

First records and descriptions of the marine littoral mite genus *Amhyadesia* Fain and Ganning 1979 (Acari : Astigmata : Hyadesiidae) from southern Africa

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Three species of the rocky-shore inhabiting mite genus *Amhyadesia* Fain and Ganning 1979 (Acari, Astigmata, Hyadesiidae) were present in collections made across the extent of the southern African sub-continent, from Elandsbaai on the west coast to Inhambane (Mozambique) on the east coast. Two are new species, *A. austafricana* spec. nov. and *A. elizabethensis* spec. nov., and are described herein. The third species, *A. heterophallus*, collected from the east coast only, is widely-distributed throughout the Indo-Pacific region.

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Introduction

Mites (Acari) are primarily terrestrial arthropods, but taxa from four major mite orders (Mesostigmata, Prostigmata, Oribatida and Astigmata) have secondarily invaded marine habitats. Although members of a single prostigmatid family, the Halacaridae, are distributed in the marine environment to the ocean depths, marine mites are generally confined to littoral habitats. Most littoral mite families also have freshwater and/or terrestrial representation. Hyadesiid mites (Astigmata, Hyadesiidae), however, are exclusively marine littoral, being particularly associated with rocky-shores. They have been recorded from most geographic regions, and from every continent except Antarctica, although they are common on sub-Antarctic islands (see Luxton 1989 and references therein). The family comprises some 30 known species from two genera, *Hyadesia* Mégnin 1891 and *Amhyadesia* Fain & Ganning 1979.

Even though southern Africa is of particular faunistic interest, in that the region is characterized by a high species diversity and high specific endemism and, the littoral and sub-tidal marine fauna are relatively well known (Field & Griffiths 1991), there are no previous records of southern African hyadesiid mites. However, there are records of other marine mite taxa from the region based on *ad hoc* collections, including halacarid (Prostigmata: Halacaridae; 13 species; Bartsch 1972, 1974, 1987, 1992) rhodacarid (Mesostigmata: Rhodacaridae; 1 species; Loots 1969), and oribatid (Oribatida: Ameronothridae; 1 species; Weigmann 1975) mites. As part of a recently-initiated study attempting to characterize the southern African marine acarofauna, hyadesiid mites (both *Amhyadesia* and *Hyadesia* [*Parahyadesia*]) were collected from numerous localities between Elandsbaai on the west coast and Inhambane, Mozambique, on the east coast of southern Africa (see Figure 1). This article records and describes from these collections the first southern African *Amhyadesia* sp.

Systematics

Hyadesiidae Halbert 1915

Amhyadesia Fain & Ganning 1979

Amhyadesia austafricana spec. nov.

Material examined

Small patches of fine green algae, almost encrusting the rocky surface, in the upper-shore *Littorina* zone (Branch & Branch 1981) were investigated for mites. This species was found to be widely distributed in the southern African region, from Elandsbaai on the west coast, to Port Edward on the Kwa-Zulu-Natal (KZN) south coast (see Figure 1). Other localities of its occurrence include Seapoint, Mossel Bay and Sardinia Bay (near Port Elizabeth) (Figure 1). At Sardinia Bay, the species occupies an additional habitat, being the edges of supralittoral brackish pools. Type specimens were taken from the Sardinia Bay material only (both the *Littorina* zone and supralittoral material). Holotype (male/female), two paratype males and two paratype females will be deposited in the National Museum, Bloemfontein, South Africa. Although more than one notation has been proposed for the idiosomatic setae of the Astigmata, in this article we follow that used in the initial description of the genus and subsequent species descriptions (see Fain & Ganning 1979; Luxton 1989).

Description (Figures 2 and 3)

Dimensions of types. Sexual dimorphism, with males being smaller than females. Female type length 472 μm (range: 424 to 472 μm ; $n = 3$), width 296 μm (range: 288 to 304 μm ; $n = 3$); Male type length 376 μm (range: 368 to 384 μm ; $n = 4$), width 232 μm (range: 232 to 248; $n = 4$).

Dorsum Entire surface of prodorsum (Figure 2) covered with closely set fine punctations, especially over the central region. Dorsal shield is not very distinct. It is wider than long (length = 34 μm , width = 90 μm), not extending to the vertical oil channels. Vertical setae (*vi*) long and thick, arising anteriorly of dorsal shield. External scapular setae (*sce*) longer than vertical setae. Internal scapular setae (*sci*) fine, setaceous

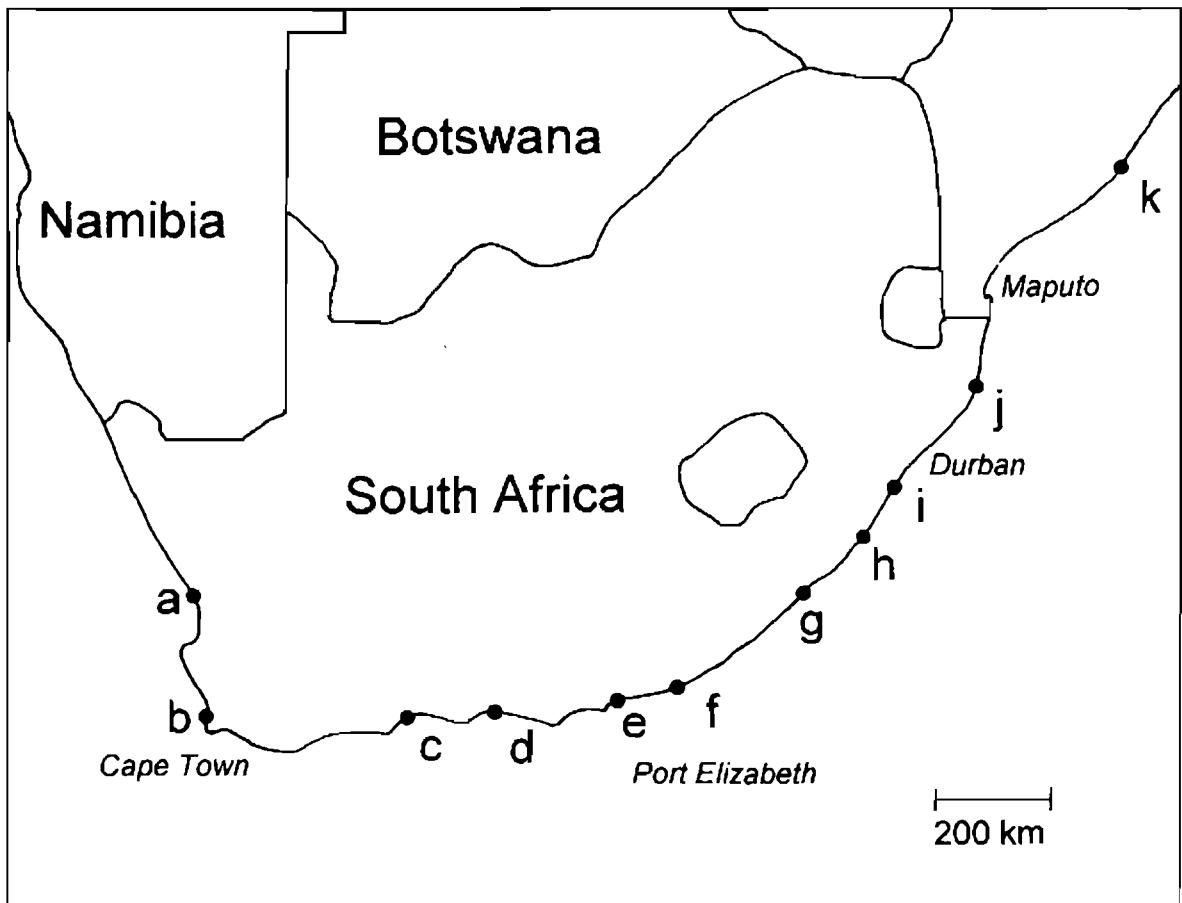


Figure 1 Collection sites of hyadesiid mites along the southern African coastline.

a. Elandsbaai (West coast), b. Sea Point, Cape Town (West coast), c. Mossel Bay (southern Cape), d. Brenton (near Knysna, southern Cape), e. Sardinia Bay (near Port Elizabeth, eastern Cape), f. Port Alfred (eastern Cape), g. Lwandile (near Pressley Bay, Transkei coast), h. Port Edward (Kwazulu-Natal (KZN) south coast), i. Park Rynie (KZN, south coast), j. Mapelane (KZN, Zululand coast), Tofo (near Inhambane, Mozambique)

and short. Supracoxal setae obscured but appearing to arise anteriorly of external scapular setae, almost in line with vertical setae. Grandjean's organ slender, curved and pointed. The suture between hysterosoma and prosoma/propodosoma distinct and complete. Integument much more heavily sclerotized towards the posterior half of the hysterosoma than elsewhere. This sclerotization extends over the dorsal and ventral surfaces in the posterior third of the idiosoma, giving it a tan appearance.

Five pairs of smooth dorsal setae: *d1* setaceous; *d2*, *d3*, and *d4* long and stout and similar in length, and *d5* (ventral) short and setaceous. Five pairs of smooth lateral setae: *l1* and *l2* short; *l3*, *l4* (ventral) and *l5* long and terminally hooked. Humeral setae (*h*) long and with hooked ends. Two latero-medial oil channels extend from the posterior to near the dorso-segugal furrow. No transverse oil channel linking latero-medial channels near dorso-segugal furrow. Four pairs of pores on the dorsum of the hysterosoma: one pair located between the humeral and *d2* setae, other pairs associated with the oil glands and lateral to these and the fourth pair (also seen ventrally) near the *l4* setae.

Venter. Posterior third of venter with fine punctations, and heavily sclerotized posteriorly of *a1* setae (Figures 2 and 3).

Two pairs of genital setae in both sexes. Three pairs of anal setae in female, but two pairs in male (*a2* missing). Epigynium absent in female. Apodemata I not meeting apodemata II, but apodemata III and IV meet. Integument thickening associated with apodemata I and extending laterally from apodemata II towards apodemata III and IV. One pair of oil pores opens on the venter adjacent to anal slit below the *a3* setae.

Lengths of idiosomal setae. Setal lengths variable between individuals of the same sex and especially between sexes. Female (mean length for two individuals) *vi* 80, *sce* 140, *sci* 18, *l1* 24, *l2* 37, *l3* 106, *l4* 100, *l5* 122, *d1* 20, *d2* 63, *d3* 79, *d4* 67, *d5* 22, *a1* 14, *a2* 14, *a3* 2, *h* 105. Male type (mean of three male individuals given in parenthesis) *vi* 70 (63), *sce* 104 (99), *sci* 6 (13), *l1* 20 (18), *l2* 30 (24), *l3* 98 (91), *l4* 90 (79), *l5* 80 (87), *d1* 16 (16), *d2* 44 (48), *d3* 46 (67), *d4* 60, *d5* 16, *a1* 10, *a3* 20, (*a2* absent in male), *h* 100.

Legs. Leg setation is typical for *Amhyadesia*, thus legs are not figured. Setation (coxa, trochanter, femur, genu, tibia, tarsus): leg I 1, 1, 1, 3, 3 (ventral seta a spine), 7 plus 2 spines in female (6/7 plus 1 spine and a sucker in male); leg II 0, 1, 1, 3, 3 (ventral seta a spine), 7 plus two spines in female (6 plus 2 spines in male); leg III 1, 1, 0, 1, 2, 5 plus 3 spines in female (plus 1 spine and a sucker in male); leg IV 0, 0, 0, 0, 2, 5 plus

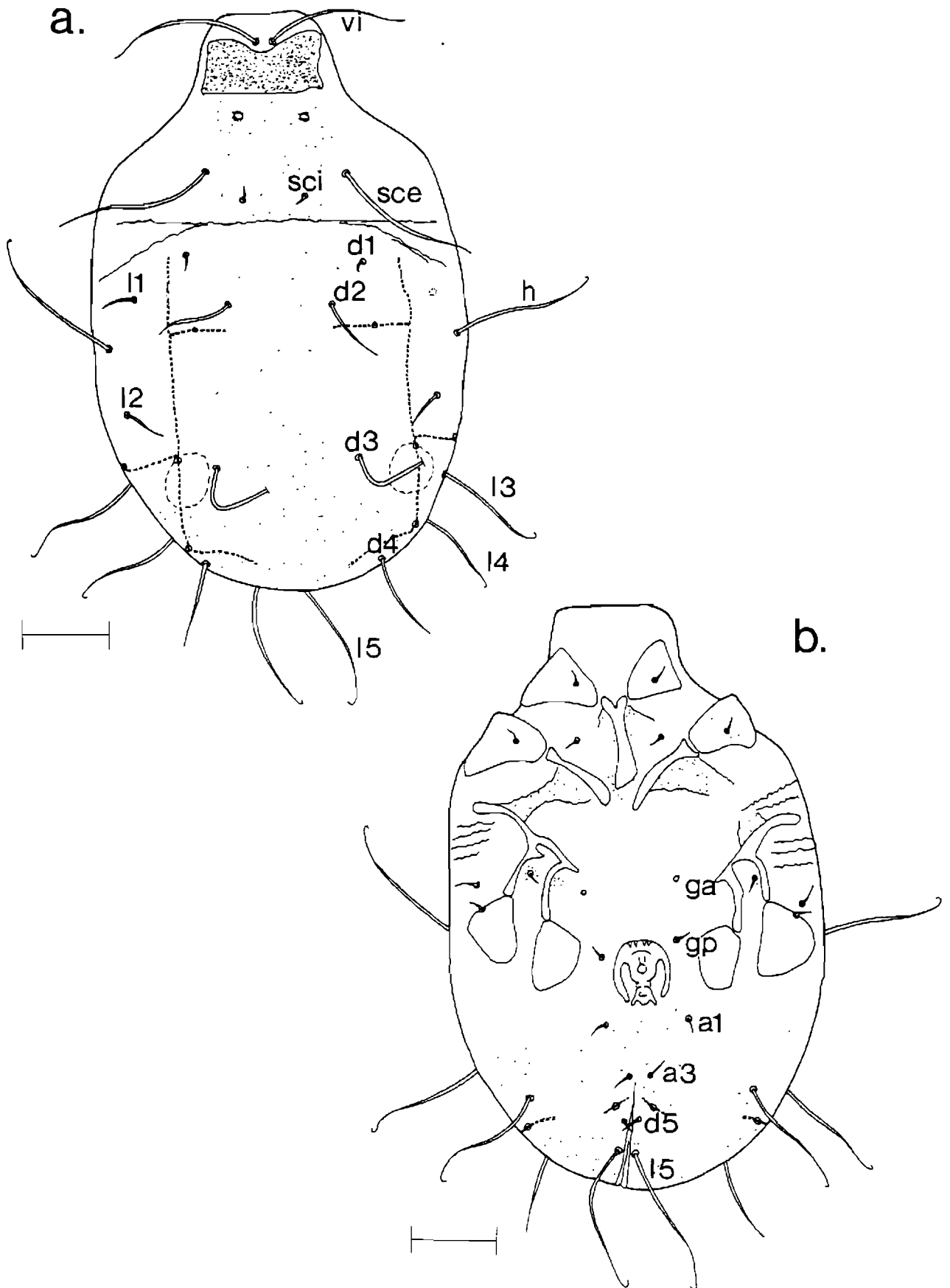


Figure 2 *Amhyadesia austafricana* spec. nov.: a. Dorsal male, scale bar = 70 μ m; b. Ventral male, scale bar = 70 μ m

3 spines in female (plus 1 spine and sucker in male). Length and width (in parenthesis) of leg segments (femur, genu, tibia, tarsus), measured at widest or longest part (female): femur I-IV: 28, 28, 31, 29 (27, 32, 24, 25); genu I-IV: 28, 25, 21, 22 (26, 28, 22, 23); tibia I-IV: 30, 30, 23, 22 (23, 25, 19, 20); tarsus I-IV: 12, 16, 20, 21 (15, 14, 10, 13); length of pretarsal claw I-IV (measured in a straight line from base of claw): 8, 6, 18, 17. Length and width (in parentheses) of leg segments, measured at widest or longest part (male): femur I-IV: 46, 49, 28, 29 (28, 30, 33, 33); genu I-IV: 26, 25, 19, 20 (37, 35, 32, 33); tibia I-IV: 31, 27, 24, 26 (32, 28, 28, 28); tarsus I-IV: 14, 11, 9, 12 (17, 18, 13, 15); length of pretarsal claw I-IV (measured in a straight line from base of claw): 10, 9, 16, 16. Total length and total width (in parenthesis) of leg segments (femur, genu, tibia, tarsus) of legs I-IV (female): 98, 99, 95, 94 (91, 99, 75, 81); (male): 117, 112, 80, 87 (114, 111, 106, 109). Clearly, legs I and II of the female are shorter and legs III and IV are longer than those of the male. All legs of the male are thicker than those of the female. Trochanter IV is entirely medial to trochanter III. Distoventral sucker-like, non-sclerotized areas on all tibiae of both sexes.

Etymology. The name of this species refers to its wide distri-

bution on the west, south and east coasts of southern Africa.

Remarks. This species is morphologically most similar to *A. longipilis* Fain & Schuster 1984 in having long lateral setae, especially 13 and 14. However, the species differ by the much longer lateral setae as well as long 11 and 12 setae in *A. longipilis*, different positions of the oil gland openings (adjacent to 13 setae in *A. austafricana*, and not between 13 and 12), and the presence of *d5* setae in *A. austafricana* spec. nov. The leg proportions of the male of *A. austafricana* spec. nov. are distinctive for this species. Legs III and IV are notably thick and stubby in comparison to other *Amhyadesia* and *A. elizabethensis* spec. nov. described below, whereas legs I and II are much longer than those of *A. elizabethensis* spec. nov.

***A. elizabethensis* spec. nov.**

Material examined

Ten individuals (males, females, nymphs) were collected from barnacles (*Tetraclita*, *Octomeris*) in the Upper Balanoid zone (Branch & Branch 1981) at a single locality, Sardinia Bay (near Port Elizabeth; Figure 1). Holotype (male/female), 2 paratype males and 2 paratype females will be deposited in the National Museum, Bloemfontein, South Africa.

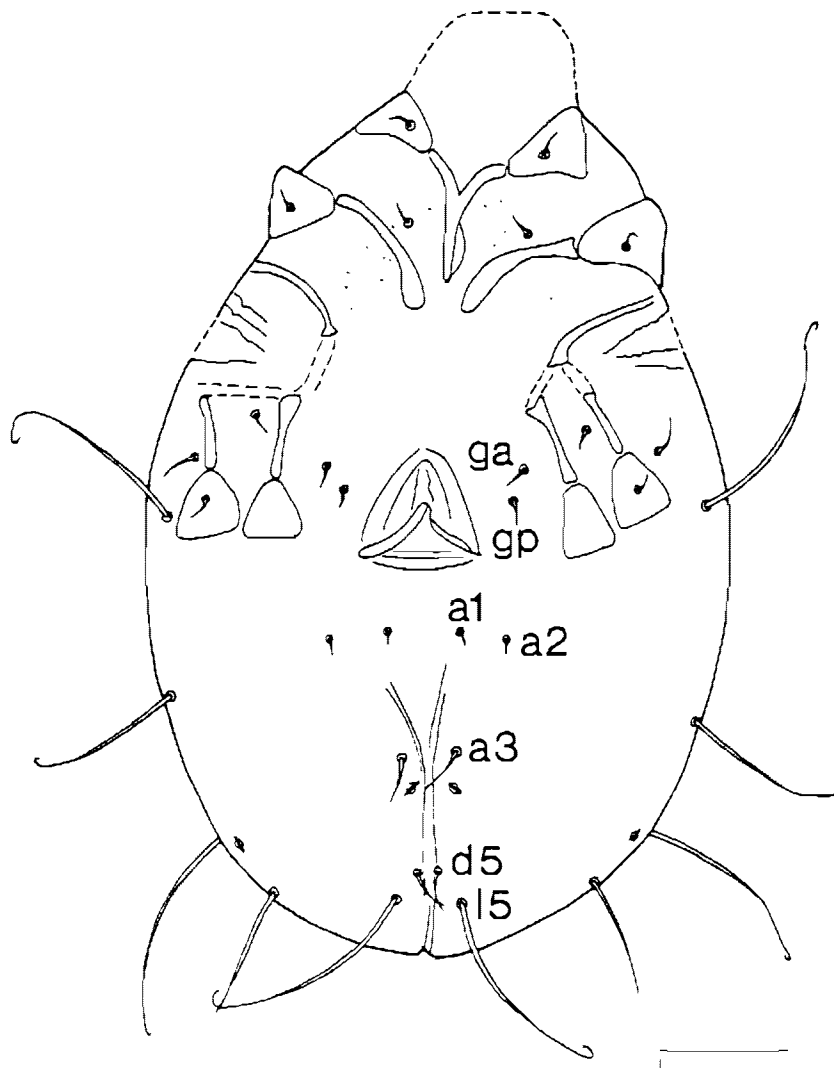


Figure 3 *Amhyadesia austafricana* spec. nov.: Ventral female, scale bar = 70 μ m

Description (Figure 4)

Dimensions of types. Female type: length 400 μm (range: 400 to 432 μm ; $n=3$), width at widest point 256 μm (range: 248 to 264 μm ; $n=3$); Male type: length 416 μm (range: 376 to 384 μm ; $n=3$), width 253 μm (range: 232 to 240; $n=3$).

Dorsum. Entire surface of prodorsum punctate. Propodonal shield very distinct, and longer (80 μm) than wide (48 μm), extending posteriorly from just below the vertical setae (*vi*) to beyond the vertical oil channels and the external scapular setae (*sce*). It narrows posteriorly of the vertical oil channels. Vertical setae typically long and thick, finer distally. External scapular setae (*sce*) are longer than vertical setae. Internal scapular setae (*sci*) fine, setaceous and short. Supracoxal seta and Grandjean's organ were obscured in all specimens. Suture between hysterosoma and prosoma (propodosoma) distinct and complete. Hysterosoma is covered with coarse punctations set in a more finely punctuated integument, but the medial, posterior region (area within *d3* and *d4* setae) is finely punctated only. Coarse punctations laterally and anteriorly on hysterosoma.

Five pairs of smooth dorsal setae: *d1* and *d5* are setaceous, and of short and medium length respectively, *d2*, *d3* long and *d4* very long. Five pairs of smooth lateral setae: *l1*, *l2* and *l3* short; *l4* and *l5* long with *l4* originating ventrally. Humeral setae (*h*) present and typically long. Two latero-medial oil channels extend from the posterior to the dorso-segugal furrow where they meet a transverse channel. Anteriorly to the *l2* setae, the latero-medial channels branch both inwards, and outwards to pores. At the posterior third of the hysterosoma, the latero-medial channels have three branches extending to the margins, where they terminate in or lead to pores. A fourth branch near the oil glands extends medially. A fifth pair of pores is associated with the oil glands.

Venter. Posterior third of venter with coarse punctations, posteriad of genital openings, and laterally. Three pairs of genital setae present. Anal setae absent. Epigynium absent in female. Apodemata I either meet or do not meet apodemata II. Apodemata III and IV not joined. Integument thickening associated with coxae I and II. Body morphology of sexes similar. Male venter is thus not figured.

Lengths of idiosomal setae. Setal lengths similar in both sexes. Female type (mean length of three individuals is given in parentheses): *vi* 90 (72), *sce* 140 (127), *sci* 14 (17), *d1* 36 (36), *d2* 46 (43), *d3* 90 (93), *d4* 130 (127), *d5* broken 80, *l1* 16 (16), *l2* 14 (16), *l3* 18 (20), *l4* 140 (134) (ventral), *l5* broken (173), *h* 132 (106).

Legs. Setation (coxa, trochanter, femur, genu, tibia, tarsus). Leg I 1, 1, 1, 3, 3 (ventral seta a spine), (6/7) plus 2 spines in female (5 plus 1 spine and sucker in male); leg II 0, 1, 1, 3, 3 (ventral seta a spine), 6 (plus 2 spines); leg III 1, 1, 0, 2, 2, 5 plus 3 spines in female (plus 1 spine and a sucker in male); leg IV 0, 0, 1, 0, 2, 5 plus 3 spines in female (plus 1 spine and a sucker in male). Length and width (in parentheses) of leg segments (female): femur I-IV: 30, 30, 29, 30 (28, 28, 21, 22); genu I-IV: 24, 22, 20, 21 (25, 25, 17, 20); tibia I-IV: 24, 24, 22, 22 (18, 17, 14, 16); tarsus I-IV: 16, 13, 20, 22 (8, 7, 9, 11); pretarsal claw I-IV (measured in a straight line from base of claw): 8, 7, 18, 20. Length and width (in parentheses) of leg segments (male): femur I-IV: 41, 40, 32, 36 (34, 33, 25, 28); genu I-IV: 24, 21, 21, 20 (33, 30, 22, 24); tibia I-IV: 22, 24,

24, 24 (28, 24, 21, 20); tarsus I-IV: 12, 10, 10, 14 (16, 14, 13, 13); pretarsal claw I-IV (measured in a straight line from base of claw): 6, 7, 18, 18. Total length and total width (in parentheses) of leg segments (femur, genu, tibia, tarsus of legs I-IV (female): 94, 89, 91, 95 (83, 82, 61, 69); male: 99, 95, 87, 94 (111, 101, 81, 85). Trochanter IV posteriorly to trochanter III.

Etymology. The specific name refers to the collection locality near Port Elizabeth, in the eastern Cape Province of southern Africa.

Remarks. Three pairs of genital setae group this species with *A. californica* Fain & Ganning 1979 and *A. glynni* (Manson 1963) (see Fain & Ganning 1979). However, it differs from these species in many respects, including having very long *l4* setae, an absence of anal setae, and an elongated propodonal shield. Pretarsal claws I and II relative to claws III and IV in *A. elizabethensis* are small compared to those of most other *Amhyadesia*.

A. heterophallus Fain & Schuster 1984

This species was collected from Tofo (near Inhambane, Mozambique) and Mapelane (north coast, KwaZulu-Natal, South Africa; see Figure 1). At the former locality it inhabited fine green algal turf in the *Littorina* zone whereas at Mapelane it occurred in the Upper Balanoid/Oyster zone (see Branch & Branch 1981) amongst barnacles (*Tetraclita*, *Octomeris*) and oysters (*Saccostrea*).

General discussion

Four biogeographical regions have been identified along the southern African coast. Cold temperate conditions prevail along the west coast (Cape Point northwards), largely influenced by the adjacent Benguela current originating in the south Atlantic and Southern Ocean. The south and east coasts, under the influence of the warm Agulhas current, are warm temperate, becoming sub-tropical towards the east, and tropical off Mozambique.

Due to the tropical influence, the marine fauna from Port Edward northwards, in particular, is characterized by an increasing Indo-Pacific element. It is therefore not surprising that *A. heterophallus*, the species found to occur at Mapelane and Inhambane, is also known from the Maldives and Philippines (Fain & Schuster 1984). Our observations represent a further extension of what has previously been considered to be a remarkably wide geographic distribution (Fain & Schuster 1984).

The distribution of *A. austafricana* spec. nov. is interesting in that it extends across the range of biogeographic regions in the subcontinent, suggesting physiological tolerance of a wide temperature variation. Geographic distribution information for *A. elizabethensis* spec. nov. is limited by the very limited sampling along the coast from habitats below the upper-shore zone. *A. austafricana* spec. nov. and *A. elizabethensis* spec. nov. are, in all likelihood endemic species, considering the high level of specific endemism of the marine fauna to the regions where they occur.

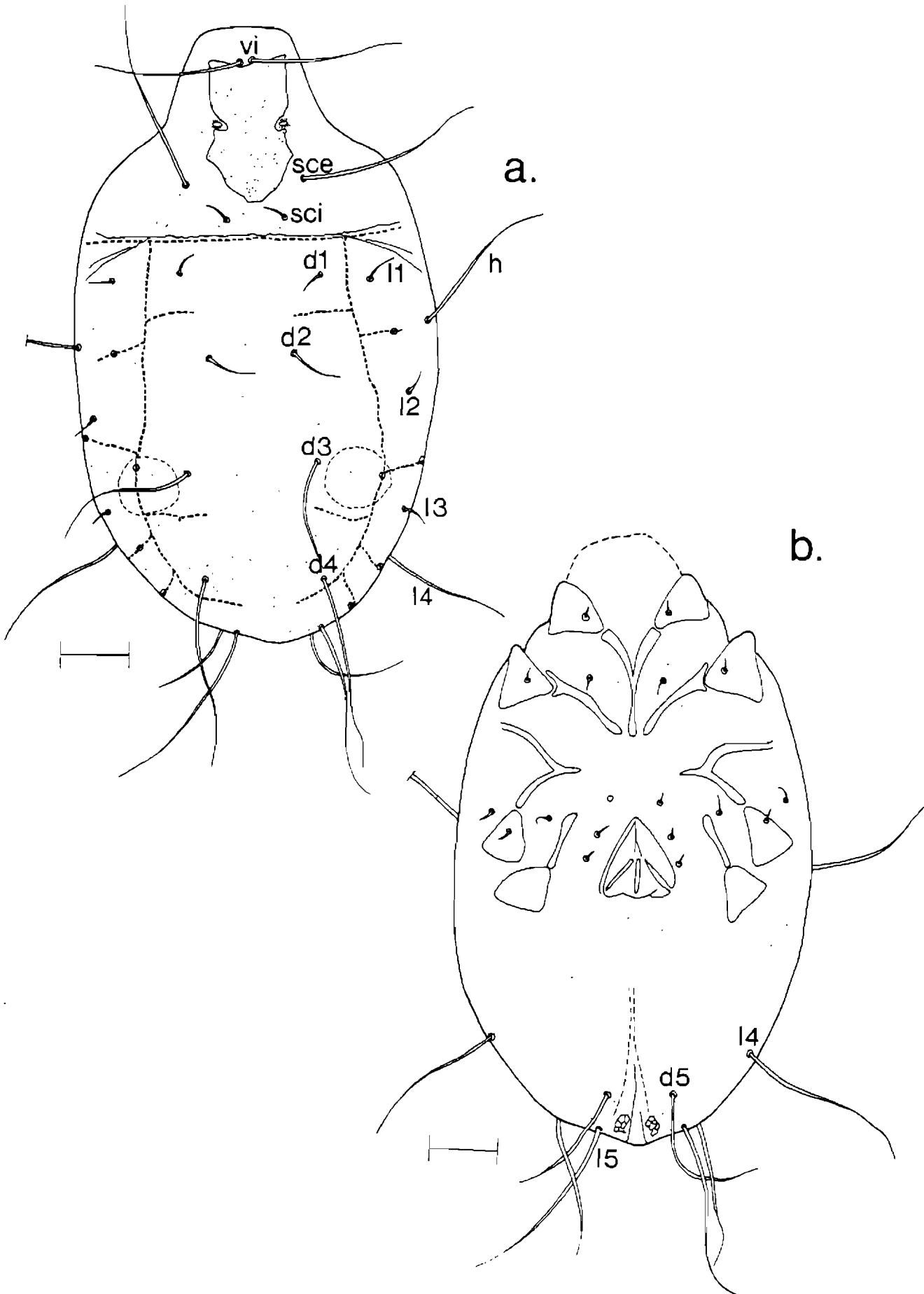


Figure 4 *Anihyadesia elizabethensis* spec. nov.: a. Dorsal female, scale bar = 40 μ m. b. Ventral female, scale bar = 40 μ m

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