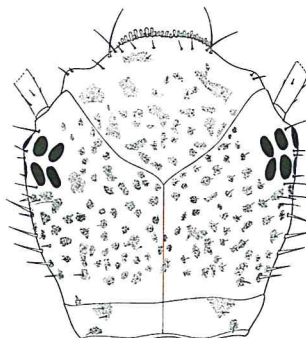


Figure 20
Allodessus

- 15(14) Last two segments of antenna equal in length (Fig. 21); cerci < 2x length of last abdominal segment.....*Rhantus*
- Apical segment of antenna approximately three-quarters length of penultimate segment (Fig. 22); cerci > 4x length of last abdominal segment.....**16**
- 16(15) Cerci about 5 times the length of the last abdominal segment*Platynectes*
- Cerci about 8 times the length of the last abdominal segment*Lancetes*
- 17(14) Cerci with three setae other than apical ones (Fig. 23).....*Platynectes*
- Cerci with numerous setae (Figs 24, 25)**18**
- 18(17) Cerci < 2 times length of last abdominal segment (Fig. 24).....*Rhantus*
- Cerci > 2 times length of last abdominal segment (Fig. 25).....*Lancetes*
- 19(10) Head, first five abdominal segments and tip of last abdominal segment yellow, rest dark (Fig. 26); southern.....*Australphilus*
- Body more uniformly coloured; northern*Laccophilus*

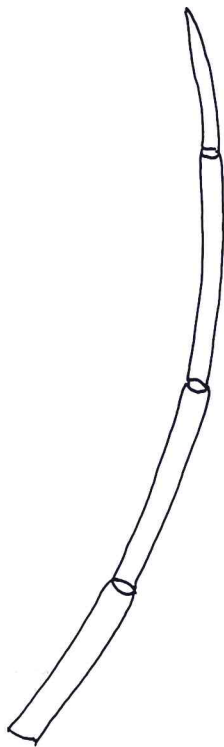


Figure 22

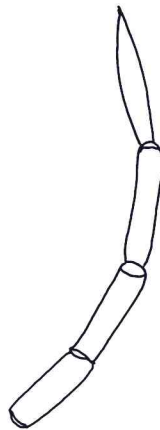


Figure 21



Figure 26
Australphilus

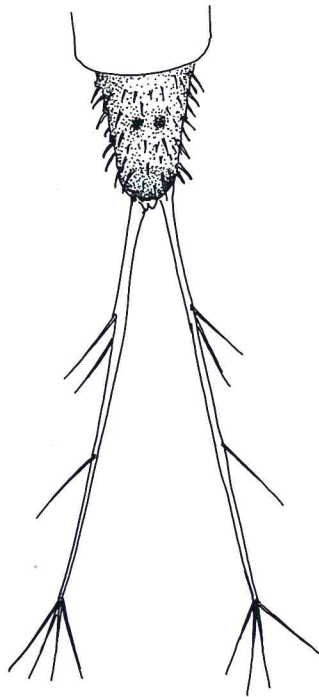


Figure 23
Platynectes

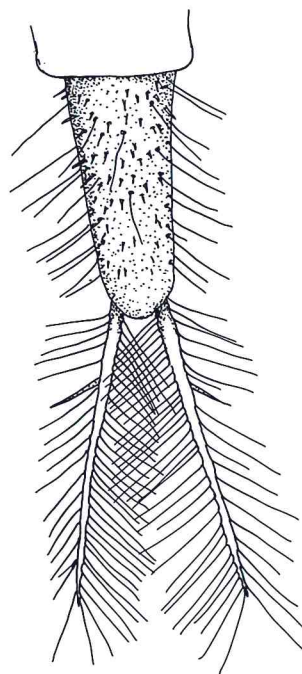


Figure 24
Rhantus

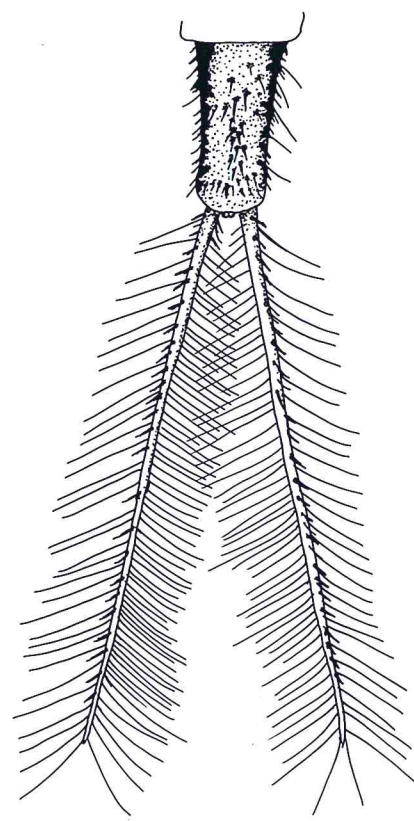


Figure 25
Lancetes

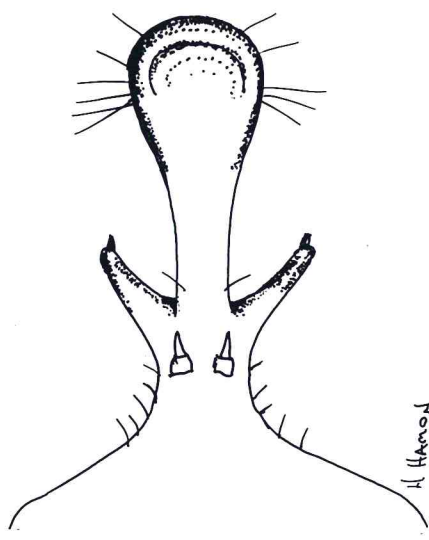


Figure 27
Antiporus

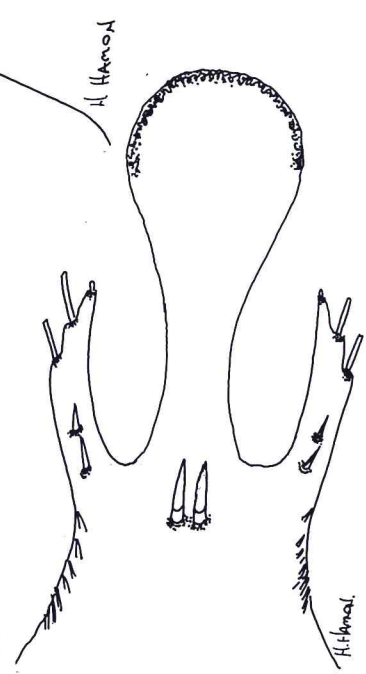


Figure 28
Sekaliporus

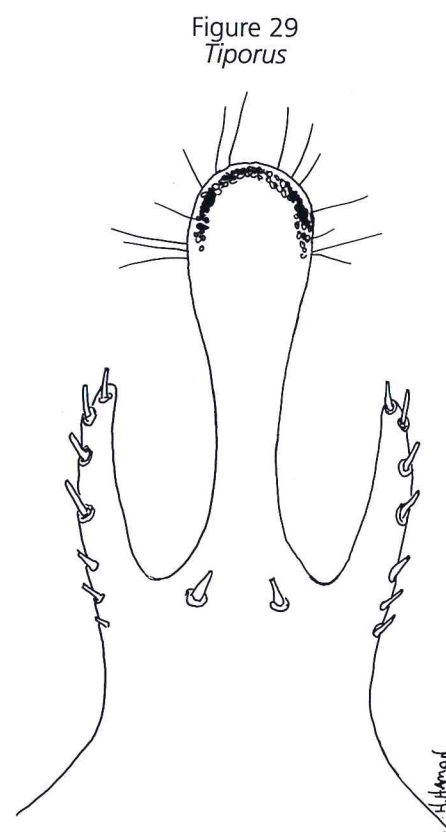


Figure 29
Tiporus

- 20(1) Frontal projection with lateral notches (Figs 33-42).....**23**
- Frontal projection without lateral notches (Figs 30-32)**21**
- 21(20) Distinct yellow/dark colour pattern (Fig. 44); frontal projection long, narrower in middle than at base and apex (Fig. 32).....*Hyphydrus*
- Without distinct yellow/dark colour pattern, frontal projection variable, if elongate then not narrower in middle (eg. Fig. 31).....**22**
- 22(21) Body spindle-shaped (Fig. 43); cerci in older instars not reaching beyond tip of siphon which is sharply pointed; frontal projection relatively thin, approximately 2 times as long as wide (Fig. 31); dorsal surface often covered with small dark spots.....*Hydrovatus*
- Body elongate; cerci reach well beyond end of siphon which is bluntly pointed (Fig. 45); frontal projection relatively broad < 1.5x as long as wide (Fig. 30); body without dorsal dark spots.....**Tribe Bidessini**
- 23(20) Head uniformly light testaceous, body colourless; eyeless; from underground in Central Australia and arid regions of Western Australia.....*Nirripiriti*
- Not as above**24**
- 24(23) Siphon on last abdominal segment > 2/3 length of rest of segment (Figs 54, 55), notches on nasal approximately same width as rest of nasal at that point (Figs 34, 35).....**25**
- Siphon on apical abdominal segment < 2/3 length of rest of segment (eg. Fig. 48), width of notches on nasal variable**26**
- 25(24) Siphon on last abdominal segment >1.5x (in first instar) to 3.5x (in third instar) rest of segment (Fig. 55).....*Megaporus*
- Siphon on last abdominal segment approximately the same length as rest of segment (Fig. 54).....*Chostonectes*

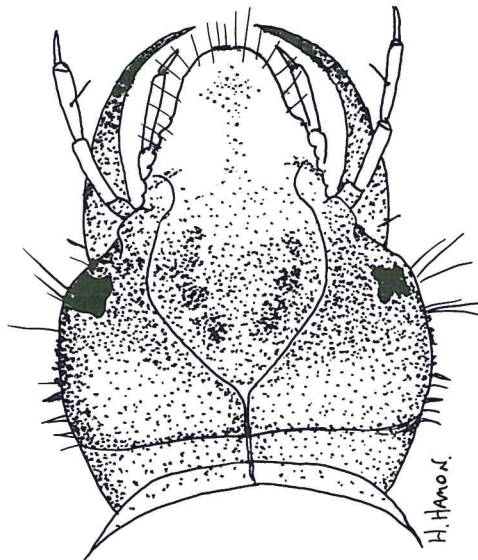


Figure 30
Allodessus

- 26(24) Notch on side of frontal projection large, at least equal to the width of rest of projection at base of notch (Figs 40-42)**27**
- Notch < width of rest of frontal projection at base of notch (Figs 36-39)**29**
- 27(26) Pair of spines on underside of frontal projection well behind base of lateral projections; lateral projections angled outwards, without spines (Fig. 27)
.....*Antiporus*
- Pair of spines on underside of frontal projection about level with notch; lateral projections long, subparallel with lateral spines (Figs 28, 29)**28**
- 28(27) Pair of spines on underside of frontal projection with bases touching (Fig. 28)*Sekaliporus*
- Pair of spines on underside of frontal projection with bases well separated (Fig. 29)*Tiporus*

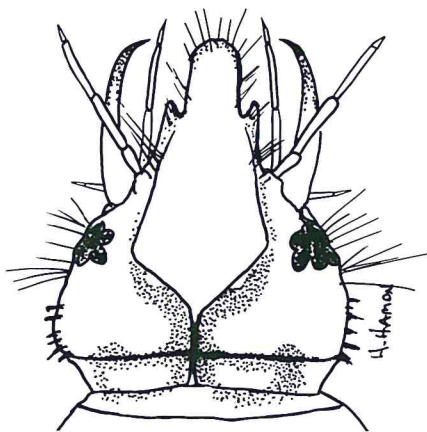


Figure 37 *Necterosoma*

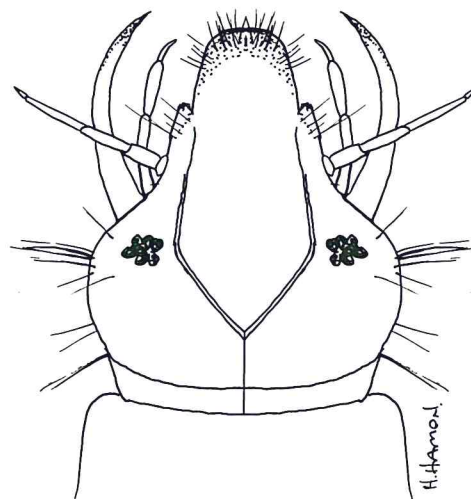


Figure 38 *Paroster*

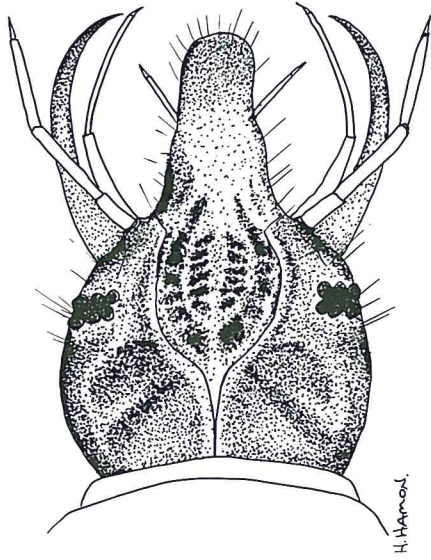


Figure 31 *Hydrovatus*

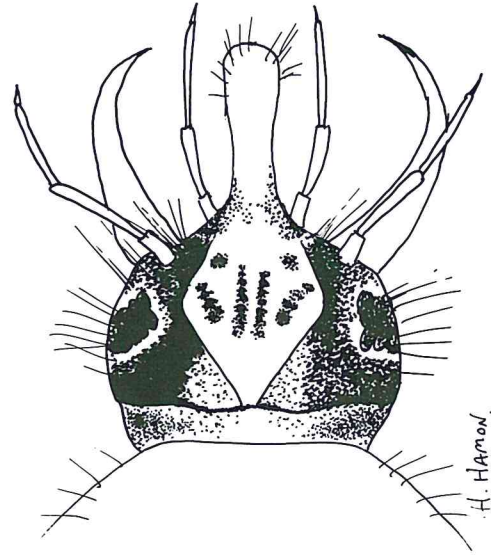


Figure 32 *Hyphydrus*

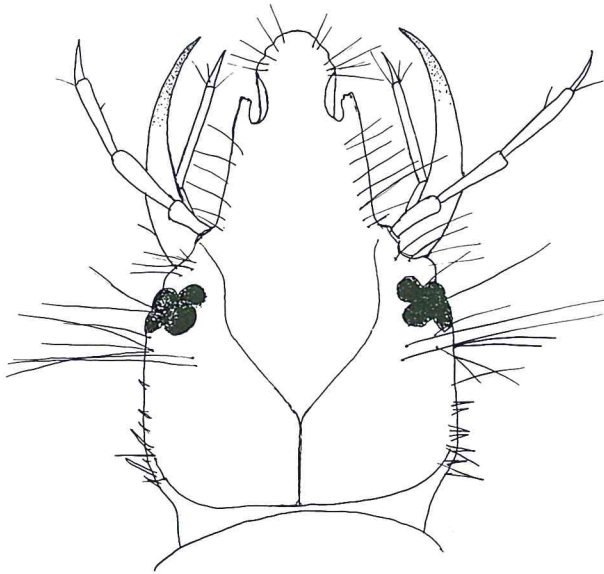


Figure 33 *Carabhydrus*

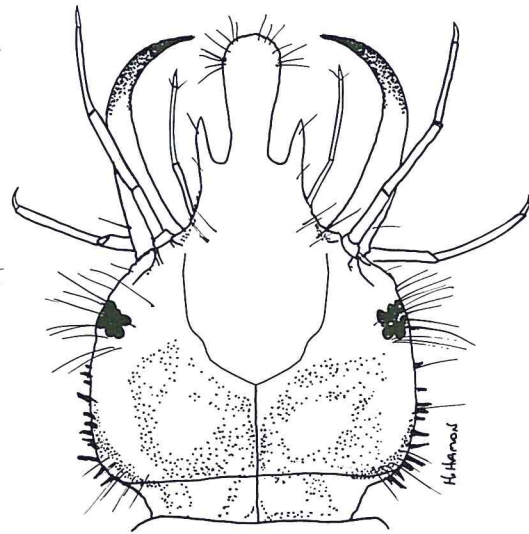


Figure 34 *Megaporus*

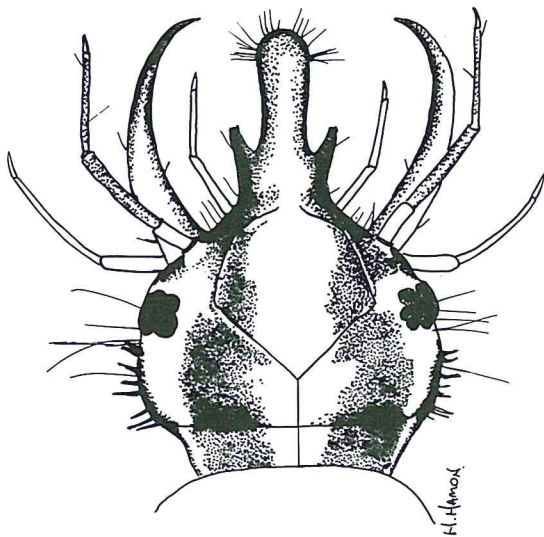


Figure 35 *Chostonectes*

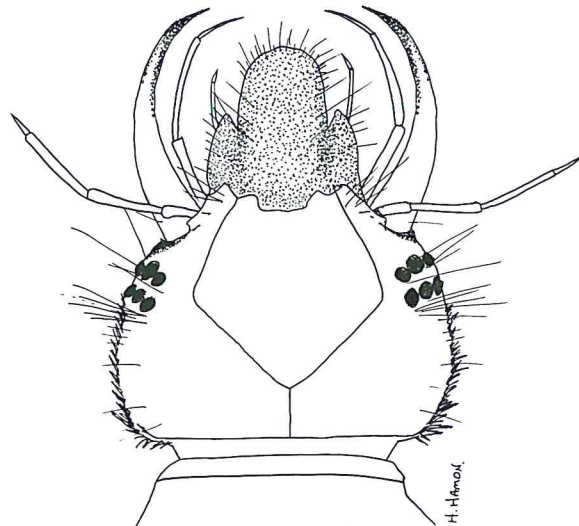


Figure 36 *Barretthydrus*

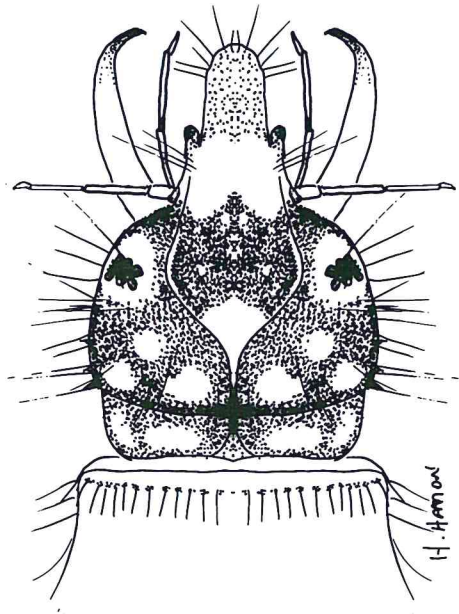


Figure 39 *Sternopriscus*

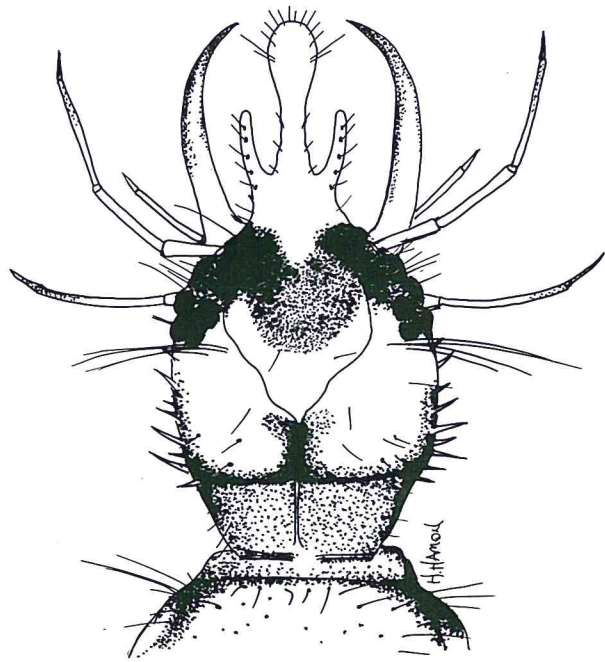


Figure 40 *Tiporus*

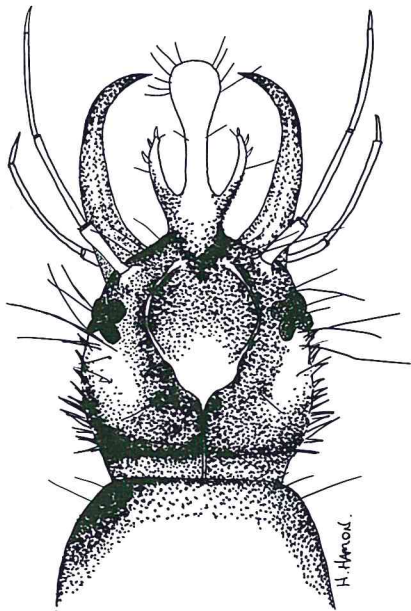


Figure 41 *Sekaliporus*

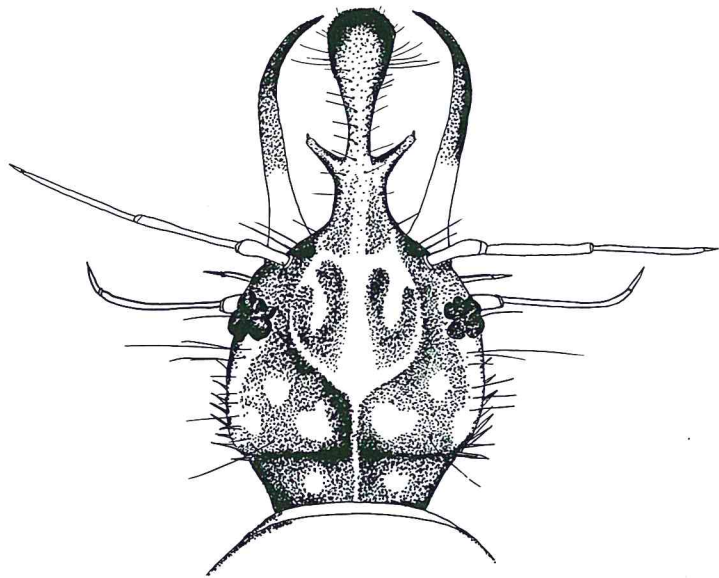


Figure 42 *Antiporus*

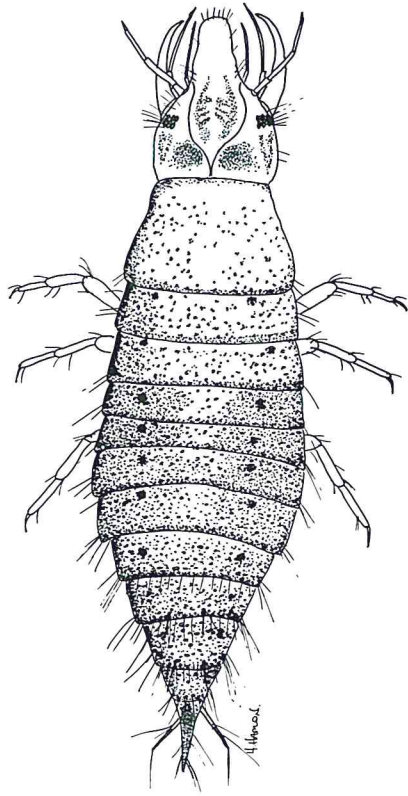


Figure 43 *Hydrovatus*

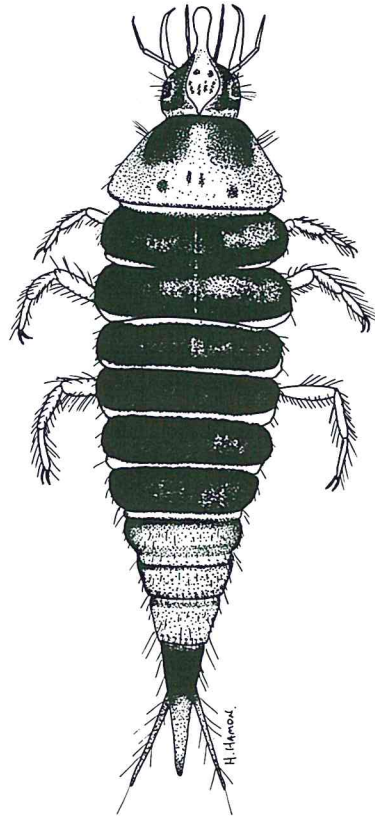


Figure 44 *Hyphydrus*

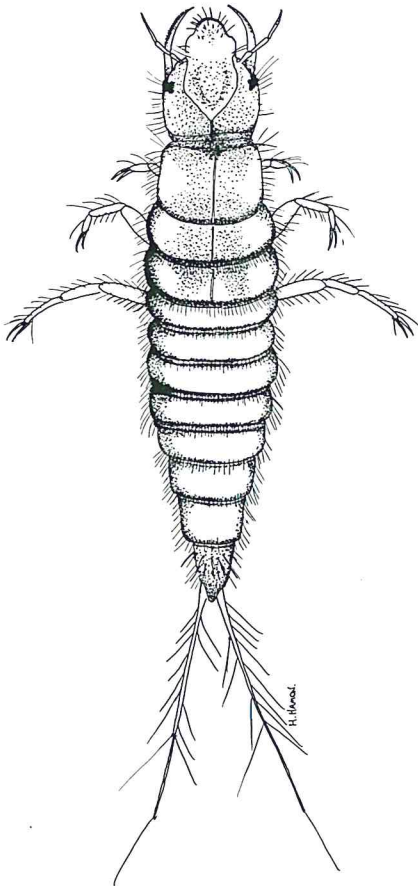


Figure 45 *Allodessus*

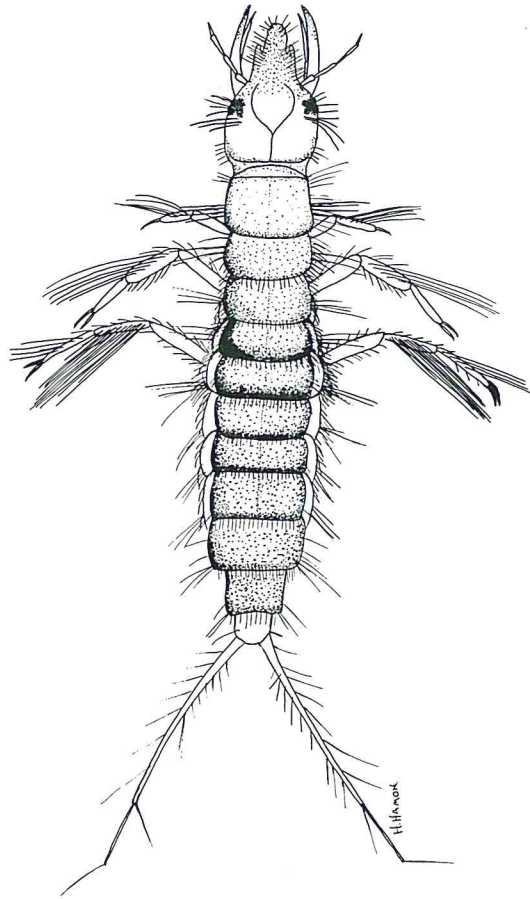


Figure 46 *Carabhydrus*

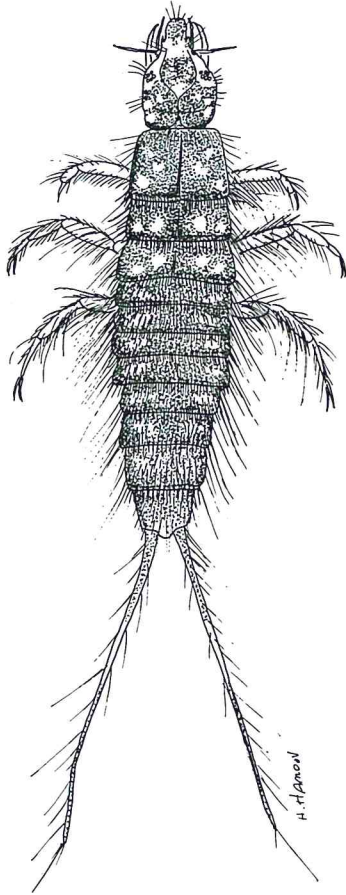


Figure 47 *Sternopriscus*

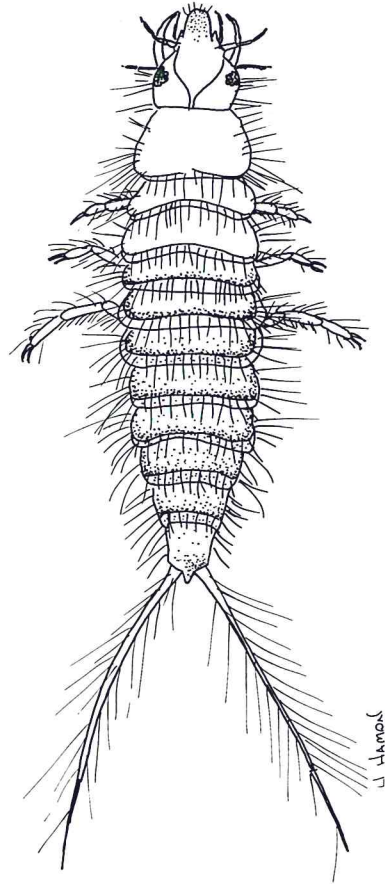


Figure 48 *Paroster*

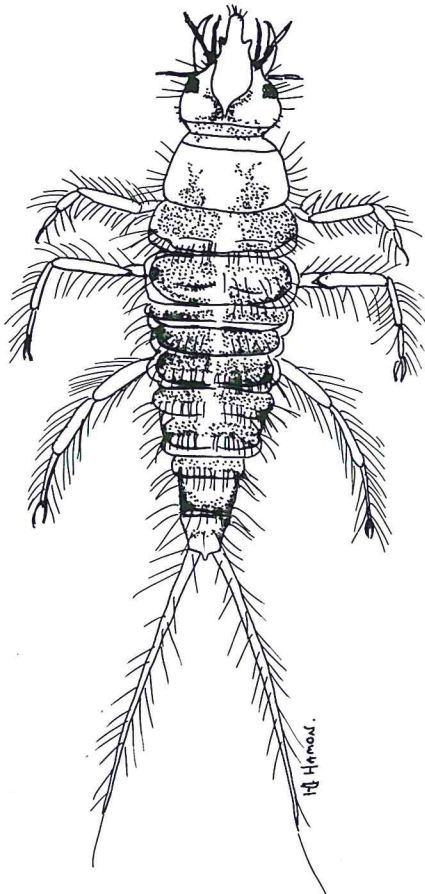


Figure 49 *Necterosoma*

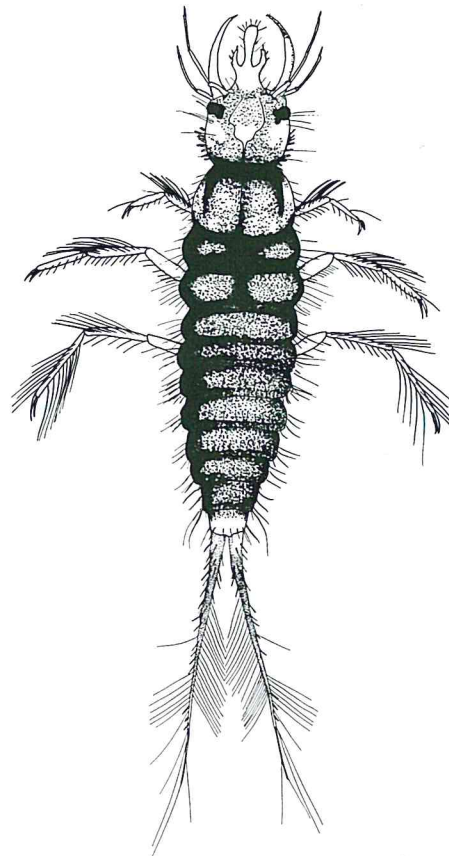


Figure 50 *Sekaliporus*



- 29(26) Last abdominal segment without siphon (Figs 46, 47)30
- Last abdominal segment with small siphon (Figs 48, 49)31
- 30(29) Thoracic segments about same width as head; cerci < half length of head and body (Fig. 46)*Carabhydrus*
- Thoracic segments wider than head; cerci > half length of head and body (Fig. 47)*Sternopriscus*
- 31(29) Body with 2-3 distinct bands of dark and yellow (Fig. 53).....*Barretthydrus*
- Body not as above32
- 32(31) Side of head with row of strong spines (Fig. 37); lateral projections on frontal projection moderate (Fig. 37)*Necterosoma*
- Side of head lacking row of strong spines (Fig. 38); later projections on frontal projection weak, peg-like (Fig. 38)*Paroster*

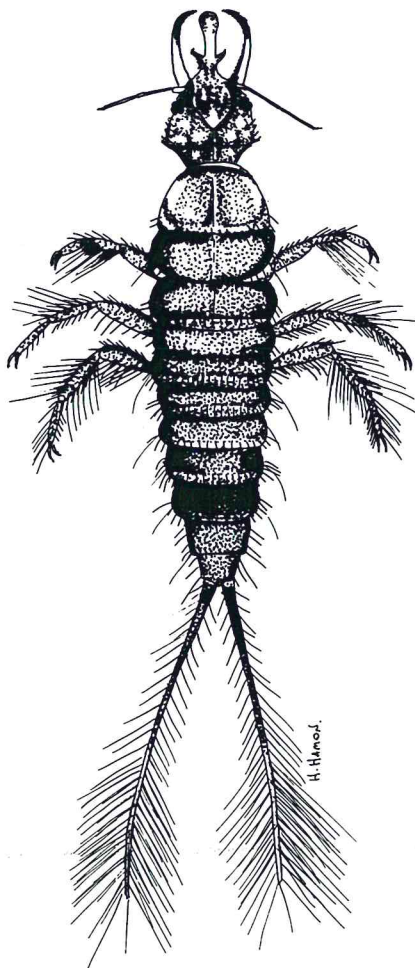


Figure 51 *Antiporus*

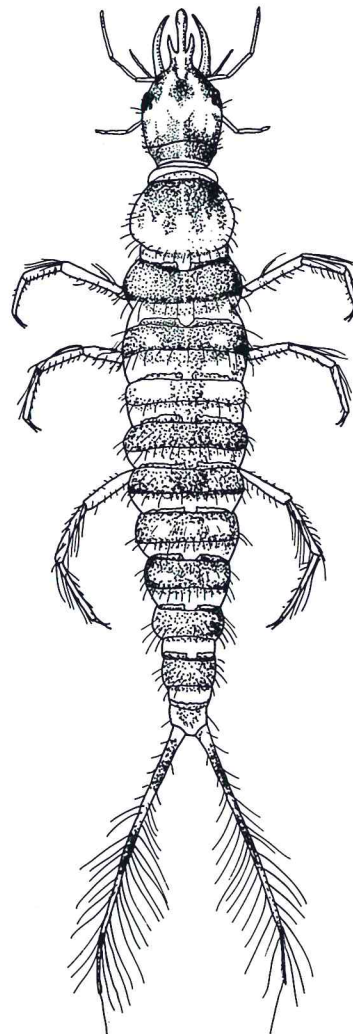


Figure 52 *Tiporus*

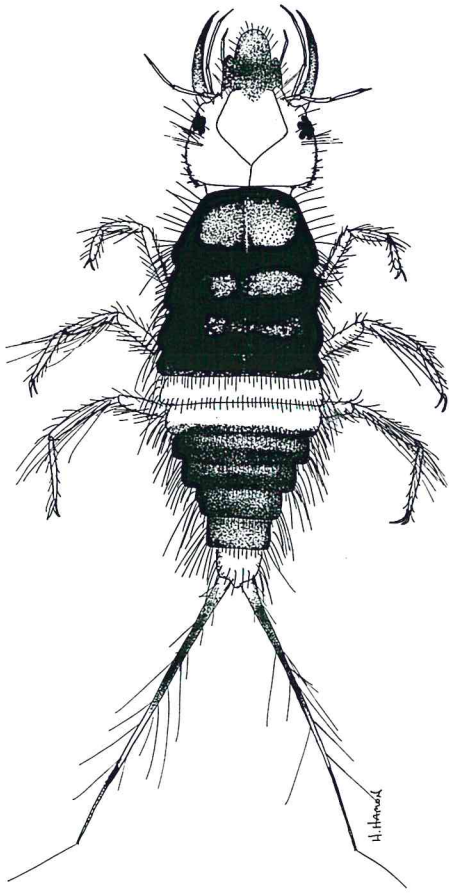


Figure 53 *Barretthydrus*

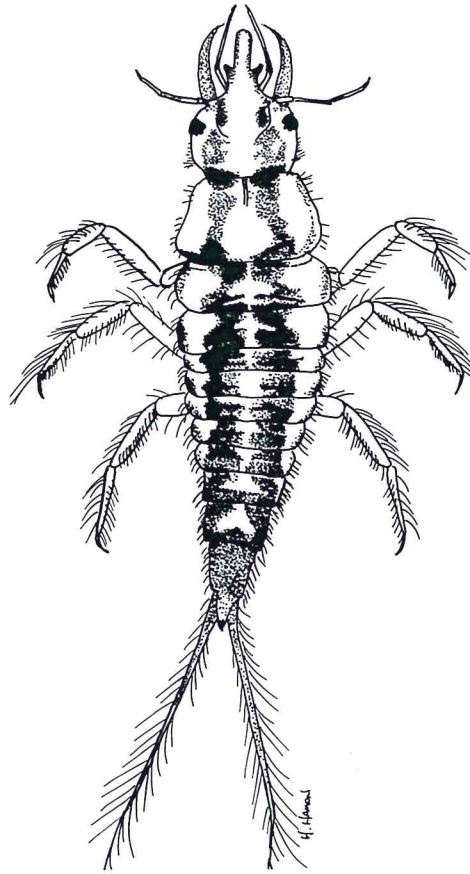


Figure 54 *Chostonectes*

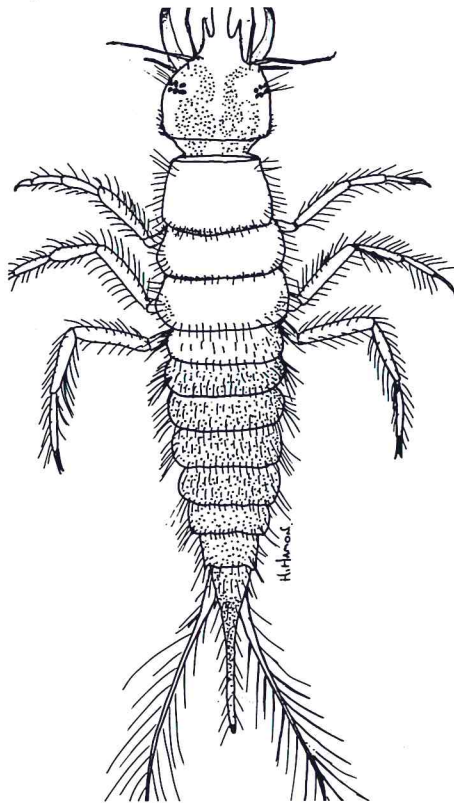


Figure 55 *Megaporus*

NOTES ON GENERA OF AUSTRALIAN DYTISCIDAE

(In alphabetic order)

Allodessus Guignot

Small (2.9-3.5mm), oval, grey-yellow. Very common and widespread, more common in inland areas than wet coastal, in still water. One described species, *A. bistrigatus*, and possibly one undescribed (Larson 1993). Larvae known; spring and summer. Closely related species in Java, New Zealand, Tonga and Easter Island (Balke pers. comm.).

Can be confused with: *Liodesus*, which never have a light grey dorsal surface strongly contrasting with a black (in the male) or partially black (in the female) ventral surface; *Gibbidessus*, which are significantly smaller (2.0mm long) and have strongly punctate metacoxal plates; *Hydroglyphus*, which have sutural striae on the elytra.

Allomatus Mouchamps

Medium sized (8.5-10.0mm), elongate, streamlined, black. Found along banks of small to large rivers. Rare, although can be locally abundant. Two described species *A. nannup* in the south-west, *A. wilsoni* in the south-east. Larson (1993) records a third species from north Queensland. Larvae known (Alarie et al 2001). Endemic.

Can be confused with: *Batracomatus*, which have elytra covered with dense minute punctures, lacking in *Allomatus*; *Platynectes*, which are more oval and have a group of strong spines on the outer hind angle of the hind femurs; *Copelatus*, which lack the grooved prosternal process found in *Allomatus*.

Antiporus Sharp

Small (3.5-6.8mm), oval, reddish-yellow to black species. One species, *A. gilberti*, has distinct dark lines on elytra. Males of all but one species with expansions to the hind tibiae. Common, generally in still water. Fourteen species. Larvae known (Alarie and Watts 2002); spring. Endemic to Australia and New Zealand. Watts, 1997b; Watts and Pinder, 2000; Hendrich, 2001.

Can be confused with: *Necterosoma*, which have the front and middle tarsi clearly five-segmented and have notches on the front tibia in the males which are lacking in *Antiporus*; *Megaporus*, which have a single row of punctures on the hind femur rather than an even coverage and hind femurs which are never expanded as in the males of most species of *Antiporus*; *Chostonectes*, which have a single row of punctures on the hind femur rather than an even coverage and hind femurs which are never expanded as in the males of most species of *Antiporus*; *Tiporus*, which have the lobes of the basal segments of the front and mid tarsi strongly asymmetrical and males with three-segmented front tarsi; *Sekaliporus*, which have asymmetrical lobes to the basal segments of the front tarsi (inner lobe greater).

Austrodytes Watts

Large (17-19mm), oval, wider behind middle, greenish-black with narrow yellow boarder. Found in small streams in the north. One species, *A. insularis*. Larvae unknown. Endemic.

Can be confused with: *Onychohydus*, particularly *O. atratus* which looks very similar but lacks the numerous moderate punctures as well as minute ones on the dorsal surface and the grooved pronotal process which are present in *Austrodytes*; *Cybister*, which only have minute punctures on the elytra and has two claws rather than one on the hind tarsi of the males; *Hydaticus*, which are smaller (<16mm long) and which have the outer margin of the metasternal wings straight rather than curved (Fig. 43).

***Australphilus* Watts**

Small (2.3-3.0mm), shiny, streamlined, narrowing toward rear with strong yellow/dark pattern on top surface. Relatively rare, found in running water, occurs in south-eastern Australia and Tasmania. Two species. Larvae known; late summer (Alarie et al 2001). Endemic.

Can be confused with: *Laccophilus*, which are larger (3.0-4.5mm long) and have the base of the pronotum sinuate and are also northern in distribution.

***Barretthydrus* Lea**

Small (4.0-4.8mm), black with well-marked reddish spots on elytra, elytra grooved. Found in mountain streams in south-eastern Australia as far north as the New England region. Often abundant in local area. Three species. Larvae known; winter. Endemic.

Can be confused with: *Carabhydrus*, which are smaller (2.0-3.5mm long), with the base of the pronotum constricted, small scutellum, two rather than four grooves on each elytron and males which lack a deep notch on the front tibia; *Sternopriscus*, which lack grooves on the elytra, have clearly five-segmented front and mid tarsi and males that often have an expanded antennal segments and lack deeply notched fore tibia.

***Batrachomatus* Clark**

Medium sized (8.5-10.0mm), elongate oval, shiny, black. Elytron often with reddish basal spots or lateral pale stripe. Still running water. Two species, one, *B. wingi* has a distinctive yellow stripe on side of elytron and is restricted to the north, the other, *B. daemeli*, found in eastern Australia from north Queensland to Victoria, lacks these stripes. Larvae known (Alarie et al 2001). Endemic.

Can be confused with: *Allomatus*, which have the elytra covered with a fine reticulation without punctures; *Copelatus*, which lack the flat, grooved pronotal process found in *Batrachomatus*; *Hydrocanthus* (Noteridae), which have enlarged post coxal processes that cover the bases of the hind legs; *Platynectes*, which have a group of stout setae on the outer angle of the hind femur.

***Bidessodes* Regimbart**

Small (2.3-4.2mm), elongate, oval. Found in still water and small streams in wetter areas of northern and eastern Australia as far south as Victoria. Relatively common. Five described species and possibly an undescribed one. Larvae unknown. Genus also occurs in North America.

Can be confused with: *Hydroglyphus*, which have sutural striae on elytra and well-marked pronotal and elytral striae; *Liodessus*, which have well-developed elytral and pronotal stria.

***Boongurrus* Larson**

Very small (1.8-2.2mm), elongate, flattened, parallel sided. Found amongst gravel in shallow headwaters of streams or upstream ends of pools in drying riverbeds including interstitially in water below surface-dry areas immediately upstream. Rare. Two species, one, *B. rivulus*, from the Atherton region of North Queensland and an undescribed one from the Pilbara in Western Australia. Larvae unknown. Endemic. Larson, 1994.

Can be confused with: *Hydroglyphus*, which are mostly larger (2.0-4.0mm long) and have sutural lines on elytra; *Limbodessus*, which are uniformly reddish, torpedo-shaped and have elytral epipleura with a basal cavity (Fig. 18); *Liodessus*, which are larger (2.4-3.1mm long), dark testaceous, not flattened and have a cervical stria that is absent in all but an occasional *B. rivulus*; *Notomicrus* (Noteridae) which are smaller (1.2mm long), reddish, torpedo-shaped with enlarged, flattened, hind coxae covering the bases of the hind legs.

***Carabhydrus* Watts**

Small (2.0-3.5mm), with a distinctly wasted look at junction of pronotum and elytra, a small scutellum, and grooved elytra. Found sparingly in fast running mountain streams in eastern Australia and Tasmania. Five described and several undescribed species. Larvae ? known; spring. Endemic. Larson & Storey, 1994.

Can be confused with: *Barretthydrus*, which are larger (4.0-4.8mm long), lack a constricted pronotum, lack a scutellum, and have four rather than two grooves on each elytron; *Sternopriscus*, which lack grooves on the elytra, lack a scutellum, and have a well-developed fourth segment on front and mid tarsi.

***Chostonectes* Sharp**

Small to medium sized (3.8-6.5mm), round, deep bodied, strongly punctured, with colour pattern on elytra. Common in south, rare in north where restricted to central Australia and Atherton tableland. Still to fast running water. Specimens from fast streams in alpine areas tend to be more strongly coloured than those from lowland regions. Five species. Larvae known; spring in south, wet season in north. Endemic. Wewalka, 1994.

Can be confused with: *Hyphydrus*, which have obviously unequal hind claws; *Hydrovatus*, which have a broad triangular-shaped prothoracic process; *Antiporus*, which have the hind tibia strongly and evenly covered in punctures; *Megaporus*, which are larger (> 5.0 mm long) except for *C. gigas* which has strong rather than very weak punctures on the head and a black pronotum with yellow lateral margins.

***Clypeodytes* Regimbart**

Small (1.2-2.7mm), round. Found in still water in northern Australia as far south as northern New South Wales. Often common. Larvae unknown. Three described species and several undescribed ones. Larson, 1994. Most Australian species currently in *Clypeodytes* actually belong in *Leiodytes*.

Can be confused with: *Hydrovatus*, which have broadly triangular pronotal process; *Hydroglyphus*, which have sutural striae on elytra; *Gibbidessus*, which lack a raised front margin to the clypeus and are restricted to the South-east and South-west; *Uvarus*, which lacks a cervical stria and is restricted to the South-west; *Leiodytes*, which have elytral epipleura without a basal cavity (Fig. 19) and have a strong dorsal colour pattern.

***Copelatus* Erichson**

Medium sized (4.0-10.0mm), elongate oval or even parallel sided, black to reddish occasionally with weak dorsal colour pattern, often with long grooves, or numerous short striae on elytra. Common over whole of Australia in ponds and streams. Twenty described species and several undescribed. Larvae known; spring in south, wet season in north.

Can be confused with: *Platynectes*, which have a group of strong setae and on the outer hind angle of the hind femur; *Batrachomatus*, which have a grooved pronotal process; *Allomatus*, which have a grooved pronotal process; *Hydrocanthus* (Noteridae), which have broad flat metacoxal processes covering the bases of the hind legs.

***Cybister* Curtis**

Large to very large (16-34mm), oval, widening behind middle, greenish to black with narrow yellow border. Still waters in centre and north. One species, *C. tripunctatus*, is common and widespread and is the only species found outside the north and north-east coastal regions north of Townsville. Five species. Larvae known (Watts 1964); wet season. Hendrich, 1997. Most species in the genus are too large (>21mm long) to be confused with any other Australian species other than *Onychohydrus scutellaris* which has a testaceous rather than a black ventral surface. The small species *C. weckworthi* (15-18mm long) which is known only from Kakadu.

Can be confused with: *O. atratus*, which has hind legs with only one claw in the male and the lateral yellow band < width of the eye; *Austrodytes*, which has a flat pronotal process with the lateral borders ridged; *Hydaticus*, which are smaller (< 16mm long) and are never greenish with the lateral area broadly yellow; *Spencerhydrus*, which are southern, rather than northern and have the pronotal process grooved.

***Eretes* Castelnau**

Medium sized (12.5-16.0mm), broadly oval, slightly triangular, rather flat, yellowish. Often extremely abundant in still, temporary water in arid areas, absent or very rare from wet coastal areas. Two species, one, *E. australis*, is common and widespread, the other *E. sticticus*, is known only from one specimen from Darwin in the South Australian Museum. Larvae known; summer in south, opportunistic inland and north.

The moderate size, yellowish colour and very large punctures on the elytra contrasting with the more normal sized ones on the pronotum readily identifies this genus.

***Gibbidessus* Watts**

Small (1.8-2.1mm), oval. Restricted to South-west and South-east Australia. Rare. Found in ponds or slow moving streams in open country. One species, *G. chipi*. Larvae unknown. Endemic.

Can be confused with: The presence of a cervical stria separates this genus from other similar looking genera other than: *Allodessus*, which is larger (> 3.0mm long); *Clypeodytes*, which are northern in distribution, and have a raised front edge of the clypeus. *Leiodytes*, which are northern, have a strong dorsal colour pattern and a raised front edge of the clypeus; *Liodessus*, which are larger (> 2.4mm long), testaceous and torpedo-shaped; *Hydrovatus*, which have a broadly triangular pronotal process (Fig.34).

***Kintingka* Watts and Humphreys**

Very small (1.1mm long), eyeless, flightless, uniformly light testaceous. One species, *K. kurutjutu*, known from one specimen collected from an underground aquifer in inland Western Australia. Larva unknown. Watts and Humphreys, 1999.

Can be confused with: *Nirridessus*, which have well-developed swimming-hairs on the front and middle legs which are lacking in *Kintingka*.

***Hydaticus* Leach**

Medium sized (9.0-16.0mm), oval, often with colour pattern on elytra. Found in still and slow water in north, one species as far south as New South Wales/Victorian border. Common. Eleven species. Larvae known; wet season. Widespread outside Australia. Daussin, 1980; Wewalka, 1975; Nilsson, 2001.

Can be confused with: *Rhantaticus*, which has the outer edge of the metasternal wing curved, tips of metatibial spines truncated or bifid; *Sandracottus*, which have the outer edge of the metasternal wings curved, a strongly patterned elytra and tips of metatibial spines truncated or bifid.

Hyderodes Hope

Large (18.0-20.0mm), oval, deep bodied, black. Found in still temporary water in south. Two species, *H. shuckhardi* in South-east and *H. crassus* in the South-west. Larvae known; spring. Endemic. The relatively large size and the lack of lateral yellow band separates *Hyderodes* from all the Australian genera.

Hydroglyphus Motschulsky

Small (2.0-4.0mm), elongate oval, often with colour pattern on elytra. Found predominantly in still water. Common in northern Australia south to the NSW/Victorian border. Ten described and some undescribed species. Larvae known; wet season in north, unknown in south. Bistrom, 1988; Hendrich, 1999.

The presence of sutural striae separate *Hydroglyphus* from all other Australian genera. **Can be confused with;** *Bidessodes* which, when wet, can appear to have a weak sutural striae but lack elytral striae and have very weak or absent pronotal striae.

Hydrovatus Motschulsky

Small (2.0-4.0mm), broadly oval, deep bodied, reddish to black, lacking colour pattern on elytra. Found in still water. Very common in north, much rarer in south. Seven species. Larvae known. Main breeding season unknown. Widespread outside Australia (Bistrom 1996).

Can be confused with: *Hyphydrus*, which have a coloured dorsal surface and an elongate pronotal process rather than a broadly triangular one;
Clypeodytes, which have an elongate pronotal process rather than a broad triangular one and often have a marked dorsal colour pattern.

Hyphydrus Illiger

Small (4.0-5.0mm), oval, deep bodied, often with well marked black/yellow pattern on elytra. Common in still to moderate flowing water over much of Australia, more abundant in north. Five species. Larvae known. Bistrom, 1983.

Can be confused with: *Hydrovatus*, which have a broadly triangular pronotal process and lack the yellow/black dorsal colour pattern present in most *Hyphydrus*;
Megaporus, which have hind claws that are more or less equal in size.

***Laccophilus* Leach**

Small (3.0-4.5mm), shiny, streamlined narrowing towards rear, often with clear colour pattern on elytra. Very common in north, coming as far south as South Australia and central New South Wales in still to moderately running water. Nine species. Larvae known, Alarie et al 2000; one of first to start breeding in wet season. Widespread outside Australia. Brancucci, 1983.

Can be confused with: *Australphilus*, which are smaller (2.2- 2.8 mm long), more southern in distribution and have a relatively straight hind edge to the pronotum.

***Leiodytes* Guignot**

Very small (1.0-2.0mm long), round, robust, strongly punctured, with strongly patterned elytra and pronotum. Common across northern Australia. Widespread in South-east Asia. Some Australian species may be seasonal, inhabiting temporary streams during the wet season, others in billabongs. Several species, some currently in *Clypeodytes*.

Can be confused with: *Gibbidessus*, which have a southern distribution, lack a strong colour pattern and lack a raised front margin to the clypeus; *Uvarus*, which have a southern distribution, lack a strong colour pattern and lack a raised front margin to the clypeus; *Clypeodytes*, which have a basal cavity on the elytral epipleura.

***Limbodessus* Guignot**

Small (1.8-2.4mm), narrowly oval, endemic. Widespread and relatively common in still water in wetter areas of north and eastern Australia. One species, *L. compactus*. Larvae known; spring (in south). Endemic.

Can be confused with: *Liodesus*, which are generally larger (> 2.2mm long), have a cervical stria which is lacking in *Limbodessus* and lack a basal epipleural cavity (Fig.19); *Notomicrus* (Noteridae), which have broad, flat, postcoxal plates covering the bases of the hind legs; *Boongurrus*, which are somewhat flattened and lack an epipleural cavity on the elytron.

***Liodesus* Guignot**

Small (2.0-3.1mm), oval, elongate. Found predominantly in still water. Common throughout Australia. Six described species and possibly some undescribed. Larvae known; spring and summer. Widespread outside of Australia.

Can be confused with: *Limbodessus*, which are smaller (1.8-2.5mm long), lack a cervical stria which is present in *Liodesus* and their epipleura have a basal cavity; *Allodessus*, which have a black (in males) or partially black (in females) ventral surface contrasting with a dull-greyish dorsal surface; *Boongurrus*, which are smaller (< 2.2mm long), somewhat flattened and lack a cervical stria in most specimens.

Lancetes Sharp

Medium sized (10.5-12.0mm), elongate. Readily recognised by its size and the dark lines on elytra. Common. Widespread in small creeks and ponds in southern Australia but seemingly in relatively low density in any one locality. One species, *L. lanceolatus*. Larvae known, Alarie et al, 2001; winter/spring. Gondwanan distribution. Colour photograph; *Lancetes lanceolatus*, Plate 1b. The moderate size and alternating dark and light stripes on the elytra separate it from all other Australian species.

Megaporus Brinck

Medium sized (5.8-7.2mm), oval, reddish or sometimes with yellow and black colour pattern on elytra. Widespread and common in still to slowly running water. Eight species. Larvae known; spring in south, wet season in north. Endemic.

Can be confused with: *Hyphydrus*, which have hind claws obviously unequal in length; *Chostonectes*, which have well marked punctures and often striations on the head and, other than *C. gigas*, are smaller; *Antiporus*, which have the hind femurs and tibiae evenly covered with punctures.

Necterosoma MacLeay

Small (4.0-5.2mm), oval, with a distinct colour pattern on elytra, raised elytral carinae in two species. Males have front tibiae notched, often strongly. Very common and widespread in still to running water. Eight species and one undescribed from the Kimberley. Larvae known, (Watts 1963); spring/summer. Endemic. Zwick, 1984

Can be confused with: *Antiporus*, which have a small inconspicuous fourth segment to the front and mid tarsi and lack strongly notched front tibia in males; *Chostonectes*, which have a small inconspicuous fourth segment to the front and mid tarsi and lack strongly notched front tibia in males; *Tiporus*, which have a small inconspicuous fourth segment to the front and mid tarsi and lack strongly notched front tibia in males. Colour photograph; *Necterosoma regulare*, Plate 1f.

Nirridessus Watts and Humphreys

See under *Tjirtudessus*.

Nirripiriti Watts and Humphreys

Small (4-5mm), elongate, relatively flat, eyeless, flightless, uniformly light testaceous. One described species, *N. hinzeae*, and numerous undescribed ones from underground waters in arid Western Australia and Central Australia. Larvae known but not yet described. Watts and Humphreys 2002.

Can be confused with: *Tjirtudessus* / *Nirridessus*, which have the hind metatibia narrow at the base rather than strongly expanding towards the apex, in contrast to their more

even width in some *Nirripiriti*. At present the only definitive way of separating these two genera is the shape of the aedeagus which has two segmented parameres in the Bidessine *Tjirtudessus/Nirridessus* and one segmented in the Hydroporine *Nirripiriti*.

***Onychohydus* Schaum & White**

Medium to large (16-28mm), oval, dorsal surface greenish-black narrowly yellow at sides. Relatively rare in still water. Two species, the smaller, *O. atratus* in the north and larger, *O. scutellaris*, in south. Larvae known; late spring in south, wet in north. Previously known as *Homoeodytes* Régimbart. Endemic to Australia and New Zealand. Nilsson *et al*, 1989. Colour photograph; *Onychohydus scutellaris*, Plate 1c, 1d.

Can be confused with: *Cybister*, which have well developed hind coxal lines, never have a testaceous ventral surface as in *O. scutellaris*, and males with only one claw on the hind legs; *Austrodytes*, which is very similar to *O. atratus* but has a flat pronotal process with border ridges and has the head (and much of the dorsal surface) with small punctures as well as minute ones; *Spencerhydus*, which have the outer spine on the hind femur not much broader than the inner one.

***Paroster* Sharp**

Small (2.5-4.5mm), elongate, oval, dorsal surface quite strongly reticulate and evenly punctured. Southern, locally common in spring in the South-west and in southern South Australia and south-western Victoria. In shallow, temporary, pools and small creeks, in winter and spring. Seven described species and several undescribed from Western Australia. Larvae known; winter and early spring. Endemic. The fine uniform reticulation over most of the body surface separate *Paroster* from other Australian species.

Can be confused with: *Neohydrocoptus* (Noteridae) which has broad, flat, postcoxal processes which cover the bases of the hind legs.

***Platynectes* Sharp**

Medium sized (5.8-7.2mm), oval, rather flat, shiny black usually with a few yellowish spots at side of elytra. Found in running water throughout Australia. Common. Twelve described species but taxonomy poor and several undescribed species present. Larvae known; spring in south, wet season in north. Gueorguiev, 1972. Also in New Guinea and Indonesia.

Can be confused with: *Copelatus*, which lack the patch of strong setae at the outer hind edges of the hind femurs.

***Rhantaticus* Sharp**

Medium sized (9.0-10.5mm), oval, rather flat, elytra speckled yellow and black with darker bands. Still water. Relatively common in north. One species, *R. congestus*. Larvae known; wet season. Also in Africa and South-east Asia.

Can be confused with: *Rhantus*, which have the front edge of the eye partly covered by a backward extension of the side of the head; *Hydaticus*, which have the outer margins of the metasternal wings straight.

Rhantus Lacordaire

Medium sized (11.5-14.0mm), brownish. Found in ponds and slow creeks, even backyard swimming pools. Two species, one, *R. suturalis*, is very common throughout Australia (and outside Australia as far as Europe) the other, *R. simulans*, is from the South-west. Larvae known; throughout the year in south, wet season in north. Balke 1993; Balke et al 2000. Widespread outside of Australia. Colour photograph; *Rhantus suturalis*, Plate 1a.

Can be confused with: *Rhantaticus*, which have the front of the eye not partially covered by a backward extension of the side of the head; *Hydaticus*, which have the front of the eye not partially covered by a backward extension of the side of the head; *Eretes*, which have large punctures on the elytra in contrast to the much smaller ones on the pronotum.

Sandracottus Sharp

Medium sized (13.5-15mm), oval black and yellow beetles. Found in permanent water in central Australia and north. Rare, but can be locally common. Colour pattern variable. One species, *S. bakewelli*. Larva of an Indian species known (Vazirani 1971). Also in South and South-east Asia.

Can be confused with: *Hydaticus*, which have the outer margins of the metasternal wings straight and usually lacks the strong colour pattern found in *Sandracottus*.

Sekaliporus Watts

Small (3-4mm), oval, black with reddish/yellow spots on elytra. Rare. Known only from coastal Northern Territory. Found in small woodland streams, often together with species of *Tiporus*. One species, *S. kriegi*. Larvae known. Endemic. Watts, 1997a.

Can be confused with: *Tiporus*, which have the shoulders of the elytra obliquely bent upwards (Fig. 30) and males with three segmented front tarsi; *Antiporus*, which have the shoulders of the elytra regularly rounded (Fig. 31) and the lobes of the segments of front and middle tarsi approximately similar in size (Fig. 27).

Sternopriscus Sharp

Small (2.2-4.8mm), elongate, rather hump-backed, usually with colour pattern on elytra. The males of many species have antennae with greatly and oddly enlarged segments. Common and widespread in wetter coastal areas in still to fast running water. Twenty six described species. Larvae known; spring-summer. Endemic. Hendrich and Watts, 2002. Colour Photograph: *Sternopriscus maedfooti*, Plate 1e.

Can be confused with: *Barretthydrus*, which have the fourth segment of the front and mid tarsi small and hidden by the deeply lobed third segment, and the elytra with four longitudinal grooves; *Antiporus*, which have the fourth segment of the front and mid tarsi small and hidden by the deeply lobed third segment, and never have males with expanded antennal segments.

***Spencerhydrus* Sharp**

Large (15.5-18.0mm), oval, widening behind, greenish with rather wide yellow border. Found in still temporary water in south. Two species, *S. pulchellus* in South-west, *S. latecinctus* in South-east. Larvae known; early spring. Endemic. Restricted to the South-west and South-east.

Can be confused with: *Onychohydrus scutellaris*, which is larger (>23mm. long) and lacks the grooved pronotal process found in *Spencerhydrus*.

***Terradessus* Watts**

Minute(1.1-1.5mm), flattish, eyeless. Found in moist litter in mountain forests of north Queensland. Two species. Larvae unknown. Endemic. Brancucci & Monteith, 1997. Cannot be confused with any other Australian species.

***Tiporus* Watts**

Small (3.8-5.0mm) oval, often rather chunky, a few species with colour pattern on elytra. Found in ponds and streams in the north. The males have three-jointed tarsi which is unique in Australian Dytiscidae. Eleven described species. Larvae known; wet season. Endemic. Watts, 1985.

Can be confused with: *Necterosoma*, which have front and mid tarsi which are clearly five-segmented. *Sekaliporus*, which has the lateral edges of the pronotum and elytra meeting in the same plane, and males with five-segmented front tarsi; *Antiporus*, which have the shoulders of the elytra regularly rounded, and males which lack small spines on the front tibia; *Laccophilus*, which have the hind tarsi flattened and oar-like.

***Tjirtudessus* Watts and Humphreys/ *Nirridessus* Watts and Humphreys**

(The generic distinction between these two genera is unlikely to be maintained. so at this time I feel that it is best to treat them together.)

Small (1.0–5.0mm), elongate, eyeless, flightless, uniformly light testaceous. The combined genera have fifteen described and at least as many undescribed species from underground waters in inland Western Australia and the Northern Territory. Larvae known.

Can be confused with: *Nirripiriti*, which have the hind tibiae of roughly even width throughout rather than narrow at the base and widening to the apex; *Kintingka*, which lack swimming-hairs on the front and middle legs.

***Uvarus* Guignot**

Very small (1.8-2.2mm), broadly oval. Restricted to the South-west. Rare, a still water species. One described species, *U. pictipes*, and one undescribed one. Larvae unknown. The genus also occurs in Africa and America. The Australian species are probably wrongly classified as *Uvarus*.

Can be confused with: *Gibbidessus*, which has a cervical stria; *Clypeodytes*, which are northern and have the front edge of the clypeus narrowly flanged; *Hydrovatus*, which have a broad, triangular-shaped pronotal process; *Leiodytes*, which are northern, have a strong dorsal colour pattern and have the front edge of clypeus narrowly flanged.

CHECKLIST OF AUSTRALIAN DYTISCIDAE
(Arrangement after Nilsson (2001); genera and species arranged alphabetically within tribes.)

Subfamily Agabinae Thomson

Tribe Agabini Thomson

Platynectes Regimbart

<i>P. aenescens</i> (Sharp)	<i>P. darlingtoni</i> Gueorguiev	<i>P. monostigma</i> (Hope)
<i>P. australicus</i> Gueorguiev	<i>P. decempunctatus</i> (Fabricius)	<i>P. octodecimmaculatus</i> (MacLeay)
<i>P. bakewelli</i> (Clark)	<i>P. laurinus</i> Watts	<i>P. reticulosus</i> (Clark)
<i>P. brownei</i> Gueorguiev	<i>P. magellanicus</i> (Babington)	<i>P. tasmaniae</i> (Clark)

Subfamily Colymbetinae Erichson

Tribe Colymbetini Erichson

Rhantus Dejean

<i>R. simulans</i> Regimbart	<i>R. suturalis</i> (W. S. MacLeay)
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Subfamily Copelatinae Van den Branden

Tribe Copelatini Van den Branden

Copelatus Erichson

<i>C. ater</i> Sharp	<i>C. divisus</i> J. Balfour-Browne	<i>C. marginatus</i> Sharp
<i>C. australiae</i> Clark	<i>C. elongatulus</i> MacLeay	<i>C. melanarius</i> Sharp
<i>C. australis</i> (Clark)	<i>C. ferrugineus</i> Sharp	<i>C. nigrolineatus</i> Sharp
<i>C. bakewelli</i> J. Balfour-Browne	<i>C. gapa</i> Watts	<i>C. punctipennis</i> Lea
<i>C. boulevardi</i> Watts	<i>C. glyptus</i> Guignot	<i>C. rasilis</i> Lea
<i>C. clarki</i> Sharp	<i>C. gracilis</i> Sharp	<i>C. simplex</i> Clark
<i>C. daemeli</i> Sharp	<i>C. irregularis</i> MacLeay	<i>C. tenebrosus</i> Regimbart

Subfamily Dytiscinae Leach

Tribe Aciliini Thomson

Rhantaticus Sharp

<i>R. congestus</i> (Klug)

Sandracottus Sharp

<i>S. bakewelli</i> (Clark)

Tribe Cybistrini Sharp

Austrodytes Watts

<i>A. insularis</i> (Hope)

Cybister Curtis

C. godeffroyi Wehncke
C. loxidiscus Wilke

C. tripunctatus (Olivier)
C. weckwerthi Hendrich

C. yulensis Guignot

Onychohydrus Schaum & White

O. atratus (Fabricius)

O. scutellaris (Germar)

Spencerhydrus Sharp

S. latecinctus Sharp

S. pulchellus Sharp

Tribe **Eretini** Crotch

Eretes Castelnau

E. australis (Erichson)

E. sticticus (Linnaeus)

Tribe **Hydaticini** Sharp

Hydaticus Leach

H. bihamatus Aubé

H. chrisi Nilsson*

H. consanguineus Aubé

H. daemeli Sharp

H. fabrici W. S. Macleay

H. finus Watts

H. microdaemeli Watts

H. parallelus Clark

H. pulcher Clark

H. quadrivittatus Blanchard

H. watsi Daussin

* replacement name for *H. variegatus* Watts

Tribe **Hyderodini** Miller

Hyderodes Hope

H. crassus Sharp

H. schuckardi Hope

Subfamily **Hydroporinae** Aube

Tribe **Bidessini** Sharp

Allodessus Guignot

A. bistrigatus (Clark)

Bidessodes Regimbart

B. bilita Watts

B. denticulatus (Sharp)

B. flavosignatus (Zimmerman)

B. grossus (Zimmerman)

B. mjobergi (Zimmerman)

Boongurrus Larson

B. rivulus Larson

Clypeodytes Regimbart

C. bifasciatus (Zimmerman)

C. darlingtoni Watts

C. migrator (Sharp)

Gibbidessus Watts

G. chipi Watts

Hydroglyphus Motschulsky

- H. basalis* (MacLeay) *H. grammopterus* (Zimmerman) *H. signatus* (Sharp)
H. balkei Hendrich *H. leai* (Guignot) *H. trifasciatus* (Watts)
H. daemeli (Sharp) *H. mastersi* (Macleay)
H. godeffroyi (Sharp) *H. orthogrammus* (Sharp)

Limbodessus Guignot

- L. compactus* (Clark)

Liodessus Guignot

- L. amabilis* (Clark) *L. gemellus* (Clark) *L. praelargus* (Lea)
L. dispar (Sharp) *L. inornatus* (Sharp) *L. shuckhardi* (Clark)

Nirridessus Watts and Humphreys

- N. bigbellensis* Watts and Humphreys *N. masonensis* Watts and Humphreys
N. challaensis Watts and Humphreys *N. morgani* Watts and Humphreys
N. cueensis Watts and Humphreys *N. pinnaclesensis* Watts and Humphreys
N. fridaywellensis Watts and Humphreys *N. pulpa* Watts and Humphreys
N. hinkleri Watts and Humphreys *N. windarraensis* Watts and Humphreys
N. lapostaae Watts & Humphreys

Tjirtudessus Watts & Humphreys

- T. eberhardi* Watts & Humphreys *T. magnificus* Watts & Humphreys
T. hahni Watts & Humphreys *T. raesideensis* Watts & Humphreys

Uvarus Guignot

- U. pictipes* (Lea)

Tribe **Carabhydrini** Watts

Carabhydrus Watts (Status uncertain. Larson & Storey, 1994)

- C. andreas* Zwick *C. mubboonus* Larson & Storey *C. niger* Watts
C. plicatus Watts *C. monteithi* Watts

Tribe **Hydroporini** Aube

Antiporus Sharp

- A. bakewelli* (Clark) *A. hollingsworthi* Watts *A. pennifolidae* Watts &
Pinder *A. blakei* (Clark) *A. interrogationis* (Clark)
A. simplex Watts
A. femoralis (Boheman) *A. jenniferae* Watts *A. willyamsi* Watts
A. gilberti (Clark) *A. mcraeae* Watts & Pinder *A. wilsoni* Watts
A. gottwaldi Hendrich *A. pembertoni* Watts

Barretthydrus Lea

- B. geminatus* Lea *B. stepheni* Watts *B. tibialis* Lea

Chostonectes Sharp

- C. gigas* (Boheman) *C. nebulosus* (Macleay) *C. watti* Wewalka
C. johnsoni (Clark) *C. sharpi* Watts

Megaporus Brinck

M. gardeneri (Clark)
M. hamatus (Clark)
M. howitti (Clark)

M. ruficeps (Sharp)
M. nativigi Mouchamps
M. wilsoni Mouchamps

M. solidus (Sharp)
M. fischeri Mouchamps

Necterosoma MacLeay

N. aphrodite Watts
N. darwini (Babington)

N. penicillatum (Clark)
N. regulare Sharp

N. susanna Zwick
N. undecimlineatum
(Babington)

N. dispar (Germar)

N. schmeltzi Sharp

Nirripiriti Watts and Humphreys

N. hinzeae Watts and Humphreys

Paroster Sharp

P. couragei Watts
P. gibbi Watts
P. insculptilis (Clark)

P. michaelsoni Regimbart
P. niger Watts
P. nigroadumbratus (Clark)

P. pallescens Sharp

P. sharpi Watts

Sekaliporus Watts

S. kriegi Watts

Sternopriscus Sharp

S. alligatorensis Hendrich and Watts
S. alpinus Hendrich and Watts

S. mundanus Watts

S. pilbaraensis Hendrich and Watts

S. aquilonaris Hendrich and Watts
S. balkei Hendrich and Watts
S. barbarae Hendrich and Watts
S. browni Sharp

S. storeyi Hendrich and Watts
S. signatus Sharp
S. tarsalis Sharp
S. tasmanicus Sharp

S. goldbergi Hendrich and Watts
S. meadfooti (Clark)
S. minimus Lea.
S. marginatus Watts
S. montanus Watts
S. multimaculatus (Clark)
S. mouchampsi Hendrich and Watts

S. hansardi (Clark)
S. wallumphilia Hendrich and Watts
S. wattsi Pederzani
S. weckwerthi Hendrich and Watts
S. wehnckeii Sharp
S. weiri Hendrich and Watts

Tiporus Watts

T. alastairi (Watts)
T. centralis (Watts)
T. collaris (Hope)
T. denticulatus (Watts)

T. georginae Watts
T. giuliani (Watts)
T. josepheni (Watts)
T. lachlani Watts

T. moriartyensis Watts
T. tambreyi (Watts)
T. undecimaculatus (Clark)

Tribe **Hydrovatini** Sharp

Hydrovatus Motschulsky

H. fasciatus Sharp
H. nigrita Sharp
H. opacus Sharp

H. ovalis Sharp
H. parallelus Sharp
H. rufoniger (Clark)

H. weiri Bistrom

Tribe **Hyphydrini** Sharp

Hyphydrus Illiger

H. contiguus Wehncke *H. effeminatus* Watts *H. lyratus* Swartz
H. decemmaculatus Wehncke *H. elegans* (Montrouzier)

Tribe **unknown**

Kintingka Watts and Humphreys

K. kurutjutu Watts and Humphreys

Terradessus Watts (Systematic position uncertain (Brancucci & Monteith 1996).)

T. anophthalmus Brancucci & Monteith *T. caecus* Watts

Subfamily **Laccophilinae** Leach

Tribe **Laccophilini** Leach

Australphilus Watts

A. montanus Watts *A. saltus* Watts

Laccophilus Leach

L. cingulatus Sharp *L. religatus* Sharp *L. transversalis*
Regimbart

L. clarki Sharp *L. seminiger* Fauvel *L. univittatus*
Regimbart

L. quadrimaculatus Sharp *L. sharpi* Regimbart *L. walkeri* Balfour
Browne

Subfamily **Lancetinae** Van den Branden

Tribe **Lancetini** Van den Branden

Lancetes Sharp

L. lanceolatus (Clark)

Subfamily **Matinae** Van den Branden

Tribe **Matini** van den Branden

Allomatus Mouchamps

A. nannup Watts *A. wilsoni* Mouchamps

Batrachomatus Clark

B. daemeli (Sharp) *B. wingi* Clark

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Family NOTERIDAE

A relatively small family of aquatic beetles sometimes included within the Dytiscidae, that in Australia comprise only six species but in four genera. These are essentially tropical but *Notomicrus* reaches Victoria and *Hydrocanthus* northern New South Wales. At least in the north they are common in still water, with the exception of *C. ephemeralis* which is restricted to wet-season streams of the escarpments of the Northern Territory and northern Western Australia. All four Australian genera occur widely outside Australia. Adults are carnivorous, as are the larvae of *Canthydrus* and *Hydrocanthus*. Little is known of the larvae of the other genera. The larvae of *Canthydrus* and *Hydrocanthus* are surface breathers but those of *Noterus* (a Northern Hemisphere genus) are thought to obtain air from within the stems of water-plants by piercing them with a strongly pointed abdominal tip. The larva of the Australian *Neohydrocoptus* is similar structurally and may also do this. The larva of the very small (1.5mm long) *Notomicrus* is unknown. Pupation is thought to be in underground cells similar to those constructed by larval Dytiscids.

Within a genus Noterids are structurally very similar and identification to species often difficult. With so few species in Australia this is not a problem and all can be readily identified to species on external characters. No recent taxonomic work has been done on the species other than my recent description of *C. ephemeralis*.

KEY TO THE ADULTS OF AUSTRALIAN NOTERIDAE

- 1 Size < 1.5mm, uniformly reddish*Notomicrus tenellus*
- Size > 2.0mm; usually not uniformly reddish.....2
- 2(1) Size > 5.5mm long3
- Size < 4.0mm long4
- 3(2) Uniformly reddish.....*Hydrocanthus waterhousei*
- Uniformly black (Plate 4a)*Hydrocanthus australasiae*
- 4(2) Black, often with light spots, body tear-shaped, weakly punctate.....5
- Mottled grey-brown and testaceous; parallel-sided; strongly punctate/reticulate (Plate 4b)*Neohydrocoptus subfasciatus*
- 5(4) Black with vague white spots towards apex of elytra, swamps (Plate 4c).....
.....*Canthydrus bovillae*
- Black with well marked white spots on elytra, seasonal streams running off escarpments in northern Australia.....*Canthydrus ephemeralis*

KEY TO THE LARVAE OF AUSTRALIAN GENERA OF NOTERIDAE

(Other than *Notomicrus* a very small species (adult 1.5 mm long) which should key to *Neohydrocoptus*, but minute)

- 1- Body thin, elongate, cylindrical; testaceous; legs without swimming-hairs; apical abdominal segment sharply pointed (Fig. 3).....
 *Neohydrocoptus subfasciatus*
- Body narrowly spindle-shaped; dark and light coloured areas; legs with swimming-hairs; apical segment narrowing behind but not sharply pointed (Figs 1, 2) 2
- 2 Head and pronotum paler than rest (Fig. 2); legs relatively elongate, tarsal claws on mid and hind legs approximately half length of last segment of tarsi (Fig. 4); segment two of antenna approximately as long as segment three (penultimate) (Fig. 6); mandible tip bifid. *Canthydrus*
- Body more uniformly dark (Fig. 1); legs stout, tarsal claws on mid and hind legs equal in length to last tarsal segment (Fig. 5); segment two of antenna longer than segment three (Fig. 7); mandible tip not bifid. *Hydrocanthus*

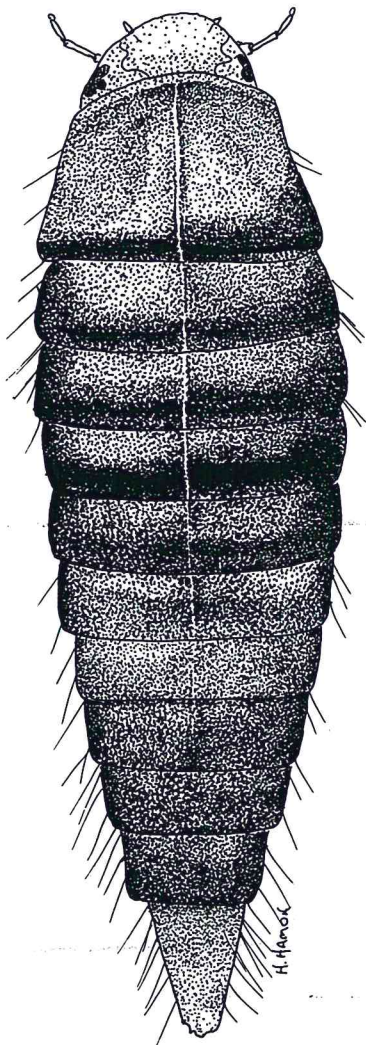


Figure 1 *Hydrocanthus australis*

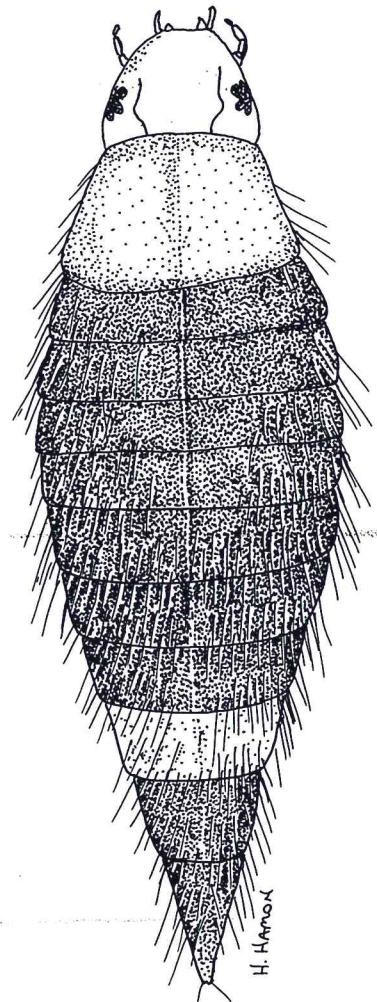


Figure 2 *Canthydrus bovillae*

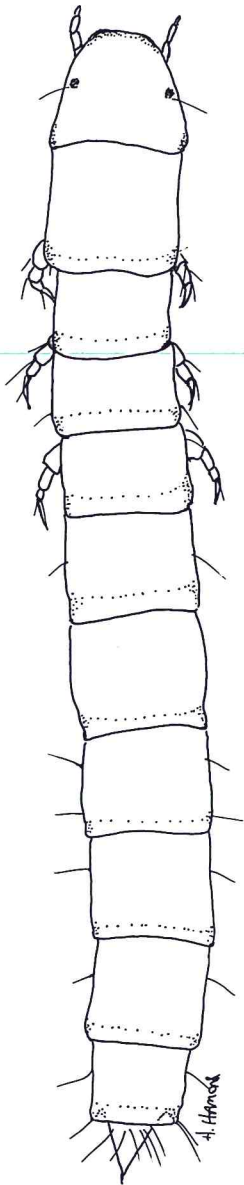


Figure 3

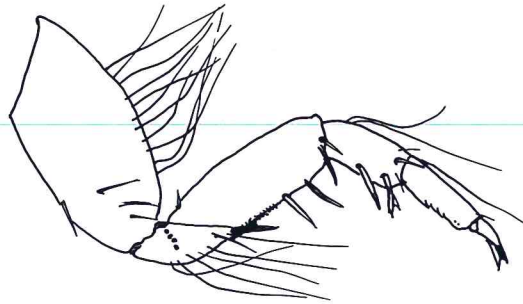


Figure 4

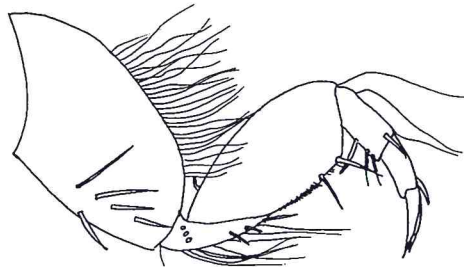


Figure 5

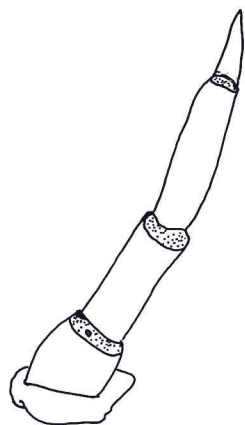


Figure 6

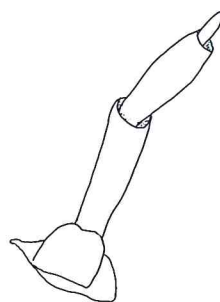


Figure 7

NOTES ON GENERA OF AUSTRALIAN NOTERIDAE

Canthydrus Sharp

One widespread species (*C. bovillae*), in billabongs across northern Australia and one species (*C. ephemeralis*), so far known only from small temporary streams running off the escarpments of Arnhem Land and the Kimberley. Both are relatively small (2.5-3.5mm), streamlined and dorsally black with pale spots on the elytra. *Canthydrus ephemeralis* usually with four well-marked spots in the apical half of the elytra: *C. bovillae* lacking spots or with two spots in the apical half of the elytra and some vague ones near the base of the elytra. Watts, 2001.

Hydrocanthus Say

At 6-7mm long the largest of Australian Noteridae. The all black *H. australasiae* is widespread, occurring in still water across northern Australia and south to northern New South Wales. The reddish *H. waterhousei* occurs from the Kakadu region to the Atherton Tableland. It is particularly common around the Gulf of Carpentaria.

Neohydrocoptus Sato

One small (2-3mm long) almost rectangular species, with a mat surface and indistinct but quite noticeable light/dark colour pattern on the dorsal surface. A still water species, rarer than the other species, although its strong attraction to light makes it relatively common in collections. I have seen only one specimen of what I assume to be its larva which has a distinctive long tubular body, shield-like head and sharp-pointed apex. The very pale colour and armoured head suggest that it spends its time deep within the bases of aquatic vegetation. *Neohydrocoptus* is a recent replacement name for *Hydrocoptus* (Nilsson et al 1989, Pederzani 1995)

Notomicrus Sharp

One very small (1.5 mm long) species common in still water in northern and eastern Australia, becoming much rarer in the south where it has been collected as far south as western Victoria. The same or a very similar species is found in Islands to the north of Australia. Easily recognised by its small size, reddish colour and streamlined shape.

CHECK LIST OF AUSTRALIAN NOTERIDAE

Tribe Notomicrini Zimmerman

Neohydrocoptus Sato

(Previously *Hydrocoptus*. See Nilsson *et al*, 1989)

N. subfasciatus (Sharp)

Notomicrus Sharp

N. tenellus (Clark)

Tribe Hydocanthini Sharp

Canthydrus Sharp

C. bovillae Blackburn

C. ephemeralis Watts

Hydrocanthus Say

H. australasiae Wehncke

H. waterhousei Blackburn

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- Watts, CHS. 1985. A faunal Assessment of Australian Hydradephaga. *Proceedings of the Academy of Natural Sciences of Philadelphia* **137**: 22-28.
- Watts, CHS. 2001. A new species of Australian *Canthydrus* Sharp with a key to the Australian species of Noteridae (Coleoptera). *Records of the South Australian Museum*, **34**: in press

Family GYRINIDAE

Adult Gyrinidae are a common and conspicuous sight on the surface of pools and quiet areas of creeks in permanent or semi-permanent water. They are readily recognised by their streamlined shape, divided eyes and strong paddle-like legs. The larvae are similarly distinctive with a long thin body and lateral gills, which make them independent of surface air. Pupation occurs above ground in earthen cells constructed out of mud by the larvae and attached to a hard surface not far above the waterline. Of the four genera and nineteen species found in Australia most are found in eastern and northern coastal regions. Gyrinids are rarer in both number of individuals and in species in Tasmania and the South-west.

The Australian species were revised by Ochs in 1949 and 1956. No taxonomic work has been done since then. However, unlike most other groups, there don't seem to be many, if any, additional undescribed species.

Adults of the four genera are readily distinguished on dorsal characters. Ventral characters are required to identify members of the specious genus *Macrogyrus* to species. In other countries the genitalia have proved useful but these have not yet been investigated for the Australian species, however, as in most groups, extrusion of the male genitalia before permanent mounting would be a sound practise. All four Australian genera are well represented in other countries.

I have provided a key to the larvae of Australian genera based on my rearing of *Macrogyrus australis* to adult and information in Bertrand (1972). Although Bertrand briefly described the larvae of a European species of *Aulonogyrus* the information available does not enable reliable segregation of *Aulonogyrus* and *Macrogyrus*. I have not seen examples that I can confidently identify as *Aulonogyrus* amongst the Australian material available.

KEY TO THE ADULTS OF AUSTRALIAN GENERA OF GYRINIDAE

(From Ochs, 1949)

- 1 Suture of elytra with a small raised border. Length 4.0 – 6.5 mm. **Gyrinini**...2
- Suture of elytra without small raised border. Length > 6.5 mm ..**Enhydrini**...3
- 2(1) Length 4.0 – 4.5 mm. Sides not bordered with yellow ^{N Aus N NSW} ***Gyrinus convexiusculus***
- Length 5.5 – 6.5 mm. Sides bordered with yellow ***Aulonogyrus strigosus***
Aus
- 3(1) Scutellum visible ***Macrogyrus*** Aus
- Scutellum invisible ***Dineutus***
②, N Coast

KEY TO THE LARVAE OF AUSTRALIAN GENERA OF GYRINIDAE

- 1 Head subcircular, with neck narrow and relatively distinct; pronotum about as wide as long; front edge of head with prominent triangular extension (Fig.1) ..
*Dineutus* Q, Mont
- Head elongate, with neck indistinct about as wide as rest of head; pronotum longer than wide (Fig. 2); front edge of head with 2 or 4 lobes (Figs 2-4).....2
- 2 Front edge of head with two lobes (Fig. 3)*Gyrinus* WAUS, MONT
- 2 Front edge of head with four lobes (Figs 2, 4)*Aulonogyrus** /*Macrogyrus* AUS

* I have not seen examples of this genus. Characters used are from Bertrand 1972. Figure 4, *Aulonogyrus* sp. after Bertrand (1972).

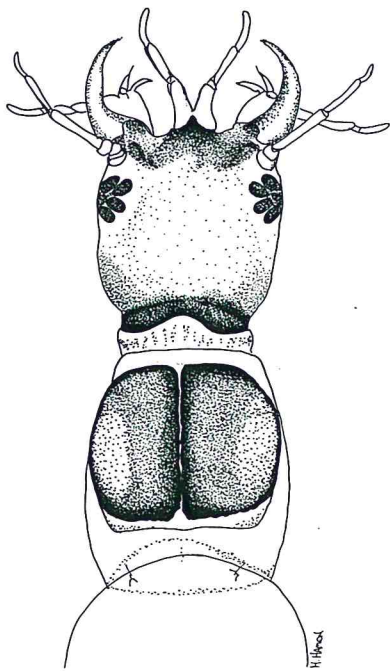


Figure 1 *Dineutus australis*

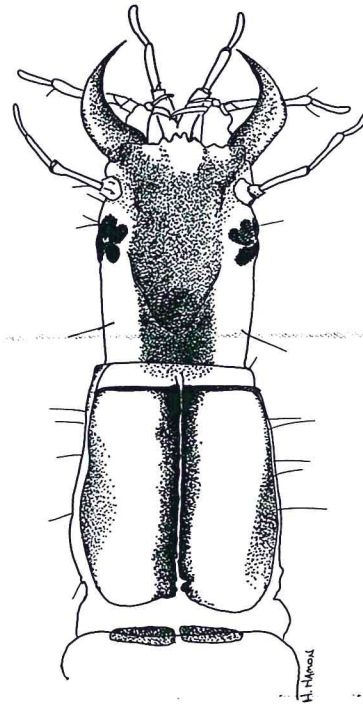


Figure 2 *Macrogyrus australis*

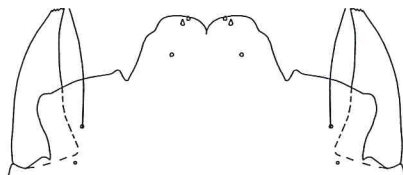


Figure 3 *Gyrinus convexiusculus*



Figure 4 *Aulonogyrus* sp (after Bertrand, 1972)

NOTES ON THE GENERA OF AUSTRALIAN GYRINIDAE

Aulonogyrus Regimbart

One species (5.5-6.5 mm) recognised by its comparatively small size (5.5-6.5mm), lateral yellow bands and the raised border to the elytron adjacent to the suture. Widely distributed on the mainland. Possibly absent from Tasmania.

Dineutus MacLeay

A widespread and dominant genus in tropical areas of the world, *Dineutes* is represented in Australia by only two species; *D. australis* widespread and abundant and *D. neohollandicus* less common and seemingly restricted to Queensland and the north coast. Characterised by dark dorsal surface, invisible scutellum, average size (6.5-9.0mm), and truncated body shape.

Gyrinus Linneaus

The only Australian species is our smallest gyrid, recognised by its small size (3.5-4.8 mm) and uniformly black colour. More tropical than the other genera it is found across northern Australia and into northern New South Wales possibly favouring shallow, more open, weedy billabongs/pools than other genera.

Macrogyrus Regimbart

The most abundant and specious genus in Australia with fifteen species of average to large size (6.5-15 mm), typical of creek pools in eastern Australia but wide-spread over most of the country wherever there is reasonably permanent water. Identified by large size, absence of raised sutural borders to the elytra and visible scutellum. Divided by Ochs (1949) into a number of subgenera. Identification to species can be done with some difficulty from Ochs (1949. 1956) but the taxonomy of the genus would benefit from a modern revision.

CHECK LIST OF AUSTRALIAN GYRINIDAE

Subfamily Gyrininae

Tribe Gyrinini Regimbart

Aulonogyrus Regimbart

A. strigosus (Fabricius)

Gyrinus Linneaus

G. convexiusculus MacLeay

Tribe Enhydrini Regimbart

Dineutus MacLeay

D. australis (Fabricius)

D. neohollandicus Ochs

Macrogyrus Regimbart

M. angustatus Regimbart

M. australis (Brulle)

M. darlingtoni Ochs

Meneville)

M. venator (Boisduval)

Regimbart

M. gibbosus Ochs,

M. gouldi (Hope)

M. howitti (Clark)

M. elongatus Regimbart

M. finschi Ochs

M. viridisulcatus Mjoberg

M. reichei (Aubé)

M. rivularis (Clark)

M. striolatus (Guerin-

M. oblongus Boisduval

M. paradoxus

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- Bertrand, HPI. 1972. Larves et nymphes des Coleopteres aquatiques du globe. 804pp
F. Paillart, Paris.
- Ochs, G. 1949. A revision of the Australian Gyrinidae. *Records of the Australian
Museum* 22: 171-199.
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Museum* 24: 31-35.

Family HYGROBIIDAE

Screech beetles (Hygrobiidae), so named for their habit of loud stridulation when handled, have an unusual World distribution. The single genus *Hygrobia* has one species in Europe, one in South-west China and four in Australia. The Australian species are all rare and found in ponds and farm dams in wetter coastal regions from Darwin around the East Coast to South Australia as well as the extreme South-west and Tasmania.

The larvae are compact, large headed, with a long thin elongation to the apical segment which together with two long cerci gives the end of the larva a distinctive three-pronged look. Beneath the thorax and abdomen they have setose gills which are readily seen in the living animal but less obvious when dead. Pupation, in at least the European species, is in cells dug into the damp ground at the edge of the pond.

NOTE ON GENUS *HYGROBIA*

Four Australian species: *Hygrobia maculata* occurs in the north and has a dark/light dorsal colour pattern; *H. niger*, a slightly smaller all black species, occurs down the east coast; *H. australasiae*, which is a relatively uniform reddish brown (Plate 3a), occurs in South Australia, Tasmania, and up the east coast at least as far as Brisbane; finally *H. wattsi*, a dark species with reddish sides (Photographs, Back Cover & Plate 1e), is found in the swamps of the extreme South-west.

CHECK LIST OF AUSTRALIAN HYGROBIIDAE

Hygrobia Latreille

H. australasiae (Clark)

H. maculata Britton

H. niger (Clark)

H. wattsi Hendrich

REFERENCES

- Britton, EB. 1981 The Australian Hygrobiidae (Coleoptera). *Journal of the Australian Entomological Society* **20**: 83-86.
- Hendrich, L. 2001. A new species of *Hygrobia* Latreille, from peatlands of south-western Australia (Coleoptera: Hygrobiidae). *Koleopterologische Rundschau* **71**: 17-25

Family HALIPLIDAE

In Australia represented only by the genus *Haliplus* with 15 species distributed in all the better-watered regions with a preponderance of species in the north. Recently reviewed by Von Vondel (1995) who provided a very well-illustrated key and descriptions of the adults. Both adults and larvae are found in still/slow water either in ponds or the slower regions of rivers and creeks among aquatic vegetation. Both life stages are herbivorous. In both northern Australia and areas of Mediterranean climate in the south the species are strongly seasonal with adults not appearing until winter or the "wet" are well underway. In more permanent rivers of eastern Australia adults appear less seasonal.

NOTE ON GENUS *HALIPLUS* LATREILLE

Fifteen species are recorded in Australia and numerous species worldwide. They can be identified to species relatively easily using Von Vondel (1995) but in a few cases the male genitalia are required for species identification. No work has been done on Australian larvae. Photograph, Plate 2f.

CHECKLIST OF AUSTRALIAN HALIPLIDAE

Haliplus Latreille

- H. alastairi* Watts, 1988
- H. australis* Clark, 1862
- H. bistriatus* Wehncke, 1880
- H. ferruginipes* Regimbart, 1891
- H. fuscatus* Clark, 1862
- H. gibbus* Clark, 1862
- H. hydei* Von Vondel, 1995
- H. oberthuri* Von Vondel, 1995
- H. signatipennis* Regimbart, 1891
- H. sindus* Watts, 1988
- H. stepheni* Watts, 1988
- H. storeyi* Von Vondel, 1995
- H. testudo* Clark, 1862
- H. timmsi* Von Vondel, 1995
- H. wattsi* Von Vondel, 1995

REFERENCES

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SUPERFAMILY HYDROPHILOIDEA

In this guide I follow the classification of Hansen (1991). This comprehensive study of the superfamily treats the Hydrochidae, Spercheidae and Georissidae as separate families and not as subordinate taxa within Hydrophilidae as others have done (eg Lawrence and Britton 1991). Hydraenidae, which has in the past been considered close to Hydrophilidae, is now almost universally treated as more closely related to the rove-beetles, Staphylinidae.

The following keys combine the Australian genera included in the superfamily Hydrophiloidea but in all other respects I have treated each family separately.

Morphology of adult Hydrophiloidea

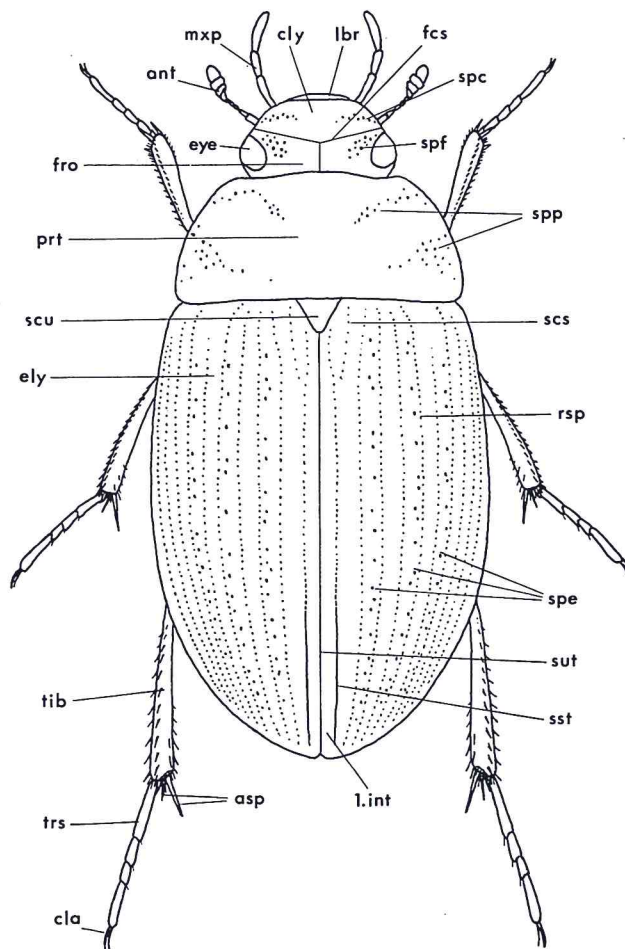


Fig 1. Hydrophilid, dorsal view: Dorsal view: ant = antenna; asp = apical spurs of tibia; cla = claws; cly = clypeus; ely = elytron; eye = compound eye; fro = frons; fcs = frontoclypeal suture; lbr = labrum; msp = maxillary palpus; prt = pronotum; rsp = row of serial punctures; scs = scutellary stria; scu = scutellum; spc = systematic punctures of clypeus; spf = systematic punctures of frons; spc = systematic punctures of elytra; spp = systematic punctures of pronotum, sst = sutural stria (= 1st stria); sut = elytral suture; trs = tarsus; tib = tibia; 1.int = first elytral interstice. From Hansen, 1991.

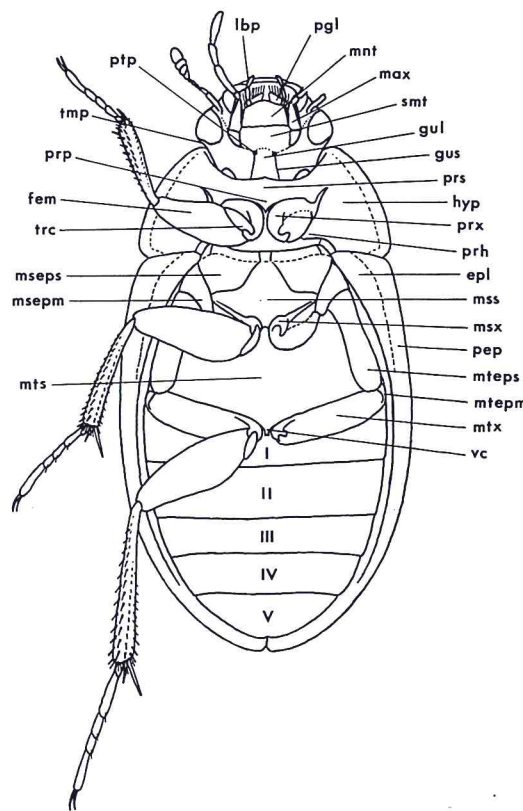


Fig 2. Hydrophilid, ventral view: epl = epipleuron; fem = femur; gul = gula; gus = gular suture; hyp = hypomeron; ldp = labial palpus; max = maxilla; mnt = mentum; msepem = mesepimeron; mseps = mesepisternum; mss = mesosternum; msx = mesocoxa; mtepm = metepimeron; mteps = metepisternum; mts = metasternum; mtx = metacoxa; pep = pseudopipleuron; pgl = paraglossa; prh = projection of hypomeron; prp = prosternal process; prs = prosternum; prx = procoxa; ptp = posterior tentorial pit; smt = submentum; tmp = tempora; trc = trochanter; vc = ventral condyles of metasternum; 1-V = ventrites. From Hansen, 1991.

**KEY TO THE ADULTS OF AUSTRALIAN GENERA OF AQUATIC
HYDROPHILOIDEA**

(Families Hydrophilidae, Spercheidae, Hydrochidae and Georissidae)

- 1 Meso-and meta- sternae with a continuous median longitudinal keel which is prolonged posteriorly into a spine between hind coxa (Fig.3); > 10mm long. **2**
- Meso-and meta- sternae without a continuous common keel; <10mm long**4**
-
- 2(1) Prosternal carina with deep cavity behind to receive anterior part of sternal keel, keel not notched on lower edge anteriorly; 18-43mm long*Hydrophilus*
- Prosternal carina without cavity, sternal keel notched; <20mm long**3**
- 3(2) Prosternal carinae usually produced backwards in a spine (Fig. 4); only front femurs with basal portions densely punctate and pubescent. Northern
.....*Hydrobiomorpha*
- Prosternal carinae without a spine; basal portions of all femurs densely punctate and pubescent*Sternolophus*
- 4(1) Second segment of maxillary palpi thick (Fig. 5), basal segment of third tarsi longer than second, 4.6mm long (Fig. 6).....*Coelostoma*
- Second segment of maxillary palpi slender (Fig. 8), basal segment of hind tarsi shorter than second (Fig. 7).....**5**

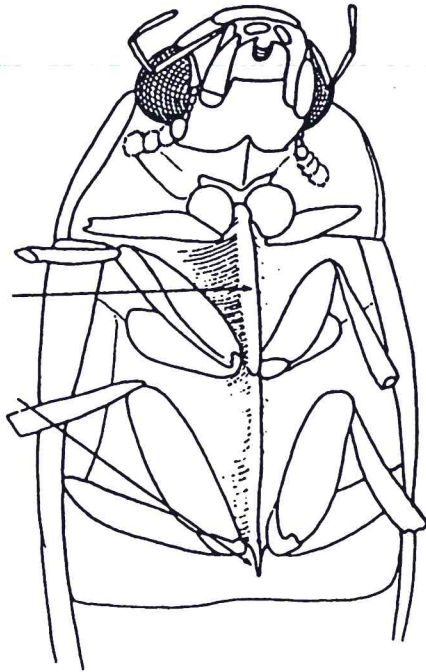


Figure 3

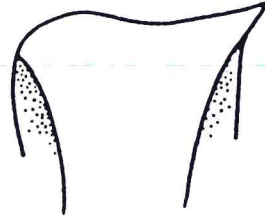


Figure 4

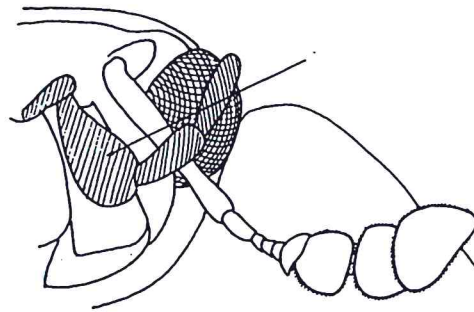


Figure 5



Figure 6



Figure 7

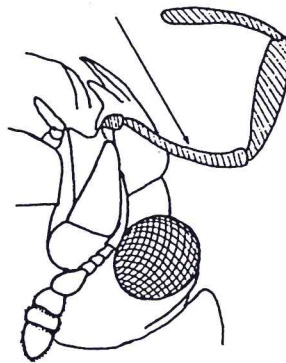


Figure 8

- 5(4) Elytra with strongly raised ridges and/or heavily sculptured (Figs 9-11).....6
- Elytra usually smooth.....8
- 6(5) Body broad, convex (Figs 10, 11).....7
- Body narrow, (Fig. 9).....**Hydrochidae, *Hydrochus***
- 7(6) Less than 2.0mm long, black (Fig. 11).**Georissidae, *Georissus***
- Greater than 3.0mm long, grey-testaceous (Fig. 10)...**Spercheidae, *Spercheus***
- 8(5) Eyes divided into upper and lower portions by extensions of side of head (Fig. 12), almost spherical.....***Amphiops***
- Eyes not so divided (Fig. 13)9
- 9(8) Head markedly deflexed (Fig. 13), scutellum a long triangle (Fig. 15)10
- Head not strongly deflexed (Fig. 14); scutellum not or not much longer than its basal width (Fig. 16).....12
- 10(9) Dorsally black.....11
- Dorsally yellow/brown.....***Berosus***

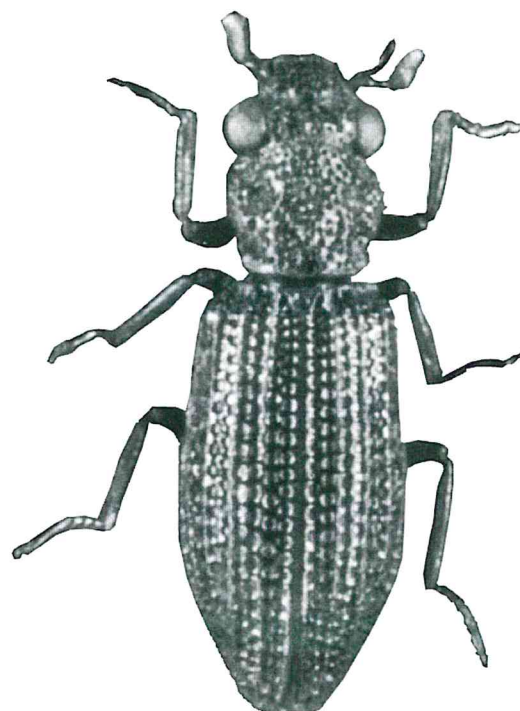


Figure 9



Figure 10

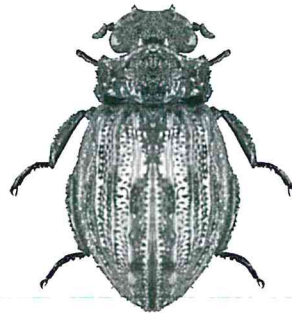


Figure 11

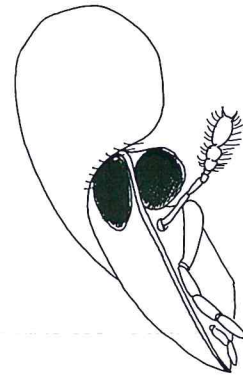


Figure 12

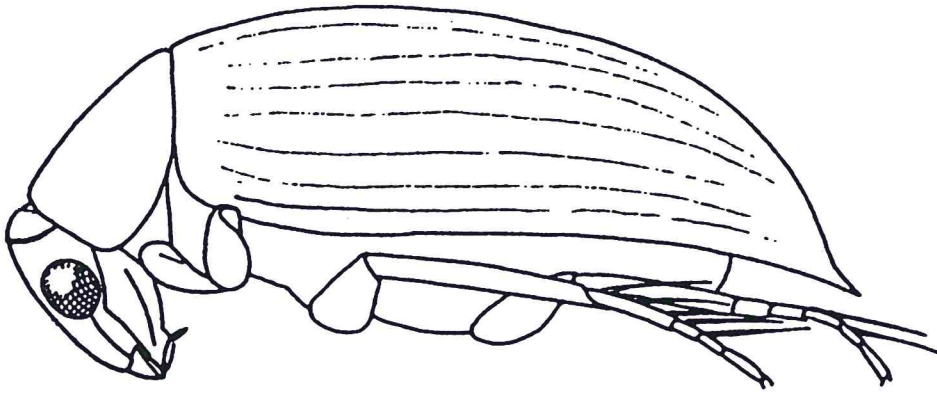


Figure 13

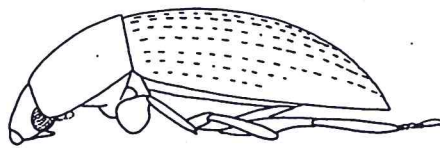


Figure 14

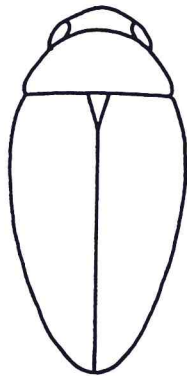


Figure 15

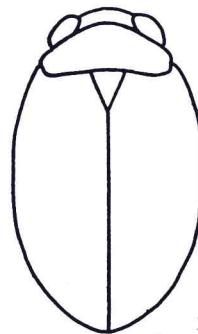


Figure 16



- 11(10) Body almost spherical (Fig.16); elytra as high as long, virtually without striae*Allocotocerus*
- Body elongate (Fig.15); elytra about 2.8 x longer than high, with distinct striae*Regimbartia*
- 12(9) Maxillary palpi robust and short, shorter or not much longer than antennae, ultimate segment as long as or longer than penultimate (Fig. 17).....**13**
- Maxillary palpi more slender, longer than antennae with ultimate segment usually shorter than penultimate (Fig.18)**24**
- 13(12) Length > 5.0mm**14**
- Length < 5.0mm**16**
- 14(13) Meso-and meta-tarsi without a fringe of long setae (swimming-hairs).....**15**
- Meso-and meta- tarsi with a fringe of long setae.....*Limnoxenus*
- 15(14) Elytra with 10 punctate striae*Hybogrammus*
- Elytra without striae.....*Enochrus* (in part, *E mastersi*)
- 16(13) First abdominal segment with a large concavity on each side, normally filled with a hyaline mass, and a fringe of long setae on basal margin of segment
.....*Chaetarthria*
- Not as above**17**
- 17(16) Hind trochanters with an elongate apex and separated from the femora at their tip (Fig.19). Elytron without a striae close to suture. Six abdominal segments, the sixth somewhat retractile into the fifth (Fig. 19)*Laccobius*
- Hind trochanters not elongate (Figs 21-24). Elytron with a sutural striae (Fig. 20). Five abdominal segments (Figs 21-24).....**18**
- 18(17) Sutural striae diverging noticeably towards front
.....*Enochrus* (in part, *E. peregrinus*)
- Sutural striae parallel (Fig. 20).....**19**

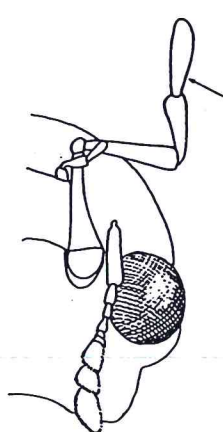


Figure 17

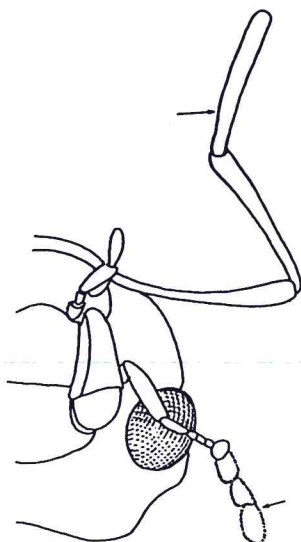
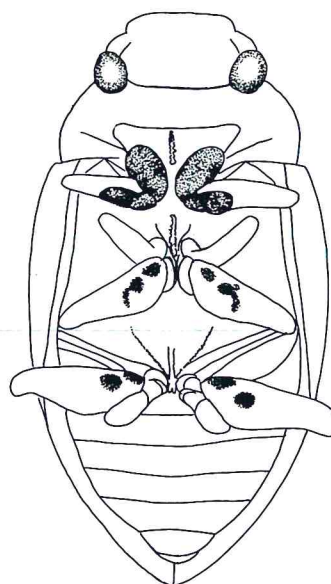


Figure 18



side profile

Figure 19
laccobius decipiens

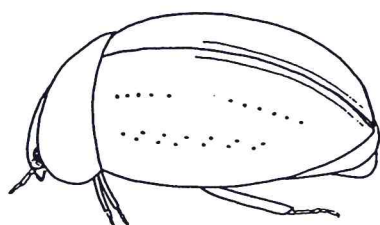
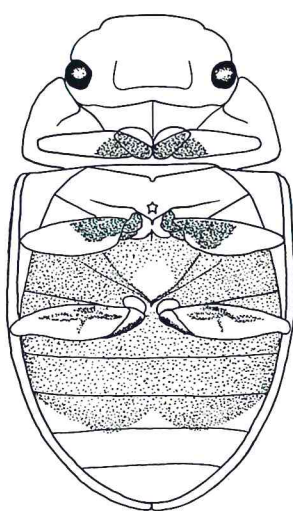
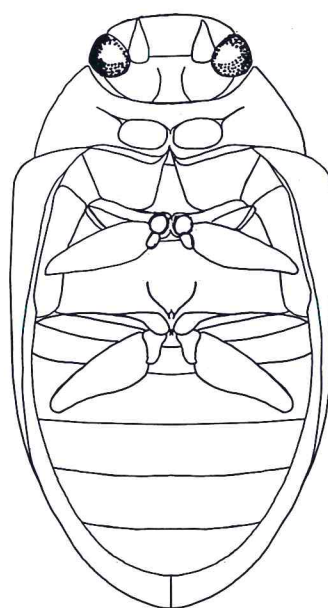


Figure 20



side profile

Figure 21
Phelea breviceps



side profile

Figure 22
Crenitis neogallica

- 19(18) Apical three ventral abdominal segments shiny, lacking fine pubescence present on other segments (Fig. 21); 3.5-4.5mm long; Tasmania*Phelea*
- All abdominal segments covered with fine pubescence**20**
- 20(19) Midfemurs glabrous (Fig. 22): midline of pro- and mesosterna smooth (Fig. 22)*Crenitis*
- Midfemurs extensively covered with hydrofugal hairs (Figs 23-24); midline of pro- or mesosterna may have raised structures (Figs 23-24)**21**
- 21(20) Prosternum keel-shaped in the middle (Fig. 22). Hind femurs without dense hydrofugal hairs (Fig. 23), never with rows of punctures on elytra.*Paracymus*
- Prosternum without a longitudinal keel (Fig. 24). Base of hind femurs, at least in front, with dense hydrofugal hairs (Fig. 24); may have rows of punctures on elytra**22**
- 22(21) Central portion of front edge of labium straight or only weakly concave (Fig. 25); Australia wide**23**
- Central portion of front of labium surface strongly concave (Fig. 26); Alpine areas of South-east*Notohydrus*

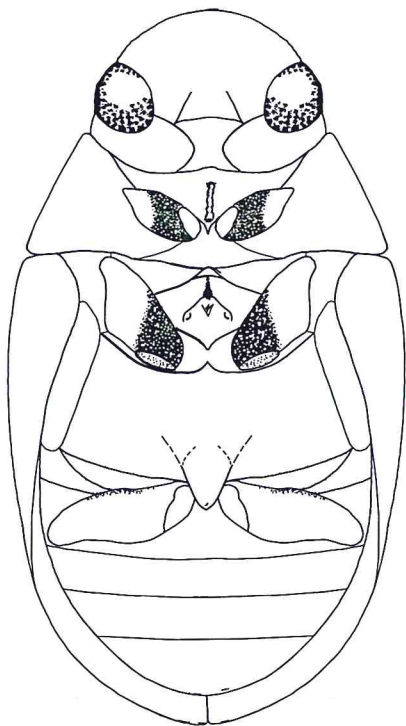


Figure 23 *Paracymus pygmaeus*

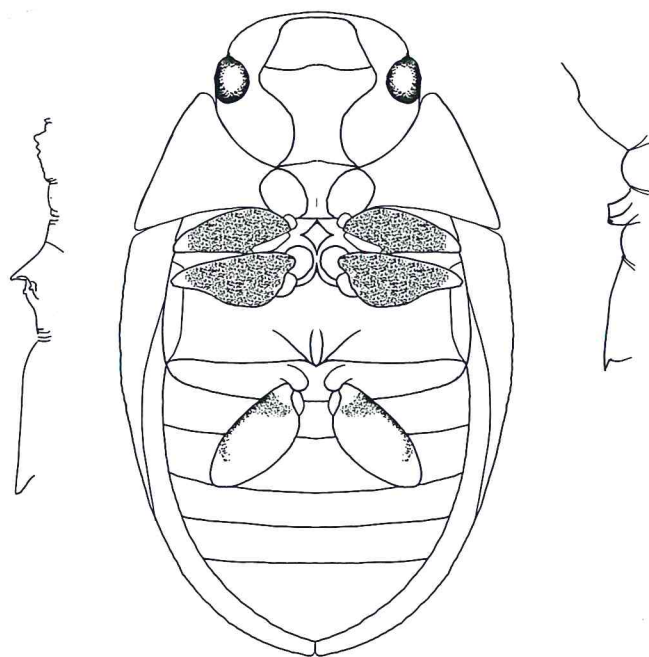


Figure 24 *Paranaraena horni*

- 23(22) Midline of mesosternum strongly raised (Fig. 24); antenna 8-segmented
.....*Paranacaena*
- Midline of mesosternum smooth; antenna 9-segmented.....
.....**New genus**, Hebauer, 2002
- 24(12) Curved pseudobasal segment of maxillary palp bent outwards (Fig. 27), elytra randomly punctate.....*Enochrus* (in part)
- Curved pseudobasal segment of maxillary palp bent inwards (Fig. 28), elytral punctures often in rows**25**
- 25(24) Small (< 3.0mm long) head predominantly black, pronotum and elytra yellow-brown, elytra sparsely punctured, punctures not in rows*Agraphydrus*
- Not as above**26**
- 26(25) Black, with sutural striae strongly marked in at least apical half, otherwise without elytral striae.....*Chasmogenus*
- Black or brown, without sutural striae, with elytral striae in all but one species (*H. foveicollis*)*Helochares*

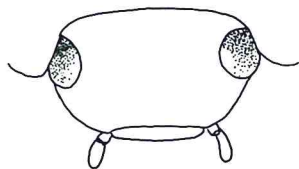


Figure 25

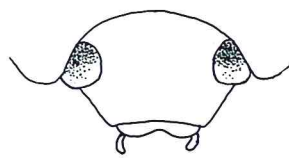


Figure 26

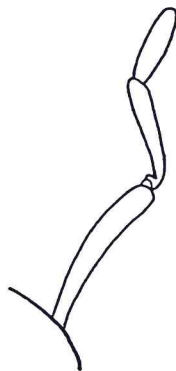


Figure 27



Figure 28

MORPHOLOGY OF LARVAL HYDROPHILOIDAE

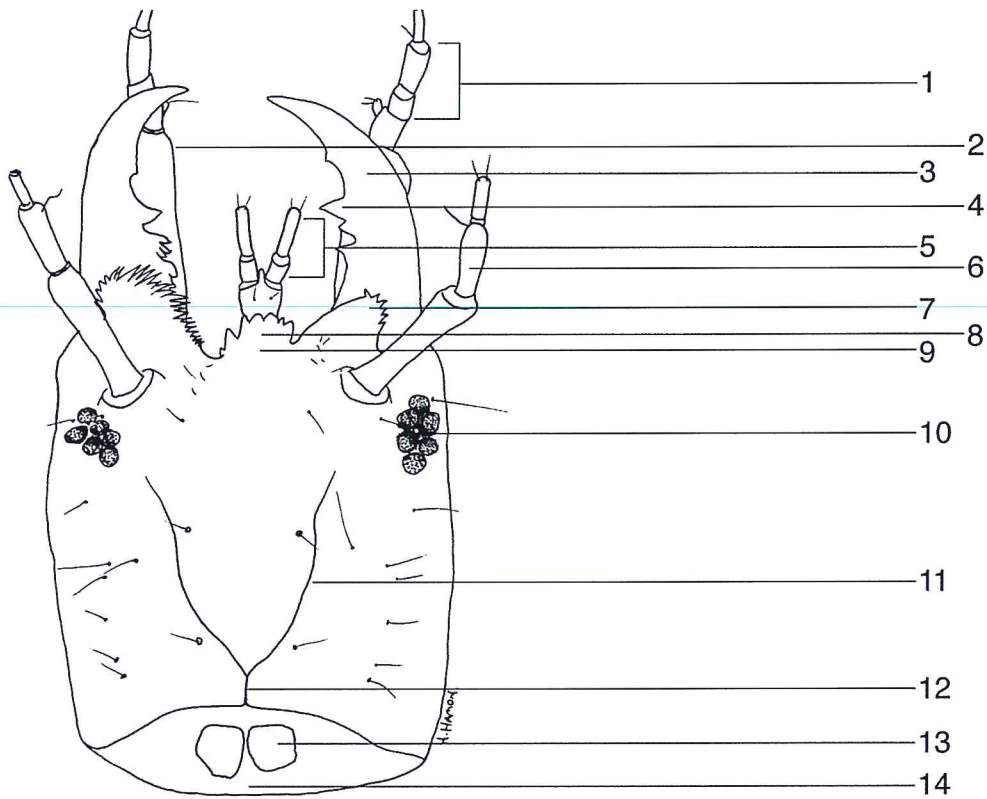


Figure 1

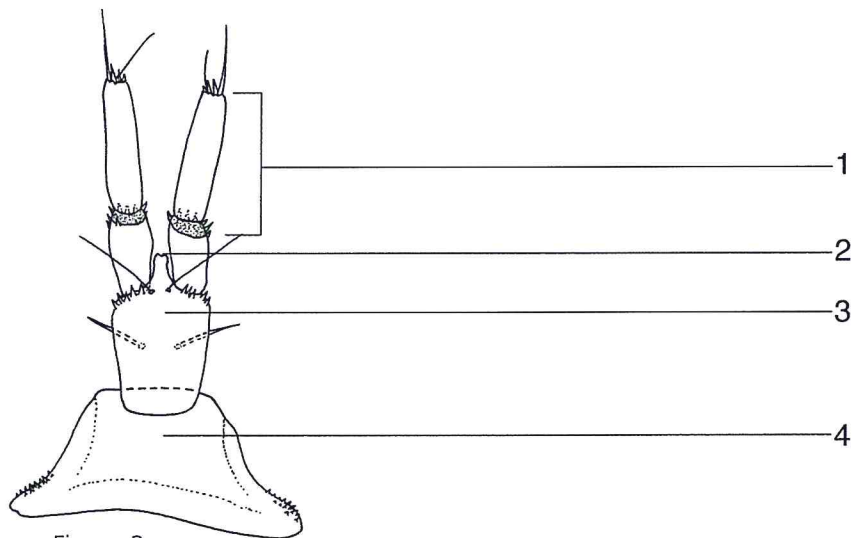


Figure 2

Fig.1 Dorsal side of head capsule of *Hybograllus hartmeyeri*. 1) Maxillary palpus; 2) stipes of maxillary palpus; 3) mandible; 4) mandibular teeth; 5) labium; 6) antenna; 7) right lobe of epistome; 8) teeth of nasale; 9) nasale (7,8 & 9 make up the labroclypeus); 10) stemmata; 11) frontal sulci; 12) coronal sulcus; 13) cervical sclerites; 14) occipital foramen.

Fig. 2. Dorsal side of labium of *Hybograllus hartmeyeri*. 1) labial palpus; 2) ligula; 3) prementum; 4) mentum.

**KEY TO THE LARVAE OF AUSTRALIAN GENERA
OF AQUATIC HYDROPHILOIDEA**

(Families Hydrophilidae, Spercheidae, Hydrochidae and Georissidae.)

Not including the Hydrophilid genera *Notohydrus*, *Paranacaena*, *Phelea*, *Agraphydrus* and “New genus” whose larvae are unknown.

- 1 Tip of mandible bifid (Fig. 3).....**SPERCHEIDAE, *Spercheus***
- Tip of mandible not bifid (eg. Fig.10).....**2**
-
- 2(1) Legs reduced, three segmented, body <3.0 mm long
.....**GEORISSIDAE, *Georissus***
- Legs well developed, five segmented, body usually longer than 3.0mm**3**
- 3(2) Mandibles with apical setae (Fig.4), body to 5.0mm long
.....**HYDROCHIDAE, *Hydrochus***
- Mandibles without apical setae (eg. Fig.10) body often longer than 5.0mm
.....**HYDROPHILIDAE.....4**
- 4(3) Hypopharyngeal lobe well developed, like a pubescent tongue, originating at
the base of the labium on the left side (Fig. 5)
.....Subfamily **Sphaeridiinae,* *Coelostoma***
**Members of the subfamily Sphaeridiinae are predominantly terrestrial, occurring in moist
situations such as dung and decaying vegetation. Members of only one genus, Coelostoma, are
found in aquatic situations in Australia.*
- Hypopharyngeal lobe reduced or absent ... Subfamily **Hydrophilinae.....5**
- 5(4) Abdominal segments with long filamentous gills (Fig. 6), or with multiple
setose lateral projections on abdominal and thoracic segments (Fig. 7)
.....Tribe **Berosini.....6**
- Lacking long filamentous abdominal gills or complex lateral projections, at
most with simple short fleshy projections.....**8**

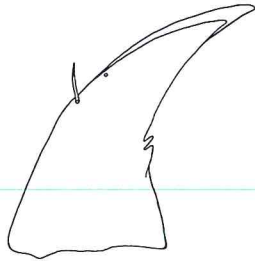


Figure 3

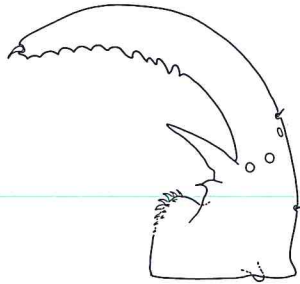


Figure 4

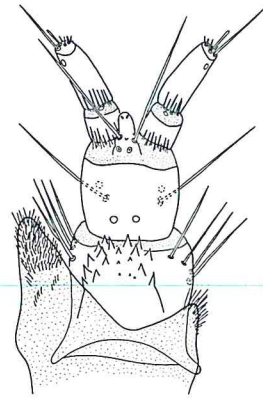


Figure 5

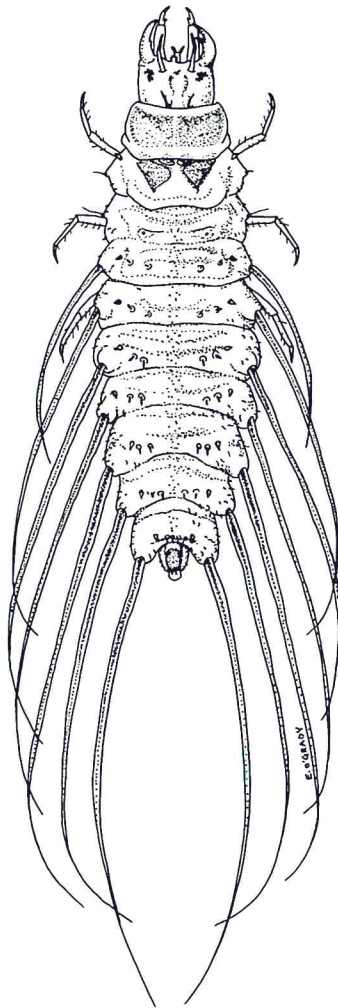


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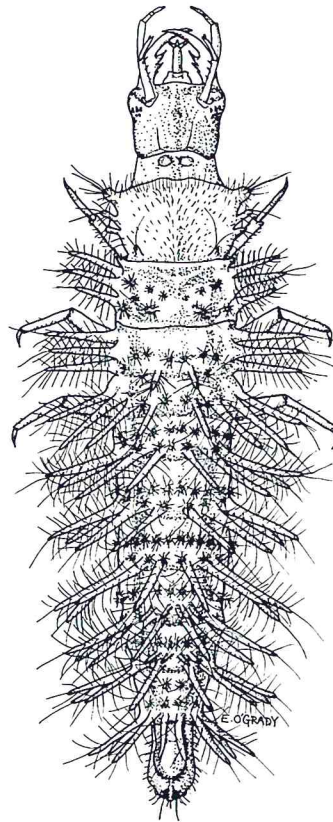


Figure 7

- 6(5) Gills long, without setae (Fig. 6); labroclypeus asymmetric (Fig.9); mandibles asymmetric (Fig. 10); prementum small and squat, without ligula (Fig.11), basal segment of antennae without lateral projection (Fig. 12).....**Berosus**
- Abdominal and thoracic segments each with two or more setose, lateral projections (Fig. 7); mandibles nearly symmetrical (Fig. 13); prementum long and thin, with ligula (Figs. 14, 15); basal segment of antenna with lateral projection (Figs 16, 17)7
-
- 7(6) Body spines predominantly blunt, weakly bifid at tips (Fig. 18); lateral projection on basal segment of antenna near apex, sharp, spine-like (Fig.16); apex of second segment with lateral extension (Fig.16); ligula relatively short, prementum stouter (Fig.15)**Allocotocerus**
- Body spines predominantly pointed (Fig.19); lateral projection on basal segment of antenna thumb-like, further from apex (Fig. 17), second segment of antennae without lateral extension (Fig.17); ligula relatively long; prementum more elongate (Fig.14).....**Regimbartia**

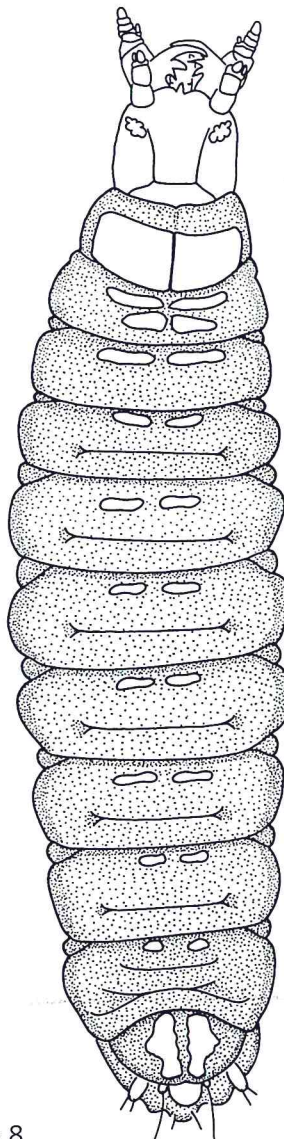


Figure 8

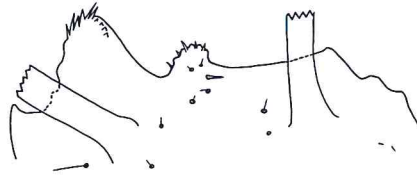


Figure 9

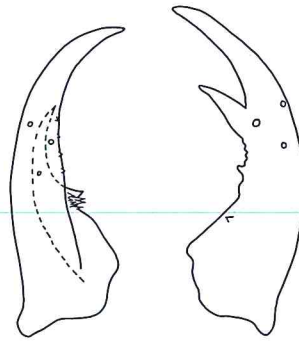


Figure 10

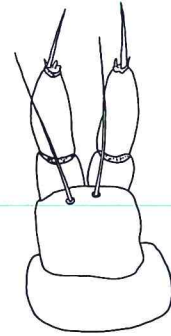


Figure 11

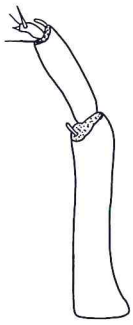


Figure 12

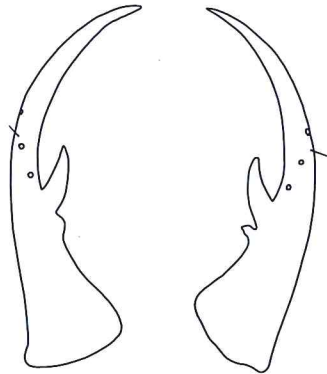


Figure 13

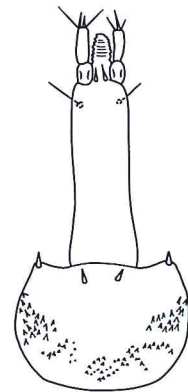


Figure 14

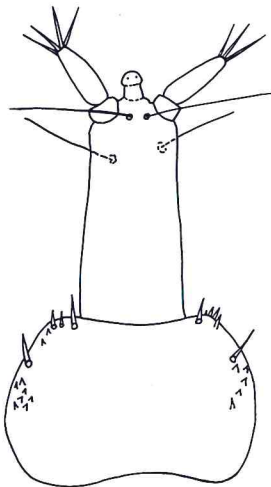


Figure 15

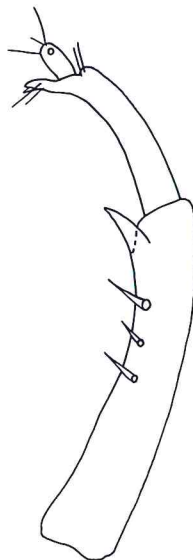


Figure 16



Figure 17

- 8(5) Apical segment of antenna about same length as penultimate (Figs 20-21); femora with fringe of swimming-hairs (Fig. 23); with prostyles (two retractable, fleshy appendages on last abdominal segment)
Subtribe **Hydrophilina**.....**9**
- Apical segment of antenna much shorter than penultimate (Fig. 22); femora virtually lacking swimming-hairs, without prostyles.....**11**
- 9(8) Labroclypeus without teeth (Fig. 24); mandibles asymmetrical, left one very robust, right one more slender (Fig. 25); ligula shorter than first segment of labial palp (Fig. 26); up to 40mm long**Hydrophilus**
- Labroclypeus with weak to moderate teeth (old specimens may lack teeth due to wear) (Fig. 27); mandibles symmetrical or nearly so (eg. Fig. 28); ligula longer than first segment of labial palp (Figs 29, 30); up to 20 mm long.....**10**
- 10(9) Prementum longer than mentum (Fig. 30); First segment of antenna with few spines (Fig. 21); mandibles each with two large distal teeth and one small proximal denticle (Fig. 31).....**Sternolophus**
- Prementum bit shorter than mentum (Fig. 29); first segment of antenna with numerous spines on inside (Fig. 20); mandibles each with one large distal tooth which is pick-shaped at the tip and one or two small proximal denticles (Fig. 28)**Hydrobiomorpha**

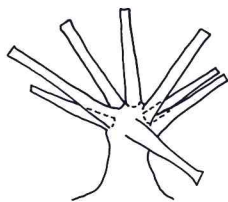


Figure 18

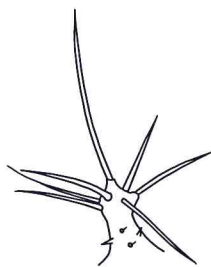


Figure 19

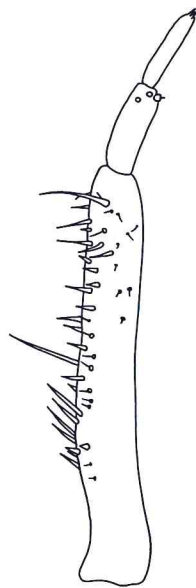


Figure 20

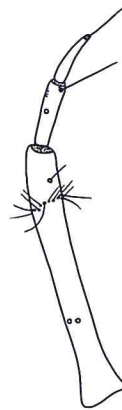


Figure 21



Figure 22

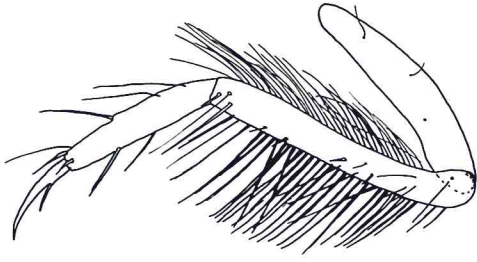


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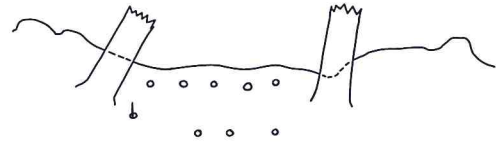


Figure 24

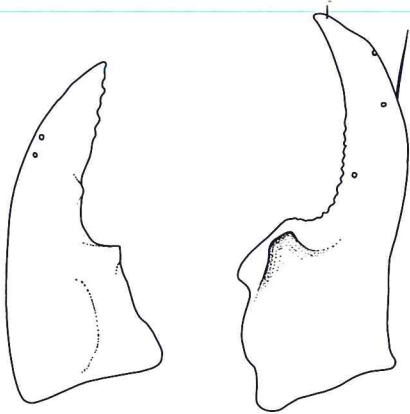


Figure 25

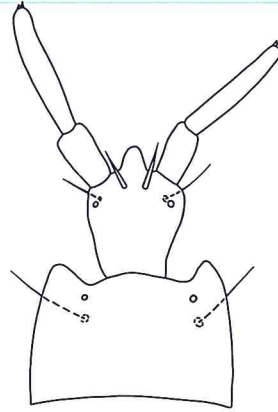


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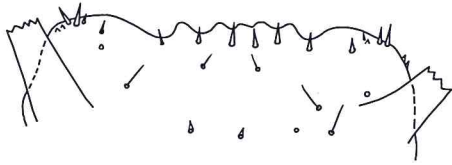


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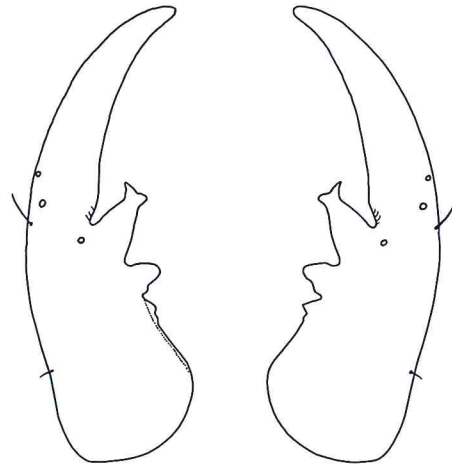


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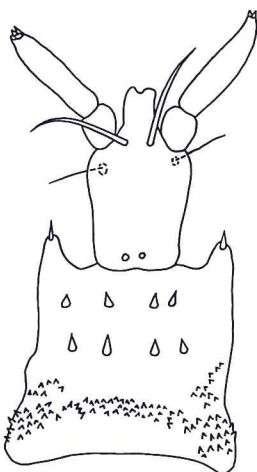


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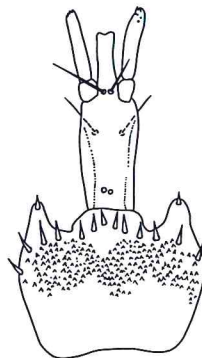


Figure 30

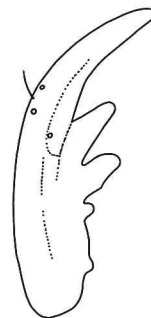


Figure 31

- 11(8) Left expansion of epistoma much more prominent than the right and with a row of stout setae on front edge (Figs 32-33); left mandible with group of stout setae at base of middle tooth which is lacking on the right mandible (Figs 34, 35)**12**
- Lateral expansions of epistoma similar, without a row of stout setae (eg. Fig. 27); both mandibles without a group of setae near base of middle tooth.....**13**
- 12(11) Frontal sulci parallel and not uniting to form a coronal sulcus; nasal with three teeth (Fig. 33); prementum wider than long (Fig. 36); ligula absent or virtually so (Fig. 36).....*Laccobius*
- Frontal sulci converging to meet just before occipital foramina to form a coronal sulcus (Fig.1); nasal with five teeth (Fig. 32); prementum longer than wide (Fig.37); ligula present though small (Fig. 37).....*Hybograhius*
- 13(11) Legs very short, without claws; prementum with a large round ligula (Fig. 38); length up to 6 mm*Chaetarthria*
- Legs usually longer, with claws; Prementum with or without ligula, but if present never large and round (Figs 39, 40); length up to 15 mm.....**14**

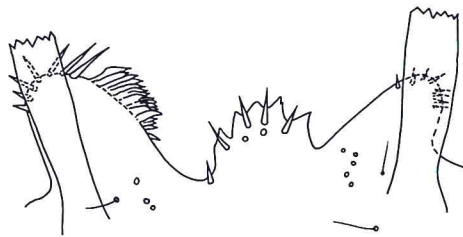


Figure 32

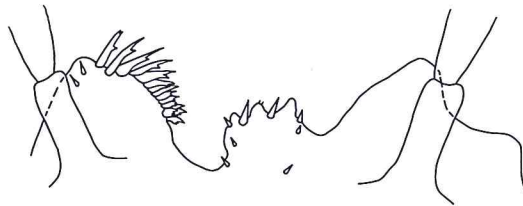


Figure 33

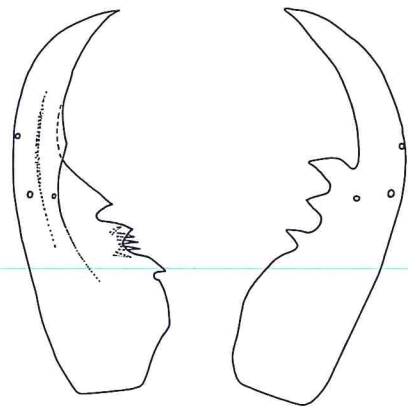


Figure 34

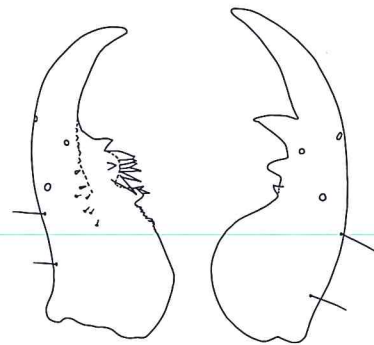


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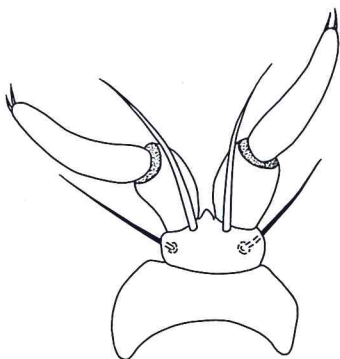


Figure 36

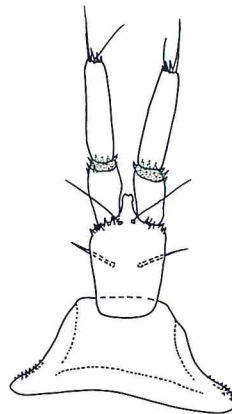


Figure 37

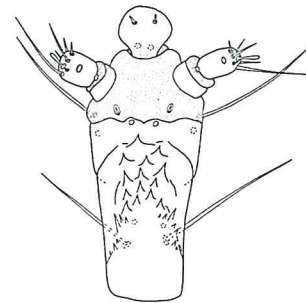


Figure 38

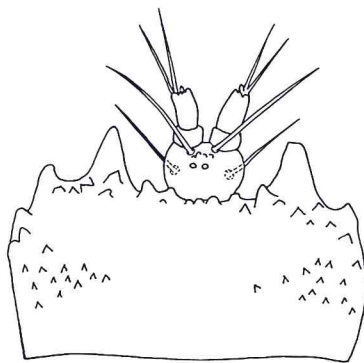


Figure 39

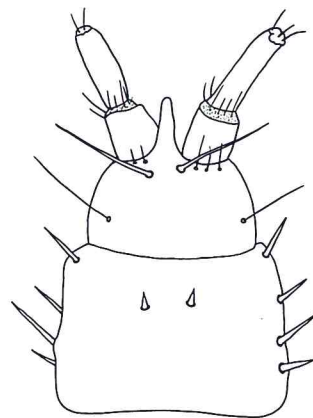


Figure 40

- 14(13) Mentum large, wider than long, prementum much smaller, without ligula (Fig. 39)*Amphiops*
- Mentum square or longer than wide, prementum relatively large (Fig. 40)...**15**
- 15(14) All abdominal segments with dorsal sclerites, although often small (Fig. 8); without coronal sulcus; length up to 6 mm; antennal appendage same length as apical segment (Fig. 41); mandible symmetrical with three teeth.....
.....Tribe **Anacaenini**.....**16**
- Abdominal segments, other than 1 and 8, lacking dorsal sclerites; with short coronal sulcus (eg. Fig 1); antennal appendage =<half length of apical segment (Figs 44, 46); mandibles often asymmetrical and with < three teeth; length up to 15 mm.....**17**
- 16(15) With lateral abdominal flaps (Fig.8); without cervical sclerites.....*Crenitis*
- Lacking abdominal flaps; with small cervical sclerites*Paracymus*
- 17(15) Apical segment of antenna about half length of penultimate (Fig. 43); mandibles symmetrical with three teeth, without serrations (Fig. 44).....
.....*Limnoxenus*
- Apical segment of antenna about a quarter the length of the penultimate segment (Figs 45, 46); mandibles weakly to strongly asymmetric, with one or two teeth, often with serrations (Fig. 47).....Subtribe **Acidocerina**.....**18**
- 18(17) Nasal moderately developed, with right hand side more prominent (Fig. 48)**19**
- Nasal poorly developed, all areas equally prominent (Fig. 49).....**21**

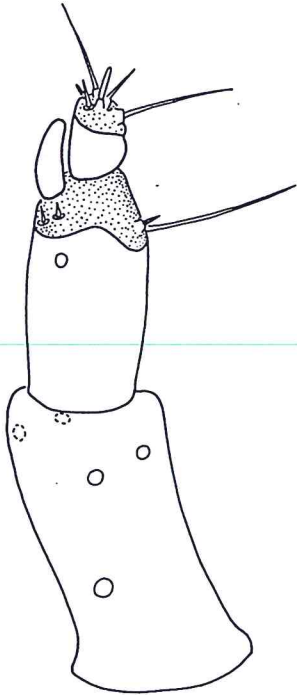


Figure 41



Figure 42

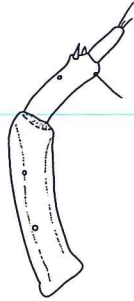


Figure 43

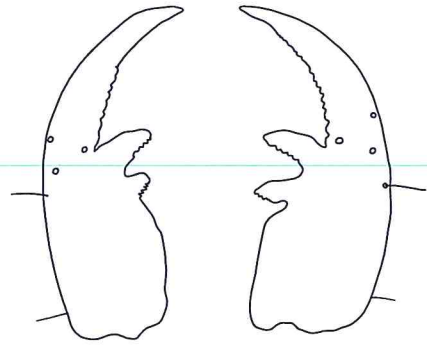


Figure 44

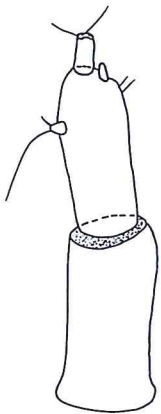


Figure 45

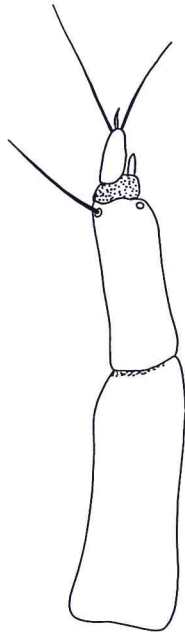


Figure 46

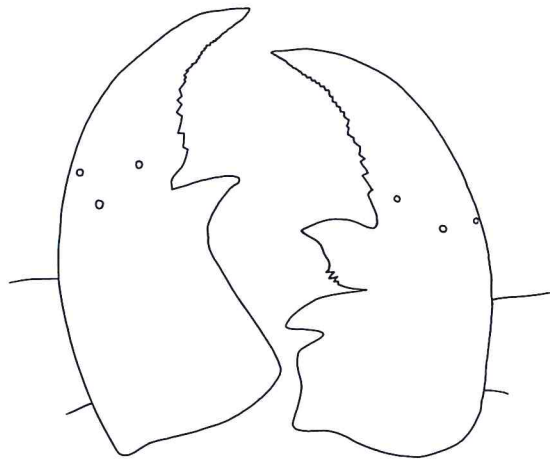


Figure 47



Figure 48

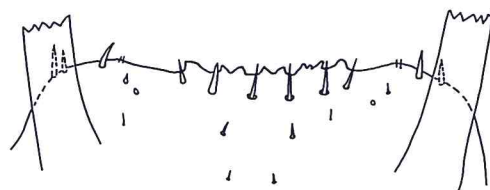


Figure 49

- 19(18) Mandibles asymmetric, right hand one with one tooth and left hand one with two (Fig. 47) *Enochrus* (other than *E. mastersi*)
- Mandibles almost symmetrical, both with two teeth (Fig. 44) **20**
- 20(19) Inside of maxillary stipe with group of spines near base (Fig. 50); ligula > length of first segment of labial palp (Fig. 52); prementum approximately the same length as mentum (Fig. 52).....*Helochares* (other than *H. foveicollis*)
-
- Inside of maxillary stipe lacking such spines (Fig. 51); ligula < length of first segment of labial palp (Fig. 53); prementum approximately twice length of mentum (Fig. 53) *E. mastersi*
- 21(18) First segment of antenna with bulge on inside near apex (Fig. 54); mandibles each with two teeth *H. foveicollis*
- First segment of antenna without bulge; right mandible with one tooth, left one with two (Fig 55) *Chasmogenus*

Figures 4, 5, 8, 38, 41 from Archangelsky (1997); Figure 55 from Anderson (1976).

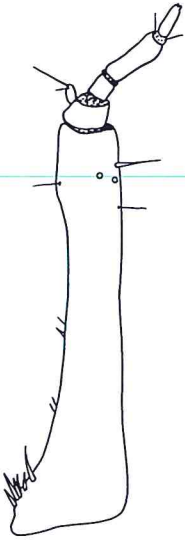


Figure 50

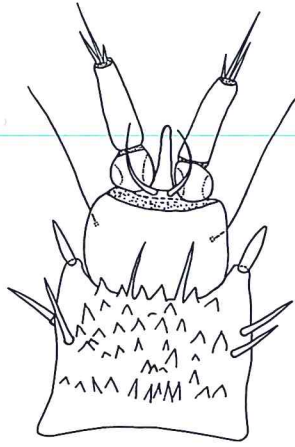


Figure 52

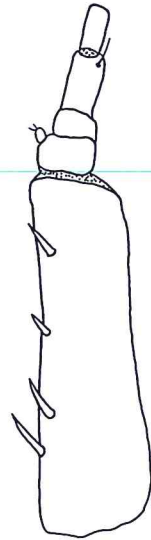


Figure 51

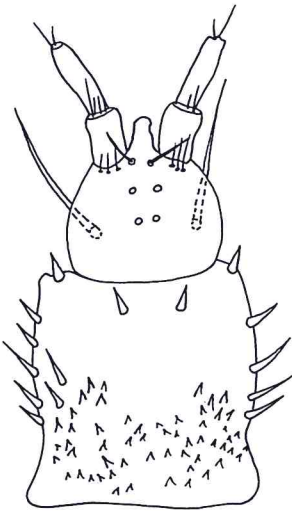


Figure 53

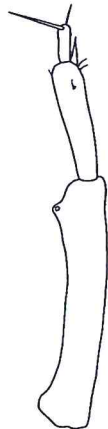


Figure 54

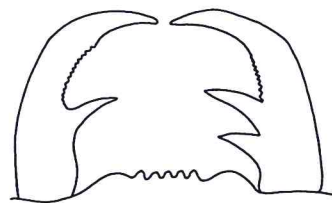


Figure 55

Family HYDROPHILIDAE

Australian Hydrophilid beetles, or at least the adults, are becoming relatively well known thanks to the work of Hansen (1991) at the generic level and above, and Gentili (see references) and Watts (see references) at the species level. Together these authors provide keys and descriptions to genera and species covering most of the fauna. However, they are scattered, are technical and not easy for a non-specialist to use.

This guide summarises the available material and is aimed at identifying Australian genera as easily and accurately as possible. Often how a specimen is initially prepared has a great bearing on how easy it is to identify later. I prefer to work with pinned or card mounted material since it is easier to handle and in most cases characters such as the degree of pubescence are easier to see. In a number of genera, characters of both the ventral and dorsal surfaces are required for identification in which case specimens should be mounted on their side or, if confident that they belong to the same species (dangerous in some cases), two specimens, one dorsal one ventral, can be mounted on the same card.

In most genera the male genitalia provide important characters and in some they are essential for identification. Dissection is best done before the specimen is mounted since its removal from a card, rehydrating, dissecting, remounting and labelling is a nuisance and frustrating if the specimen turns out to be female. Luckily for many species the aedeagus can be quite easily extruded when wet with a small pin: even if only the tip of the aedeagus is made visible this is all that is need in many cases. Alternatively specimens can be left in spirit which I don't much like but seems to be a widespread practice in the survey world!

Only about half of the know genera of Hydrophilidae are aquatic, with the terrestrial ones, in the main, restricted to moist environments such as dung and rotting vegetation. These are not dealt with in this guide. Keys to them can be found in Hansen (1991). The aquatic species are often abundant in still or slowly moving water; few are found in running water. The larvae are carnivorous preying on a wide range of aquatic invertebrates including snails. The adults are herbivorous.

In a summary work like this I must acknowledge the excellent work of, E. Gentili, M. Archangelsky and the late M. Hansen on which I have largely based the keys.

NOTES ON GENERA OF AUSTRALIAN HYDROPHILIDAE
(In alphabetical order)

***Agraphydrus* Regimbart**

A widespread genus of small (<3mm) yellow/grey species with predominantly black head and greatly elongate maxillary palpi with the apical segment shorter than penultimate. The only Australian species is *A. coomani* Orchymont found in wetter northern areas. Larvae unknown.

Can be confused with: *Enochrus*, (particularly *E. esuriens*) which has the basal segment of maxillary palpi bent outwards; *Paracymus* and *Paranacaena*, which have normal sized maxillary palpi.

***Allocotocerus* Kraatz**

A genus restricted to Australia and New Guinea with three Australian species. All are relatively small (3.5mm-4.5mm), almost spherical, black with swimming-hairs on hind legs. Found in still water or shallow creeks in tropical areas as far as south Queensland. Only one species, *A. punctatus*, is found in eastern Australia. Larvae known (Watts 2002). The genus was previous known as *Globaria* Latreille.

Identification to species requires characters of underside so should be mounted on side. Extraction of male genitalia useful to confirm identification. Moderately easy to identify to species (especially *A. punctatus*) using key in Watts (1998a).

Can be confused with: *Amphiops*, which lacks swimming-hairs and has “divided” eyes.

***Amphiops* Erickson**

A worldwide genus of small (<5mm), almost spherical, red-brown to black beetles. Readily recognised by the unique division of the eye into an upper and lower position by an extension of the side of the head. The five Australian species are restricted to wetter areas of the north and east coast as far south as northern NSW. Found in ponds and small shallow rivers. Larvae known (Watts 2002).

Identification is difficult and requires characters of at least the apical half of the male genitalia. A key is given in Watts (1998a).

Can be confused with: *Allocotocerus*, which has a row of long swimming-hairs on the hind legs and lacks the extension of the side of the head which divides the eyes in two in *Amphiops*.

***Berosus* Leach**

A worldwide genus of small to moderate sized (3.0mm-10mm) usually straw coloured beetles, with well developed swimming-hairs on the back legs. Common and widespread in Australia. Predominantly in ponds and slow moving water but a few species are found in fast cool-water rivers and streams in eastern Australia. There are 35 described Australian species. Larvae known (Watts 2002).

Identification to species requires characters of the underside and often the male genitalia. Specimens from southern Australia are reasonably easily identified to species using the key in Watts, 1987, but those from northern Australia hard to key. A revision of at least the northern species is required. Watts (1997) described additional species from inland and northern Australia. Schodl (1993) resurrected *B. devisi* from synonymy with *B. pulchellus*.

Can be confused with: *Laccobius*, which lack swimming-hairs on hind legs; *Notohydrus*, which lacks swimming-hairs on hind legs.

***Chaetarthria* Stephens**

Small (<3mm), globular, shiny. One Australian species, *C. nigerrima*. In northern and eastern coastal regions from the Pilbara to north-eastern Victoria; Rare in still water, more common in north. Resembles a very small *Amphiops* but without divided eyes. Larvae of Northern Hemisphere species known (Archangelsky 1997). Revised by Watts (2000).

Cannot be confused with any other genus.

***Chasmogenus* Sharp**

A tropical genus. The one Australian species, *C. nitescens* Fauvel, is relatively small (2.5mm to 5mm), elongate oval, rather flat, black with well marked sutural striae. It occurs in the wetter areas of northern and eastern Australia as far south as northern NSW but does not appear common. Seemingly a still water species. *Chasmogenus nitescens* was until recently included within *Helochares* (Hansen, 1991). Larvae known (Anderson 1976; Watts 2002).

Can be confused with: *Enochrus*, which has yellow areas in front of the eyes in all species in the size range of *Chasmogenus*; *Helochares*, in which all but one species are reddish brown with strongly punctate and striate elytra. The exception, *H. foveicollis*, can be separated by its lack of sutural striae; *Paracymus* and *Paranacaena*, which have normal sized maxillary palpi, lack sutural striae and most species have some yellowish colouring.

Coelostoma Brulle

A member of the subfamily Sphaeridiinae most members of which are terrestrial but adults of at least one species of the genus *Coelostoma* is thoroughly aquatic in Australia. This species, *C. fabricii*, is 4-6mm, broadly oval and black. Larvae of European species known (Boving & Henriksen 1938).

Can be confused with: *Helochares* (*H. foveicollis*), *Enochrus*, and *Hybograhius* but can be separated from all these (and all other aquatic Australian Hydrophilids) by the broad squat basal segment of the maxillary palpi.

Crenitis Bedel

A worldwide genus. One described Australian species, *C. neogallica*, and probably at least one undescribed one (E. Gentili, personal communication). *Crenitis neogallica* is 3.0-3.5 mm long, oval, flattened, light testaceous and with weakly protruding eyes. The few known specimens were collected from the Mittagong Range in New South Wales (Gentili 1996b).

Can be confused with: *Enochrus*, which have maxillary palpi much longer than antennae except for *E. peregrinus* which has sutural lines diverging in front; *Paracymus*, which have a small raised keel in the midline of the prosternum, and are predominantly black species; *Paranacaena*, which are smaller (< 3.0mm long) and have non-protruding eyes; *Notohydrus* which have hydrofugal hairs on the rear portion of the hind femur absent or only weakly developed.

Enochrus Thomson

A worldwide genus. Australian species are small to moderately sized (1.5-9.5mm), oval, with elytral striae; most have yellow areas in front of the eyes and are otherwise yellowish to black. All but two species have elongate maxillary palpi. A number of species are distinctly dimorphic in colour either having the upper surface black, apart from the patches in front of the eyes, or yellowish. Fourteen Australian species which are widespread and common in still water. Larvae known (Anderson 1976; Watts 2002).

Identification to species requires the apical portion of the male genitalia to be visible. This can be extruded without too much difficulty before mounting. They can be identified to species relatively easily using characters of the male genitalia using key in Watts (1998b). In a few closely related species female specimens cannot be identified to species.

Can be confused with: *Agraphhydrus*, which has the convex portion of the basal segment of the maxillary palpi bent inwards rather than outwards; *Chasmogenus*, which lacks yellow areas in front of eyes present in all similar sized (2.5-5mm) *Enochrus*; *Helochares*, particularly *H. foveicollis*, which has the basal segment of the maxillary palpi bent inwards rather than outwards; *Hybograhius*, which has rows of punctures on elytra; *Limnoxenus*, which has swimming-hairs on the hind legs and distinct rows of punctures on the elytra; *Notohydrus*, which lacks elongate maxillary palpi; *Paracymus*, which is deeper and rounder shaped, has normal sized maxillary palpi and lacks sutural

striae; *Paranacaena*, which is rounder shaped, has distinct rows of punctures on the elytra and lacks sutural striae.

***Helochares* Mulsant**

Relatively small (3-9mm), yellowish brown, rather flat and often broad, strongly punctate, elytral punctures in ten rows. An exception is *H. foveicollis*, which is shiny black with relatively smooth elytra with few, if any, puncture lines on elytra. Common and widespread in still water. Thirteen Australian species. Larvae known (Anderson 1976; Watts 2002). Hebauer & Hendrich, 1999

Can be identified with some difficulty from the key given in Watts (1995). Identification is made easier if the, usually very distinctive, male genitalia are visible.

Can be confused with: *Chasmogenus*, which has a well marked stria alongside the inner sutural edge of each elytron, and is shiny black which will separate it from all *Helochares* except *H. foveicollis*; *Enochrus*, (particularly *H. foveicollis*), which has the basal segment of the maxillary palpi bent outwards and, other than *H. foveicollis*, by the 10 rows of elytral punctures in *Helochares* which are lacking in *Enochrus*; *Notohydus*, which has normal sized maxillary palpi.

***Hybograhius* Orchymont**

Relatively small, black, without swimming-hairs on hind legs and with normal sized maxillary palpi (ie not greatly elongated). One species, *H. hartmeyer*. Found in small, temporary winter/spring streams in the western scarp of the Darling Ranges near Perth, Western Australia. Larvae known (Watts 2002).

Can be confused with: *Chasmogenus*, different locality and has elongated maxillary palpi; *Coelostoma*, which has a thick basal segment to maxillary palpi; *Enochrus*, which has elongate maxillary palpi except in *E. peregrinus*, which is much smaller (<4mm), and *E. mastersi* which lacks elytral striae; *Helochares*, which has greatly elongate maxillary palpi; *Limnoxenus*, which has swimming-hairs on hind legs.

***Hydrobiomorpha* Blackburn**

A genus of moderate sized (10-18mm) black beetles, except for *H. helenae* which is green-black with indistinct stripes. Found in shallow, still water in the tropics. There are five Australian species. Larvae known (Watts 2002). Reasonably identifiable to species using key in Watts (1990). Characters of the underside required for identification.

Can be confused with: *Limnoxenus*, which is smaller (<10mm) with well-marked rows of punctures on the elytra; *Sternolophus*, which has the basal portions of mid and hind femurs densely punctate/pubescent unlike *Hydrobiomorpha*.

***Hydrophilus* Muller**

A worldwide genus of large to very large black beetles with eight Australian species found throughout the country in ponds, dams and other still water. These are often temporary. Larvae known (Watts 2002). Readily identifiable to species using key in Watts (1998). Too large (20mm to 42mm) to be confused with any other Hydrophilid.

***Laccobius* Erickson**

Small (<4mm), rather flat, dull grey/yellow, long legged beetles with worldwide distribution. Widespread in Australia where there are eight species, but more common in northern regions, absent from Tasmania. Most often found in stones/gravel at the edge of moderate to large rivers. Larvae known (Watts 2002). With some difficulty can be identified to species using key in Gentili (1980). Identification to species made easier if male genitalia extracted.

Can be confused with: *Agraphydrus*, which has elongate maxillary palpi; *Berosus*, which has swimming-hairs on hind legs which are absent in *Laccobius*; *Enochrus*, which has elongate maxillary palpi, except in *E. mastersi* which is much larger than any *Laccobius* and black and *E. peregrinus* which has sutural striae; *Helochares*, which has elongate maxillary palpi; *Notohydrus*, which has sutural striae and is restricted to mountain streams in south-eastern Australia; *Paracymus* and *Paranacaena* which have much stouter legs with no gap between the tip of the hind trochanter and the femur.

***Limnoxenus* Motschulsky**

Small-medium sized (4.5-10mm), black, hind legs with swimming-hairs, elytra with well-marked rows of punctures. One Australian species (*L. zelandicus*). Common and widespread in still to moderately flowing waters. Larvae known (Watts 2002).

Can be confused with: *Enochrus*, particularly *E. mastersi*, but differs in having rows of elytral punctures, swimming-hairs on back legs and normal sized maxillary palpi; *Hybograllius*, which lacks swimming-hairs on hind legs; *Hydrobiomorpha*, which is larger (>10mm) and has a continuous longitudinal keel on the meso- and meta-sternae; *Sternolophus*, which has a continuous longitudinal keel on the meso- and meta- sternae.

***Notohydrus* Balfour-Browne**

Small (<5mm), rather broad and flat, yellowish to dark red-brown beetles. Five species, restricted to mountain streams in Victoria and southern NSW. Larvae not known. Endemic. Identification is easier using characters of male genitalia.

Can be confused with: *Berosus*, which has swimming-hairs on hind legs; *Crenitis neogallica*, which has the mid femur without hydrofugal hairs, and is uniformly light testaceous; *Enochrus*, which has greatly elongated maxillary palpi in all species that are likely to be confused with *Notohydrus*; *Laccobius*, which lack sutural striae; *Paranacaena*, which have shorter maxillary palpi.

New Genus (Hebauer 2002.)

The species *Paranacaena nitens*, has a range of characters that justify it being put in a separate monotypic genus to be described by Hebauer, 2002. It is 1.8-2.0 mm long, black except for the sides of the pronotum. It is found in rainforest pools at Cape Tribulation and near Caloundra Queensland.

Can be confused with: *Agraphydrus*, which has greatly elongate maxillary palpi and is light testaceous in colour; *Chasmogenus*, which has greatly elongate maxillary palpi and yellow areas in front of the eyes; *Enochrus*, which are either larger or have yellow areas in front of the eyes; *Paracymus*, which does not have the base of the hind femurs covered with hydrofugal hairs; *Paranacaena*, which have a mesosternal ridge in the midline and are never black with yellowish sides to the pronotum.

***Paracymus* Thomson**

Small (<3mm), round to oval, relatively deep bodied, yellowish to black. Worldwide distribution. Widespread in Australia in still water at the edges of fast flowing water. Nine described species but one, *P. pygmaeus*, is by far the most common and often abundant throughout the country. It is also the only species with enlarged male protarsi and claws. Gentili, 2000. Larvae of North American species known (Archangelsky 1997). Can be identified to species with some difficulty using Gentile (2000). Characters of the underside and male genitalia are required for many species.

Can be confused with: *Agraphydrus*, which has greatly elongate maxillary palpi; *Chasmogenus*, which is larger (>2.5mm), flatter, has much more elongate maxillary palpi and sutural striae; *Crenitis neogallica*, which is uniformly light testaceous; *Enochrus*, which greatly elongate maxillary palpi, except *E. mastersi* which is much larger (>4mm) and *E. peregrinus* which has sutural striae; *Laccobius*, which has much longer legs and well-developed epipleura in front half of elytra; *Paranacaena*, which has the base of the hind femurs covered with dense hydrofugal hairs and often has rows of punctures on elytra which are absent in Australian *Paracymus*.

***Paranacaena* Blackburn**

An Australian endemic genus, separated from *Anacaena* by Gentili (1993). Small (<5mm), deep bodied, round to oval, yellowish to black beetles which are relatively common in ponds and streams in areas where there is permanent water throughout Australia. Seven described species. Larvae not known. Can be identified to species, with some difficulty, using the key in Gentili (1993).

Can be confused with: *Agraphydrus*, which has greatly elongate maxillary palpi; *Enochrus*, which has greatly elongate maxillary palpi except *E. mastersi* (much larger) and *E. peregrinus* which has sutural striae which diverge in front; *Notohydrus*, which have sutural stria; *Paracymus*, which does not have the base of the hind femurs covered with hydrofugal hairs and lacks rows of punctures on the elytra.

***Phelea* Hansen**

An Australian endemic genus with one species, *P. breviceps*, known only from specimens collected from the Cradle Mountain plateau, Tasmania. *Phelea breviceps* is 3.5-4.5mm long, black with noticeably reddish legs, with a wide short head and the apical abdominal segments shiny. Found in small tarns on the high plateau at the base of Cradle Mountain. Larva not known. Hansen, 1999a.

Can be confused with: *Chasmogenus*, which have long maxillary palpi; *Crenitis neogallica*, which is light testaceous; *Enochrus*, which has greatly elongate maxillary palpi except *E. mastersi* (much larger) and *E. peregrinus* which has sutural striae which diverge in front; *Notohydrus*, which always have some testaceous colouring and have uniformly pubescent abdominal segments; *Paracymus* and *Paranacaena*, which have normal head shape and have all abdominal segments strongly reticulate and moderately covered with pubescence.

***Regimbartia* Zaitzev**

The only Australian species, *R. attenuata*, is 3.5-5.0mm long, shiny black, deep bodied and boat shaped with swimming-hairs on the hind legs. A still water species found in wetter tropical areas as far south as northern NSW (Watts 1998a). Larvae known (Watts 2002).

Cannot be confused with any other genus.

***Sternolophus* Solier**

Moderate sized (10mm to 15mm) shiny black beetles with three widespread Australian species. Rare in the south, very common in ponds and other still water in the north, particularly in drying river beds. Reasonably easily identified to species using key in Watts (1989). Characters of the underside are needed for identification. Larvae known (Watts 2002)

Can be confused with: *Hydrobiomorpha*, which lacks punctate/pubescent areas on the base of the mid and hind femurs found in *Sternolophus*; *Limnoxenus*, which has elytra with well marked rows of punctures.

CHECK LIST OF AUSTRALIAN AQUATIC HYDROPHILIDAE

(Arrangement follows Hansen (1995). New names from Hansen (1999b) unless otherwise indicated.)

Subfamily **Hydrophilinae** Latreille

Tribe **Berosini** Mulsant

Berosus Leach

- | | | |
|------------------------------------|----------------------------------|----------------------------------|
| <i>B. amoenus</i> Watts | <i>B. josephenae</i> Watts | <i>B. ralphi</i> Watts |
| <i>B. approximans</i> Fairmaire | <i>B. juxtadiscolor</i> Watts | <i>B. reardoni</i> Watts |
| <i>B. aquilo</i> Watts | <i>B. macropunctatus</i> Watts | <i>B. sadieae</i> Watts |
| <i>B. arcus</i> Watts | <i>B. macumbensis</i> Blackburn | <i>B. sarahae</i> Watts |
| <i>B. australiae</i> Mulsant & Rey | <i>B. dallasae</i> Watts | <i>B. devisi</i> (Blackburn) |
| <i>B. majusculus</i> Blackburn | <i>B. sonjae</i> Watts | <i>B. debilipennis</i> Blackburn |
| <i>B. nicholasi</i> Watts | <i>B. subovatus</i> Knisch | |
| <i>B. decipiens</i> Blackburn | <i>B. niger</i> Watts | <i>B. timmsi</i> Watts |
| <i>B. discolor</i> Blackburn | <i>B. nutans</i> (W. MacLeay) | <i>B. trishae</i> Watts |
| <i>B. duplopunctatus</i> Blackburn | <i>B. pulchellus</i> W. MacLeay | |
| <i>B. veronicae</i> Watts | <i>B. gibbae</i> Watts | <i>B. quadrapunctatus</i> Watts |
| <i>B. vijae</i> Watts | <i>B. involutus</i> (W. MacLeay) | |
| <i>B. queenslandicus</i> Blackburn | <i>B. wadeae</i> Watts | |

Regimbartia Zaitzev

- R. attenuata* (Fabricius)

Allocotocerus Kraatz

- | | |
|---------------------------------|-------------------------------------|
| <i>A. punctatus</i> (Blackburn) | <i>A. tibialis</i> (Balfour-Browne) |
| <i>A. yalumbaboothyi</i> Watts | |

Tribe **Chaetarthriini** Mulsant

Amphiops Erichson

- | | |
|---------------------------------|---|
| <i>A. australicus</i> Blackburn | <i>A. duplopunctatus</i> Blackburn |
| <i>A. micropunctatus</i> Watts | |
| <i>A. austrinus</i> Watts | <i>A. queenslandicus</i> Balfour-Browne |

Chaetarthria Stephens

- C. nigerrima* (Blackburn)

Tribe **Anacaenini** Hansen

Notohydrus Balfour-Browne

N. australis (Blackburn)
N. kosciuskoi Gentili

N. margaretae Gentili *N. newtoni* Gentili
N. montanus (Blackburn)

Paracymus Thomson

P. australiae Gentili
P. cariceti Gentili
P. gigas Gentili
P. weiri Gentili

P. opacus Gentili *P. spenceri* Blackburn
P. ovum Gentili *P. wattsi* Gentili
P. pygmaeus (W. MacLeay)

Paranacaena Blackburn

P. eremita (Blackburn)
P. horni (Blackburn)
P. lindi (Blackburn)

P. littoralis (Orchymont) *P. wattsi* Gentili
P. nitens Gentili
P. sublineata (Blackburn)

Phelea Hansen

P. breviceps Hansen

Crenitis Bedel

C. neogallica Gentili

Tribe **Laccobiini** Bertrand

Laccobius Erichson

L. billi Gentili
L. brittoni Gentili
L. bicaudatus Gentili
L. clarus Gentili

L. collium Gentili *L. quantulus* Gentili
L. decipiens Gentili *L. roseiceps* Regimbart
L. marmoratus (W. MacLeay)
L. matthewsi Gentili *L. zietzi* (Blackburn)

Tribe **Hydrophilini** Latreille

Subtribe **Acidocerina** Zaitzev

Agraphydrus Regimbart

A. coomani (Orchymont)

Helochares Mulsant

<i>H. anthonyae</i> Watts	<i>H. luridus</i> (W. MacLeay)	<i>H. tatei</i> (Blackburn)
<i>H. tenuistriatus</i> Regimbart	<i>H. clypeatus</i> (Blackburn)	<i>H. marreensis</i> Watts
<i>H. tristis</i> (W. MacLeay) Hebauer & Hendrich	<i>H. dalhuntii</i> Watts	<i>H. nigripalpis</i>
<i>H. loweryae</i> Watts Hendrich	<i>H. foveicollis</i> (Montrouzier)	<i>H. watti</i> Hebauer &
	<i>H. percyi</i> Watts	

Chasmogenus Sharp

C. nitescens (Fauvel)

Enochrus Thomson

<i>E. aliciae</i> Watts	<i>E. eyrensis</i> (Blackburn)	<i>E. peregrinus</i> Knisch
<i>E. deserticola</i> (Blackburn)	<i>E. fuscatus</i> (Motschulsky)*	<i>E. pseudoweiri</i> Watts
<i>E. eubenangeei</i> Watts	<i>E. isabellae</i> Watts	<i>E. samae</i> Watts
<i>E. elongatus</i> (W. MacLeay)	<i>E. maculiceps</i> (W. MacLeay)	<i>E. weiri</i> Watts
<i>E. esuriens</i> (Walker)	<i>E. mastersi</i> (W. MacLeay)	.

*Previously *E. malabarensis* Regimbart (S.Schodl in lit 1998)

Subtribe **Hydrobiina** Mulsant

Hybograhius Orchymont

H. hartmeyeri (Regimbart)

Limnoxenus Motschulsky

L. zelandicus (Broun)

Subtribe **Hydrophilina** Latreille

Sternolophus Solier

S. australis Watts *S. immarginatus* Orchymont *S. marginicollis* (Hope)

Hydrobiomorpha Blackburn

H. bovilli Blackburn *H. helenae* Blackburn *H. troxi* Watts
H. debbae Watts *H. microspina* Watts

Hydrophilus Geoffroy

<i>H. albipes</i> Castelnau	<i>H. latipalpus</i> Castelnau
<i>H. bilineatus</i> (MacLeay)*	<i>H. brevispina</i> Fairmaire
<i>H. macronyz</i> (Regimbart)	<i>H. watti</i> Hansen +
<i>H. infrequens</i> Watts	<i>H. pedipalpus</i> (Bedel)

* Previously *H. picicornis* Chevrolat. +Previously *H. viridus* Watts.

Subfamily **Sphaeridiinae** Latreille

Tribe **Coelostomatini** Heyden

Coelostoma Brulle

C. fabrici (Montrouzier)

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Family HYDROCHIDAE.

A worldwide family of small aquatic beetles with only one genus, *Hydrochus*, but numerous species. Represented in Australia by the cosmopolitan genus. Included in the key to the genera of Hydrophiloidea. Identification to species, or species groups, requires characters of underside and, in many cases, characters of the male genitalia. Since a number of superficially very similar species can be found in the same water body a good percentage of the specimens from one locality should be mounted singly, on their sides, preferably with the genitalia extracted and mounted on the same card. Because of large intraspecies variation and the likelihood of closely related species being involved an effort should be made to collect reasonable numbers from each locality.

NOTE ON THE GENUS *HYDROCHUS* LEACH

A worldwide genus with 25 described Australian species. Small (0.5mm to 7.0mm long) elongate, very strongly punctate beetles, mostly testaceous to black but a number of species can be brightly iridescent gold or green. Common and widespread wherever there is permanent water other than the Cooper Basin where they are seemingly absent, with a wide range of habitats from stagnant pools to the gravel edges of major rivers. Larvae of non-Australian species known (Archangelsky 1997). No Australian larvae known. The larvae of the North American *H. rufipes* Melsheimer have been described by Archangelsky (1997). Species are not easy to identify and most require consideration of the male genitalia. See Watts (1999) for a recent revision.

Can be confused with: *Hydreana* (family Hydraenidae), which has very long maxillary palpi (>2x length of head) compared with those of *Hydrochus* (<1x length of head); *Ochthebius* (family Hydraenidae), which has a membranous area at the hind corners of the pronotum which is lacking in *Hydrochus*.

CHECK LIST OF AUSTRALIAN HYDROCHIDAE

Hydrochus Leach

<i>H. abditus</i> Watts	<i>H. euryspleuron</i> Watts	<i>H. multicolor</i> Lea
<i>H. adalaidae</i> Blackburn	<i>H. gitaraiiae</i> Makhan	<i>H. numerosepunctatus</i> Watts
<i>H. aenigmatis</i> Watts	<i>H. granicollis</i> Lea	<i>H. obscuroaeneus</i> Fairmaire
<i>H. aschnakiranae</i> Makhan	<i>H. horni</i> Blackburn	<i>H. obsoletus</i> Lea
<i>H. atratus</i> Watts	<i>H. imamkhani</i> Makhan	<i>H. radjiei</i> Makhan
<i>H. australis</i> Motschulsky	<i>H. interioris</i> Blackburn	<i>H. simplicicollis</i> Lea
<i>H. burdekinensis</i> Watts	<i>H. kunarajahi</i> Makhan	<i>H. umbratilis</i> Watts
<i>H. cucullatus</i> Watts	<i>H. lateviridis</i> Blackburn	
<i>H. decorus</i> Watts	<i>H. macroaquilonius</i> Watts	

REFERENCES

- Archangelsky, M. 1997. Studies on the Biology, Ecology, and Systematics of the Immature Stages of New World Hydrophiloidea (Coleoptera: Staphyliniformia). *Bulletin of the Ohio Biological Survey New Series* **12**: 1-201.
- Watts, CHS. 1999. Revision of Australian *Hydrochus* (Coleoptera: Hydrochidae). *Records of the South Australian Museum* **32**: 1-43.

FAMILY GEORISSIDAE

A small worldwide monogeneric (*Georissus*) family of small (2-3mm) chunky black beetles that live in the littoral zone of rivers and creeks. The three described Australian species of *Georissus* are very small (<2mm), highly sculptured, very compact, round, black beetles. Most specimens have been collected around lights in northern Australia, but the genus extends to both the South-west and Victoria. The only specimens that I have collected, or have good habitat data for, are from clean gravel at edges of relatively large rivers. Larvae of non-Australian species known (Archangelsky 1997). No revision of the Australian species. Adults are included in the key to adult Hydrophiloidea p.64 and larvae in the key on p.74.

Can be confused with: *Ochthebius* (family Hydraenidae), which has a membranous area at the hind corners of the pronotum; some Elmidae eg *Kingolus*, which have long, thin antennae and much smoother surface.

CHECKLIST OF AUSTRALIAN SPECIES OF GEORISSIDAE

Georissus Latreille

G. australis King

G. kingi Blackburn

G. occidentalis Carter

REFERENCES

- Archangelsky, M. 1997. Studies on the biology, ecology, and systematics of the immature stages of New World Hydrophiloidea (Coleoptera: Staphyliniformia). *Ohio Biological Survey Bulletin New Series* **12**: 207pp.
- Carter H.J. 1932. New Guinea and Australian Coleoptera. Notes and new species. *Proceeds of the Linnean Society of New South Wales* **57**: 101-115.
- Deleve, J. 1969. Quelques *Georissus* Latreille Nouveaux de l'Indonesie, Vietnam et de Nouvelle Guinee (Coleoptera: Georissidae). *Acta Zoologica Academiae Scientiarum Hungaricae* **15**: 23-30.
- Lawrence JF. & Britton EB. 1991. Coleoptera (Beetles)- *In*: The Insects of Australia 2nd ed. Melbourne University Press p. 543-683.

Family SPERCHEIDAE

A small monogeneric (*Spercheus*) worldwide family of small (3-6mm) aquatic beetles. The two Australian species are relatively small (<5mm), dull brown, rounded with distinct raised areas on elytra. Found in still water. The widespread *S. platycephalus* Macleay is predominantly northern but extends down the east coast to Victoria. *Spercheus wattsi* Hebauer appears to be restricted to the North-west. Hebauer, 1999. Larvae known (see Hawking and Smith for a photograph of *S. platycephalus*). Adults and larvae are included in the keys to Hydrophiloidea p64 and p74.

Cannot be confused with any other genus.

CHECKLIST OF AUSTRALIAN SPERCHEIDAE

Spercheus Kugelann

S. platycephalus MacLeay *S. wattsi* Hebauer

REFERENCES

- Hawking, JH. & Smith, FJ. 1997. Colour guide to the Invertebrates of Australian Inland Waters. Identification Guide No.8, CRCFE, Murray-Darling Freshwater Research Centre Albury, Australia.
- Hebauer, F. 1997 Revision der Arten der Familie Spercheidae Erichson, 1897 (Coleoptera, Hydrophiloidea). *Entomologische Blätter* **93**: 9-42.
- Hebauer, F. 1999. *Spercheus wattsi* sp.n. a second Australian species of the genus (Coleoptera, Hydrophiloides). *Acta Coleopterologica* **15**: 5-6.

Family HYDRAENIDAE

A world wide, very specious, family of small to very small beetles represented in Australia by eight genera and numerous species.

Most genera are distinctive and easily recognised: within genera however the species are difficult to distinguish and identification almost always requires examination of the male genitalia- doubly awkward due to the small size of the species. Within the subtribe Ochthebiina identification to both genus and species requires close examination of the underside of the head best done on microscopic mounts, as well as the examination of the male genitalia.

Zwick (1977) reviewed the genus *Hydraena* and Perkins (1997) treated the genera in his worldwide revision but otherwise no modern work has been done on the Australian species. (Perkins is currently working on revisions of portions of the Australian fauna).

The species are predominantly littoral, often abundant at the edges of gravelly rivers and streams. One genus, *Tympanogaster*, is a specialist inhabitant of the mossy splash zone of small waterfalls: rubbing these surfaces with a small scrubbing brush and washing the trapped material into a dish can often reveal numerous specimens. Another, *Hughleechia*, inhabits rock crevices in the intertidal zone in southern Australia.

The larvae are seldom collected and most of the larval specimens known have been reared from adults. The larvae of no Australian species is known but those of European representatives of *Hydraena*, *Limnebius* and *Ochthebius* have been described in detail by Delgado & Soler (1996, 1997a, 1997b).

KEY TO THE ADULTS OF AUSTRALIAN GENERA OF HYDRAENIDAE
 (Other than members of the subtribe Ochthebiina.) (After Perkins 1997.)

- 1 Maxillary palp much longer than head (Fig. 2).....*Hydraena*
- Maxillary palp equal to or shorter than head (Fig. 1).....2
- 2(1) Dark-brown to black, highly polished, streamlined, length < 1.4 mm
*Limnebius*
- Brown, body surface highly sculptured, not streamlined, length > 1.2 mm3
- 3(2) Outside hind angle to pronotum with hyaline sheet (area of soft translucent material) (Fig. 1).....Subtribe **Ochthebiinae**
- Outside hind angle of pronotum without such a sheet.....4
- 4(3) Metasternum with large central shiny area; living in splash zone of waterfalls in eastern Australia and Tasmania.....*Tympanogaster*
- Metasternum with longitudinal impression in midline; living in damp leaf litter in South-west*Tympallopatrium*

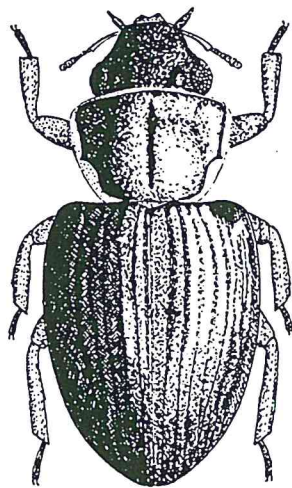


Figure 7.1
Ochthebius cupreus

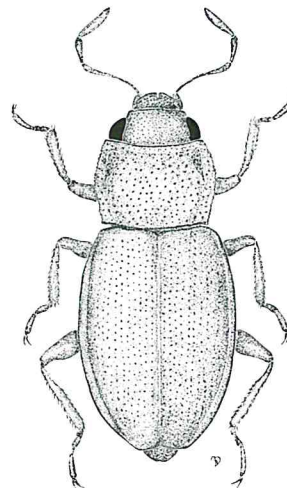


Figure 7.2
Hydraena sp.

NOTES ON GENERA OF AUSTRALIAN HYDRAENIDE

(In alphabetical order)

Hydraena Kugelann

A worldwide genus represented in Australia by 29 named species and other unnamed ones. The species are small (1.1-2.5mm long) and are usually found attached to vegetation or at the sides of still to slowly flowing water, where they are often common. Recognised most readily by the long maxillary palpi. Identification relies on examination of the male genitalia. Reviewed by Zwick 1977 but without a key to species.

Limnebius Leach

Very small (0.8-1.4 mm) streamlined black beetles found among sand and gravel at the edges of rivers and pools. Predominantly in northern and inland Australia but also as far south as Adelaide. Specimens are often abundant in seasonal pools in the north and centre. No described Australian species.

Subtribe *Ochthebiina* Thomson

The subtribe is based around the specious and cosmopolitan genus *Ochthebius* with 15 described species and numerous undescribed ones in Australia. Three other genera, occur in Australia. They are all endemic. One, *Hughleechia*, is restricted to the intertidal zone, with one described species, *H. guilianii*, from southern Australia and one undescribed species from Tasmania (Perkins 1997). The two other genera, *Gymnantherlius* and *Gymnochthebius*, have a few species each in eastern Australia.

Members of the subtribe are readily recognised by the presence of a semi-transparent sheet of tissue (hyaline sheet) at the hind angles of the pronotum. However separation of the four genera is difficult and is based on characters of the male genitalia and on detailed characters of the underside of the head associated with grooming behaviour. The precise relationships between these genera and the correct generic placement of the species currently in *Ochthebius* is under study by Philip Perkins of Harvard University.

Tympanogaster Janssens

A relatively specious genus endemic to Australia with seven described species and a number of undescribed ones from eastern Australia and Tasmania. Includes a number of species previously included in the genus *Meropathus* Enderlein not now considered to occur in Australia (Perkins 1997). All known species are inhabitants of the splash zone of waterfalls. Separated from the superficially similar *Ochthebiina* by the lack of a lateral hyaline sheet at the hind corners of the pronotum.

Tympalopatrum Perkins

The one described species, *T. longitudum*, is restricted to the extreme southwest of the continent. The only habitat recorded is from litter in karri forest near the head of a creek. Additional undescribed species are known (Perkins 1997).

CHECKLIST OF AUSTRALIAN HYDRAENIDAE

Subfamily Hydraeninae Mulsant

Tribe Hydraenini Mulsant

Hydraena Kugelann

H. ambiflagellata Zwick

H. australica Zwick

H. barbipes Zwick

H. billi Zwick

H. blackburni Zaitzeff

H. brittoni Zwick

H. castanea Deane

H. clavigera Zwick

H. cygnus Zwick

H. decipiens Zwick

H. extorris Zwick

H. hamifera Zwick

H. hynesi Zwick

H. impercepta Zwick

H. lucernae Zwick

H. luridipennis MacLeay

H. magnetica Zwick

H. parva Zwick

H. pilipes Zwick

H. reticulata Zwick

H. robusta Zwick

H. rudallensis Blackburn

H. ruinosa Zwick

H. simplicicollis Blackburn

H. simplipes Zwick

H. tricamtha Zwick

H. trpezoidalis Zwick

H. williamsensis Deane

H. ypsilon Zwick

Tribe Limnebiini Mulsant

Limnebius Leach

A number of different species occur in Australia but none described.

Subfamily Ochthebiinae Thomson

Tribe Ochtheosini Perkins

Subtribe Meropathina Perkins

Tympallopatrium Perkins

T. longitudum Perkins

Tympanogaster Janssens

T. cornutus (Janssens)

T. deani Perkins

T. labratus (Deane)

T. macrognathus (Lea)

T. novicius (Blackburn)

T. obcordatus (Deane)

T. subcostatus (Deane)

Subtribe Ochthebiina Thomson

Gymnanthelius Perkins

G. clypeatus (Deane)

G. hieroglyphicus (Deane)

Gymnochthebius Orchymont

G. brisbanensis (Blackburn)

G. clypeatus (Deane)

G. fischeri (Deane)

G. lividus (Deane)

G. notalis (Deane)

Hughleechia Perkins
H. giuliani Perkins

Ochthebius Leach

(A number of these might belong in other genera)

<i>O. australis</i> Blackburn	<i>O. flavocinctus</i> Deane	<i>O. notalis</i> Deane
<i>O. angustipennis</i> Deane	<i>O. hieroglyphicus</i> Deane	<i>O. novicius</i> Blackburn
<i>O. clarki</i> Deane	<i>O. leai</i> Deane	<i>O. pallidipennis</i> Deane
<i>O. costatus</i> Deane	<i>O. levis</i> Deane	<i>O. schzolabrus</i> Deane
<i>O. cupreus</i> Deane	<i>O. lividus</i> Deane	<i>O. tenebricosus</i> Deane

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- Delgado, JA. & Soler, AG. 1997. Morphology and chaetotaxy of larval Hydraenidae (Coleoptera) 1: Genus *Limnebius* Leach, 1815 based on a description of *Limnebius cordobanus* d'Orchymont. *Aquatic Insects* **19**: 37-49.
- Delgado, JA. & Soler, AG. 1997. Morphology and chaetotaxy of larval Hydraenidae (Coleoptera) 2: The subgenus *Ochthebius* s. str. Leach. *Bulletin de l'Institut royal des sciences naturelles de Belgique (entomologie)* **67**: 45-55.
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- Perkins, PD.1979 New names for two species of aquatic beetles from Australia and China (Coleoptera, Hydraenidae) *The Coleopterists Bulletin* **33**: 336.
- Perkins, PD. 1997 Life on the effective bubble: exocrine secretion delivery systems (ESDS) and the evolution and classification of beetles in the family Hydraenidae (Insecta: Coleoptera). *Annals of Carnegie Museum* **66**: 89-207.
- Zwick, P. 1977. Australian *Hydraena* (Coleoptera, Hydraenidae). *Australian Journal of Zoology* **25**: 147-84.

BRIEF NOTES ON THE FAMILIES OF AUSTRALIAN AQUATIC BEETLES NOT INCLUDED IN THIS GUIDE.

Family ELMIDAE

A large worldwide family of small to very small beetles, both adults and larvae of which are found crawling on solid substrates in moving water, most often in the beds of mountain rivers and streams. For a separate guide to larvae of this family see CRCFE Identification Guide No. 21, "Guide to the identification of Australia Elmidae larvae (Insecta: Coleoptera). Alena Glaister (1999). Adults of the Family are currently been revised by Andrew Calder CSIRO Canberra.

Family PSEPHENIDAE

A small family in which the adults are terrestrial but the distinctive larvae - known as water pennies - are aquatic and live on stones in running water, typically in the creeks and rivers of eastern Australia, but one species, *Sclerocyphon fuscus*, occurs in the ranges of central Australia. For a separate guide to the larvae see CRCFE Guide No. 17 "A guide to the identification of larval Psephenidae, water pennies (Insecta: Coleoptera)," Jenny Davis (1998).

Family PTILODACTYLIDAE

A small world wide family with terrestrial adults some of which have aquatic larvae which are long (to 1.5cm) thin and cylindrical and resemble meal-worm larvae (Tenebrionidae). Found among stones in the beds of rivers and creeks in eastern Australia.

Three genera are known from coastal eastern Australia but only the larvae of *Byrrucryptus* Brown are aquatic. These are quite common among stones in the beds of rivers and creeks in the South-east.

No work has been done on the Australia fauna, other than the terrestrial *Australichas* Lawrence and Stribling (1992), but the larvae of a New Zealand species of *Byrrucryptus* has been described by Hudson (1934)

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- Hudson, GV. 1934. New Zealand beetles and their larvae, 236 pp. Wellington: Ferguson and Osborn.
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- Lawrence, JF. & Stribling, JB. 1992. A new genus of Ptilodactylidae (Coleoptera) Elateriformia) from Australia, with description of the presumed larva. *Journal of the Australian Entomological Society* **31**: 19-27

Family SCIRTIDAE

A moderately large worldwide family with terrestrial adults and aquatic larvae, with nine named Australian genera (several undescribed) and numerous species (many undescribed). The larvae are common in both still and running water, although, being surface breathers larvae are mostly restricted to the littoral zone. Readily recognised, as they are the only beetle larvae with long multisegmented antennae. The taxonomy of the genera *Pseudomicrocara* Armstrong, *Heterocyphon* Armstrong, and *Peneveronatus* Armstrong have been treated by Armstrong (1953) and Kitching & Allsopp (1987) described the adults and larvae of the tree-hole dwelling *Prionocyphon niger* Kitching & Allsopp from rainforest of northern New South Wales. Otherwise no work has been done on Australian species. Colour photograph; Scirtidae larva, Plate 3h.

REFERENCES

- Armstrong, JWT. 1953. On Australian Helodididae (Coleoptera). 1 Descriptions of new genera and species. *Proceedings of the Linnean Society of New South Wales* **78**: 19-32.
- Hawking, JH. & Smith, FJ. 1997 Colour guide to the Invertebrates of Australian Inland Waters. Identification Guide No. 8, CRCFE, Murray-Darling Freshwater Research Centre Albury, Australia.
- Kitching, RL. & Allsopp, PG. 1987. *Prionocyphon niger* sp.n. (Coleoptera, Scirtidae) from water-filled tree holes in Australia. *Journal of the Australian Entomological Society* **26**: 73-9.

Family CURCULIONIDAE

A few species of the huge weevil family are aquatic or semi-aquatic living on floating or emergent vegetation. Specimens are seldom found in large numbers but are consistently collected in low numbers. Members of the genus *Bagous* Germar are the most often collected. The grub-like larvae occur in the same situations as the adults. Two species of the South American genus *Cyrtobagous* Hustache have been introduced into Australia to control the floating fern *Salvinia* (Zimmerman 1994). There is no taxonomic work specifically on the Australian aquatic species.

REFERENCES

- Hawking, JH. & Smith, FJ. 1997 Colour guide to the Invertebrates of Australian Inland Waters. Identification Guide No.8, CRCFE, Murray-Darling Freshwater Research Centre Albury, Australia.
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