

## Two new species of the water mite genus *Aspidiobates* Lundblad from Western Australia (Acarina: Hygrobatidae)

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### Abstract

The new species *Aspidiobates pilbara* and *A. wittenoom* are described from material collected in the Hamersley Ranges, northern Western Australia. A revised key to the Australian members of the genus is presented and evolution within the genus is discussed.

### Introduction

The water mite genus *Aspidiobates* Lundblad has a wide distribution in the southern hemisphere and has been recorded from Australia, New Zealand, New Caledonia and Chile with the Australian fauna currently represented by five species from south-eastern Australia (Cook 1986; Harvey and Cook 1988). Two unusual new species of *Aspidiobates* that appear to have affinities with some of the New Caledonian species were recently collected by Dr W.F. Ponder, Australian Museum, Sydney, in the Hamersley Ranges, Western Australia, and are described here. In addition, the variation in the morphology of the dorsal shield within the genus is analysed.

Specimens are lodged in the Western Australian Museum, Perth (WAM) and the Australian Museum, Sydney (AM), and are all mounted on slides in glycerol gel. Methods follow Harvey (1987).

### Systematics

#### Genus *Aspidiobates* Lundblad

*Aspidiobates* Lundblad, 1941: 115; Cook, 1974: 224; Harvey and Cook, 1988: 51. Type species *Aspidiobates scutatus* Lundblad, 1941, by original designation.

#### Diagnosis

See Cook (1974) and Harvey and Cook (1988).

#### Remarks

The key to the Australian *Aspidiobates* species provided by Harvey and Cook (1988) is revised here to accommodate the two new species from Western Australia.

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Key to Australian species of *Aspidiobates*

1. Males ..... 2  
 Females (those of *A. wittenoom* not known) ..... 8
- 2(1). Genital field with 4 pairs of acetabula ..... 3  
 Genital field with 3 pairs of acetabula ..... 4
- 3(2). Dorsal shield with 1 large anterior platelet and 2  
 smaller posterior platelets ..... *A. wittenoom* sp. nov.  
 Dorsal shield with 1 large anterior platelet and 4  
 smaller posterior platelets ..... *A. aethes* Harvey and Cook
- 4(2). Dorsal shield entire; genu IV proximally curved,  
 ventral margin with a row of stout setae .....  
 ..... *A. bidewel* Harvey and Cook  
 Dorsal shield with 1 large anterior platelet and 2-4  
 smaller posterior platelets; genu IV not curved,  
 without stout setae ..... 5
- 5(4). Dorsal shield with 1 large anterior platelet and 2  
 smaller posterior platelets ..... 6  
 Dorsal shield with 1 large anterior platelet and 4  
 smaller posterior platelets ..... 7
- 6(5). Pedipalpal femur with small ventral projection;  
 first pair of dorsoglandularia on same level as  
 postocularia ..... *A. geometricus* Cook  
 Pedipalpal femur with large ventral projection;  
 first pair of dorsoglandularia posterior to level  
 of postocularia ..... *A. pilbara* sp. nov.
- 7(6). Distance separating first pair of dorsoglandularia  
 greater than distance separating second pair of  
 glandularia; anus midway between genital field  
 and posterior edge of ventral shield ..... *A. scutatus* Lundblad  
 Distance separating first pair of dorsoglandularia  
 equal to distance separating second pair of glandu-  
 laria; anus close to genital field ..... *A. similis* Cook
- 8(1). Genital field with 4 pairs of acetabula ..... *A. aethes* Harvey and Cook  
 Genital field with 3 pairs of acetabula ..... 9
- 9(8). Dorsal shield with 1 large platelet and 5 smaller  
 posterior platelets ..... *A. geometricus* Cook

- Dorsal shield with 1 large platelet and 4 smaller posterior platelets . . . . . 10
- 10(9). Distance separating first pair of dorsoglandularia greater than distance separating second pair . . . . . 11  
 Distance separating first pair of dorsoglandularia equal to distance separating second pair . . . . . 12
- 11(10). Pedipalpal femur with small ventral projection . . . . . *A. scutatus* Lundblad  
 Pedipalpal femur with large ventral projection . . . . . *A. pilbara* sp. nov.
- 12(11). Dorsal shield approximately 850-960  $\mu\text{m}$  in length . . . . . *A. similis* Cook  
 Dorsal shield greater than 1100  $\mu\text{m}$  in length . . . . .  
 . . . . . *A. bidewel* Harvey and Cook

*Aspidiobates pilbara* sp. nov.

Figures 1-9

**Holotype**

Male, Pilbara Springs, bottom end of Lily Pond/Crystal Pool, Millstream National Park, Western Australia, 21°36'30"S, 117°04'E, Stn P8, 14 September 1987, W.F. Ponder (WAM 88/857, formerly AM KS 18085).

**Paratypes**

1 male, 2 females, same collection data as holotype (AM KS 18085).

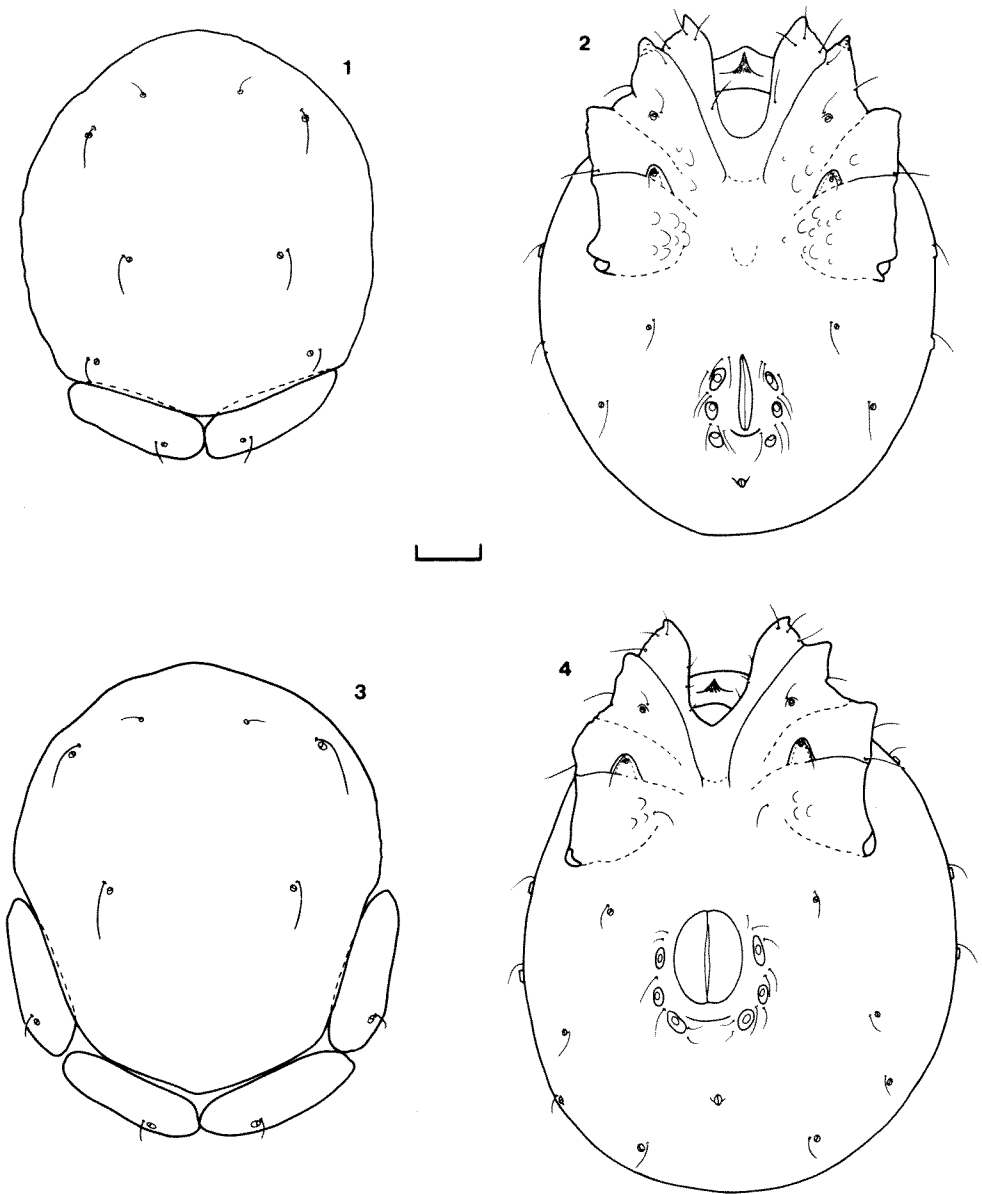
**Diagnosis**

Dorsal shield of male with 1 large platelet and 2 smaller posterior platelets, of female with 1 large platelet and 4 smaller posterior platelets. Genital field with 3 pairs of acetabula. Pedipalpal tibia with 3 ventral setae in large bases; femur without large, blunt, medial seta.

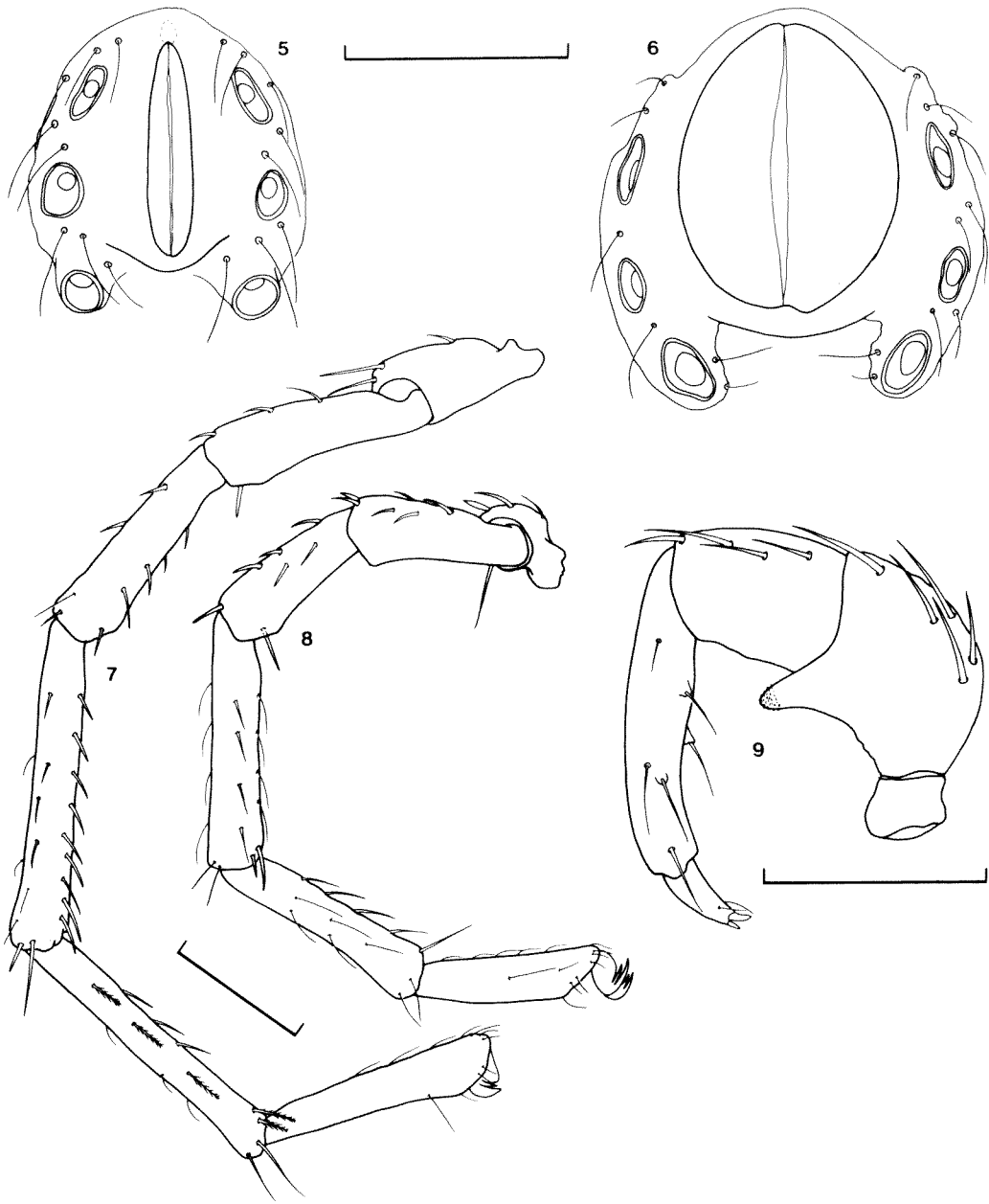
**Description**

*Adults:* dorsal and ventral shields present; dorsal shield of male (Figure 1) with 1 large anterior platelet and 2 smaller postero-medial platelets, of female (Figure 3) with 1 large anterior platelet and 4 smaller posterior platelets; first pair of glandularia slightly posterior to postocularia and closer to lateral margins of plate than to postocularia; distance separating first pair of glandularia slightly greater than distance separating second pair of glandularia. Ventral shield (Figures 2, 4) with suture lines between third and fourth coxae extending anterolaterally at a moderate angle; glandularia of fourth coxae shifted onto third coxae; genital

New species of *Aspidiobates*



Figures 1-4 *Aspidiobates pilbara* sp. nov. 1. Dorsal shield, holotype male. 2. Ventral shield, holotype male. 3. Dorsal shield, paratype female. 4. Ventral shield, paratype female. Scale line = 100  $\mu$ m.



Figures 5-9 *Aspidiobates pilbara* sp. nov., holotype male except as noted. 5. Genital field. 6. Genital field, paratype female. 7. Left leg IV, paratype female. 8. Left leg I. 9. Right pedipalp. Scale lines =  $\mu\text{m}$ .

field with 3 pairs of acetabula (Figures 5, 6), anterior pair slightly elongate, others ovoid; anus midway between genital field and posterior margin of shield. Pedipalp (Figure 9): not sexually dimorphic; femur with moderately large ventral projection; tibia slender, with three ventral setae set in large bases. Legs (Figures 7, 8): swimming setae absent; not sexually dimorphic.

Dimensions ( $\mu\text{m}$ ), ♂ (♀): dorsal shield 595-608/487-506 (675/522), anterior platelet length 544-551 (611), postero-median platelet length 182-200 (214), postero-lateral platelet length (228); ventral shield 723-746/556-570 (810/608), genital field 133-139/111-115 (176/166); capitulum length 166 (153); chelicera length 236-256 (?); pedipalp: trochanter 25-30 (25), femur 103-111 (121), genu 80-83 (86), tibia 138-148 (159), tarsus 41-44 (37); leg I: trochanter 75-77 (64), basifemur 110-129 (128), telofemur 111-117 (120), genu 174-181 (179), tibia 154-162 (161), tarsus 141-142 (138); leg IV: trochanter 124-129 (124), basifemur 160-168 (166), telofemur 166-168 (161), genu 227-230 (228), tibia 212-221 (253), tarsus 177-186 (189).

#### Etymology

The specific epithet is a noun in apposition taken from the type locality.

#### Remarks

The form of sexual dimorphism of the dorsal shield in *A. pilbara* is encountered elsewhere in the genus only in three species from New Caledonia, *A. serratus* K.O. Viets, *A. violaceus* K.O. Viets and *A. starmuehlneri* K.O. Viets (K.O. Viets, 1969). *Aspidiobates pilbara* differs from these species as follows: from *A. serratus* by the lack of the large, blunt, medial seta on the pedipalpal femur present in that species; from *A. violaceus* by the lack of the large ventral projections on the pedipalpal femur present in that species; and from *A. starmuehlneri* by the presence of three ventral setae set in large setal bases on the pedipalpal femur. *Aspidiobates pilbara* further differs from *A. serratus* and *A. violaceus* by the position of the first pair of dorsoglandularia which are separated by slightly more than the distance separating the second pair of glandularia (in *A. serratus* and *A. violaceus* the distance separating each pair is equal).

#### *Aspidiobates wittenoom* sp. nov.

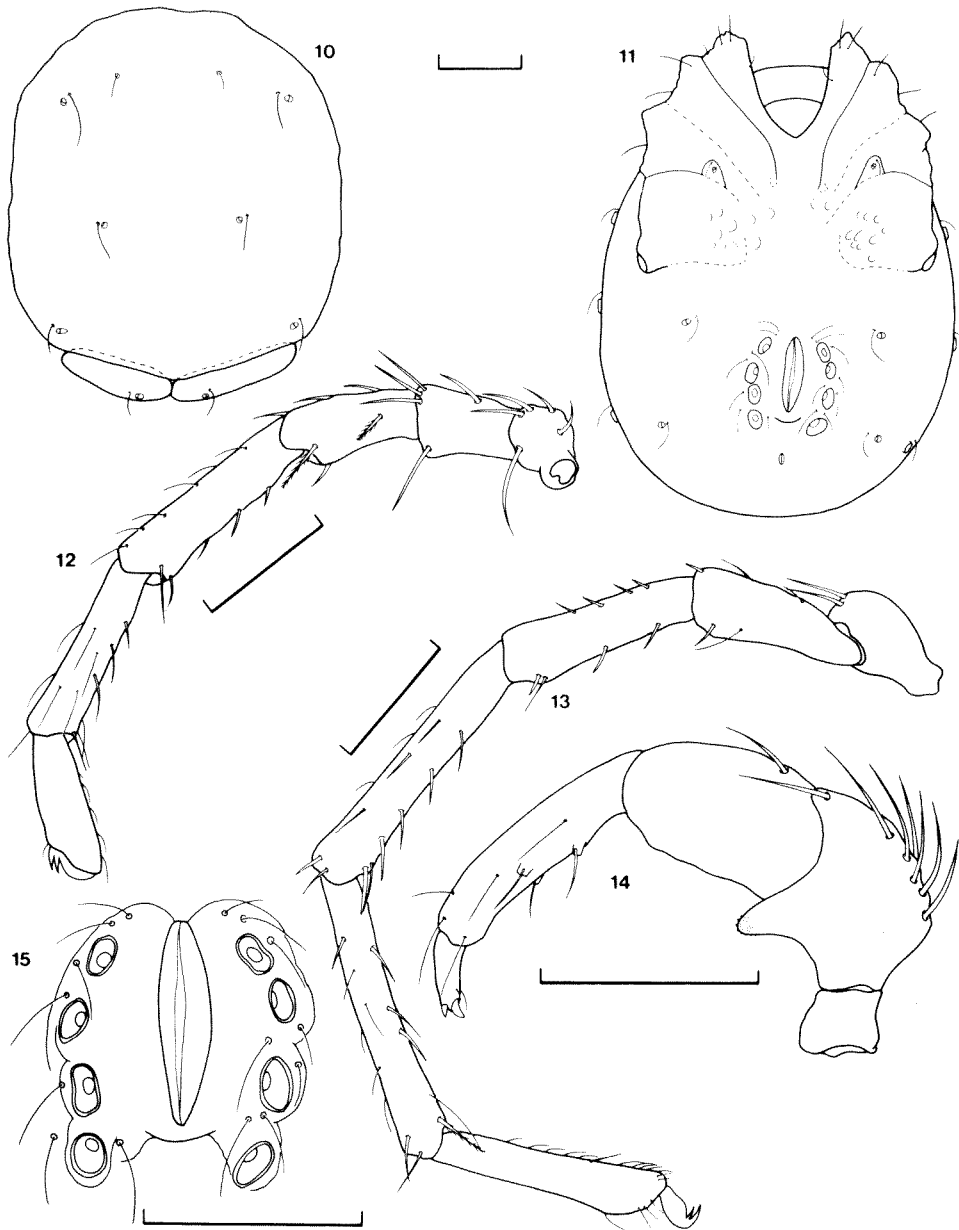
Figures 10-15

#### Holotype

Male, Pilbara Springs, upper part of Dales, Fortescue Falls area, 50 km SE of Wittenoom Gorge, Western Australia, c. 22°25'S, 118°41'E, Stn P12A, 15 September 1987, W.F. Ponder (WAM 88/858, formerly AM KS 18081).

#### Diagnosis

Dorsal shield of male with 1 large plate and 2 smaller posterior platelets. Genital field with 4 pairs of acetabula. Pedipalpal tibia with 3 ventral setae in large bases; femur without large, blunt, medial setae.



Figures 10-15 *Aspidiobates wittenoom* sp. nov., holotype male. 10. Dorsal shield. 11. Ventral shield. 12. Right leg I. 13. Right leg IV. 14. Right pedipalp. 15. Genital field. Scale lines = 100  $\mu$ m.

## Description

*Male*: dorsal and ventral shields present; dorsal shield (Figure 10) with 1 large anterior platelet and 2 smaller postero-medial platelets; first pair of glandularia slightly posterior to postocularia and closer to lateral margins of plate than to postocularia; distance separating first pair of glandularia greater than distance separating second pair of glandularia. Ventral shield (Figure 11) with suture lines between third and fourth coxae extending anterolaterally at a moderate angle; glandularia of fourth coxae shifted onto third coxae; genital field with 4 pairs of elliptical to ovoid acetabula (Figure 15); anus slightly closer to genital field than to posterior margin of shield. Pedipalp (Figure 14): femur with moderately large ventral projection; tibia slender, with three ventral setae set in large bases. Legs (Figures 12, 13): swimming setae absent.

Dimensions ( $\mu\text{m}$ ): dorsal shield 494/422, anterior platelet length 467, posterior-medial platelet length 141; ventral shield 611/455, genital field 127/119; capitulum length 143; chelicera length ?; pedipalp: trochanter 27, femur 103, genu 89, tibia 130, tarsus 40; leg I: trochanter 64, basifemur 114, telofemur 102, genu 156, tibia 147, tarsus 118; leg IV: trochanter 96, basifemur 141, telofemur 147, genu 212, tibia 219, tarsus 189.

## Etymology

The specific epithet is a noun in apposition taken from the type locality.

## Remarks

*Aspidiobates wittenoom* resembles *A. aethes* Harvey and Cook in possessing four pairs of acetabula, but males differ from this species by the possession of only two posterior platelets (four in males of *A. aethes*).

## Discussion

### Evolution

The form of the dorsal shield in *Aspidiobates* species varies interspecifically, and in many cases is sexually dimorphic. I have arranged 14 of the 18 described species into seven groups based on the form of the dorsal shield. The other four species, *A. parvulus* K.O. Viets, *A. caeruleus* K.O. Viets, *A. harveyi* Cook and *A. wittenoom* sp. nov., are each currently known from only a single sex and thus their position within the scheme presented here cannot be ascertained.

The outline presented here is based solely on the morphology of the dorsal shield. Apart from group C, which is defined by an additional platelet in the female (see below), each group is delimited by the loss of pairs of platelets, each of which is here considered to be synapomorphic. Consequently, each remaining group is potentially paraphyletic and cannot at present be defined by synapomorphies. Nevertheless, these groups appear to serve a useful purpose, whether or not they are rigorously defined by the application of hennigian principles.



The presence of four posterior platelets is here thought to represent the plesiomorphic condition for the genus, and which is found in both sexes of Group A species, as well as females of Groups B, C and D species. This has subsequently been reduced to two platelets in other groups, and platelets have been lost in others (even though the vestiges of platelets may be present in certain species). The situation is certainly fairly complex, and this analysis may contribute partly towards a satisfactory phylogenetic analysis of the genus.

### Group A

#### Diagnosis

Males and females with four posterior platelets.

#### Included species

*A. scutatus* Lundblad, *A. similis* Cook and *A. aethes* Harvey and Cook.

This group contains the most primitive species of the genus and at present is known only from south-eastern Australia.

### Group B

#### Diagnosis

Males with two posterior platelets; females with four posterior platelets.

#### Included species

*A. serratus* K.O. Viets, *A. violaceus* K.O. Viets, *A. starmuehlneri* K.O. Viets, and *A. pilbara* sp. nov.

Members of this group appear to have been derived from Group A, and differ in the lack of the posterior-lateral platelets in males. Of the four known species, three are from New Caledonia and one from Western Australia. Three separate lineages (Groups C, D and E) appear to have been derived from this group.

### Group C

#### Diagnosis

Males with two posterior platelets; females with four posterior platelets and a median platelet.

#### Included species

*A. geometricus* Cook.

The first group that appears to have been derived from Group B consists of only a single species from south-eastern Australia, in which the male possesses a dorsal shield similar to those of Group B, but females possess an additional median platelet.

### Group D

#### Diagnosis

Males without posterior platelets; females with four posterior platelets.

### Included species

*A. imamurai* K.O. Viets and *A. bidewel* Harvey and Cook.

The second group that appears to have been derived from Group B differs from that group in the lack of posterior platelets in males such that a single, entire dorsal shield is present (in some specimens of *A. bidewel*, the vestiges of the posterior platelets may be evident [Harvey and Cook 1988]). Two species are known, one from New Caledonia and one from south-eastern Australia.

### Group E

#### Diagnosis

Males and females with two posterior platelets.

#### Included species

*A. lundbladi* K.O. Viets and *A. motasi* K.O. Viets.

The third group that appears to have been derived from Group B differs from Group B in the lack of posterior-lateral platelets in both males and females; two species from New Caledonia are known.

### Group F

#### Diagnosis

Males with two posterior platelets; females without posterior platelets.

#### Included species

*A. spatiosus* K.O. Viets.

This group appears to have been derived from Group E and differs from that group in the lack of posterior platelets in females; only a single species from New Caledonia has been described.

### Group G

#### Diagnosis

Males and females without posterior platelets.

#### Included species

*A. orbiculatus* Hopkins.

The final group appears to have been derived from Group F from which it differs by the lack of posterior platelets in both males and females; a single species is known from New Zealand.

### Relationships of the Western Australian species

Despite recent field work by the author and other collectors in Western Australia (including the south-western corner and the Kimberleys), the two species of *Aspidiobates* described here are the only ones known from the state. They probably represent part of a relictual fauna that was more extensive over Australia when climatic conditions were less severe.

*Aspidiobates pilbara* and *A. wittenoom* are very similar to each other and may represent sister-species. This hypothesis can only be tested when the female of *A. wittenoom* is known. As discussed above, the form of sexual dimorphism of the dorsal shield in *A. pilbara* is encountered elsewhere in the genus only in three New Caledonian species. The presence of four pairs of acetabula in *A. wittenoom* suggests comparisons with *A. aethes* from Victoria (Harvey and Cook 1988), but it seems more reasonable to suggest that each has evolved from different species with three pairs of acetabula. This view is strengthened by the extreme similarity of the pedipalps of *A. pilbara* and *A. wittenoom*, especially of the tibial setation and tubercles.

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