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An illustrated key to the morphospecies of terrestrial isopods (Crustacea: Oniscidea) of Barrow Island, Western Australia

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ABSTRACT – This paper presents an illustrated key to eighteen morphospecies of terrestrial isopods from Barrow Island with a brief summary regarding their currently known distribution and potential endemicity to the island. Six described species are recorded, *Ligia exotica* (family Ligiidae), *Alloniscus pallidulus* (Alloniscidae), *Laevophiloscia yalgooensis* (Philosciidae), *Porcellionides pruinosus* (Porcellionidae), *Barrowdillo pseudopyrgoniscus*, *Buddelundia hirsuta* (both Armadillidae), but the identifications of most need to be confirmed following genus-level revisions and examination of type- or topotypical material. The key includes twelve undescribed species and at least two undescribed genera from the family Armadillidae, one of which is apparently restricted to Barrow Island. Although there is still considerable taxonomic work required to evaluate distributions, it appears that at least six of the eighteen species are potential short-range endemics (SRE).

KEYWORDS: Armadillidae, *Buddelundia*, *Barrowdillo*, Pilbara, Isopoda, taxonomy

INTRODUCTION

In Western Australia (WA) terrestrial isopods (Crustacea: Oniscidea) have received little attention in the scientific literature. The first species descriptions from WA were compiled by Budde-Lund in 1912, but his work remained unfinished and not comprehensively illustrated. In recent years, taxonomic works have been limited to the description of new species from Cape Range (Dalens 1992), the Kimberley and Barrow Island (Dalens 1993) and calcretes in the Murchison Region (Taiti and Humphreys 2001). Very few species can be identified based on the original taxonomic literature because most of the descriptions are incomplete by modern taxonomic standards and poorly illustrated. Moreover, the taxonomy of the Armadillidae, the dominant group in the driest parts of the Western Australia, has been confused by different interpretations and nomenclatural problems (Taiti et al. 1998). Placing new species within the correct genera is therefore highly problematic without undertaking a complete revision of the Australian Armadillidae.

Discovery of large gas deposits prompted Chevron Australia Pty Ltd to make an application to construct an industrial plant to liquefy natural gas on the island in 2001. Part of the process involved an environmental impact assessment which included a baseline survey of the terrestrial invertebrate fauna (Callan et al. 2011). Sampling occurred from 2005–2007 and rationale for site selection and detailed methodology was given in Callan et al. (2011). Prior to this survey, only four species of terrestrial isopods had been recorded from Barrow Island (Dalens 1993). These were: *Ligia exotica* Roux, 1828, *Olibrinus* sp., *Laevophiloscia yalgoonensis* Wahrberg, 1922 and *Barrowdillo pseudopyrgoniscus* Dalens, 1993. This paper illustrates the terrestrial isopods collected by this survey and subsequent quarantine surveillance for non-indigenous species (see Callan et al. 2011). Eighteen morphospecies are detailed which are likely to belong to eleven genera of the families Ligiidae, Olibrinidae, Alloniscidae, Philosciidae, Porcellionidae and Armadillidae.

The purpose of this paper is to document and to

provide a tool to enable the determination of these morphospecies. The formal description of the new species and the confirmation of some nominal species reported require a more comprehensive taxonomic work and is beyond the scope of this paper.

MATERIALS AND METHODS

The majority of the material studied in this paper was collected as part of the baseline study outlined above. Original determinations were made by the first author in 2008 and the data derived from this work is included in Callan et al. (2011). For this paper, the best material from the baseline study was reexamined. Further material collected between March 2010 and March 2012 as part of quarantine surveillance was also included. All specimens are lodged at the Western Australian Museum (WAM) and registration numbers are provided.

The images of the specimens used in the key were photographed using a Leica DFC420 digital camera mounted on a Leica M205C stereo microscope and stacked montages were created using the Leica Application Suite V3 automontage software. The key is followed by a list of the morphospecies including the material examined, other available data, the taxonomic status and the main characters used to identify each taxon. Sites codes in the list of material examined are the same as those used by Callan et al. (2011). Distribution maps, derived from the coordinates in the list of material examined, are included along with an indication if the taxon is found elsewhere or whether it is likely to be a short-range endemic (SRE) species (Harvey 2002).

KEY TO THE TERRESTRIAL ISOPODS OF BARROW ISLAND

1. Flagellum of second antenna consisting of more than 5 segments (Figures 1, 2) 2

   Flagellum of second antenna 2- or 3-segmented (Figures 6, 7)..... 3

2. Eye large, consisting of more than 100 ommatidia.....*Ligia exotica* (Figure 1)

   Eye small, consisting of 5 ommatidia .... *Olibrinus* sp. (Figure 2, 3)

3. Uropod exopodites long, extending beyond uropod protopodite (Figure 4) 4

   Uropod exopodites short, not extending beyond uropod protopodite (Figure 5)..... 6

4. Flagellum of second antenna 3-segmented (Figure 6) 5

   Flagellum of second antenna 2-segmented (Figure 7) ....*Porcellionides pruinosus* (Figure 8)

5. Epimera of pleonites 3–5 long and tapered; outline of pereon and pleon a smooth line; *noduli laterales* absent ....*Alloniscus pallidulus* (Figure 9)

   Epimera of pleonites 3–5 reduced; pleon narrower than pereon, outline of pereon and pleon a stepped line; *noduli laterales* present (Figure 10) .... *Laevophiloscia yalgoonensis* (Figure 11)

6. Pleopod exopodites interlocking with fourth pair large and overlapping the fifth pair (Figure 12) which is not visible in ventral view..... 7

   Pleopod exopodites not interlocking with the fifth pair visible (Figure 13)..... 15

7. Ventral surface of pereonite 1 and pereonite 2 without interlocking structures, but with small rounded bumps (Figure 14); uropod exopodites extending almost to the distal margin of the protopodite (Figure 15) ....Armadillidae genus 1 sp. 1 (Figure 16)

   Interlocking structures present on pereonites, either in the form of divergent inner and outer lobes forming a cleft (schisma) on posterior corner of pereonite 1 (Figure 17) or a large tooth-like inner lobe present on ventral surface of epimera of pereonite 1 and 2 (Figure 18); uropod exopodites not extending to the distal margin of the protopodite (Figure 5) 8

8. Dorsal surface convex but with epimera horizontal, or tending horizontal, at the distal margin (Figure 19); schisma absent on pereonite 1; dorsal surface tuberculate or with shallow bumps; uropod protopodite longer than broad and tapering (Figure 20) 9

Dorsal surface convex with vertical epimera; schisma present on pereonite 1 (Figure 17); dorsal surface without tubercles; uropod protopodite not longer than broad and not tapering (Figure 21) 10

9. Dorsal surface with well-developed tubercules; epimera horizontal (Figure 19)..... ..... *Barrowdillo pseudopyrgoniscus* (Figure 22)

Dorsal surface with sparse shallow bumps; epimera not horizontal but tending horizontal at the margins..... .....Armadillidae genus 2 sp.1 (Figure 23)

10. Frontal shield not divided into upper and lower sections by a transverse groove (Figure 24) 11

Frontal shield divided into upper and lower sections by a transverse groove (Figure 25) 12

11. Dorsal surface covered with short setae; well-defined interlocking lobe structures present on the ventral surface of epimera of pereonites 5–7 and pleonite 3 (Figure 26) ..... *Buddelundia* sp. 1 (Figure 27)

Dorsal surface without setae; interlocking lobe structures absent on the ventral surface of epimera of pereonites 5-7 and pleonite 3 (Figure 28) ....*Buddelundia* sp. 2 (Figure 29)

12. Dorsal surface with long setae; interlocking lobes on ventral surface of epimera of pleonite 3 (Figure 30) ..... *Buddelundia hirsuta* (Figure 31)

Dorsal surface without setae; pleonite 3 without interlocking lobes..... 13

13. *Sulcus arcuatus* (longitudinal groove parallel to lateral margin of epimera of pereonite 1) prominent (Figure 17); male with protuberances above clypeus (Figure 25)..... .....*Buddelundia* sp. 3 (Figure 32)

Sulcus arcuatus absent (Figure 33) or indistinct shallow depression (Figure 34); male without protuberances above clypeus..... 14

14. Inner lobe of schisma on pereonite 1 longer than outer lobe when viewed laterally (Figure 33); large tooth-like lobe on ventral surface of epimera of pereonite 2 (Figure 35) ....*Buddelundia* sp. 4 (Figure 36)

Inner lobe of schisma on pereonite 1 shorter than outer lobe when viewed laterally (Figure 34); moderate tooth-like lobe on ventral surface epimera of pereonite 2 (Figure 37) ....*Buddelundia* sp. 5 (Figure 38)

15. Frontal shield raised from vertex (Figure 39); uropod protopodite with distal part long and tapering (Figure 13) 16

Frontal shield flat to vertex (Figure 40); uropod protopodite with distal part short, quadrangular, approximately equally as wide as long (Figure 41)..... 17

16. Dorsal surface with tubercles ....Armadillidae genus 3 sp. 1 (Figure 42)

Dorsal surface rough but with no distinct tubercles ....Armadillidae genus 3 sp. 2 (Figure 43)

17. Lateral groove on pereonite 1 wide (Figure 40) and dorsal surface without setae..... .....Armadillidae genus 4 sp. 1 (Figure 44)

Lateral groove on pereonite 1 narrow (Figure 45) and dorsal surface covered in short setae ..... Armadillidae genus 4 sp. 2 (Figure 46)

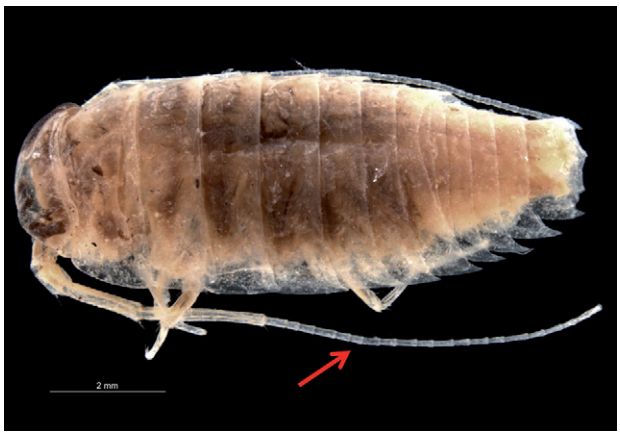

FIGURE 1 *Ligia exotica,* habitus, dorsal view. Arrow: flagellum of second antenna with more than 5 segments (WAM C1440)

FIGURE 2 *Olibrinus* sp., head, dorsal view. Arrow: flagellum of second antenna with more than 5 segments (WAM 127-91).

FIGURE 3 *Olibrinus* sp., habitus, dorsal view. (WAM 127-91).

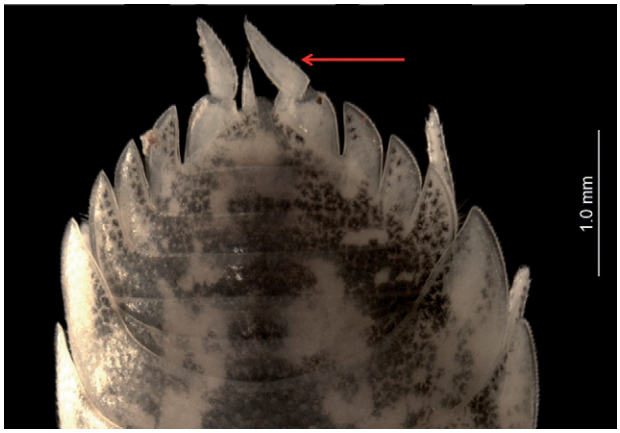

FIGURE 4 *Alloniscus pallidulus*, pleon, dorsal view. Arrow: uropod exopodite long (WAM C51828).

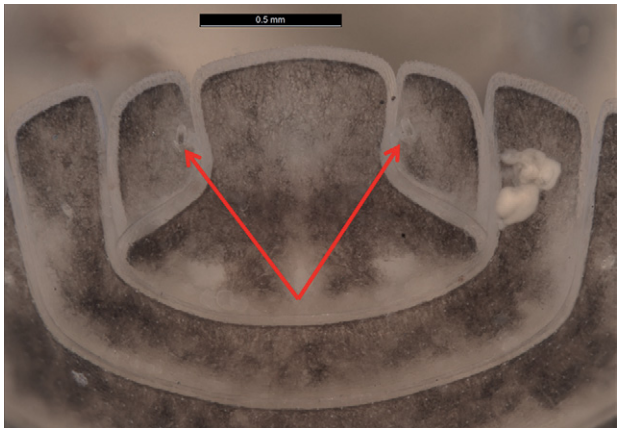

FIGURE 5 *Buddelundia* sp. 5, pleon, dorsal view. Arrows: uropod exopodites short (WAM C51810).

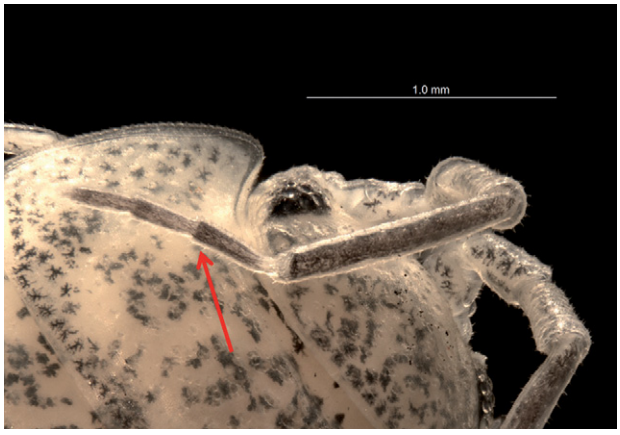

FIGURE 6 *Alloniscus pallidulus*, head, dorsal view. Arrow: flagellum of second antenna 3-segmented (WAM C51828).

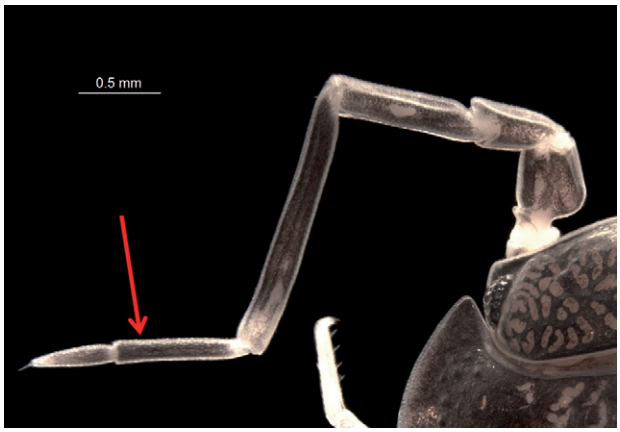

FIGURE 7 *Porcellionides pruinosus*, head, partial dorsal view. Arrow: flagellum of second antenna 2-segmented (WAM C51824),

FIGURE 8 *Porcellionides pruinosus*, habitus, dorsal view (WAM C51824).

FIGURE 9 *Alloniscus pallidulus*, habitus, dorsal view. Arrow: epimera of pleonites 3–5 long and tapered (WAM C51828).

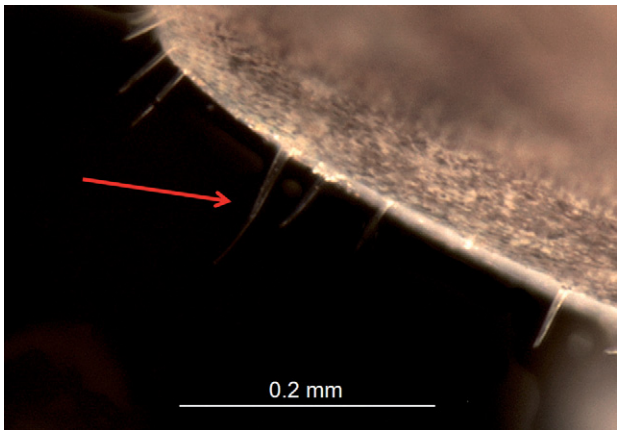

FIGURE 10 *Laevophiloscia yalgoonensis* fourth pereonite dorsal view. Arrow: noduli lateralis (WAM C51821)

FIGURE 11 *Laevophiloscia yalgoonensis*, habitus, dorsal view. Arrow: epimera of pleonites 3–5 reduced, pleon narrower than pereon (WAM C51821)

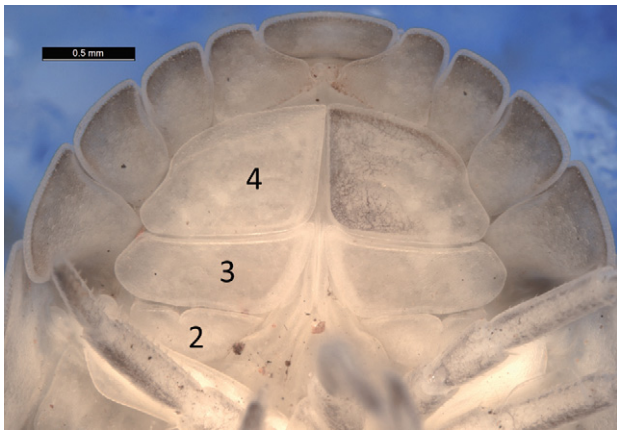

FIGURE 12 *Buddelundia* sp. 5, pleon, ventral view. Pleopod exopodites interlocking (2–4). Fourth pair overlapping fifth (WAM C51810).

FIGURE 13 Armadillidae genus 3 sp. 1, pleon, ventral view. Pleopod exopodites non-interlocking (2-5). Arrow: uropod protopodite with distal part long and tapering. (WAM C51686).

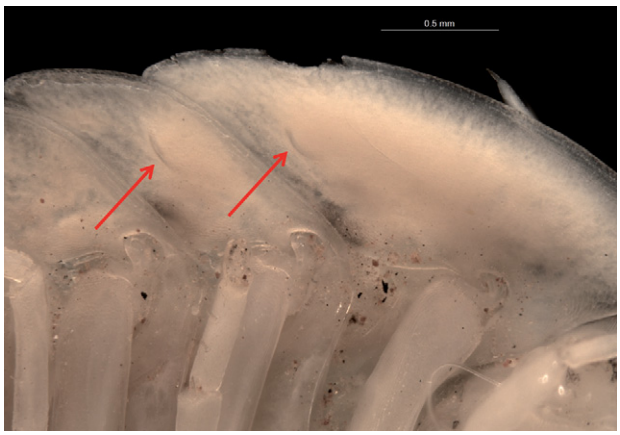

FIGURE 14 Armadillidae genus 1 sp. 1, epimera 1 and 2, ventral view. Arrows: small rounded bumps (WAM C51817).

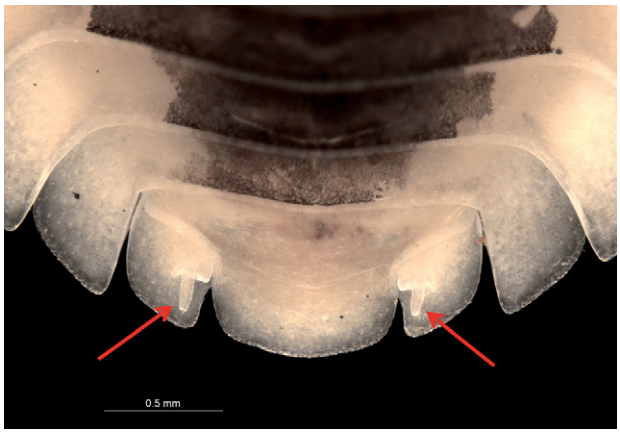

FIGURE 15 Armadillidae genus 1 sp. 1, pleon dorsal, view. Arrows: uropod exopodites extending almost to the distal margin of the protopodite. (WAM C51817).

FIGURE 16 Armadillidae genus 1 sp. 1, habitus, dorsal view (WAM C51817).

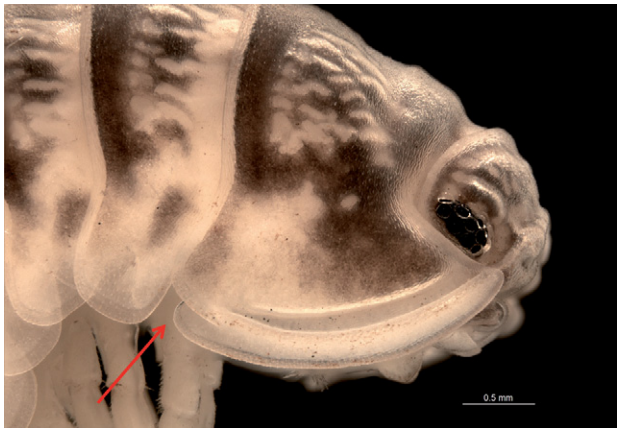

FIGURE 17 *Buddelundia* sp. 3, partial lateral view. *Sulcus arcuatus* prominent. Arrow: schisma on pereonite 1 (WAM C51741).

FIGURE 18 *Barrowdillo pseudopyrgoniscus*, pleonite, epimera 1 and 2 ventral view. Arrows: tooth-like lobes (WAM C51704).

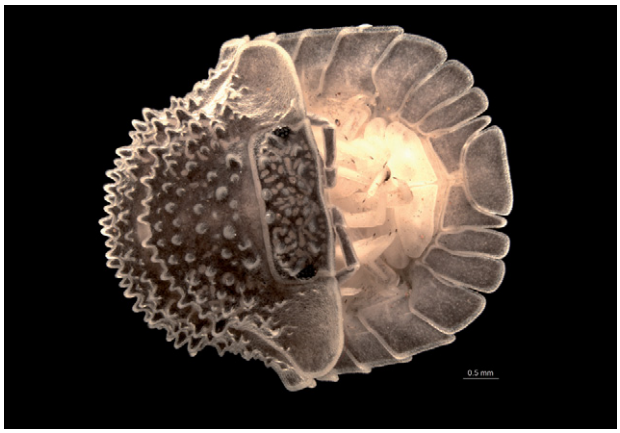

FIGURE 19 *Barrowdillo pseudopyrgoniscus*, horizontal epimera (WAM C51704).

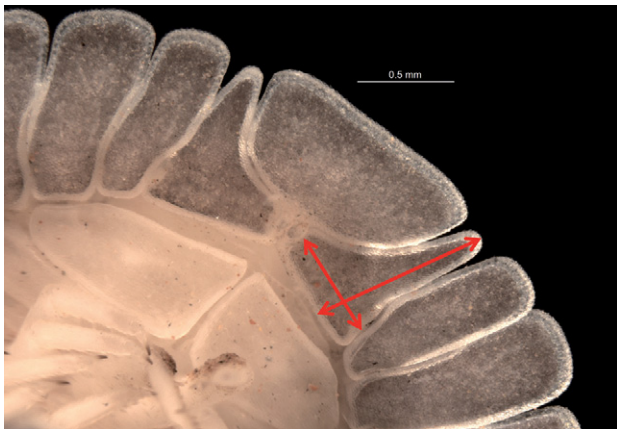

FIGURE 20 *Barrowdillo pseudopyrgoniscus*, pleon, ventral view. Arrows: uropod protopodite longer than broad and tapering (WAM C51704).

FIGURE 21 *Buddelundia* sp. 5, pleon, ventral view. Arrows: uropod protopodite not longer than broad and not tapering (WAM C51810).

FIGURE 22 *Barrowdillo pseudopyrgoniscus*, habitus, lateral view (WAM C51704).

FIGURE 23 Armadillidae genus 2 sp. 1, habitus, lateral view. Dorsal surface with shallow bumps and epimera tending horizontal at the distal margins (WAM C51818).

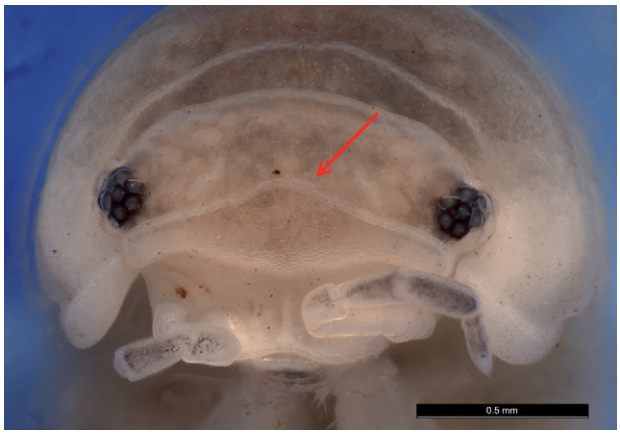

FIGURE 24 *Buddelundia* sp. 2, head and first pereonite, anterior view. Arrow: upper margin of frontal shield which is not divided by transverse groove (WAM C51771).

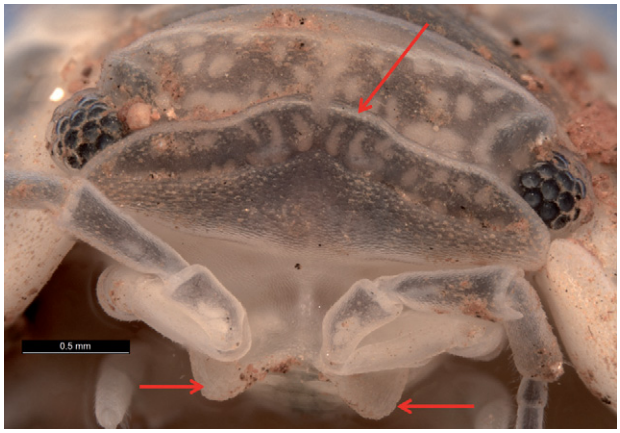

FIGURE 25 *Buddelundia* sp. 3, head and first pereonite, anterior view. Arrows: upper margin of frontal shield which is divided by transverse groove and protuberances above clypeus (WAM C51741).

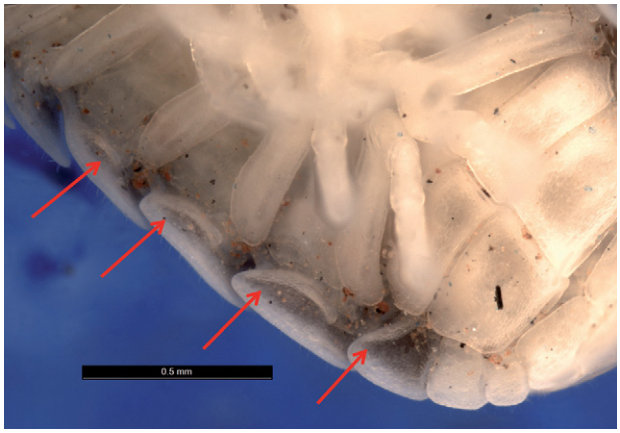

FIGURE 26 *Buddelundia* sp. 1, partial ventral view. Arrows: interlocking structures on pereonites 5–7 and pleonite 3 (WAM C51764).

FIGURE 27 *Buddelundia* sp. 1, habitus, lateral view (WAM C51764).

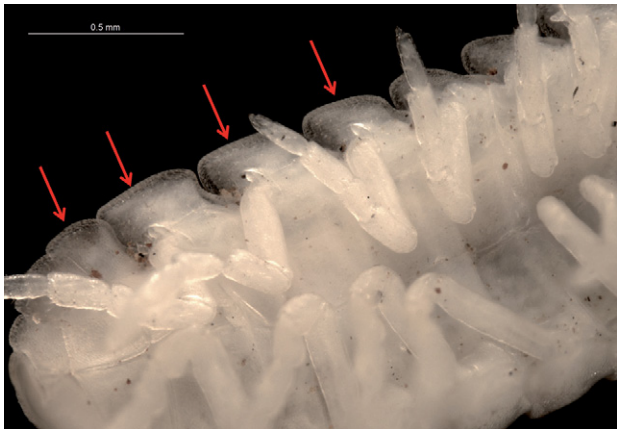

FIGURE 28 *Buddelundia* sp. 2, partial, ventral view. Arrows: interlocking structures absent on pereonites 5–7 and pleonite 3 (WAM C51771).

FIGURE 29 *Buddelundia* sp. 2, habitus, lateral view (WAM C51771).

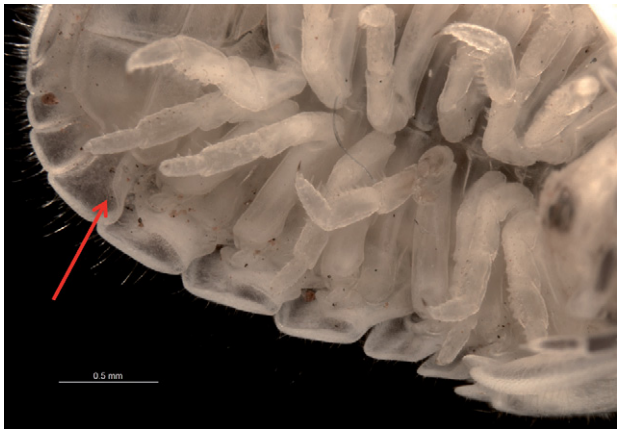

FIGURE 30 *Buddelundia hirsuta*, partial, ventral view with interlocking structures on pereonites 5–7 and pleonite 3 (arrow) (WAM C51708).

FIGURE 31 *Buddelundia hirsuta*, habitus, lateral view (WAM C51708).

FIGURE 32 *Buddelundia* sp. 3, habitus, lateral view (WAM C51741)

FIGURE 33 *Buddelundia* sp. 4, head and pereonite 1, lateral view with *sulcus arcuatus* absent. Arrows: schisma with inner lobe longer than outer (WAM C51767).

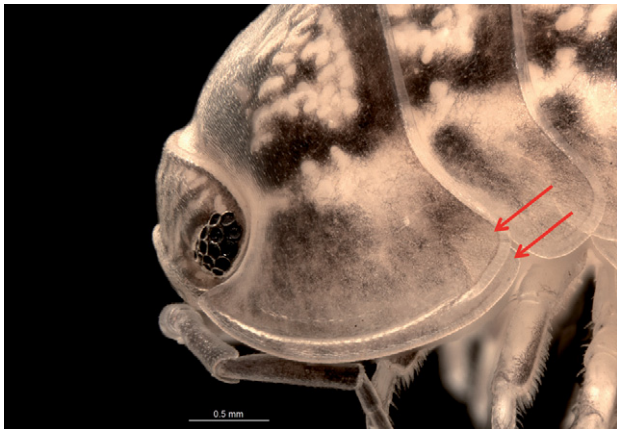

FIGURE 34 *Buddelundia* sp. 5, head and pereonite 1, lateral view with *sulcus arcuatus* indistinct. Arrows: schisma with inner lobe shorter than outer (WAM C51810).

FIGURE 35 *Buddelundia* sp. 4, epimera of pereonite 2, ventral view. Arrow: large tooth-like lobe (WAM C51767).

FIGURE 36 *Buddelundia* sp. 4, habitus, lateral view (WAM C51767)

FIGURE 37 *Buddelundia* sp. 5, epimera of pereonite 2, ventral view. Arrow: small tooth-like lobe (WAM C51810).

FIGURE 38 *Buddelundia* sp. 5, habitus, lateral view (WAM C51810).

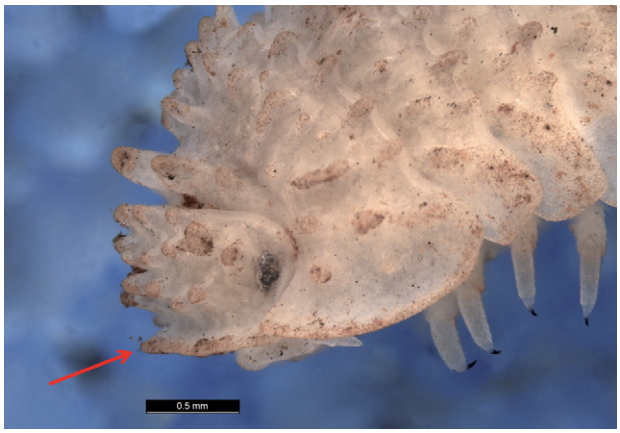

FIGURE 39 Armadillidae genus 3 sp. 1, head, lateral view. Arrow: frontal shield raised from vertex (WAM C51686).

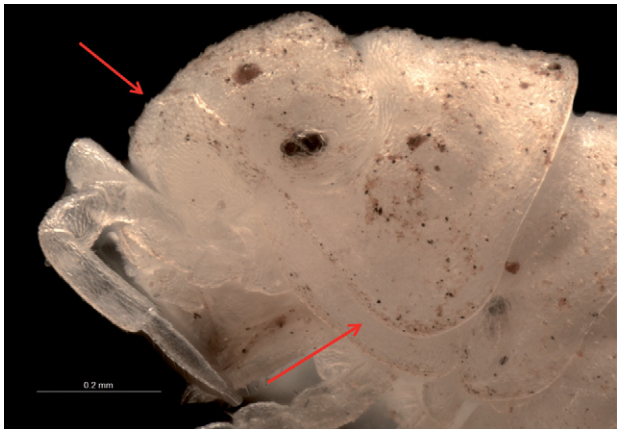

FIGURE 40 Armadillidae genus 4 sp. 1, head, lateral view. Arrows: frontal shield not raised from vertex and lateral groove on pereonite 1 wide (WAM C51700).

FIGURE 41 Armadillidae genus 4 sp. 2, pleon, ventral view. Arrow: uropod protopodite with distal part short and quadrangular, approximately equally wide as long (WAM C51695).

FIGURE 42 Armadillidae genus 3 sp. 1, habitus, lateral view. Dorsal surface with tubercules (WAM C51686).

FIGURE 43 Armadillidae genus 3 sp. 2, habitus, lateral view. Dorsal surface rough but with no distinct tubercles (WAM C51685).

FIGURE 44 Armadillidae genus 4 sp. 1, habitus, lateral view. Dorsal surface without distinct setae (WAM C51700).

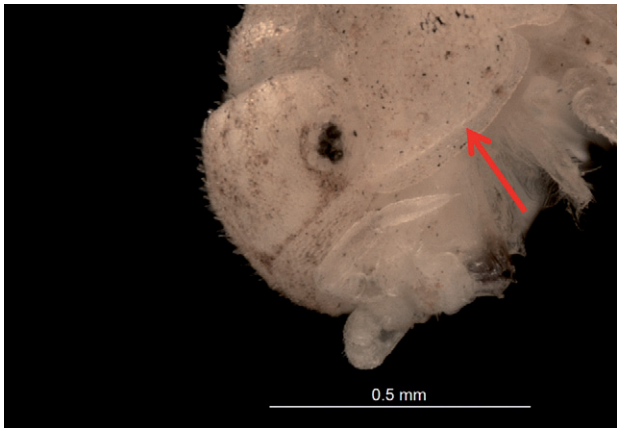

FIGURE 45 Armadillidae genus 4 sp. 2, partial lateral view. Dorsal surface with distinct setae. Arrow: lateral groove on pereonite 1 narrow (WAM C51695).

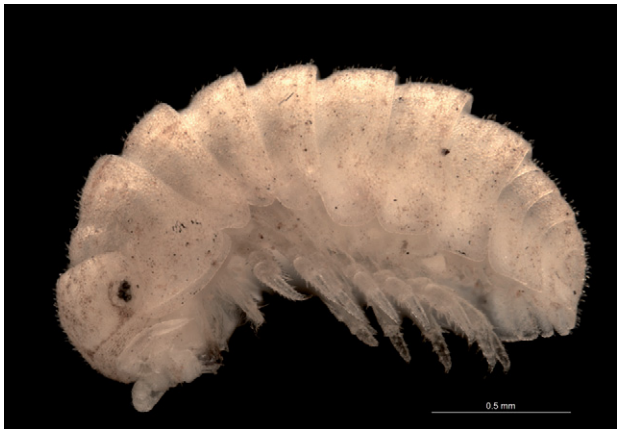

FIGURE 46 Armadillidae genus 4 sp. 2, habitus, lateral view (WAM C51695).

LIST OF THE SPECIES AND REMARKS

Family Ligiidae Leach, 1831

Genus *Ligia* Fabricius, 1798

Ligia exotica Roux, 1828

Figure 1

MATERIAL EXAMINED

Australia: ***Western Australia:*** 1 ♀, Pt. Gantheaume, Broome, ca. 1924 (WAM C1440).

REMARKS

This species was not collected during the present study but was included in the key because it was listed by Dalens (1993) from Barrow Island. The material from Barrow Island was not available for examination so the image included in the key is *Ligia exotica* from Broome. Dalens' identification requires confirmation since his description does not contain illustrations and was based on a single female specimen. *Ligia exotica* is a widely distributed tropical species (Dalens 1993). The principal diagnostic characters of this species are: uropod exopodites long, extending beyond the uropod protopodite; multi-articulate flagellum with more than 5 segments and the large eye consisting of more than 100 ommatidia. On Barrow Island the species is known from a single site (Figure 47), but is likely to be much more widespread.

FIGURE 47 Distribution records of *Ligia exotica* and *Olibrinus* sp. on Barrow Island.

Family Olibrinidae Budde-Lund, 1913

Genus *Olibrinus* Budde-Lund, 1913

Olibrinus sp.

Figures 2, 3

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Wapet Camp, 20°50′08″S., 115°25′00″E., 6 September 1991, W.F. Humphreys, B. Vine (WAM 127-91).

REMARKS

This species was not collected during the present study, but was included in the key because it was described in part by Dalens (1993). His identification was based on a single female and further studies are needed to confirm the status of this taxon. Its principal diagnostic characters are: habitus elongated; uropod exopodites long, extending beyond the uropod protopodite; long multi-articulate flagellum with more than 5 segments; and eye consisting of 5 ommatidia. *Olibrinus* sp. and *Ligia exotica* are known from the same single locality on Barrow Island (Figure 47).

Family Alloniscidae Schmidt, 2003

Genus *Alloniscus* Dana, 1854

Alloniscus pallidulus Budde-Lund, 1885

Figures 4, 6, 9

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Site TPT, 20°46′52.49″S., 115°28′02.87″E., 15 March 2006, S. Callan, R. Graham, winkler sack (WAM C51826); 8 ♂, Site CBH, 5 ♀, 20°49′29.76″S., 115°26′47.19″E., 25 September 2006, S. Callan, K. Edwards, winkler sack (WAM C51827); 1 ♀, Site N27, 20°49′29.76″S., 115°26′47.19″E., 6 May 2006, S. Callan, R. Graham (WAM C51828); 2 ♂, 2 ♀, Site CBH, 20°52′21.64″S., 115°19′47.74″E., 15 March 2006, S. Callan, R. Graham (WAM C51829).

REMARKS

This is a widespread littoral species that occurs along the Western Australia coast and in parts of South-East Asia (Green et al. 1990). It has been collected from Rottnest Island (Bunn and Green 1982) and from the littoral zone of the ocean and from salt water coastal lagoons in the Jurien Bay area (Judd and Horwitz 2003). Its principal

FIGURE 48 Distribution records of *Alloniscus pallidulus* on Barrow Island.

FIGURE 49 Distribution records of *Laevophiloscia yalgoonensis* on Barrow Island.

diagnostic characters are: uropod exopodites long extending beyond the uropod protopodite; flagellum of second antenna 3 segmented; epimera of pleonites 3–5 long and tapered; and *noduli laterales* absent. The species was collected from the littoral zone at three locations on Barrow Island (Figure 48).

Family Philosciidae Kinahan, 1857

Genus *Laevophiloscia* Wahrberg, 1922

Laevophiloscia yalgoonensis Wahrberg, 1922

Figures 10, 11

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♂, Site CBH, 20°49′29.76″S., 115°26′47.19″E., 25 September 2006, S. Callan, K. Edwards, winkler sack (WAM C51820); 1 ♀, Site N05, 20°51′53.94″S., 115°24′24.75″E., 6 May 2006, S. Callan, R. Graham (WAM C51821); 1 ♀, Site DMP, 20°47′51″S., 115°20′55″E.,17 May 2005, S. Callan, hand collected (WAM C51822).

REMARKS

The species was originally described by Wahrberg (1922) from two semi-arid, inland localities, namely Yalgoo and Day Dawn (Lake Austin). The species was redescribed by Vandel (1973) from four coastal limestone caves, three near Jurien Bay and one in Augusta. However, neither description is complete by modern taxonomic standards or sufficiently illustrated for accurate species identification. The identification of the specimens in this study is based on that of Dalens (1993). The species is potentially widespread. Its principal diagnostic characters are: uropod exopodites long, extending beyond the uropod protopodite; flagellum of second antenna 3-segmented; *noduli laterales* present on pereonites; and epimera of pleonites 3–5 reduced. This species was collected from three sites in this study but is probably more widespread (Figure 49).

Family Porcellionidae Brandt, 1831

Genus *Porcellionides* Miers, 1877

Porcellionides pruinosus (Brandt, 1833)

Figures 7, 8

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 3 juveniles, Site N01, 20°49′35.41″S., 115°26′39.52″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51823); 1 ♀, Site N01a, 20°49′34.11″S., 115°26′43.86″E., 1 May 2007, S. Callan, K. Edwards, hand collection (WAM C51824); 1 ♀, Site ACCZ1, 20°49′34.57″S., 115°26′43.85″E., 8 March 2010, N. Gunawardene, C. Taylor, night hand collection (WAM C51825).

FIGURE 50 Distribution records of *Porcellionides pruinosus* on Barrow Island.

FIGURE 51 Distribution records of *Barrowdillo pseudopyrgoniscus* on Barrow Island.

REMARKS

This is an introduced, widespread and synanthropic species with its origin in the Mediterranean basin. It is possibly an early introduction into Western Australia. Its principal diagnostic characters are: uropod exopodites long extending beyond the uropod protopodite; flagellum of second antenna 2-segmented; head with small frontal lobes; and posterior margin of pereonite 1 convex. This species was collected from three sites on Barrow Island adjacent to human infrastructure (Figure 50).

Family Armadillidae Brandt, 1831

Genus *Barrowdillo* Dalens, 1993

Barrowdillo pseudopyrgoniscus Dalens, 1993

Figures 18, 19, 20, 22

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♂, Site N14, 20°48′36.60″S., 115°25′37.35″E., 1 May 2007, S. Callan, K. Edwards, hand collected (WAM C51701); 1 ♂, Site N20, 20°44′59.84″S., 115°26′50.99″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51702); 3 ♀, Site N03, 20°49′26.33″S., 115°26′34.84″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51703); 1 ♀, 20°47′38″S., 115°26′34″E., 24 April 2005, S. Callan (WAM C51704); 1 ♂, Site HDDZI, 20°41′37.02″S., 115°25′14.70″E., 30 March 2012, N. Gunawardene, C. Taylor, wood bait (WAM C51705); 1 ♀, Site QAPZ1, 20°47′21.75″S., 115°27′44.38″E., 30 March 2012, N. Gunawardene, C. Taylor, night hand collection (WAM C51706).

REMARKS

This is the type and the only species of *Barrowdillo* currently described. It is known only from Barrow Island and the adjacent Varanus Island and may therefore be considered a short-range endemic species (SRE) (Harvey 2002). Dalens' (1993) description is incomplete and not adequately illustrated for identification. A taxonomic revision is necessary, in particular because there are at least three undescribed species (S. Judd unpublished data) found in the western Pilbara region. Its principal diagnostic characters are: flagellum of second antenna 2 segmented; pleopod exopodites interlocking with pleopod 5 covered by pleopod 4; dorsal surface convex but with horizontal epimera; and schisma on posterior corner of pereonite 1 absent but with large tooth-like ventral lobe on pereonites 1 and 2. The distribution of this species on Barrow Island is shown in Figure 51.

Genus *Buddelundia* Michaelsen, 1912

REMARKS

Buddelundia was erected by Michaelsen (1912) and the type species, *B. labiata* (Budde-Lund, 1912) was designated by Taiti et al. (1998). As it is currently

defined, *Buddelundia* comprises over 70 species in Western Australia, most of them undescribed and therefore the genus is in need of revision. The genus is particularly diverse in the Pilbara with many undescribed species (S. Judd, unpublished data). Its principal diagnostic characters are: pleopod exopodites interlocking with pleopod 5 covered by pleopod 4; dorsal surface convex with horizontal epimera and a schisma on posterior corner of pereonite 1.

***Buddelundia hirsuta* Dalens, 1992**

Figures 30, 31

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Site N05a, 20°51′53.94″S., 115°24′24.75″E., 1 May 2007, S. Callan, R. Graham, winkler Sack (WAM C51707); 1 ♂, 2 ♀, Site N05, 20°51′58.11″S., 115°24′22.41″E., 6 May 2006, S. Callan, R. Graham (WAM C51708).

REMARKS

This species was described by Dalens (1992) based on two specimens collected from the entrance of a cave in Cape Range. Although the Barrow Island specimens match Dalens' description in most details, this species needs taxonomic revision against similar morphotypes in the genus. *Buddelundia hirsuta* is known only from Cape Range and Barrow Island. Its principal diagnostic characters are: frontal shield divided into upper and lower sections by a transverse groove; interlocking structures present on pereonites 2, 5, 6, and 7 and on pleonite 3; and dorsal surface covered in many long setae. This species has been collected at only one locality on the island (Figure 52).

***Buddelundia* sp. 1**

Figures 26, 27

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 2 ♀, Site DMP, 20°47′51″S., 115°20′55″E., 24 April 2005, S. Callan, K. Edwards (WAM C51742); 15 specimens, Site GP6, 20°47′4.71″S., 115°26′27.75″E., 15 March 2005, S. Callan, K. Edwards, winkler sack (WAM C51743); > 20 specimens, Site GP9, 20°47′59.18″S., 115°27′0.46″E., 15 March 2005, S. Callan, R. Graham, winkler sack (WAM C51744); 1 ♂, Site N13, 20°50′32.41″S., 115°23′35.24″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51745); 2 ♂, Site N04, 20°43′29.29″S., 115°28′19.88″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51746); Site N12, 20°49′54.75″S., 115°25′51.86″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51747); 1 ♀, Site N11, 20°48′51.98″S., 115°22′32.15″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51748); 1 ♀, Site N15, 20°48′19.96″S., 115°25′52.36″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51749); 1 ♀, Site N17, 20°47′52.63″S., 115°21′20.41″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51750); 3 ♀, Site N18, 20°50′29.21″S., 115°23′23.31″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51751); 2 ♀, Site GP9, 20°47′59.18″S., 115°27′0.46″E., 25 September 2006, S. Callan, R. Graham, winkler sack (WAM C51752); 3 ♀, Site N05a, 20°51′58.11″S., 115°24′22.41″E., 1 May 2007, S. Callan, R. Graham, winkler sack (WAM C51753); 1 ♀, Site N07b, 20°49′5.63″S., 115°23′8.70″E., 1 May 2007, S. Callan, R. Graham, winkler sack (WAM C51754); 1 ♀, Site N08, 20°46′44.90″S., 115°27′43.34″E., 1 May 2007, S. Callan, K. Edwards, winkler sack (WAM C51755); 3 ♀, Site N11, 20°48′51.98″S., 115°22′32.15″E; S. Callan, K. Edwards, winkler sack (WAM C51756); >20 specimens, Site N14, 20°48′36.60″S., 115°25′37.35″E., 1 May 2007, S. Callan, K. Edwards, winkler sack (WAM C51757); 8 specimens, Site N15, 20°48′19.96″S., 115°25′52.36″E., 1 May 2007, S. Callan, K. Edwards, winkler sack (WAM C51758); 2 ♀, Site N16, 20°47′47.82″S., 115°21′10.22″E., 1 May 2007, S. Callan, K. Edwards, winkler sack (WAM C51759); 1 ♂, 2 ♀, Site N18, 20°50′29.21″S., 115°23′23.31″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51760); 5 ♀, Site N22, 20°49′54.98″S., 115°25′13.29″E., 1 May 2007, S. Callan, K. Edwards, winkler sack (WAM C51761); 6 specimens, Site N23, 20°49′9.10″S., 115°23′39.73″E., 1 May 2007, S. Callan,

FIGURE 52 Distribution records of *Buddelundia hirsuta* on Barrow Island.

FIGURE 53 Distribution records of *Buddelundia* sp. 1 on Barrow Island.

FIGURE 54 Distribution records of *Buddelundia* sp. 2 on Barrow Island.

K. Edwards, winkler sack (WAM C51762); 1 ♀, Site 105, 20°48′08″S., 115°26′48″E., 17 May 2005, S. Callan, winkler sack (WAM C51763); > 20 specimens, Site N07a, 20°48′58.73″S., 115°23′8.57″E., 1 May 2007, S. Callan, K. Edwards, winkler sack (WAM C51764).

REMARKS

This is an undescribed species characterised by: frontal shield not divided into upper and lower sections by a transverse groove; interlocking lobate structures present on the ventral surface of the epimera of pereonites 5–7 and pleonite 3; posterior margin of the first epimera straight (not angled backwards) and outer lobe of the schisma truncate making the inner lobe clearly visible and much longer than the outer lobe in lateral view; dorsal surface covered with short setae; the animal has a glossy brown appearance with cream-coloured telson and uropods. This species is probably also found in the western Pilbara (S. Judd unpublished data) but a complete revision of all material is needed to confirm conspecifity. It appears relatively widely distributed on Barrow Island (Figure 53).

***Buddelundia* sp. 2**

Figures 24, 28, 29

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Site GP9, 20°47′59.18″S., 115°27′0.46″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51769); 1 ♀, Site GP4, 20°47′2.70″S., 115°27′33.54″E., 25 September 2006, S. Callan, R. Graham, pitfall trap (WAM C51770); 1 ♀, Site N14, 20°48′36.60″S., 115°25′37.35″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51771); 1 ♀, Site GP4, 20°47′2.70″S., 115°27′33.54″E., 16 March 2006, S. Callan, R. Graham, winkler sack (WAM C51772); 1 ♀, Site GP7, 20°47′51.40″S., 115°26′26.89″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51773).

REMARKS

This is an undescribed species distinguished by: frontal shield not divided into upper and lower sections by a transverse groove; interlocking lobate structures absent on the ventral surface of the epimera of pereonites 5–7 and pleonite 3; and dorsal surface without setae. No males were present in the material and more material is needed for a comprehensive morphological assessment. The species has only been found at four sites on the eastern part of the island and is considered a potential SRE species (Figure 54).

***Buddelundia* sp. 3**

Figures 17, 25, 32

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀ damaged, Site GP7, 20°47′51.40″S., 115°26′26.89″E., 25 September 2006, S. Callan, R. Graham,

hand collected (WAM C51709); 1 ♀, Site GP9, 20°47′59.18″S., 115°27′0.46″E., 25 September 2006, S. Callan, R. Graham, hand collected (WAM C51710); 1 ♀, 20°49′43″S., 115°26′36″E., 1 May 2005 (WAM C51711); 1 ♀, 20°49′43″S., 115°26′36″E., 1 May 2005 (WAM C51712); 1 ♂, Site GPX, 20°47′45.203″S., 115°27′8.39″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51713); 1 ♀, Site GP9, 20°47′59.18″S., 115°27′0.46″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51714); 1 ♂, Site GP3, 20°47′9.10″S., 115°27′26.18″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51715); 1 ♀, Site GP8, 20°47′46.08″S., 115°26′25.15″E., 15 March 2006, S. Callan, R. Graham (WAM C51716); 2 ♂, Site N01, 20°49′35.41″S., 115°26′39.52″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51717); 1 ♂, 1 ♀, Site N04, 20°43′29.29″S., 115°28′19.88″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51718); 3 ♂, 2 ♀, Site N06, 20°47′51.13″S., 115°25′57.60″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51719); 4 ♂, 3 ♀, Site N08, 20°46′44.90″S., 115°27′43.34″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51720); 1 ♂, 2 ♀, Site N12, 20°49′54.75″S., 115°25′51.86″E., 6 May 2006, S. Callan, R. Graham, Hand Collected (WAM C51721); 2 ♂, Site N15, 20°48′19.960″S., 115°25′52.36″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51722); 1 ♂, 2 ♀, Site N26, 20°49′1.22″S., 115°26′6.32″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51723); 1 ♂, Site N01a, 20°49′34.12″S., 115°26′43.86″E., 1 May 2007, S. Callan, R. Graham, pitfall trap (WAM C51724); 1 ♀, Site N03, 20°49′26.33″S., 115°26′34.84″E., 1 May 2007, S. Callan, R. Graham, hand collected (WAM C51725); 2 ♂, 2 ♀, Site N04b, 20°43′43.85″S., 115°28′22.60″E., 1 May 2007, S. Callan, R. Graham, pitfall trap (WAM C51726); 1 ♂, 1 ♀, Site N05a, 20°51′58.11″S., 115°24′22.41″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51727); 2 ♂, Site N08, 20°46′44.90″S., 115°27′43.34″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51728); 2 ♂, 1 ♀, Site N12, 20°49′54.75″S., 115°25′51.86″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51729); 1 ♂, Site N15, 20°48′19.960″S., 115°25′52.36″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51730); 1 ♀, Site N26, 20°49′1.22″S., 115°26′6.32″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51731); 1 ♂, Site GTPZ1, 20°47′40.20″S., 115°26′47.10″E., 30 March 2005, N. Gunawardene, C. Taylor, Wood bait (WAM C51732); 1 ♂, Site GTPZ1, 20°47′39.95″S., 115°26′48.38″E., 30 March 2005, N. Gunawardene, C. Taylor, night hand collection (WAM C51733); 6 ♂, 2 ♀, Site GTPZ2, 20°47′39.18″S., 115°27′11.77″E., 30 March 2005, N. Gunawardene, C. Taylor, barrier pitfall trap (WAM C51734); 1 juvenile, Site GTPZ1, 20°47′37.57″S., 115°27′13.06″E., 30 March 2005, N. Gunawardene, C. Taylor, litter sample (WAM C51735); 5 ♂, 4 ♀, Site GTPZ1, 20°47′10.33″S., 115°27′28.52″E., 30 March 2005, N. Gunawardene, C. Taylor, pitfall trap (WAM C51736); 1 ♀, Site QAPZ1, 20°47′21.72″S., 115°27′44.38″E., 30 March 2005, N. Gunawardene, C. Taylor, night hand collection (WAM C51737); 1 ♀, Site WAPV2, 20°43′33.88″S., 115°28′23.95″E., 30 March 2005, N. Gunawardene, C. Taylor, window trap (WAM C51738); 2 ♂, 2 ♀, Site N03, 20°49′26.33″S., 115°26′34.84″E., 6 May 2006, S. Callan, R. Graham (WAM C51739); 2 ♂, Site GP6, 20°47′4.71″S., 115°26′27.75″E., 25 September 2006 (WAM C51740); 4 ♂, 2 ♀, Site N14, 20°48′36.60″S., 115°25′37.35″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51741).

REMARKS

This is an undescribed species that occurs throughout the coastal parts of the western Pilbara (S. Judd unpublished data). The principal diagnostic characters are: frontal shield divided into upper and lower sections by a transverse groove; prominent *sulcus arcuatus* on pereonite 1; pleonite 3 without interlocking lobes; protuberances above the clypeus in males; and outer lobe of the schisma on the posterior corner of pereonite 1 slightly projected backwards and longer than inner lobe. The species shows affinities with *B. bipartita* Budde-Lund, 1912 occurring between Denham and Geraldton, *B. cinerascens* Budde-Lund, 1912 from Rottnest Island and *B. inaequalis* Budde-Lund, 1912 from Fremantle. All these species need to be revised in detail to obtain a better understanding of their taxonomic status and distribution. *Buddelundia* sp. 3 appears relatively common and widely distributed on the eastern part of the island (Figure 55).

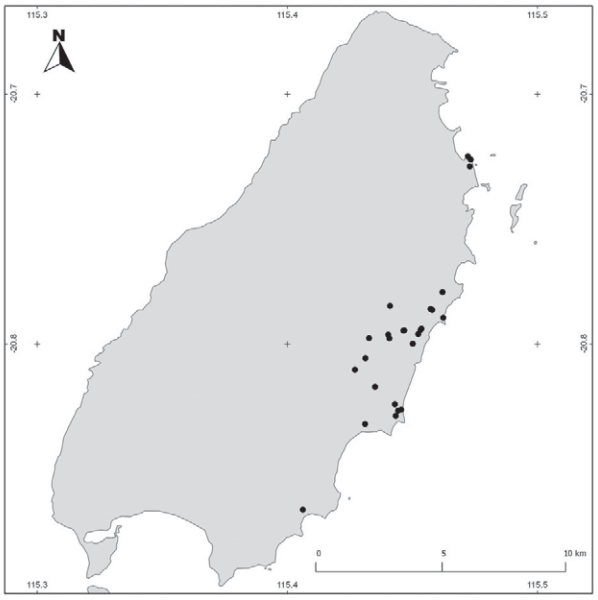

FIGURE 55 Distribution records of *Buddelundia* sp. 3 on Barrow Island.

Buddelundia sp. 4

Figures 33, 35, 36

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Site HDDZ1, 20°41′29.89″S., 115°25′7.31″E., 29 September 2011, N. Gunawardene, C. Taylor, window trap (WAM C51765); 1 ♂, 1 ♀, Site HDDZ1, 20°41′35.11″S., 115°25′12.40″E., 30 March 2012, N. Gunawardene, C. Taylor, litter sample (WAM C51766); 1 ♂, 1 ♀, Site HDDZ1, 20°41′34.79″S., 115°25′12.82″E., 29 September, 2011, N. Gunawardene, night hand collection (WAM C51767); 1 ♂, 1 ♀, Site GTPZ2, 20°47′42.39″S., 115°26′52.51″E., 30 March 2012, N. Gunawardene, C. Taylor, litter sample (WAM C51768); 2 ♂, Barrow Island Surf Point Beach, 20°41′S., 115°28″E., 8 January 2012, K. Edwards (WAM 49699).

REMARKS

This is an undescribed species known only from four sites on Barrow Island (Figure 56). The principal diagnostic characters are: frontal shield divided into upper and lower sections by a transverse groove; pleonite 3 without interlocking lobes; *sulcus arcuatus* absent; inner lobe of schisma on posterior corner of first pereonite slightly longer than outer; and large tooth-like lobe on the ventral surface of pereonite 2. The species is pale cream with patches of light brown. This species was not collected in the original baseline study detailed in Callan et al. (2011).

FIGURE 56 Distribution records of *Buddelundia* sp. 4 on Barrow Island.

Buddelundia sp. 5

Figures 5, 12, 21, 34, 37, 38

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 2 ♂, 2 ♀, Site 22, 20°47′12″S., 115°27′17″E., 24 April 2005, S. Callan (WAM C51774); 2 ♂, 5 ♀, Site 45, 20°47′18″S., 115°26′31″E., 24 April 2005, S. Callan (WAM C51775); 6 ♀, Site 22, 20°47′12″S., 115°27′17″E., 17 May 2005, S. Callan (WAM C51776); 1 ♀, Site 10, 20°52′01″S., 115°24′19″E., 17 May 2005, S. Callan (WAM C51777); 1 ♀, Site 105, 20°49′07″S., 115°26′15″E., 17 May 2005, S. Callan (WAM C51778); 1 ♀, Site CC1, 20°49′1.33″S., 115°26′14.72″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51779); 1 ♀, Site GP7, 20°47′51.40″S., 115°26′26.90″E., 15 March 2006, S. Callan, R. Graham (WAM C51780); 3 ♀, Site CC2, 20°49′2.49″S., 115°26′23.98″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51781); 1 ♂, 1 ♀, Site N10, 20°49′13.93″S., 115°22′21.20″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51782); 3 ♀, Site N10, 20°49′13.93″S., 115°22′21.20″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51783); 1 ♂, Site N22, 20°49′54.98″S., 115°25′13.29″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51784); 2 ♂, 1 ♀, Site N05, 20°51′53.94″S., 115°24′24.75″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51785); 1 ♀, Site N06, 20°47′51.13″S., 115°25′57.60″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51786); 2 ♀, Site N07, 20°49′3.91″S., 115°23′6.34″E., 6 May 2006, S. Callan, R. Graham, winkler sack (WAM C51787); 1 ♀, Site N10, 20°49′13.93″S., 115°22′21.20″E., 6 May 2006, S. Callan, R. Graham, suction sample (WAM C51788); 5 ♂, 5 ♀, Site N14, 20°48′36.60″S., 115°25′37.35″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51789); 1 ♀, Site N17, 20°47′52.63″S., 115°21′20.41″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51790); 1 ♂, 2 ♀, Site N23, 20°49′9.10″S., 115°23′39.73″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51791); 1 ♂, Site GPX, 20°47′45.20″S., 115°27′8.39″E., 25 September 2006, S. Callan, R. Graham, winkler sack (WAM C51792); 1 ♀, Site CC1, 20°49′1.33″S., 115°26′14.72″E., 25 September 2006, S. Callan, R. Graham, hand collected (WAM C51793); SJ758, 2 ♂, 5 ♀, Site GP3, 20°47′9.10″S., 115°27′26.18″E., 25 September 2006, S. Callan, R. Graham, hand collected (WAM C51794); 1 ♀, Site GP4, 20°47′2.70″S., 115°27′33.54″E., 25 September 2006, S. Callan, R. Graham, hand collected (WAM C51795); 1 ♂, 2 ♀, Site GP5, 20°46′59.01″S., 115°27′2.63″E., 25 September 2006, S. Callan, R. Graham, hand collected (WAM C51796); 1 ♂, 2 ♀, Site GP6, 20°47′4.71″S., 115°26′27.75″E., 25 September 2006, S.

Callan, R. Graham, hand collected (WAM C51797); 1 ♂, Site GP7, 20°47′51.40″S., 115°26′26.89″E., 25 September 2006, S. Callan, R. Graham, pitfall trap (WAM C51798); 3 ♂, Site N05a, 20°51′58.11″S., 115°24′22.41″E., 1 May 2007, S. Callan, R. Graham, hand collected (WAM C51799); 3 ♀, Site N05b, 20°51′50.22″S., 115°24′23.2″E., 1 May 2007, S. Callan, R. Graham, pitfall trap (WAM C51800); 2 ♀, Site N07b, 20°49′5.63″S., 115°23′8.70″E., 1 May 2007, S. Callan, R. Graham, pitfall trap (WAM C51801); 1 ♂, 1 ♀, Site N10, 20°49′13.93″S., 115°22′21.20″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51802); 3 ♂, 1 ♀, Site N10, 20°49′13.93″S., 115°22′21.20″E., 1 May 2007, S. Callan, K. Edwards, hand collected (WAM C51803); 1 ♀, Site N16, 20°47′47.82″S., 115°21′10.22″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51804); 1 ♂, Site N22, 20°49′54.98″S., 115°25′13.29″E., 1 May 2007, S. Callan, K. Edwards, hand collected (WAM C51805); 1 ♂, 2 ♀, Site N23, 20°49′09.10″S., 115°23′39.73″E., 1 May 2007, S. Callan, K. Edwards, hand collected (WAM C51806); 1 ♂, Site AIRZ2, 20°51′59.14″S., 115°24′23.69″E., 30 March 2012, N. Gunawardene, C. Taylor, window trap (WAM C51807); 1 ♂, 4 ♀, Site GTPZ2, 20°47′42.82″S., 115°26′49.15″E., 30 March 2012, N. Gunawardene, C. Taylor, window trap (WAM C51808); 1 ♂, 1 ♀, Site GTPZ220°47′42.39″S., 115°26′52.51″E., 30 March 2012, N. Gunawardene, C. Taylor, litter sample (WAM C51809); 3 ♂, 3 ♀, Site N10, 20°49′13.93″S., 115°22′21.20″E., 6 May 2006, S. Callan, R. Graham (WAM C51810).

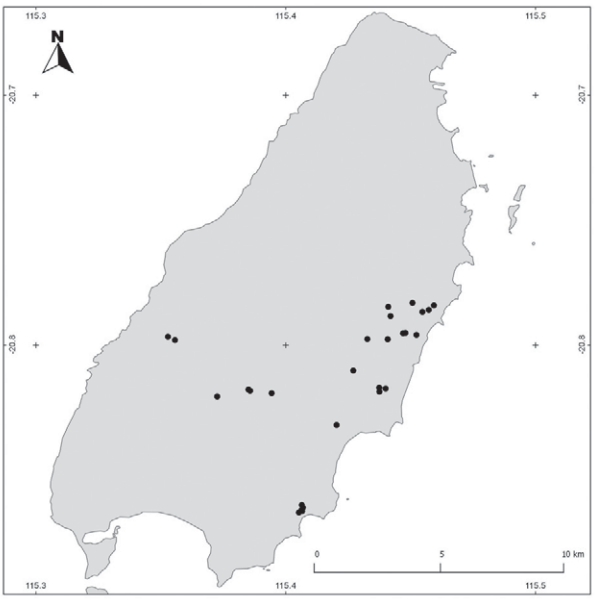

FIGURE 57 Distribution records of *Buddelundia* sp. 5 on Barrow Island.

REMARKS

This is an undescribed species characterised by: frontal shield divided into upper and lower sections by a transverse groove; pleonite 3 without interlocking lobes; first pereonite without *sulcus arcuatus* but with shallow depression; inner lobe of schisma on posterior corner of first pereonite slightly shorter than outer lobe; and moderate tooth-like lobe on ventral surface of pereonite 2. The species is dark brown with patches of cream. This is the most common isopod collected in the present study and appears widely distributed in the southern half of the island (Figure 57). The species is potentially widespread in the Pilbara (S. Judd unpublished data) but more taxonomic work to assess species boundaries is required.

Armadillidae genus 1

Armadillidae genus 1 sp. 1

Figures 14, 15, 16

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Site GP7, 20°47′51.40″S., 115°26′26.89″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51811); 1 ♂, 4 ♀, Site WAPZ1, 20°43′38.42″S., 115°28′26.63″E., 29 September 2011, C. Taylor, night hand collection (WAM C51812); 1 ♀, Site N22, 20°49′54.98″S., 115°25′13.29″E., 6 May 2006, S. Callan, R. Graham, pitfall trap (WAM C51813); 1 ♂, Site 45, 20°47′18″S., 115°26′31″E., 24 April 2005, S. Callan, winkler sack (WAM C51814); 1 ♂, Site N22, 20°49′54.98″S., 115°25′13.29″E., 6 May 2006, S. Callan, R. Graham, hand collected (WAM C51815); 1 ♀, Site QAPZ1, 20°47′21.75″S., 115°27′44.38″E., 30 March 2012, N. Gunawardene, C. Taylor, night hand collection (WAM C51816); 2 ♀, Site N14, 20°48′36.60″S., 115°25′37.35″E., 6 May 2006, S. Callan, R. Graham (WAM C51817).

REMARKS

This species represents an undescribed and currently considered monotypic genus known only from five sites on the eastern half of Barrow Island (Figure 58). In contrast to *Buddelundia* and *Barrowdillo* it is dorso-ventrally flattened and appears to have limited capacity for conglobation. It is light in colour and the brown pigmentation on the pleon and pereonite 1 is unusual. The genus shares the same arrangement of the pleopod exopodites found in *Buddelundia* and *Barrowdillo;* so it is included in the subfamily Buddelundiinae Vandel, 1973. The principal diagnostic characters

FIGURE 58 Distribution records of Armadillidae genus 1 sp. 1 on Barrow Island.

FIGURE 59 Distribution records of Armadillidae genus 2 sp. 1 on Barrow Island.

are: pleopod exopodites interlocking, with pleopod 5 covered by pleopod 4; ventral surface of pereonites 1 and 2 without interlocking structures but with small rounded bumps; and uropod exopodites extending almost to the distal margin of the protopodite. This species is only known from Barrow Island and is therefore highly likely a SRE species.

Armadillidae genus 2

Armadillidae genus 2 sp. 1

Figure 23

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♂, Site N06a, 20°47′34.01″S., 115°25′27.17″E., 1 May 2007, S. Callan, K. Edwards (WAM C51818); 1 juvenile, Site N08, 20°46′44.90″S., 115°27′43.34″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51819).

REMARKS

This species potentially represents an undescribed genus close to *Barrowdillo*; however, as only one damaged male and a juvenile were collected from two sites during the survey (Figure 59), more material is needed to confirm its taxonomic status. This species had a very similar overall morphology to *Barrowdillo* except that the epimera are not horizontal in this species. The principal diagnostic characters are: pleopod exopodites interlocking with pleopod 5 covered by pleopod 4; schisma absent on pereonite 1, but interlocking structures present in the form of a tooth-like inner lobe on ventral surface of epimera 1 and 2; distal part of uropod protopodite longer than broad and tapering; and body with dorsal surface convex and epimera tending horizontal at the margins. This is a potential SRE species.

Armadillidae genus 3

Armadillidae genus 3 sp. 1

Figures 13, 39, 42

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♂, Site 17, 20°47′38″S., 115°27′24″E., 17 May 2005, S. Callan (WAM C51682); 1 ♀, Site 105, 20°48′08″S., 115°26′48″E., 17 May 2005, S. Callan, pitfall trap (WAM C51683); 2 ♀, Site GTPZ2, 20°47′39.18″S., 115°27′11.77″E., 30 March 2012, N. Gunawardene, C. Taylor, barrier pitfall trap (WAM C51684); 1 ♀, 20°47′12″S., 115°27′17″E., 17 May 2005, S. Callan (WAM C51686).

REMARKS

This genus differs from the Armadillidae listed above in that the pleopod exopodites are not interlocking and the fifth pair is visible. This is an undescribed species distinguished by: pleopod

exopodites not interlocking and with the fifth pair visible; uropod protopodite with distal part long and tapering; frontal shield raised form vertex; and dorsal surface with prominent tubercles. It must be noted that the degree of dorsal ornamentation can vary considerably among specimens collected from the same locality. At this stage Armadillidae genus 3 sp. 1 is known from four adjacent sites on Barrow Island and therefore considered an island endemic (Figure 60).

Armadillidae genus 3 sp. 2

Figure 43

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Site GP6, 20°47′4.71″S., 115°26′27.75″E., 15 March 2006, S. Callan, R Graham (WAM C51685).

REMARKS

This is an undescribed species similar to Armadillidae genus 3 sp. 1, but the dorsal tubercles are absent. This species is represented by a single female found near Armadillidae genus 3 sp.1 (Figure 61). Examination of more material, in particular males, is needed to confirm its taxonomic status. This species is also potentially endemic to the island.

Armadillidae genus 4

REMARKS

This genus shares the same arrangement of pleopod exopodites as Armadillidae genus 3. It differs in that it possess a wide lateral groove on the distal margin of pereonite. 1 Species belonging to this genus are very small (less than 5 mm) and rarely collected. Detailed taxonomic studies are needed for a better understanding of their pattern of distribution, but it appears that this genus contains many potential SRE species. Isopods of this genus are widespread in WA (S. Judd unpublished data).

Armadillidae genus 4 sp. 1.

Figures 40, 44

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♀, Site 105, 20°48′08″S., 115°26′48″E., 17 May 2005, S. Callan (WAM C51687); 2 ♀, Site 10, 20°52′01″S., 115°24′19″E., 17 May 2005, S. Callan, winkler sack (WAM C51688); 5 ♂, 5 ♀, 5 juveniles, Site CC2, 20°49′2.49″S., 115°26′23.98″E., 15 March 2006, S. Callan, K. Edwards, winkler sack (WAM C51691); 3 ♀, 2 juveniles, Site GTPZ2, 20°47′38.50″S., 115°27′15.44″E., 30 March 2012, N. Gunawardene, C. Taylor, pitfall trap (WAM C51697); 1 ♀, Site QAPZ2,

FIGURE 60 Distribution records of Armadillidae genus 3 sp. 1 on Barrow Island.

FIGURE 61 Distribution records of Armadillidae genus 3 sp. 2 on Barrow Island.

FIGURE 62 Distribution records of Armadillidae genus 4 sp. 1 on Barrow Island

FIGURE 63 Distribution records of Armadillidae genus 4 sp. 2 on Barrow Island.

20°47′21.71″S., 115°27′43.10″E., 30 March 2012, N. Gunawardene, C. Taylor, barrier pitfall trap (WAM C51698); 1 specimen, Site NO7a, 20°48′58.73″S., 115°23′8.57″E., 1 May 2007, S. Callan, K. Edwards (WAM C51700).

REMARKS

This is an undescribed species defined by: pleopod exopodites not interlocking and with the fifth pair visible; distal part of uropod exopodites short and quadrangular; frontal shield flat to vertex; wide lateral groove present on pereonite 1; and dorsal surface without conspicuous setae. Its distribution on Barrow Island is shown in Figure 62.

Armadillidae genus 4, sp. 2

Figures 41, 45, 46

MATERIAL EXAMINED

Australia: ***Western Australia:*** Barrow Island: 1 ♂, 2 ♀, Site N03, 20°49′26.33″S., 115°26′34.84″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51689); 1 ♂, Site GP9, 20°47′59.18″S., 115°27′0.46″E., 25 September 2006, S. Callan, K. Edwards, pitfall trap (WAM C51690); >50 specimens, Site GPX, 20°47′45.20″S., 115°27′8.39″E., 15 March 2006, S. Callan, R. Graham, winkler sack (WAM C51692); 4 ♂, 4 ♀, Site GP1, 20°47′31.74″S., 115°27′26.29″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51693); 1 ♂, 1 ♀, Site GP4, 20°47′2.70″S., 115°27′33.54″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51694); 1 ♂, 1 ♀, Site GP5, 20°46′59.01″S., 115°27′2.63″E., 15 March 2006, S. Callan, R. Graham, pitfall trap (WAM C51695); 1 ♂, Site N04a, 20°43′28.90″S., 115°28′20.06″E., 1 May 2007, S. Callan, K. Edwards, pitfall trap (WAM C51696); 2 ♂, 2 ♀, Site QAPZ2, 20°47′21.71″S., 115°27′43.10″E., 30 March 2012, N. Gunawardene, C. Taylor, barrier pitfall trap (WAM C53622); 1 ♂, Site WAPZ1, 20°43′30.28″S., 115°28′21.67″E., 30 March 2012, N. Gunawardene, C. Taylor, barrier pitfall trap (WAM C51699).

REMARKS

This is an undescribed species similar to Armadillidae genus 4 sp. 1 but with a narrower lateral groove on pereonite 1 and dorsal surface with conspicuous setae. It is found on the Western half of Barrow Island (Figure 63). More work is needed to establish if the species is found outside Barrow Island but it is likely to be a SRE species.

DISCUSSION

Four species of terrestrial isopod were known previously from Barrow Island. This study found fourteen additional species, eleven of which are undescribed. The determinations of two nominal species (*Ligia exotica* and *Laevophiloscia yalgoonensis*) need to be verified. Three littoral species (*Alloniscus*

pallidulus, *Ligia exotica*, *Olibrinus* sp.) are present on the island and likely to be more widespread than is indicated here, but they are poorly documented in Western Australia even in the Perth area (Judd and Horwitz, 2003). Only one introduced (non-littoral) species (*Porcellionides pruinosus*) was present. This is a synanthropic species and was found in close proximity to humans. It has also been collected at one other remote location in the Pilbara and near Leonora (S. Judd unpublished data).

The Armadillidae dominate the terrestrial isopod fauna of much of arid and semi-arid Western Australia. There are likely to be a number of SRE species. For example, the distribution of *Barrowdillo pseudopyrgoniscus* is limited to Barrow and Varanus Island. *Buddelundia hirsuta* is potentially also known from the Cape Range but this determination cannot be confirmed without reference to type material because the description is incomplete. Preliminary observations based on unpublished data suggest that most of the species found on Barrow Island found have affinities with the species in the western Pilbara. Taxonomic work/revisions are needed to fully understand species boundaries and distribution patterns. This is particularly needed for the Armadillidae since thirteen of the eighteen taxa recognised here belong to the family.

Two genera (Armadillidae genus 1 and genus 2) share the same pleopodal arrangement as *Buddelundia* and *Barrowdillo* which indicates that they belong to the subfamily Buddelundiinae. Both are only known only from either Barrow Island or the western Pilbara. Many species of these genera and *Buddelundia* have been collected in the Pilbara region since 2005 (S. Judd unpublished data) and many are potential SRE species. Judd and Horwitz (2003) have demonstrated that many species have restricted distribution elsewhere in Western Australia. A systematic study of these taxa with description of the new species and integrated genetic analysis would contribute greatly to a clearer understanding of the biogeography of the isopods in WA and inform the management of areas disturbed by human activities.

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REFERENCES

Budde-Lund, G. (1912). Oniscoidea, nachglassenes Fragment. In W. Michaelsen and R. Hartmeyer (eds.), *Die Fauna Südwest-Australiens Ergebnisse der Hamburger südwest-australischen Forschungsreise 1905*. Vol. 4, pp. 17–44. Gustav Fischer: Jena.

Bunn, S.E. and Green, A.J.A. (1982). Oniscoidea (Crustacea: Isopoda) from Rottnest Island, Western Australia. *Journal of the Royal Society of Western Australia* **65**: 147–151.

Callan, S.K., Majer, J.D., Edwards, K. and Moro, D. (2011). Documenting the terrestrial invertebrate fauna of Barrow Island, Western Australia. *Australian Journal of Entomology* **50**: 323–343.

Dalens, H. 1992. Oniscidea (Crustacea, Isopoda) from caves of Cape Range in Western Australia. 1. The genus *Buddelundia*. *Records of the Western Australian Museum* **16**: 87–102.

Dalens, H. 1993. Two new genera of terrestrial isopods (Crustacea: Isopoda: Oniscidea) from north-western Australia. *Records of the Western Australian Museum* **16:**257–267.

Green, A.J.A., Ferrara, F. and Taiti, S. (1990). Terrestrial isopoda from the Krakatau islands, south Sumatra and west Java. *Memoirs of the Museum of Victoria* **50**: 417–436.

Harvey, M.S. (2002). Short-range endemism among the Australian fauna: some examples from non-marine environments. *Invertebrate Systematics* **16**: 555–570.

Judd, S. and Horwitz, P. (2003). Diversity and biogeography of terrestrial isopods (Crustacea: Oniscidea) from south-western Australia: Organic matter and matter and microhabitat utilisation in seasonally dry landscapes. *Crustaceana Monographs* **2:** 191–215.

Lewis, F. (1998). New genera and species of terrestrial isopods (Crustacea: Oniscidea) from Australia. *Journal of Natural History* **32**: 701–732.

Roux, P. (1828). Crustacés de la Méditerranée et de son littoral, décrits et lithographies par lui- meme. *Annales des Sciences Naturelles* **16**: Paris et Marseille.

Taiti, S. and Humphreys, W. F. (2001). New aquatic Oniscidea (Crustacea: Isopoda) from groundwater calcretes of Western Australia. *Records of the Western Australian Museum, Supplement* **64:** 133–151.

Taiti, S., Paoli, P. and Ferrara, F. (1998). Morphology, biogeography and ecology of the family Armadillidae (Crustacea: Oniscidea). *Israel Journal of Ecology* **44**: 291–301.

Vandel, A. (1973). Les Isopods terrestres de l'Australie étude systématique et biogéographique. *Mémoirs du Museum National D'Histoire Naturelle, Nouvelle Série, Série A, Zoologie, Tome LXXXII*. Éditions du Muséum: Paris.

Wahrberg, R. 1922. Terrestre Isopoden aus Australien. Results of Dr. E. Mjoberg's Swedish scientific expeditions to Australia, 1910–13. No. 30. *Arkiv for Zoologie Stockholm* **15**:1–298.

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