Pictorial Guide to the *Haliplidae* (crawling water beetles) of Australia

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Contents

Introduction 3

Life History 4

Taxonomy 4

Using the guide 5

Notes on the species. (Numbers refer to the illustrations.) 10

Plate 1 Species restricted to the Pilbara region of West Australia 10

Plate 2. Species without pronotal plicae (subgenus Liaphlus) and with a distinct non-linear dorsal colour pattern. 10

Plate 3. Species without pronotal plicae (subgenus Liaphlus) with a linear dorsal colour pattern or none. 11

Plate 4. Species with pronotal plicae and apical abdominal segment without a central ridge (subgenus *Neohaliplus*) (Figs 13, 14 & 15) or with a central ridge (subgenus *Phalilus*) (Figs 16 & 17) 12

Acknowledgements 13

Further Reading and References 13

Checklist of Australian crawling water beetles (Haliplidae) (2015) 14

Introduction

Crawling water beetles , so named because of their normal hind legs rather than ones strongly modified for swimming, are a small family of small sized (2.0-6.0 mm long) water beetles with a world-wide distribution. Morphologically uniform, once recognized they are easy to spot. Nineteen species have been recorded in Australia, mostly endemic, but three of our species are also found in New Guinea, and one in New Caledonia. Australia species all belong to the cosmopolitan genus *Haliplus*. Crawling rather than swimming they are found among emergent vegetation, virtually always in still water such as billabongs and the side pools of creeks.

The adults are omnivores mainly feeding on vegetation notably algae but including small invertebrates. They are air breathers and need to come to the surface periodically to replenish their air supplies. In contrast the larvae are herbivorous feeding mainly on filamentous algae, nor do they need to come to the surface to breath.

Most Australian species are found in the tropics with only a four species known from southern areas. In both northern and southern areas the species are strongly seasonal; in the north during the winter 'wet' season and in the south in spring and summer. In both areas in seasonally wet situations.

Perhaps because of the strong seasonality, particularly in the north, crawling water beetles are not often collected and hence their distributions and ecology are poorly known. Judging by collections made at lights in different years (A. Watts personal observation) there is also a considerable yearly variation in population size. The larvae are even less well- known than the adults and are seldom collected. An exception being in the Pilbara area which was well studied by the Western Australian Environment Department and the larvae of all the four species which occur in the area are known (Van Vondel).

The aim of this guide is to enable most of the species known from Australia to be identified without dissection, however in two species, *H. fuscatus* and *H. gibbus*, examination of the male genitalia is the only way of identifying the different species. We think this is achievable but acknowledge that for some species pairs the external differences are not great and identification is reliant on locality more than we would like. Further, specimens chosen for photography were ones which showed the dorsal colour pattern well. In many specimens the colour pattern is indistinct hence identification should be based on 'best fit' rather than 'perfect fit'.

We hope that using this guide will enable this interesting and little known group of aquatic insects to be included in biological surveys etc. undertaken by schools and 'water – care' groups and in so doing help enhance our knowledge of Australian aquatic ecosystems.

Life History

Very little is known about the biology of Australian crawling water beetles. A fertile field for study. The long thin, quite hard, larvae are herbivorous, living on filamentous algae or stoneworts (*Chara*). Their mandibles are small and hollow. They feed by piercing individual plant cells and sucking out the contents. After three moults (instars) the larvae leave the water and build cells in the bank in which to pupate. In Australia because of the strong seasonality of the emergence of the adults either the pupae or adult must overwinter – or over summer in the south- in the pupal cell before the adult emerges soon after the start of the rainy season.

Adults are omnivores, living on a range of plant foods. The animal component of their diet consists mainly of small insect larvae, worms and small crustaceans.

Adults, at least of the common northern species, are often attracted to lights at night and are strong flyers. In the north-east most adult specimens have been collected at light during January to April i.e. during the wet season. In southern and eastern Australia, assuming suitable swamps and ponds are available, adults and larvae have a longer active season during the warmer mouths.

Taxonomy

Crawling water beetles are recognized by their relatively small size (1.5-4.6 mm. long), distinctive shape and strong and often darkly pigmented dorsal punctures. Another unique characteristic is the broad abdominal plates covering the bases of the hind legs (Gooderham & Tsyrlin, 2002).

The taxonomy – working out how many different kinds (species) of crawling water beetles exist in Australia, and naming them, is relatively well known from the studies of Watts 1988 and, more importantly, Van Vondel (1995). Additional species from the Pilbara region of West Australia have been described by Watts and McRae (2010) and their larvae by Van Vondel (2012).

Australian species of *Haliplus* belong to three subgenera, distinguished as follows:

Liaphlus. Pronotum without two basal grooves (plicae). Six species in Australia. Plates 1 & 4.

Neohaliplus. Pronotum with two basal grooves, last ventral abdominal segment without a central ridge. Seven species in Australia. Plate 4.

Phalilus. Pronotum with two basal grooves and last abdominal segment with a central raised ridge (Fig.17). Two species in Australia. Plate 4.

In recognising individual species within these subgenera we have mainly used: dorsal colour pattern, presence of linear dark lines and /or dark patches; the form of the pronotal plicae, if any; the form of the punctures at the base of elytral puncture row 5, either separate punctures or formed into a groove; locality.

Using the guide

In grouping the species we have used as our main characters; distribution, presence or absence of a pair of sharply incised grooves (plicae) at the base of the pronotum and the colour pattern on the wingcases (elytra). Beyond this, separation relies on geographic distribution or a character specific to the species. In the notes on the species further characters potentially useful in confirming identification are given.

We reiterate our early comment that specimens chosen for photography were ones which showed the dorsal colour pattern well. In many specimens the colour pattern will be less distinct than in the specimen illustrated hence identification should be based on 'best fit' rather than 'perfect fit'. Confirmation of an identification will usually require examination of the underside and/or dissection and examination of the male genitalia and referral to Bernard Van Vondel, 1995, or, for the Pilbara, Watts and McRae, 2010 (see references).

Other guides in the series

Pictorial Guide to the Australian Whirligig Beetles, Chris Watts & Howard Hamon, 2010 . Available on line from SA Museum. http://www.samuseum.sa.gov.au/research/biological-sciences/terrestrial-invertebrates/downloadable-terrestrial-invertebrates-publications

Pictorial Guide tothe Diving Beetles (Dytiscidae) of South Australia. Chris Watts and Howard Hamon 2014. Available on line from SA Museum. http://www.samuseum.sa.gov.au/research/biological-sciences/terrestrial-invertebrates/downloadable-terrestrial-invertebrates-publications

Plate1

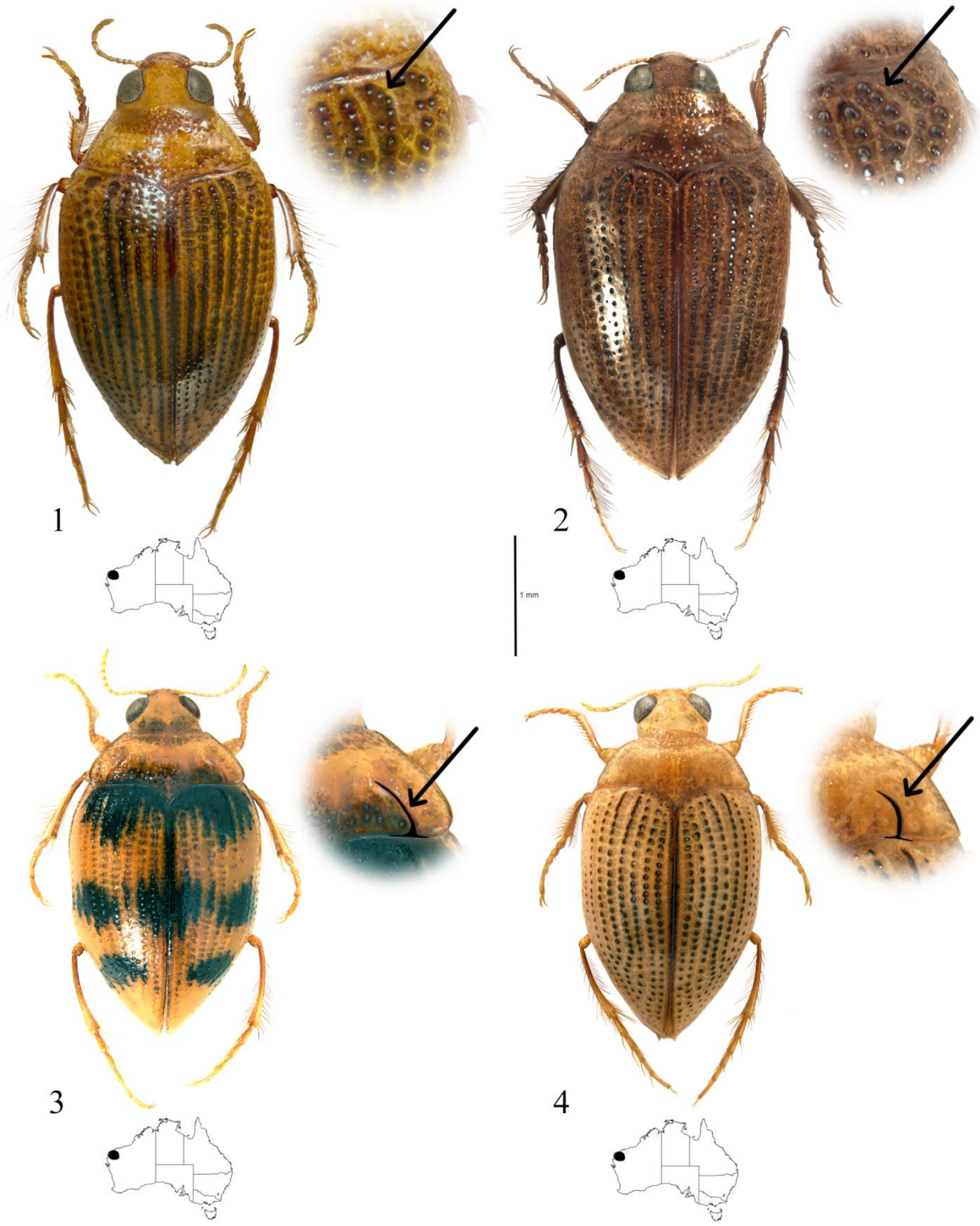

Plate 1. Pilbara Haliplids. 1, *Haliplus pilbaraensis*; 2, *Haliplus halsei*; 3, *Haliplus pinderi*; 4, *Haliplus fortescueensis*. (These four species are the only ones currently know from the Pilbara region of Western Australia. They are not illustrated in the other plates.)

Plate 2

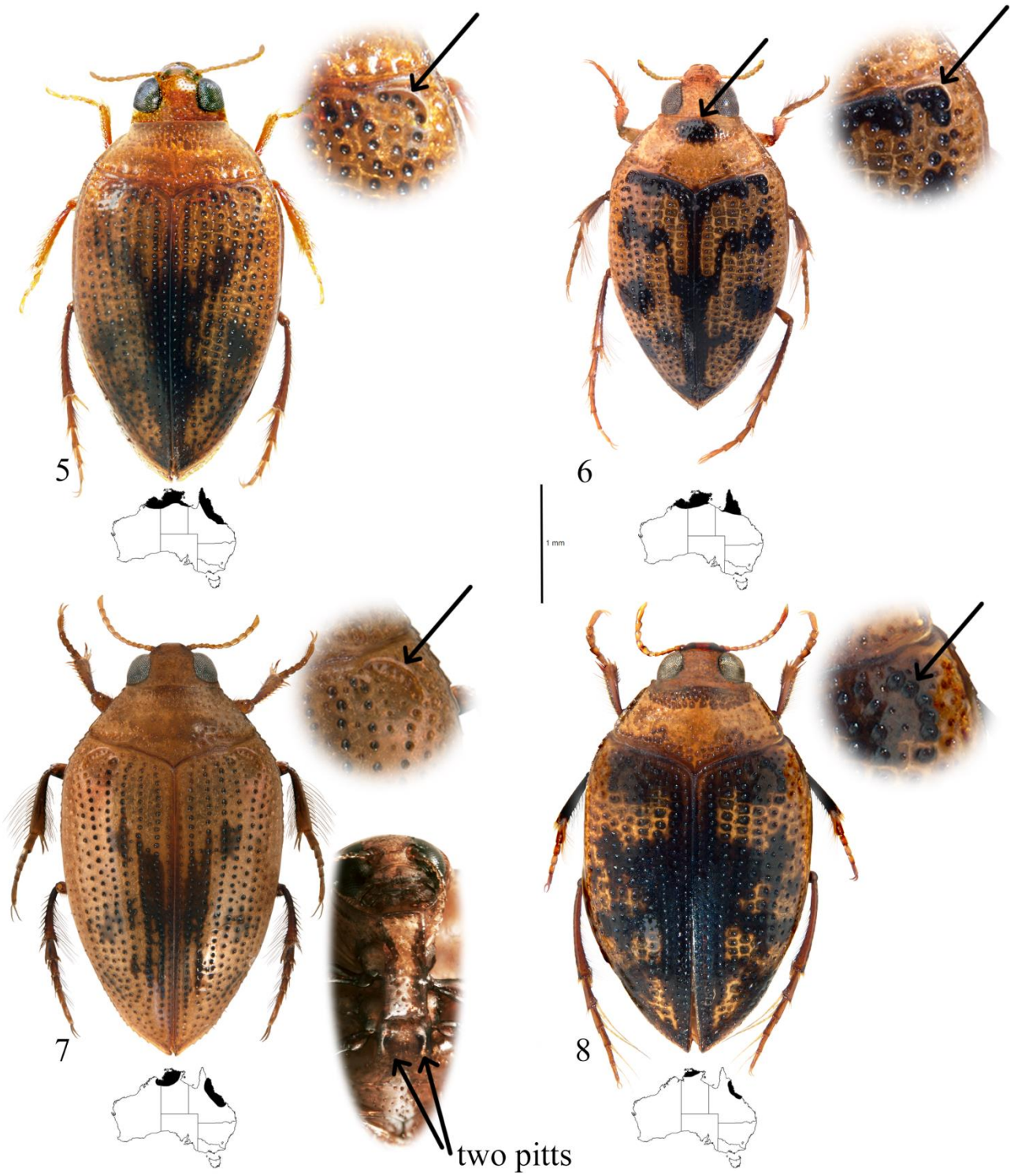

Plate 2. Species without pronotal plicae (subgenus *Liaphlus*) and with a distinct non-linear dorsal colour pattern. 5, *Haliplus alastairi*; 6, *Haliplus stepheni*; 7, *Haliplus timmsi*; 8, *Haliplus ferruginipes.*

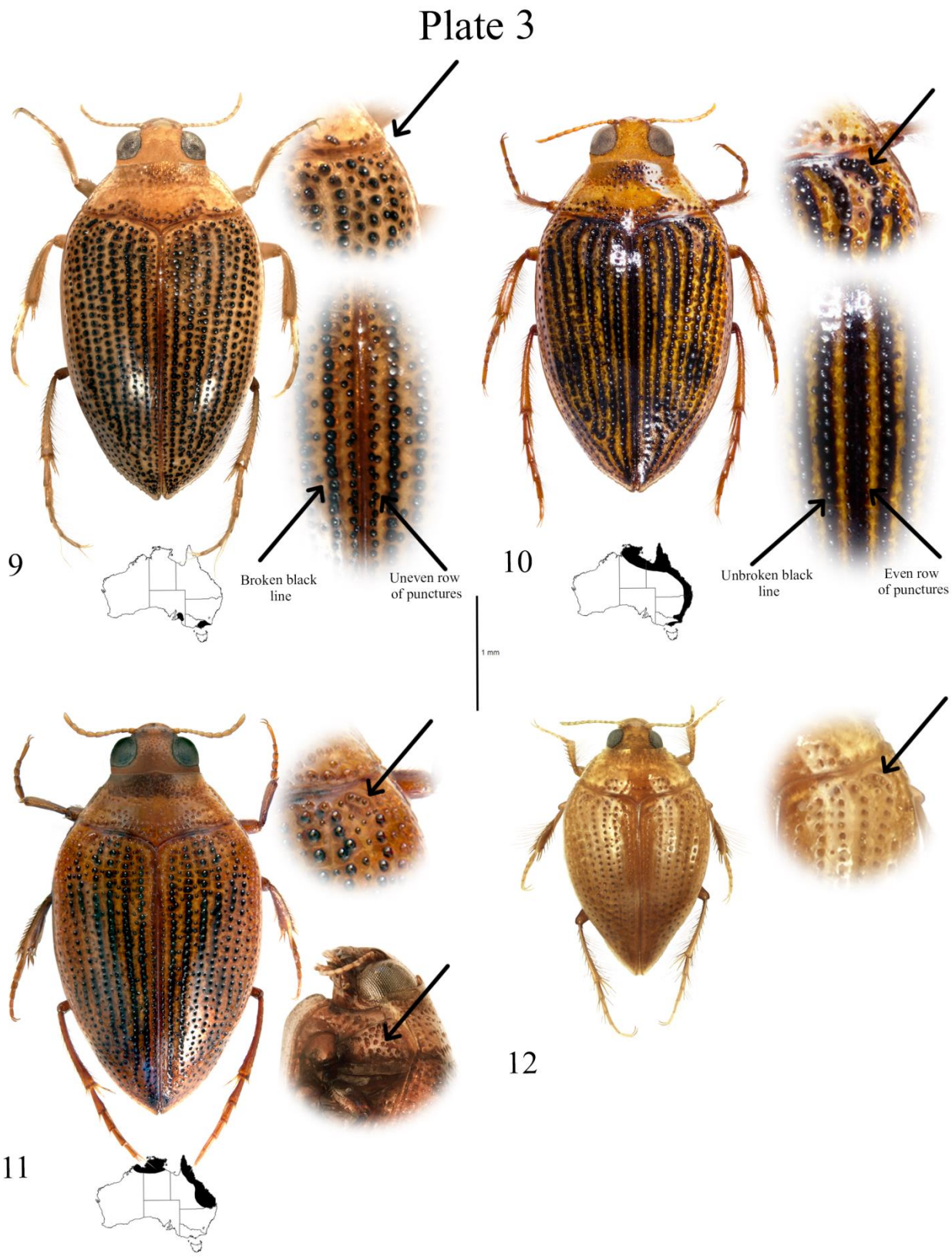

Plate 3. Species without pronotal plicae (subgenus *Liaphlus*) with a linear dorsal colour pattern or none. 9, *Haliplus australis*; 10, *Haliplus testudo*; 11,*Haliplus wattsi*; 12, *Haliplus sindus*.

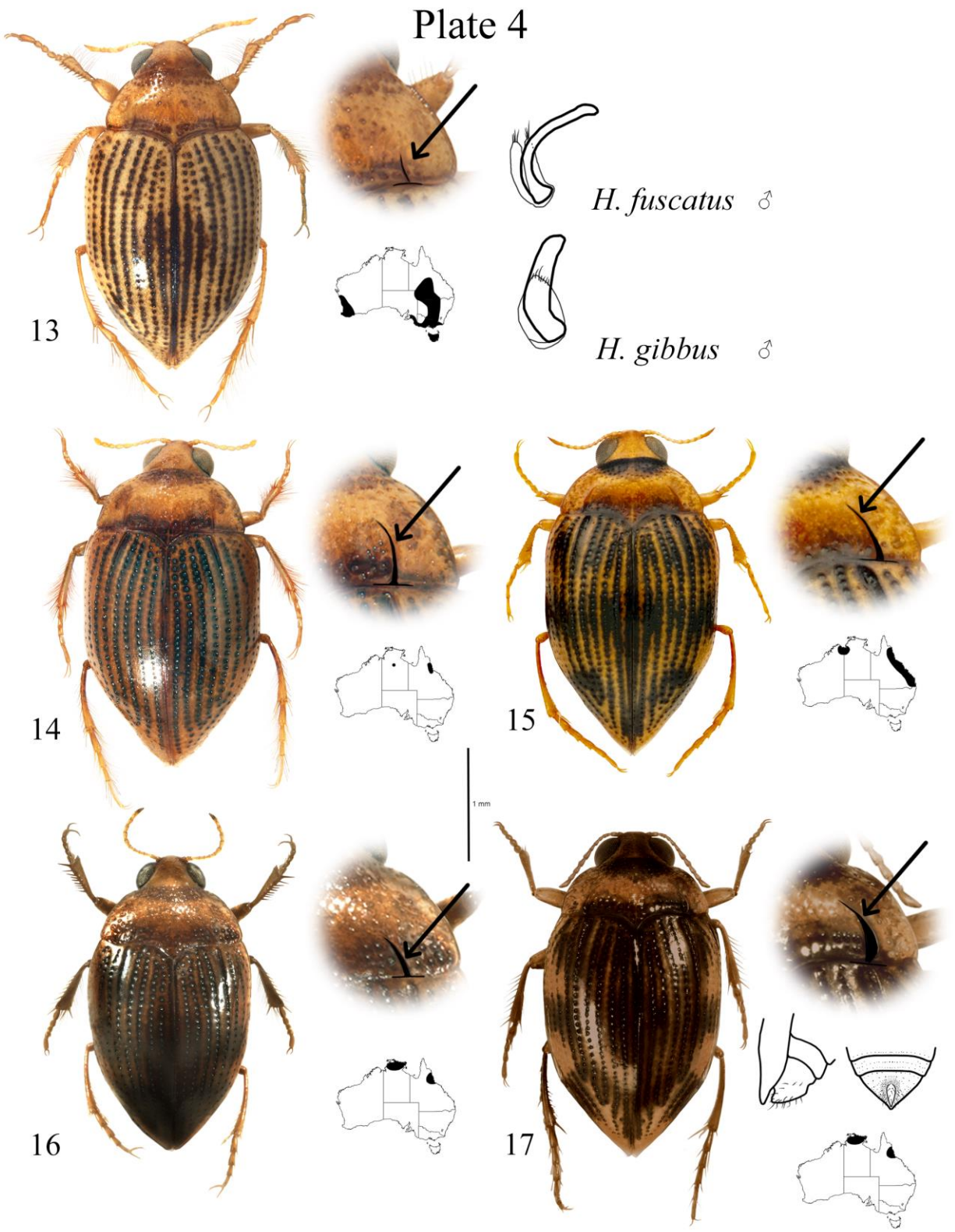

Plate 4. Species with pronotal plicae and apical abdominal segment without a central ridge (subgenus *Neohaliplus*) (Figs 13, 14 &15) or with a central ridge (subgenus *Phalilus*) (Figs 16 & 17). 13, *Haliplus fuscatus/ Haliplus gibbus* – only distinguishable by the shape of the central lobe of the male genitalia (as illustrated); 14, *Haliplus hydei*; 15, *Haliplus bistriatus*; 16, *Haliplus storeyi*; 17, *Haliplus oberthuri* (line drawings of ridge on last ventral segment).

Notes on the species. (Numbers refer to the illustrations.)

Plate 1 Species restricted to the Pilbara region of West Australia

1 *Haliplus pilbaraensis*.

Can be separated from the only other Haliplid without pronotal plicae known from the Pilbara*, H. halsei*, by at least some portions of the inner elytral puncture lines being dark as opposed to only the punctures. *Haliplus pilbaraensis* also lacks the grooves found on the metasternal process of *H. halsei*. Difficult to confidently separate from *H. testudo* which is widespread in the north but it has weaker dark linear markings on the elytra and lacks dark spots on the pronotum. Larva known (Van Vondel, 2012).

2 *Haliplus halsei.*

Separated from the only other Haliplid without pronotal plicae known from the Pilbara region of West Australia*, H. pilbaraensis*, by its, at most, dark spots, rather than linear dark lines on its elytra and the presence of grooves at the front of the metasternal process quite similar to those in *H. timmsi* (Fig. 8). Can be confused with the similarly coloured*, H. wattsi*, which is common across northern Australia, but lacks the strongly punctured proepisternum on the underside to the pronotum. Can be confused with lightly coloured specimens of *H. australis* from south- eastern Australia but, apart from locality, can be separated from this species by the smaller and evenly placed innermost row of punctures on each elytra and the lack of a small finger-like structure (digitus) at the apex of the left paramere of the male genitalia in *H. australis*. From *H. testudo* which occurs just to the north in the Kimberly it can be separated by the lack of dark dots on the pronotum and by the interrupted dark lines on the elytra. *Haliplus halsei* shares with *H. timmsi* the depressions on the metasternal process but can be separated by its smaller size (<3.4mm vs >3.4mm), the lack of the dark colour pattern seen in most *H. timmsi* and the 3-4 basal punctures on elytra puncture row 5 not forming a sharply incised crescent shaped groove. Larva known (Van Vondel, 2012).

3 *Haliplus pinderi.*

The strong elytral colour pattern makes this species unmistakeable. It is also known only from the Pilbara. The only other Australian *Haliplus* approaching this species in the strong elytral colour pattern is the more northern *H. stepheni* which lacks pronotal plicae and the details of the colour pattern differ. Larva known (Van Vondel, 2012).

4 *Haliplus fortescueensis.*

The generally light colour, particularly on the pronotum and head and weak pronotal plicae and as well as its restricted distribution to the Pilbara readily distinguish this species from others with a pronotal plicae. The small point at the tip of each elytron is unusually strong. The claws on the front leg of the male are unequal in length. *Haliplus fuscatus* is known from just south of the Pilbara and has similar weak pronotal plicae but differs in its more strongly patterned elytra and dark markings on the pronotum and claws on the front leg of the male are equal in length. Occasion specimens are much darker than the specimen illustrated. Larvae known (Van Vondel, 2012).

Plate 2. Species without pronotal plicae (subgenus *Liaphlus*) and with a distinct non-linear dorsal colour pattern.

5 *Haliplus alastairi.*

Superficially similar to *H. timmsi* in dorsal colour pattern and the strong groove at the base of elytral puncture row 5. *Haliplus alastairi* can be separated from *H. timmsi* by the absence of two strong pits on the surface of the

metasternal process (Fig.4). The dorsal markings on these two species do not extend to the base of the elytra as they do in *H. ferrugineus* and *H. stepheni*. A relatively common northern species.

6 *Haliplus stepheni.*

A northern species easily recognized by the strong dorsal colour pattern together with the punctures at the base of elytral puncture row 5 forming a groove and the lack of pronotal plicae. The dark spot at the front of the pronotum is occasionally lacking.

7 *Haliplus ferruginipes.*

A rare species from northern Australia, originally described from New Guinea. It is recognized by its strong dorsal colour pattern and the punctures at the base of puncture row 5 on the elytra not forming a well-marked groove.

8 *Haliplus timmsi.*

Superficially similar to *H. alastairi* in dorsal colour pattern and the strong groove at the base of elytral puncture row 5. Separated from *H. alastairi* by the two well-marked pits on the front of the metasternal process (Fig.8) otherwise only known in *H. halsei* from the Pilbara. The dark dorsal markings do not extend to the base of the elytra as they do in *H. ferrugineus* and *H. stepheni*. A relatively common northern species. . Larvae known (Van Vondel, 2004).

Plate 3. Species without pronotal plicae (subgenus Liaphlus) with a linear dorsal colour pattern or none.

9 *Haliplus australis.*

A southern species difficult to separate from *H. testudo,* the only other southern species without pronotal plicae. In most *H. australis* only the elytral punctures are dark whereas in *H. testudo* the elytra have linear dark lines. The innermost line of punctures on each elytron are larger and more irregularly placed than in *H. testudo* (Fig. 9). The left paramere of the male genitalia in *H. australis* has an apical tuft (digitus), which is lacking in *H. testudo.*

10 *Haliplus testudo.*

A relatively common species in coastal eastern Australia without pronotal plicae and with well-marked dark linear elytral markings. Generally darker than *H. wattsi*, it can be separated from this species by the lack of punctures on the proepisternum (Fig.11). From *H. australis*, a species with which it was previously confused (Van Vondel 1995), it differs in the stronger linear markings on the elytra, smaller and more evenly spaced punctures in the innermost row on each elytron and in lacking a small digitus on the left paramere of the male genitalia. Apart from locality it can be separated from both *H. pilbaraensis* and *H. halsei* by the presence of dark dots on the pronotum. Larvae known (Van Vondel, 2004).

11 *Haliplus wattsi.*

One of several species without pronotal plicae and with linear dark lines on the elytra. *Haliplus wattsi* is distinguished by the strong, even sized, nearly confluent punctures on the proepisternum (Fig. 11) which are lacking or virtually so in other Australian species. A relatively common northern species, the dark markings on the pronotum and elytra are less well marked than in most other species in this group.

12 *Haliplus sindus.*

By far the smallest of the Australian Haliplids which lack pronotal plicae. Recognized by its small size and uniformly yellow colour. A northern species.

Plate 4. Species with pronotal plicae and apical abdominal segment without a central ridge (subgenus *Neohaliplus*) (Figs 13, 14 & 15) or with a central ridge (subgenus *Phalilus*) (Figs 16 & 17).

13 *Haliplus fuscatus* and *Haliplus gibbus.*

These two southern species, recognized by their short pronotal plicae and weakly developed groove at the base of elytral puncture row 5, can only be separated by the male genitalia: the central piece is broad in *H. gibbus*, relatively narrow in *H. fuscatus*. They also have broadly similar distributions across southern Australia with *H. fuscatus* perhaps reaching further inland. The extent of the dark elytral colour patterning is very variable with many specimens having a stronger colour pattern on the elytra than that illustrated. The only species with pronotal plicae found in southern Australia.

14 *Haliplus hydei.*

Recognized by the relatively long, strongly impressed pronotal plicae which is straight in its basal half, uninterrupted dark lines on the elytra and the front and rear margins of the pronotum only slightly darker than the rest of the pronotum. The claws on the front leg of the male are unequal in length. A seldom collected species known only from north-east Queensland.

15 *Haliplus bistriatus.*

The long strongly curved pronotal plicae, dark area at the front of and often rear of the pronotum and its northern distribution separate this species from all others with pronotal plicae except *H. oberthuri* which has a central longitudinal ridge on the last abdominal segment (Fig. 17). The claws on the front leg of the male are equal in length, unequal in *H. oberthuri*.

16 *Haliplus storeyi.*

A northern species best recognized by its weak pronotal plicae, unusually strong, rough sided, punctures between the plicae and the sides of the pronotum, lack of a dark area at the front of the pronotum and a central ridge on the last abdominal segment (placing it, with *H. oberthuri*, in the subgenus *Phalilus*). Rare and hard to confidently separate from *H. oberthuri*. Unlike *H. oberthuri* the claws on the male front leg are of equal length. The spines on the front leg are unusually strong in the only specimen that we have seen.

17 *Haliplus oberthuri.*

A northern species with well-marked, curved pronotal plicae and a dark area at the front of and often also the rear of the pronotum. It can only be confidently separated from the rather similar and commoner *H. bistrigatus* by the strong midline ridge on the last abdominal segment and male front claws being unequal in length. The ridge on the last abdominal segment allies it to *H. storeyi* (and place these two species in the subgenus *Phalilus*). It a can be separated from *H. storeyi* by its stronger pronotal plicae, weaker lateral pronotal punctures and unequal claws on the front legs in the male.

Acknowledgements

We would like to acknowledge the help of Alexis Tindale of the South Australian Museum for allowing us to utilize photographic equipment in her charge and for advice on its use. Peter Hudson, collection manager in entomology at the museum, is thanked for facilitating access to the significant collection of Australian Haliplids in his care.

Further Reading and References

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Checklist of Australian crawling water beetles (Haliplidae) (2015)

Species arranged in alphabetic order, subgenera in brackets.

Haliplus australis (*Liaphlus*) Clark

Haliplus alastairi (*Liaphlus*) Watts

Haliplus bistriatus (*Neohaliplus*) Wehncke

Haliplus ferruginipes (*Liaphlus*) Regimbart

= *Haliplus nicholasi* Watts

Haliplus fortescueensis (*Neohaliplus*) Watts & McRae.

Haliplus fuscatus (*Neohaliplus*) Clark

Haliplus gibbus (*Neohaliplus*) Clark

Haliplus hydei (*Liaphlus*) Watts & McRae

Haliplus oberthuri (*Phalilus*) Guignot.

Haliplus pilbaraensis (*Liaphlus*) Watts & McRae

Haliplus pinderi (*Neohaliplus*) Watts & McRae

Haliplus sindus (*Liaphlus*) Watts

Haliplus stepheni (*Liaphlus*) Watts

Haliplus storeyi (*Phalilus*) Van Vondel

Haliplus testudo (*Liaphlus*) Clark

Haliplus timmsi (*Liaphlus*) Van Vondel

Haliplus wattsi (*Liaphlus*) Clark