

## A new asterinid genus from the Indo-West Pacific region, including five new species (Echinodermata: Asteroidea: Asterinidae)

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### Abstract

O'Loughlin, P. M., and Rowe, F.W.E. 2005. A new asterinid genus from the Indo-West Pacific region, including five new species (Echinodermata: Asteroidea: Asterinidae). *Memoirs of Museum Victoria* 62(2): 181–189.

A new genus of asterinid asteroid, *Ailsastra* gen. nov., and five new species, *Ailsastra achituvi*, sp. nov., *A. amezianeae*, sp. nov., *A. booneni* sp. nov., *A. eleaumei* sp. nov., *A. paulayi* sp. nov. (type species), are described from the Indo-West Pacific. *Asterina heteractis* H.L. Clark, 1938 is reassigned from *Aquilonastra* O'Loughlin, 2004 to *Ailsastra* gen. nov. The external morphological characters distinguishing *Ailsastra* from other genera of Asterinidae are the distinctively small oral plates and the variably sunken regular carinal series of plates. Internally, superambulacral and superactinal plates, where investigated, are known to be lacking in three species, including the type species. A key to the six species and a distribution map of type localities are provided.

### Keywords

Echinodermata, Asteroidea, Asterinidae, *Ailsastra*, new genus, new species, taxonomy

### Introduction

The Asterinidae have undergone three major revisions (Verrill, 1913; A.M. Clark, 1983; O'Loughlin and Waters, 2004). The most recent included for the first time a combination of morphological and (limited) molecular analyses. This resulted in the reassessment and rationalisation of some established genera, the description of four new genera (bringing the total to 21), and the inclusion of 103 valid species in the family.

Rowe and Richmond (2004) found, in the course of identifying specimens of two species of '*Asterina*' (= *Aquilonastra* O'Loughlin, 2004) from Rodrigues Island in the south-western Indian Ocean, that a problem lay in determining the correct identification of *Aquilonastra burtoni* (Gray, 1840) and the differentiation of supposedly conspecific species included in its synonymy. We have widened their work and undertaken a comparative and systematic study of Indo-West Pacific asterinid taxa.

In the process of solving this problem, additional new material became available from Drs Chantal Conand (La Réunion Island), Gustav Paulay (Indo-West Pacific), Matthew Richmond (western Indian Ocean), and Yves Samyn (south-eastern Africa). Loans of material (including type specimens) have been made by Muséum National d'Histoire Naturelle, Paris, The Natural History Museum, London, South African

Museum, Cape Town, Australian Museum, Sydney, Museum of Comparative Zoology, Harvard University, Massachusetts, The Hebrew University of Jerusalem, and Tel-Aviv University. The availability of this abundant material for comparative use has led to the recognition of yet further, numerous, new asterinid taxa that require description, and has allowed a review of some past, published determinations.

Amongst the new taxa it became apparent that both morphological and molecular (Jon Waters, pers. comm.; paper in preparation) evidence supported the recognition of a new, wide-spread, Indo-West Pacific genus of small, stellate asterinids with regular carinal series and small oral plates. Included in this genus are the eastern Australian species *Asterina heteractis* H.L. Clark, 1938 and five new species, extending in range from the Red Sea and western Indian Ocean to Indonesian waters. This paper includes descriptions of these taxa, and foreshadows an anticipated series on further Indo-West Pacific Asterinidae. The number of taxa included in the family now rises to 22 genera and 108 species.

Terminology follows O'Loughlin and Waters (2004). R/r values are given with the recognition that they vary within a species on the same specimen, amongst specimens, and with size of specimen. Abbreviations for institutions are: AM, Australian Museum, Sydney; MNHN, Muséum National d'Histoire Naturelle, Paris; NHM, The Natural History

Museum, London; NMV, Museum Victoria, Melbourne, Australia; UF, University of Florida, USA; MCZ, Museum of Comparative Zoology, Harvard University, Massachusetts, USA. Photographs were made with a Leica MZ16 stereomicroscope, DC300 Leica digital camera, and "Auto-Montage" software for composition of images.

## Asterinidae Gray, 1840

### *Ailsastra* gen. nov.

#### Figure 1

*Type species. Ailsastra paulayi* sp. nov.

*Other included species. Ailsastra achituvi* sp. nov.; *A. amezianae* sp. nov.; *A. booneni* sp. nov.; *A. eleaumei* sp. nov.; *Asterina heteractis* H.L. Clark, 1938.

*Diagnosis.* Small, stellate asterinids, up to R = 16 mm; rays predominantly 5; one species fissiparous (5–7 rays); interradial margin incurved, rays discrete, broad to narrow at base, short to long, rounded distally; flat actinally, convex abactinally, inferomarginal plates project to form acute ventrolateral margin; disc distinctly to irregularly defined; carinal series of plates present for most of ray, doubly papulate with 2 longitudinal series of large papulae for most of ray, each plate with rounded anterior projection; carinal plates imbricated by adcarinal plates on both sides, forming characteristic 'sunken' series; other abactinal plates closely imbricate, not notched, arched over papular space more than indented proximally for papula; lacking secondary plates; papulae on rays single per papular space, large, in longitudinal series; spinelets glassy, thick to thin, conical or sacciform or subsacciform, pointed or splay-pointed, in clusters or single or double series across proximal plates, sometimes in round or oval bowl-shaped series on plate; lacking pedicellariae with differentiated valves; plates with prominent glassy convexities; superomarginal and inferomarginal plates in regular series; actinal interradial plates in predominantly oblique series; oral plates distinctively small, constricted distally (pair with form of short-handled, smooth-headed mace or club); oral spines up to 6, series incurved distally; suboral spines variably present, if present in continuous series with distal oral spines; lacking superambulacral and superactinal plates in type species and two other investigated species.

*Distribution.* Lord Howe I., NE Australia, Sulawesi I., Sudanese Red Sea, Mauritius, NW Madagascar; rock and coral; 0–16 m.

*Etymology.* From *Ailsa* with the Latin *astrum* (star), in recognition of the substantial contribution by Ailsa Clark to seastar systematics (feminine).

*Remarks.* Superambulacral and superactinal plates are absent from the type species *A. paulayi*, and *A. amezianae* and *A. eleaumei*. The remaining three species (which have not been dissected) have the other generic characters of *Ailsastra*, and it is anticipated that they too lack these internal plates. *Ailsastra* shares the lack of superambulacral and superactinal plates with seven other genera currently included in the Asterinidae:

*Asterina*, *Asterinides*, *Kampylaster*, *Meridiastra*, *Pseudasterina*, *Pseudopatiria* and *Tremaster* (see O'Loughlin and Waters, 2004). However, the form of the oral plates and arrangement of the carinal series of plates distinguish *Ailsastra*, morphologically, from these and all other genera in the family. The morphological justification for recognising the new genus is supported by limited molecular data that places the two specimens of the type-species *A. paulayi* sp. nov. (see below) in a highly divergent but strongly monophyletic clade within a molecular phylogeny of Asterinidae (Jon Waters, pers. comm.; paper in preparation).

### Key to species of *Ailsastra*

1. Rays 5–7; more than 1 madreporite; fissiparous . . . . .  
     . . . . . *A. heteractis*  
 — Rays predominantly 5; single madreporite; not fissiparous  
     . . . . . 2
2. Integument obscures abactinal and actinal plates; lacking superomarginal spinelets; proximal actinal large pyramidal spines present . . . . . *A. booneni*  
 — Abactinal and actinal plates not obscured by integument; superomarginal spinelets present; lacking proximal actinal large pyramidal spines . . . . . 3
3. Rays narrow at base, R/r > 2.5, digitiform; spinelets up to 0.25 mm long . . . . . *A. paulayi*  
 — Rays broad at base, R/r < 2.0, not digitiform; spinelets not longer than 0.20 mm . . . . . 4
4. Form subpentagonal; up to 8 longitudinal series of papulae across mid-rays; spinelets up to 0.10 mm long . . . . .  
     . . . . . *A. amezianae*  
 — Rays discrete, form not subpentagonal; 6 longitudinal series of papulae across mid-rays; some spinelets more than 0.10 mm long . . . . . 5
5. Proximal abactinal spinelets frequently in bowl-shaped arrangement . . . . . *A. eleaumei*  
 — Proximal abactinal spinelets never in bowl-shaped arrangement . . . . . *A. achituvi*

### *Ailsastra achituvi* sp. nov.

Figures 1, 2a, 3a, 4a-c

*Asterina burtoni*.—Clark and Rowe, 1971: 70, table 1 (part: specimen 1951.5.7.12) (non *Asterina burtoni* Gray, 1840).

*Material examined.* Holotype (in alcohol). Sudanese Red Sea, Khor Inkeifail, on coral, *Manihine* Collections, 29 Dec 1950, NHM 1951.5.7.12.

*Diagnosis.* *Ailsastra* with, at R = 10 mm, discrete rays, medium length, wide at base, strongly tapered, rounded distally, R/r about 1.9; carinal series of plates narrowly visible, below adcarinal plates; 6 longitudinal series of papulae across mid-ray; spinelets splay-pointed, subsacciform to conical, up to 0.15 mm long; inferomarginal spinelets twice the length of superomarginal spinelets; up to 6 interradial actinal spines per plate.

*Description.* 5 rays, R = 10 mm; integument evident; rays discrete, wide at base, tapered, rounded distally, R/r about 1.9; single

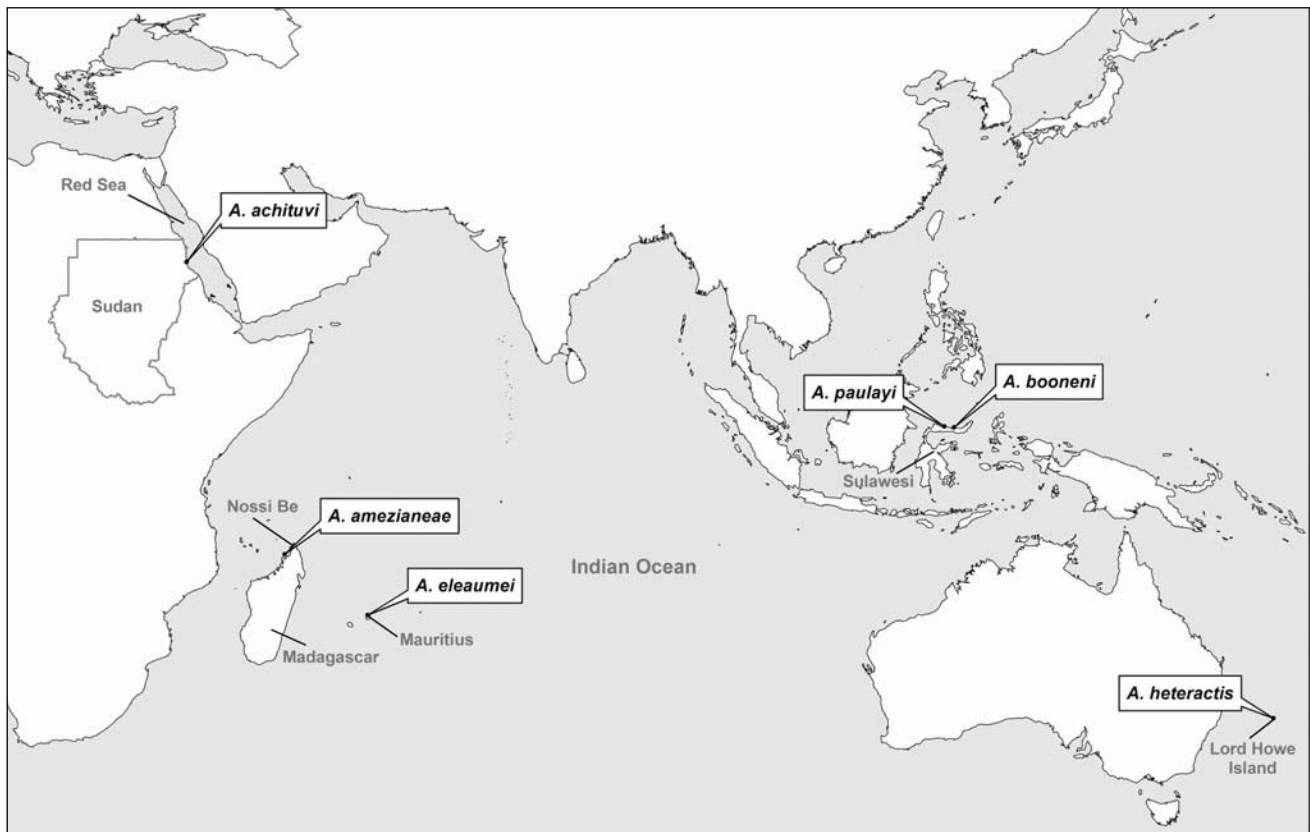


Figure 1. Distributions of the type localities of the six species of *Ailsastra* gen. nov.

madreporite, not fissiparous. Carinal series of plates narrowly visible, below adcarinal plates, doubly papulate, other ray plates slightly incurved proximally for 1 papula, 2 longitudinal series of papulae on each upper side of ray, 6 longitudinal series across mid-ray; disc close to regularly defined by 5 radial, 5 interradial plates; spinelets glassy, splay-pointed, subsacciform to conical, up to 14 spinelets in single or double series across proximal edge of plate, spinelets up to 0.15 mm long, 3–6 on distal interradial plates, proximal and distal spinelets subequal; some spinelets may act as pedicellariae, but not differentiated as valves; up to about 6 superomarginal spinelets per plate, up to about 14 inferomarginal spinelets per plate, longest distally, about twice length of superomarginal spinelets. Actinal spines per plate: oral 5; suboral 0–1; furrow (proximal) 3–4; subambulacral 3; adradial actinal 4–6; interradial 4–6; interradial spines glassy, conical, splay-pointed, in webbed tufts.

**Distribution.** Sudanese Red Sea.

**Etymology.** Named in recognition of the research on the asterinids of the eastern Mediterranean Sea and Red Sea by Dr Yair Achituv of the Bar Ilan University in Israel.

**Remarks.** The carinal plate arrangement and oral structure are consistent with this unique asterinid combination in the *Ailsastra* type species *A. paulayi*. The single specimen was not dissected. An absence of superambulacral and superactinal plates was not confirmed. Molecular data are not available for *A. achituvi*.

***Ailsastra amezieneae* sp. nov.**

Figures 1, 2b, 3b, 4d–f

**Material examined.** Holotype (dry). NW Madagascar, Nossi Be, G. Cherbonnier, 6 Oct 1959, MNHN EcAs 11845.

Paratype (dry, part dissected). Type locality, G. Cherbonnier, 2 Dec 1959, MNHN EcAs 11846.

**Diagnosis.** *Ailsastra* with, at  $R = 10$  mm, discrete, short, broad rays,  $R/r$  about 1.5; 8 longitudinal series of papulae across mid-ray; abactinal spinelets stout, short, up to about 0.10 mm long; inferomarginal spinelets twice as long as superomarginal spinelets; up to 4 actinal interradial spines per plate.

**Description.** Integument evident; 5 rays,  $R$  up to 10 mm; rays discrete, short, wide at base, broad, tapered to narrow rounded end,  $R/r$  about 1.5; single madreporite, not fissiparous; abactinal gonopores. Carinal series of plates broadly visible, not below adcarinal plates, doubly papulate, other abactinal ray plates sometimes slightly incurved proximally for single papula, 3 longitudinal series of papulae on each upper side of rays, 8 longitudinal series of papulae at mid-ray; disc close to regularly defined by 5 radial, 5 interradial plates; spinelets glassy, stout, splay-pointed subsacciform, up to about 16 spinelets in double or single series across proximal edge of plates, up to about 0.10 mm long, up to 6 in subpaxilliform tuft on distal interradial plates, proximal and distal spinelets subequal; up to about 6 short stout sacciform superomarginal spinelets per plate, up to about 16 longer sacciform

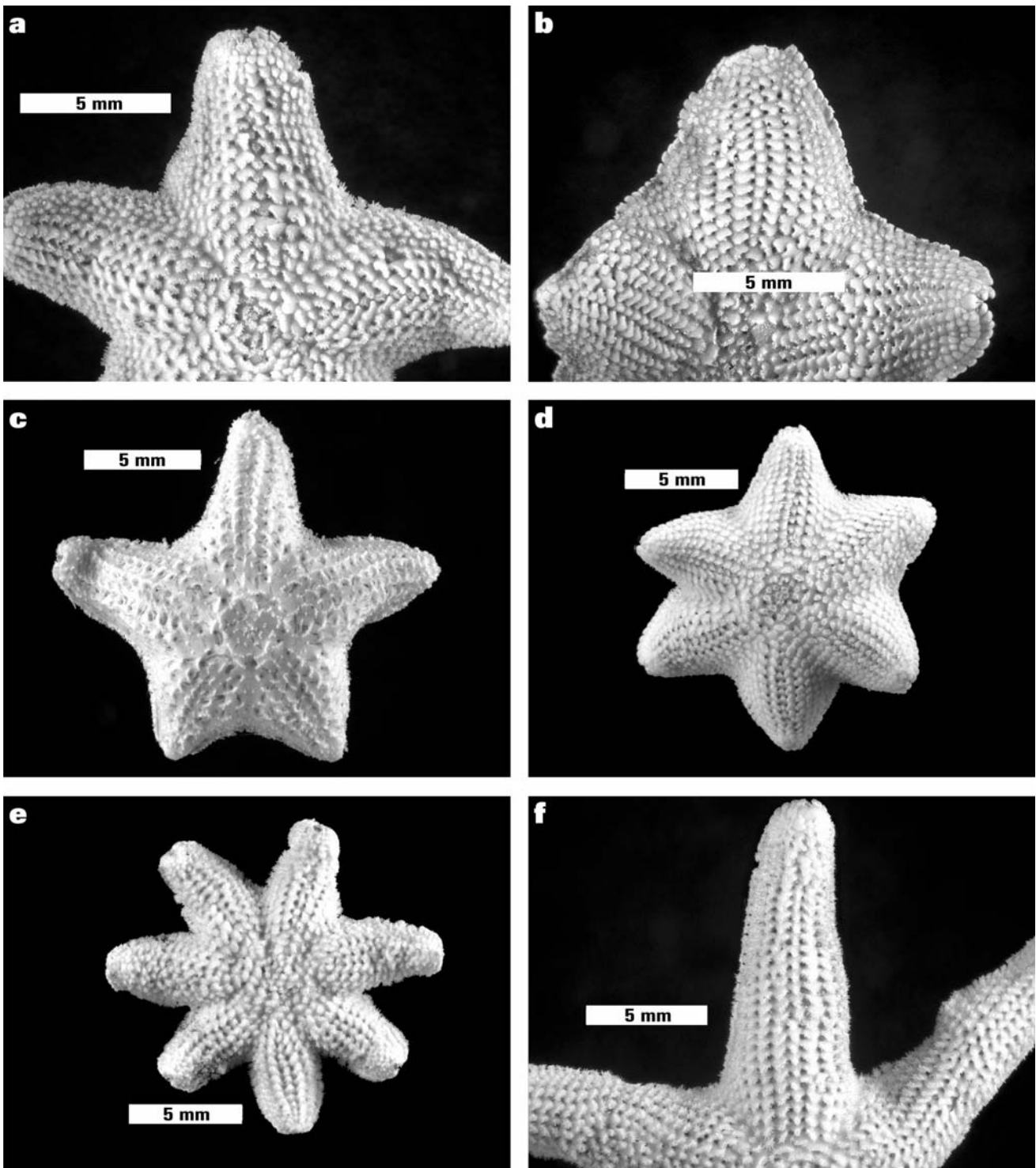


Figure 2. Abactinal view of holotypes of species of *Ailsastra* gen. nov. (photographed at same magnification). a, *Ailsastra achituvu* sp. nov., R = 10 mm, NHM 1951.5.7.12; b, *Ailsastra amezianeae* sp. nov., R = 10 mm, MNHN EcAs 11845; c, *Ailsastra booneni* sp. nov., R = 9 mm, UF 1938; d, *Ailsastra eleaumei* sp. nov., R = 7.5 mm, MNHN EcAs 11843; e, *Ailsastra heteractis* (H.L. Clark, 1938), R = 7 mm, MCZ 3258; f, *Ailsastra paulayi* sp. nov., R = 16 mm, UF 1815.

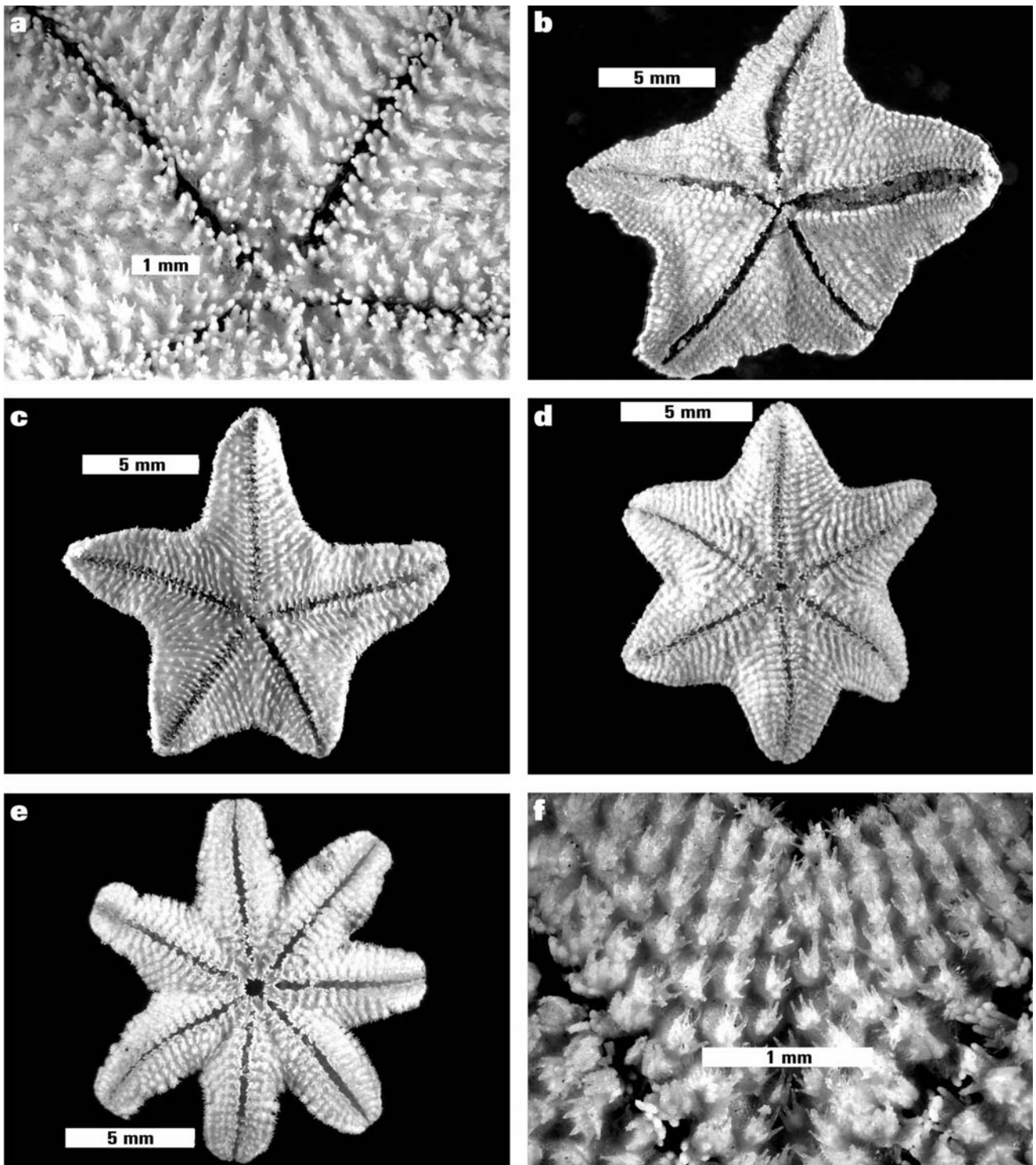


Figure 3. Actinal view of holotypes of species of *Ailsastra* gen. nov. a, *Ailsastra achituvi* sp. nov., R = 10 mm, NHM 1951.5.7.12; b, *Ailsastra amezianeae* sp. nov., R = 10 mm, MNHN EcAs 11845; c, *Ailsastra booneni* sp. nov., R = 9 mm, UF 1938; d, *Ailsastra eleaumei* sp. nov., R = 7.5 mm, MNHN EcAs 11843; e, *Ailsastra heteractis* (H.L. Clark, 1938), R = 7 mm, MCZ 3258; f, *Ailsastra paulayi* sp. nov., R = 16 mm, UF 1815.

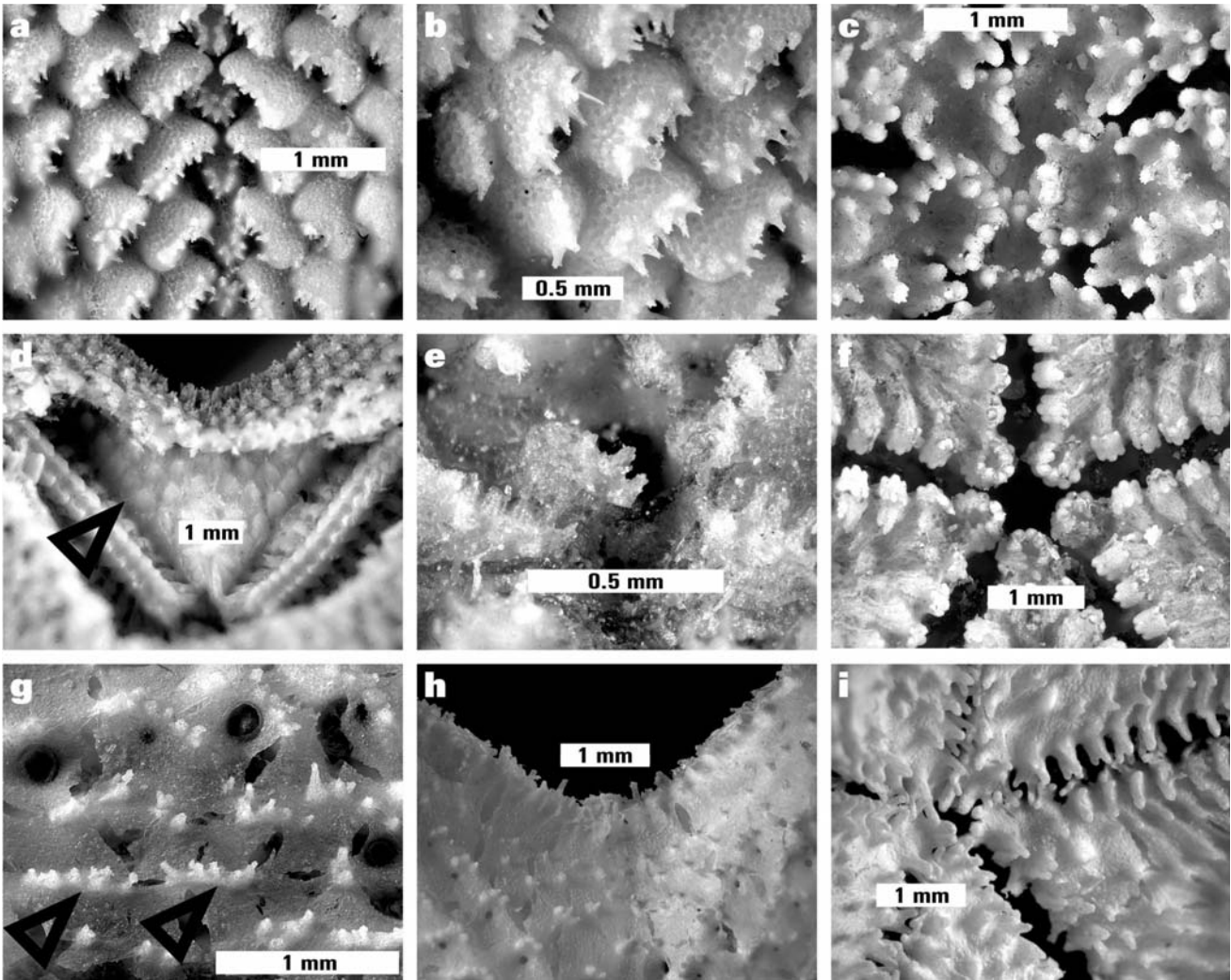


Figure 4. a–c, *Ailsastra achituvi* sp. nov., NHM 1951.5.7.12: a, low carinal series of plates; b, abactinal spinelets, glassy convexities on plates; c, small oral plates. d–f, *Ailsastra amezianeae* sp. nov.: d, abactinal interradial plates removed to show absence of superambulacral (arrow) and superactinal plates (paratype, MNHN EcAs 11846); e, abactinal spinelets (holotype, MNHN EcAs 11845); f, small oral plates (paratype, MNHN EcAs 11846). g–i, *Ailsastra booneni* sp. nov., UF 1938: g, two proximal carinal plates with longitudinal series of spinelets (arrows), breaks in enveloping integument which obscures plates, abactinal spinelets; h, distal interradius, inferomarginal spinelets, absence of superomarginal spinelets; i, small oral plates, proximal interradial single pyramidal spines.

inferomarginal spinelets per plate, up to twice as long as superomarginal spinelets. Actinal spines per plate: oral 2–5; suboral 0; furrow (proximal) 3; subambulacral 2–3; adradial actinal 2–4; interradial 2–4; interradial spines stout, subsacciform, pointed, in webbed tufts.

**Distribution.** NW Madagascar, Nossi Be.

**Etymology.** Named in recognition of Dr Nadia Améziane of the Muséum National d'Histoire Naturelle, Paris, who has graciously assisted the authors with information and the loan of materials for echinoderm research.

**Remarks.** The carinal plate arrangement, oral structure, and absence of superambulacral and superactinal plates, are consistent with this unique asterinid combination in the *Ailsastra* type species *A. paulayi*. Molecular data are not available for *A. amezianeae*.

***Ailsastra booneni* sp. nov.**

Figures 1, 2c, 3c, 4g–i

**Material examined.** Holotype (alcohol). Indonesia, N Sulawesi I., Bay of Tomini, off Salongon, Mulibagu, 0°21'31"S, 124°3'14"E, 2–15 m, G. Paulay, 18 Sep 1999, UF 1938.

**Diagnosis.** *Ailsastra* with, at R = 9 mm, discrete, narrow rays, R/r up to 1.9; 6 longitudinal series of papulae across mid-ray; integument obscuring abactinal and actinal plates; abactinal spinelets granuliform to sacciform conical, up to about 0.20 mm long; lacking superomarginal spinelets; proximal actinal large pyramidal spines present on some interradial; up to 2 actinal interradial spines per plate.

**Description.** Integument obscures abactinal and actinal plates; 5 rays, asymmetrical form, R up to 9 mm; rays discrete, narrow, tapered to

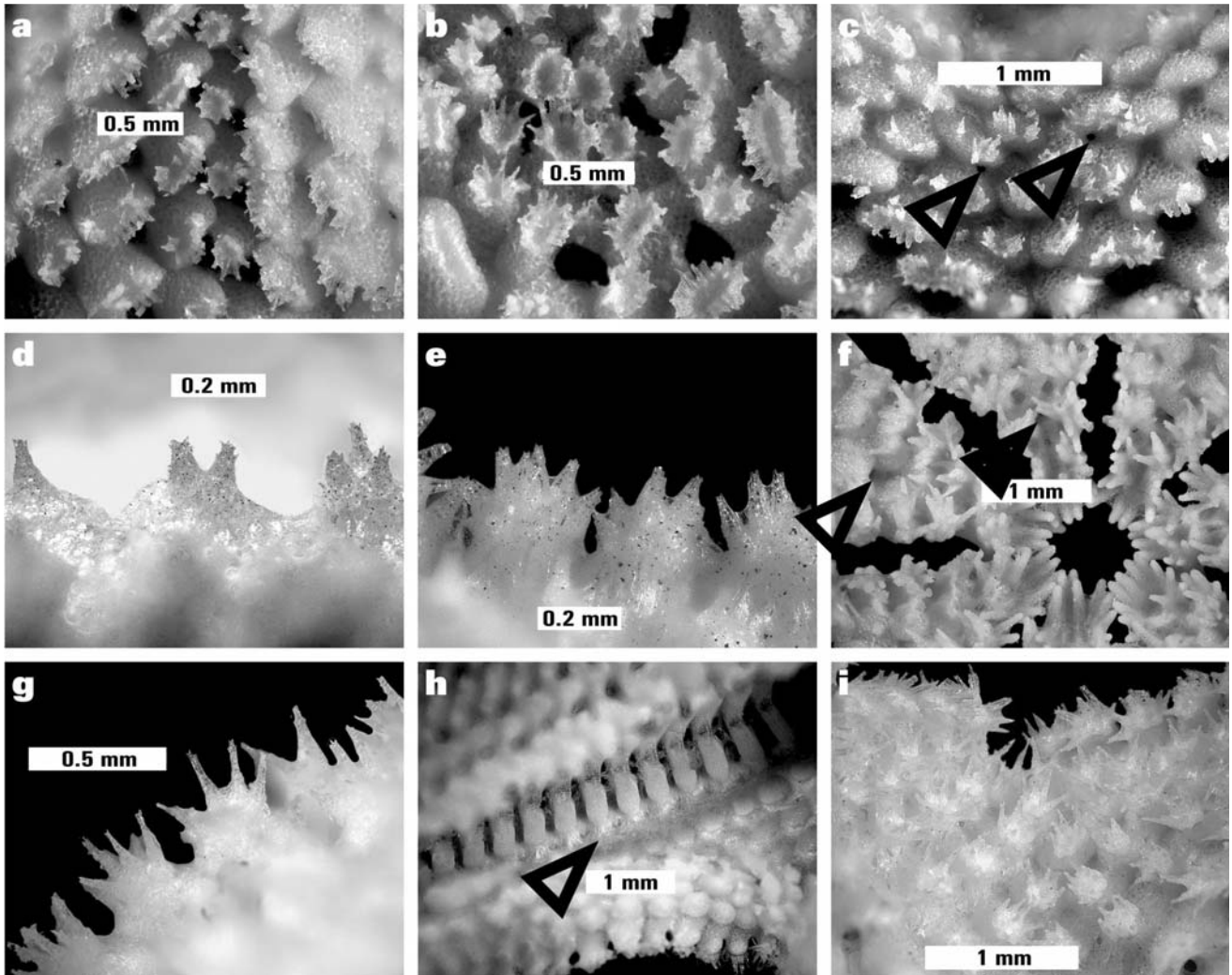


Figure 5. a–c, *Ailsastra eleaumei* sp. nov., MNHN EcAs 11843: a, low carinal series of plates with bowl-shaped spinelet arrangements; b, bowl-shaped arrangements of spinelets on disc plates; c, interradial abactinal gonopores (arrows). d–f, *Ailsastra heteractis* (H.L. Clark, 1938), MCZ 3258: d, lateral ray abactinal spinelets; e, inferomarginal spinelets; f, small oral plates, proximal actinal pores (arrows). g–i, *Ailsastra paulayi* sp. nov., UF 1815: g, abactinal spinelets; h, abactinal interradial plates removed to show absence of superambulacral plates (arrow); i, distal abactinal interradius.

narrow rounded end, R/r up to 1.9; single large madreporite, not fissiparous; abactinal paired or single interradial gonopores. Carinal series of plates extend to end of ray, below adcarinal plates creating furrow, each plate doubly papulate, other abactinal ray plates obscured by integument, crescentiform series of spinelets pointing through integument, single papula per plate, 2 longitudinal series of papulae on each upper side of rays, 6 longitudinal series of papulae across mid-ray; disc distinctly bordered by 5 radial, 5 interradial plates; spinelets glassy, stout, granuliform on upper ray, sacciform conical in interradius, up to about 0.20 mm long; up to 5 spinelets in longitudinal series on proximal carinal plates, 1–2 spinelets on carinal plates in mid ray, up to about 8 spinelets in predominantly single or double series across raised proximal edge of plates; single spinelets in mid-interradius; superomarginal plates lacking spinelets; up to about 8 long, thin, glassy spinelets per inferomarginal plate. Actinal plates obscured by integument, spines in oblique series, variably webbed by integument. Actinal

spines per plate: oral 3; suboral predominantly 1 (0–2), some longer than proximal oral spines, continuous as series with oral spines; furrow 3–2; subambulacral 2–1; adradial actinal 1; interradial 2–1; interradial spines digitiform, partly obscured by integument.

*Colour (live)*. Mottled dark mauve and white, disc reddish-brown (holotype photo by G. Paulay: GP Sula-664).

*Distribution*. Indonesia, N Sulawesi, 2–15 m.

*Etymology*. Named in appreciation of the assistance of Ben Boonen, who has graciously and skilfully prepared the images for this and other echinoderm papers.

*Remarks*. The carinal plate arrangement and oral structure are consistent with the patterns shown in the type species, *Ailsastra paulayi*. The holotype was not dissected and the absence of

superambulacral and superactinal plates was not confirmed. Molecular phylogenetic analysis by Jon Waters (pers. comm.; paper in preparation) places this species in a clade with the type species, *Ailsastra paulayi* (below).

***Ailsastra eleaumei* sp. nov.**

Figures 1, 2d, 3d, 5a–c

*Material examined.* Holotype (dry). Mauritius (Île Maurice), MAU 74-12, Peyrot-Clausade, 1974, MNHN EcAs 11843.

Paratype (dry, part dissected). Type locality, MAU 74-13, MNHN EcAs 11844.

*Diagnosis.* *Ailsastra* with, at R = 7.5 mm, discrete, short, strongly tapered rays, R/r about 1.6; frequent bowl-shaped arrangement of numerous, small, thin, webbed spinelets on abactinal plates, up to 0.17 mm long; 4 longitudinal series of papulae across mid-ray; up to 5 interradial actinal spines per plate; longitudinal alignment of spines on some distal actinal plates.

*Description.* Integument not evident; rays 6 (holotype), 5 (paratype), R up to 7.5 mm; rays discrete, short, strongly tapered, rounded distally, R/r about 1.6; single madreporite, not fissiparous; abactinal gonopores. Carinal series of plates variably narrowly evident below adcarinal plates, doubly papulate, other abactinal ray plates lacking papular indentation, single longitudinal series of non-carinal papulae on each upper side of rays, 4 longitudinal series of papulae across mid-ray; disc not delineated; spinelets glassy, thin, subsacciform to conical, finely splay-pointed, up to about 20 spinelets in 2 webbed series across proximal edge of plate, frequently in bowl-shaped series around periphery of projecting plate, up to about 0.17 mm long, up to 8 in subpaxilliform tuft on distal interradial plates; proximal and distal spinelets subequal; up to about 10 webbed spinelets around periphery of each superomarginal plate, up to about 16 longer spinelets on each inferomarginal plate, most in peripheral webbed series on abactinal surface of plate, few on actinal surface. Some non-plated areas actinally. Actinal spines per plate: oral 4; suboral 0; furrow 3; subambulacral 3; adradial actinal 1–3; interradial 1–3, up to 5 distally, sometimes in longitudinal alignment; interradial spines sacciform, thin, pointed.

*Distribution.* Mauritius (Île Maurice).

*Etymology.* Named in recognition of Marc Eleaume of the Muséum National d'Histoire Naturelle, Paris, who has graciously assisted the authors with information and the loan of materials for echinoderm research.

*Remarks.* The carinal plate arrangement, oral structure, and absence of superambulacral and superactinal plates are consistent with the type species. Variable ray number is common amongst asterinid species, and the predominant ray number for *A. eleaumei* is not evident. Molecular data are not available for *A. eleaumei*.

***Ailsastra heteractis* (H.L. Clark)**

Figures 1, 2e, 3e, 5d–f

*Asterina heteractis* H.L. Clark, 1938: 152–153, pl. 22 fig. 5.—H.L. Clark, 1946: 130, 133.—Rowe (in Rowe and Gates), 1995: 34–35.

*Aquilonastra heteractis*.—O'Loughlin and Waters, 2004: 11, 13, 15.

*Material examined.* Holotype (dry). Australia, Lord Howe I., Neds Beach, under rock fragment, littoral, K. Birmingham, Apr 1932, MCZ 3258.

Paratypes (dry). Lord Howe, Neds Beach, MCZ 3259 (1); dredged from lagoon near Goat I., MCZ 3260 (2).

Other material (dry). Queensland, Townsville, AM J9541 (2); reef flat, Heron I., AM J19449 (1).

*Diagnosis.* *Ailsastra* with 6–7 discrete high rays with narrow bases, R/r about 2.0; multiple inconspicuous madreporites; fissiparous habit; abactinal gonopores; spinelets up to 0.15 mm long; large proximal actinal interradial pores; up to 4 spines per actinal interradial plate.

*Description.* 6–7 rays, R up to 7 mm; integument evident; rays discrete, narrow base, long, blunt distally, high convex abactinally, R/r about 2.0; multiple inconspicuous madreporites; fissiparous, ray lengths frequently unequal; abactinal paired interradial proximal gonopores. Carinal series of plates broadly visible, slightly below adcarinal plates, doubly papulate for most of ray, not proximally, other ray plates slightly indented for single large papula, single longitudinal series of papulae on each upper side of rays, 4 longitudinal series across mid-ray; papular spaces large; disc not delineated; spinelets glassy, stout, conical to subsacciform, splay-pointed, up to about 8 per plate, in single or double series across plates or in apical tufts, up to 0.15 mm long; superomarginal plates with up to 4 spinelets; inferomarginal plates with up to 10 longer, splay-pointed webbed spinelets. Single large proximal actinal interradial pores. Actinal spines per plate: oral 4–6; suboral 0–3; furrow (proximal) 3–4; subambulacral 3–4; adradial actinal 2–4; interradial 1–3; interradial spines subsacciform, elongate, pointed.

*Colour (live).* Salmon pink to light orange to nearly white abactinally, whitish actinally (H.L. Clark, 1938).

*Distribution.* Lord Howe I., NE Australia, littoral to shallow sublittoral.

*Remarks.* The presence of large single proximal actinal pores is unique amongst the asterinids. There was inadequate material to confirm by dissection the nature of the pores. They were observed only on the holotype. The distal oral spines are close to the suboral spines on the characteristic small oral plates, and sometimes appear to be in continuous series. O'Loughlin and Waters (2004) assigned *Asterina heteractis* to *Aquilonastra* O'Loughlin, 2004, but noted some exceptional characters. *A. heteractis* has the carinal plate arrangement and small oral plates of *Ailsastra paulayi*, the type species of *Ailsastra*, and is reassigned to this new genus. No specimen was dissected to confirm an absence of superambulacral and superactinal plates.

***Ailsastra paulayi* sp. nov.**

Figures 1, 2f, 3f, 5g–i

*Material examined.* Holotype (in alcohol, part dissected). Indonesia, Sulawesi I., Pulau Talatakoh, 0°28'2"S, 122°8'22"E, 1–10 m, G. Paulay, 19 Sep 1999, UF 1815.

Paratype. Sulawesi I., 1–2°S, 121° E, 1–16 m, G. Paulay, 26 Sep 1999, UF 910.

*Diagnosis.* *Ailsastra* with, at R = 16 mm, discrete, elongate, narrow, slightly tapered rays, R/r about 2.7; 8 longitudinal series of papulae across mid-ray; disc regularly bordered; long, thin, spinelets, up to about 0.25 mm long; proximal and distal interradial spinelets subequal; superomarginal and inferomarginal spinelets subequal; up to 7 actinal interradial spines per plate.



*Description (holotype).* Morphological characters of *Ailsastra*; integument evident; 5 rays, R up to 16 mm; rays discrete, narrow at base, elongate, low, slightly tapered, rounded distally, R/r about 2.7; single madreporite, not fissiparous; abactinal gonopores. Carinal series of plates broadly visible, plates not noticeably below adcarinal plates, doubly papulate, other ray plates not indented for single papula, 3 longitudinal series of papulae on each upper side of rays, 8 longitudinal series across mid-ray; disc regular, defined by 5 radial, 5 interradial plates; spinelets glassy, thin, subsacciform to conical, each with few small points distally, up to about 20 spinelets in single or double webbed series across proximal edge of plate, or in splayed tufts on plates, spinelets up to about 0.25 mm long on proximal ray, up to about 10 in subpaxilliform splayed tuft on distal interradial plates; proximal and distal interradial spinelets subequal in length; superomarginal and inferomarginal spinelets subequal in length, up to about 6 per superomarginal plate, about 14 per inferomarginal plate. Actinal spines per plate: oral 5–6; suboral 0–1; furrow (proximal) 5; subambulacral 4; adradial actinal 3; interradial 3–7; interradial spines glassy, thin, subsacciform to conical, splay-pointed, in webbed tufts.

*Colour (live).* Mottled red and orange (holotype photo by G. Paulay: GP 670:24).

*Distribution.* Indonesia, Sulawesi; 1–16 m.

*Etymology.* Named in recognition of Dr Gustav Paulay of the University of Florida, who collected this material and who has facilitated extensive collecting of asterinid material throughout the Indo-Pacific region.

*Remarks.* The paratype is small (R = 7 mm), and the rays are not as narrow as those of the holotype. Molecular phylogenetic data from Jon Waters (pers. comm.) places the two specimens of *A. paulayi* in a highly divergent but strongly monophyletic clade within a molecular phylogeny of Asterinidae (Jon Waters, pers. comm.; paper in preparation).

#### Acknowledgments

We are grateful for the assistance provided by Nadia Améziene and Marc Eleaume (MNHN, loans, data), Penny Berents (AM, loan), Ben Boonen (figure preparation), Andrew Cabrinovic and Sheila Halsey (NHM, loans), Fred Collier and Bob Woollacott (MCZ, loans), Ruth Doran (NMV, map), Gustav Paulay (UF, loans, photo), Chris Rowley (NMV, photography), and Jon Waters (University of Otago, molecular phylogeny data). We are appreciative of the comments offered by the referees, Alan Dartnall and Tim O'Hara.

#### References

- Clark, A.M. 1983. Notes on Atlantic Asteroidea. 3. Families Ganeriidae and Asterinidae. *Bulletin of the British Museum of Natural History (Zoology)* 47: 19–51.
- Clark, A.M., and Rowe, F.W.E. 1971. *Monograph of shallow-water Indo-west Pacific Echinoderms*. British Museum (Natural History): London. 234 pp.
- Clark, H.L. 1938. Echinoderms from Australia. An account of collections made in 1929 and 1932. *Memoirs of the Museum of Comparative Zoology at Harvard College* 55: 1–596, 28 pls, 63 figs.
- Clark, H.L. 1946. The echinoderm fauna of Australia. Its composition and its origin. *Carnegie Institution of Washington Publication* 566: 1–567.
- O'Loughlin, P.M., and Waters, J.M. 2004. A molecular and morphological revision of genera of Asterinidae (Echinodermata: Asteroidea). *Memoirs of Museum Victoria* 61(1): 1–40.
- Rowe, F.W.E., and Gates, J. 1995. Echinodermata. In: Wells, A. (ed.), *Zoological Catalogue of Australia* 33: i–xiii, 1–510. CSIRO: Melbourne.
- Rowe, F.W. E., and Richmond, M.D. 2004. A preliminary account of the shallow-water echinoderms of Rodrigues, Mauritius, western Indian Ocean. *Journal of Natural History* 38: 3273–3314.
- Verrill, A.E. 1913. Revision of the genera of starfishes of the family Asterinidae. *American Journal of Science* 35 (4): 477–485.