

## TWO NEW SPECIES OF ALPHEID SHRIMP FROM AUSTRALIAN WATERS‡

DORA M. AND ALBERT H. BANNER\*

Hawaii Institute of Marine Biology, University of Hawaii, Honolulu, U.S.A.

### ABSTRACT

One new species of alpheid shrimp, *Alpheus soelae* sp. nov., collected by the CSIRO vessel, the R.V. "Soela", from the Australian Northwest Shelf, and one new species, *Alpheus stantoni* sp. nov., collected on Heron Island, on the Great Barrier Reef are described and illustrated.

KEYWORDS: taxonomy, Alpheidae, Australia, deep sea, coral reefs.

### INTRODUCTION

The Division of Fisheries Research of the Commonwealth Scientific and Industrial Research Organisation has been engaged in a survey of the benthic resources of the Australian Northwest Shelf region, off Port Hedland, Western Australia.

This survey, during 1983-1985, resulted in extensive collections of little known or new crustaceans from the little studied waters. Numerous representatives of the family Alpheidae were collected, amongst which was a single example of a species that is here described as new. A description of another new species of *Alpheus* Fabricius from Heron Island, Queensland, at the southern end of the Great Barrier Reef, collected by Mr Frank G. Stanton, a post-graduate student of the University of Hawaii, is also provided. The present species raise to 84 the number of species of *Alpheus* now known from Australian waters.

### SYSTEMATICS

#### *Alpheus soelae* sp. nov.

(Fig. 1)

**Type Material.** HOLOTYPE - ♀, Northern Territory Museum (NTM) Cr. 001994, TL 37 mm, bearing one possible small egg (irregular but yellow) at the upper interior margin of the first pleuron, collected in a trawl haul of the R.V. "Soela" (Operation 50, 18°41'S 120°07'E, 9 February 1984, 430 m, coll. T. Ward).

**Description.** Rostrum clearly longer than broad at base, tip reaching to middle of visible portion of first antennular article (note: anterior appendages appear to have been dis-

placed forward in handling, exposing the bases of the antennular peduncles); rostrum dorsally rounded and extended only slightly posterior to middle of cornea. Cornea apparently of normal pigmentation. Orbital hoods only slightly inflated, with short, acute teeth arising abruptly from curvature of margin and reaching well past middle of rostrum; orbitorostral grooves shallow and poorly demarked.

Second antennular article 4.4 times as long as broad, 1.5 times as long as visible portion of first (which is exposed to its base) and 2.7 times as long as third article. Stylocerite acute, slightly overreaching first antennular article. Scaphocerite with outer margin slightly concave; squamous portion narrow, reaching to end of third antennular article; outer tooth acute, reaching slightly beyond squame. Carpocerite overreaching antennular peduncles by nearly length of third article. Basicerite with lateral tooth prominent, reaching to near level of end of stylocerite.

Articles of third maxilliped with ratio; 10:4:6; all articles bearing long setae; tip bearing setae only, not spines.

Large chela 3.8 times as long as broad, with fingers occupying distal 0.28. Dactylus with superior surface high but rounded, with plunger low and confluent, with surface of dactylus similar to that of *A. distinguendus* De Man (see Banner and Banner 1982:23, Fig. 4C); tip extending well beyond tip of propodal finger rounded in superior profile and flat on opposite surface. Propodal finger with groove, not socket, to accommodate dactylus and with moderate tufts of long setae near dactylar articulation. Palm rounded in section with lateral face bearing a

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low rounded ridge reaching proximally from dactylar articulation for about one-third length of palm; ridge separated on either side by broad, shallow and ill-defined grooves; superior groove lying below condylar crest, inferior groove extending into face of propodal finger. Medial face of palm without sculpturing. Palm bearing only scattered setae, slightly concentrated along inferior margin. Carpus normal. Merus 2.6 times as long as broad, bearing along inferointernal margin 6 short, slender spines interspersed by longer setae; neither superior nor inferior distal angles projecting. Ischium bearing on inferointernal margin and at distal angle a few spines similar to those of merus.

Small chela almost as long as large chela, with tips of fingers reaching to same level as does propodal finger of large chela, slender. 5 times as long as broad with fingers and palm almost equal in length. Lateral face of palm bearing a well-demarcated 'v'-shaped groove running from near dactylar articulation to *linea impressa* (note: because of the 'v'-shape of the groove and its strong demarcation, we believe it to be an artifact from preservation, such as shrinking of muscular tissue in a strong alcoholic solution; whether the groove coincides distally with a shallow 'u'-shaped groove, such as that found on the large chela, could not be determined). Dactylar articulation flanked on either side by a moderate, sub-acute tooth. Medial face of palm bearing some scattered setae, lateral face glabrous. Fingers straight and slender, and at most sub-balaeniceps (see Banner and Banner 1982:22), with tips strongly hooked and crossing; both fingers bearing on either side a dense row of highly setiferous bristles that intermesh when chela is closed; rows on both fingers stopping abruptly before the hooked tips, and the rows on dactylus not meeting on superior surface of article. Merus 2.7 times as long as broad, bearing on inferointernal margin 4 small acute spines interspersed with long setae; margin projecting distally as a right-angled tooth; other distal angles not projecting. Ischium also bearing 2 small spines on inferodistal margin.

Carpal articles of second legs with ratio: 10:5.5:2.5:3.5.

Ischium of third leg 0.3 as long as merus, bearing a slender spine. Merus inermous, 2.8 times as long as broad. Carpus 5.5 as long as merus, with projection of superodistal mar-

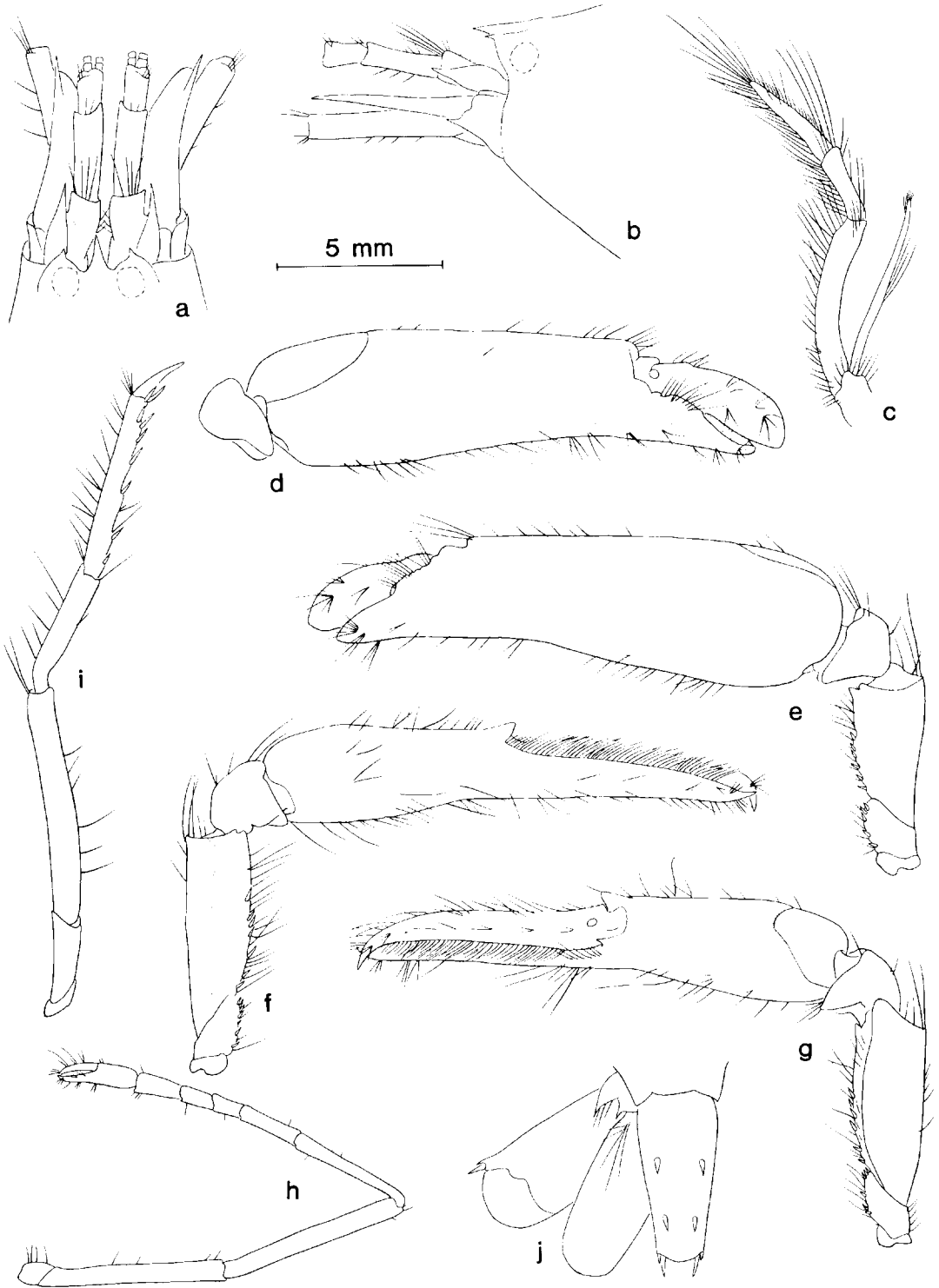
gin rounded. Propodus 0.8 as long as merus, bearing on inferior margin 7 spines and a distal pair, interspersed with a few long setae. Dactylus simple, slightly curved and tapering uniformly to an acute tip; bearing on superior surface a slight notch with a few short setae inserted.

Telson 3.8 times as long as posterior margin is broad, anterior margin 1.5 times as wide as posterior margin; lateral margins with uniform taper, posterior margin projecting as a low arc. Posterolateral spines slender and short; anterior pair of dorsal spines located anterior to middle. Spine on outer uropod uncolored in preservative.

**Colouration.** Primarily white, with an extensive reddish zone of fine speckling medially along whole body length, most strongly marked on first to fourth abdominal segments, extending more feebly over upper parts of pleura and caudal fan. Antennal peduncles, third maxilliped, chelae, pereopods and pleopods white. Antennal border of carapace red, antennal flagellae pink and corneas black.

**Discussion.** Two remarks should be made about this specimen: First, of the Indo Pacific alpheids known, this species is one of the deepest dwelling: at 430-450m, it is exceeded only by *Alpheopsis shearmii* (Alcock and Anderson) (1899:283) at 430 fathoms (785m) in the Arabian Sea and *Athanas phyllocheles* Banner and Banner (1983:152, Fig. 14) from 450 m in the western Indian Ocean (off Reunion). Second, for an alpheid dwelling in deep water, in contrast to the more littoral forms, it shows surprisingly little modification (see, for example, the species reported from around 200 m collected by the MUSORSTOM Expedition (Banner and Banner 1981:218).

In most characteristics, including the form of the large chela, the rostrum and orbital teeth, etc., the species appears to be firmly within the *sulcatus* group. The dense rows of setiferous bristles on the sides of the fingers of small chela of the female separate it from all other members of the group — indeed, we do not recall any species of the genus *Alpheus* with a similar modification. Because marked sexual dimorphism in the small chelae is rare in the *Sulcatus* Group, we suspect the male small chela will be similar to that of the female. The species is clearly separated from the members of the group without orbital



**Fig. 1.** *Alpheus soelae*: **a, b**, anterior region, dorsal and lateral views; **c**, third maxilliped, lateral face; **d, e**, large chela, medial and lateral faces; **f, g**, small cheliped, superolateral and medial faces; **h**, second leg; **i**, third leg; **j**, telson and uropods. All drawings same scale.

teeth, like *A. sulcatus* Kingsley. Of the larger group with orbital teeth, many have the dactyli of the third legs biunguiculate: these include *A. architectus* De Man, *A. canaliculatus* Banner and Banner, *A. gracilis* Heller, *A. parasocialis* Banner and Banner, *A. socialis* Heller, *A. tungii* Banner and Banner, and *A. villosus* (Olivier). *A. lottini* Guérin has orbital teeth and lacks a biunguiculate dactylus on the walking legs, but it is easily separated from this and all other species of *Alpheus*, by the heavy and bluntly rounded shape of the dactyli of the three posterior pair of the thoracic legs. Five species share the teeth on the orbital hoods and simple dactyli with *A. soelae*; in addition to the unique fringe of setae on the small chela, they may also be separated from the new species by the following characteristics: *A. brucei* Banner and Banner bears a transverse groove on the large chela proximal to the dactylar articulation; *A. facetus* De Man bears a more marked groove on the superior face of the large chela, but lacks the low ridge and inferior groove on the lateral face; the large chelae of *A. coetivensis* Coutière, *A. supachai* Banner and Banner and *A. splendidus* Coutière all lack grooves on the palm of the large chela; and *A. splendidus* can further be separated by the location of the orbital teeth, high on the orbital hoods, not on the margins.

This new species may be inserted in our key to the species of *Alpheus* of Australia (1981:26) by inserting the following couplet after the present couplet 12:

- 13(12). Both margins of both propodal finger (pollex) and dactylus of small chela bearing dense rows of setiferous bristles ..... *A. soelae*  
 Fingers of small chela bearing at most scattered setae ..... 13a.

Then the present couplet 13 can be renumbered as 13a and the following key be continued in its present arrangement.

***Alpheus stantoni* sp. nov.**  
 (Fig. 2)

**Type material.** HOLOTYPE - ♀, NTM Cr. 003435, TL 26 mm, Heron Island, Great Barrier Reef, Australia, dug out of coral rubble at 13 m, 26 August 1983, coll. F.G. Stanton.

**Description.** Rostrum relatively long with tip reaching near end of first antennular arti-

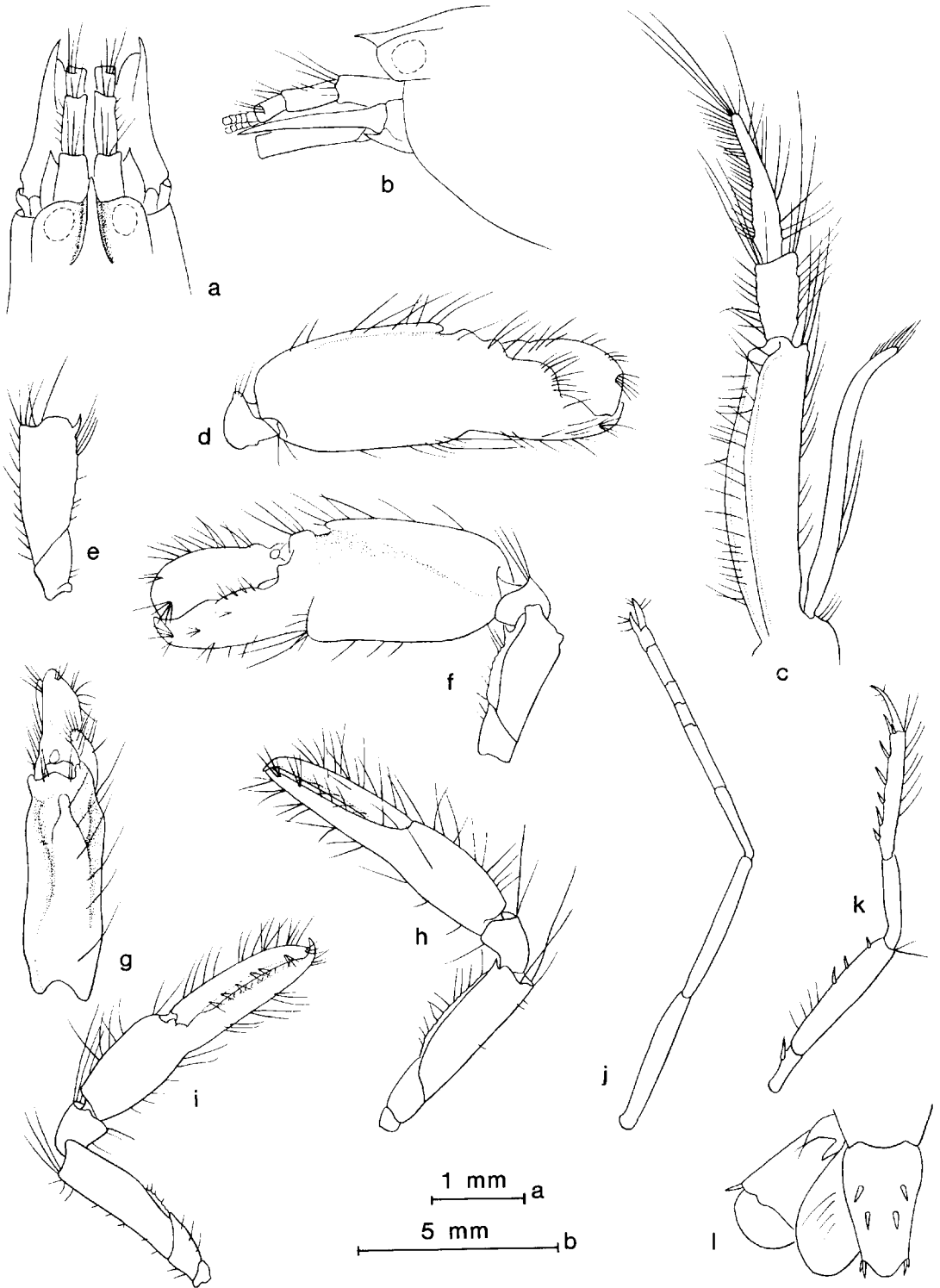
cle (in lateral view). Broad with length about twice breadth at base posterior to orbital hoods, dorsally flattened without trace of carina. Orbital hoods distinct and somewhat inflated with anterior margin curved. Orbitorostral grooves deep and well demarked, with lateral margins of rostrum definitely overhanging medial wall of groove; rostrum continuing posteriorly to posterior margin of orbital hoods. Orbitorostral margin only slightly concave between anterior margins of hood and lateral margins of rostrum.

Second antennular article 1.3 times as long as visible part of first and about 2 times as long as wide, third article half as long as second. Distal margins of articles bearing long fine setae. Stylocerite acute, reaching just past end of first antennular article. Outer margin of scaphocerite slightly concave, lateral tooth reaching well beyond antennular peduncle with squamous portion short and narrow and a little shorter. Lateral tooth of basicerite small but acute. Carpocerite 5.6 times as long as broad, viewed laterally, and as long as squame.

Ratio of articles of third maxilliped: 10:3.0:5.4. Lateral margin of first article bearing distally a rounded tooth. Third article distally bearing strong setae.

Large chela 3.0 times as long as broad, fingers occupying distal third; superior saddle well developed, proximal shoulder rounded and projecting above saddle, distal shoulder rounded. Lateral palmar groove triangular with apex extending to near proximal articulation (proximal portion of groove may be an artifact from handling). Medial surface of palm similar to lateral except lower margin bearing a more pronounced shoulder; proximal extension of groove reaching along crest of palm; crest bearing a few long setae. Merus 2.3 times as long as broad and distally bearing on superior margin slight rounded projection beset with a few long hairs; inferointernal margin irregularly serrate with few setae and distally bearing strong tooth.

Small chela of female 4.6 times as long as broad with fingers 1.3 times as long as palm; palm and fingers bearing long setae with more setae on fingers than palm. Merus 3.8 times as long as broad, similar to large chela except inferointernal margin not serrate and distal tooth smaller. Male chela unknown.



**Fig. 2.** *Alpheus stantoni*: a, b, anterior region, dorsal and lateral views; c, third maxilliped, lateral face; d, e, large chela and merus medial faces; f, large cheliped, lateral face; g, large chela, superior face; h, i, small cheliped medial and lateral faces; j, second leg; k, third leg; l, telson and uropods. All drawings except c, scale b.

Carpal articles of second leg with ratio: 10:10:3:3:5.

Ischium of third leg bearing spine. Merus 5 times as long as broad with inferior margin bearing 3 spines and a few setae but no distal tooth. Carpus 0.7 as long as merus and 6.2 times as long as broad. Propodus 0.9 times as long as merus, bearing on its inner margin 5 moderate-sized spines and a pair distally. Dactylus simple, curved, 0.5 as long as propodus. Fourth leg with merus 6.6 times as long as broad, with inferior margin bearing 2 small spines and some stiff setae.

Telson with maximum breadth slightly posterior to articulation and with breadth at this point 1.6 times that of posterior breadth. Length 2.6 times posterior breadth. Posterior margin arcuate and projecting, with posterolateral spines relatively weak. Dorsal spines normal and strong, with anterior pair anterior to middle and posterior pair near middle.

**Colouration.** (From a color transparency taken by Mr Stanton of the living specimen, shown in dorsal view): Basically scattered light red chromatophores on a transparent to translucent white ground color, with concentrations of the chromatophores in the anterior region including the bases of the first and second antennae, as indistinct transverse bands on the terga of the second and sixth abdominal segments and on the tail fan. The chelae are solid red with white fingers on the large chela; the following thoracic legs bear a single red band on the ischium and the proximal end of the merus and another band on the distal end of the merus; otherwise, the appendages and the antennular and antennal flagellae are transparent. No lateral markings are discernible in photograph.

**Biological notes.** The sole specimen was collected by Mr Stanton while he was studying alpheid-goby associations off Heron Island, Great Barrier Reef, Australia. The specimen came from a sand and coral rubble bottom beyond the edge of the northwest corner of the Heron Island fringing reef in 13 m of water. Mr Stanton's technique would be to observe a shrimp-goby hole with its occupants, then plunge a "plastic spade" into the substrate behind them in an effort to prevent the occupants from fleeing to further reaches of the tunnel. He would then exca-

vate the sand-rubble by hand, usually 5-10 cm deep and 30-40 cm wide. Such an excavation produced this shrimp, but Mr Stanton is emphatic that it was not the same species of shrimp as the one he saw associated with the goby (*Amblyeleotris* sp.) at the mouth of the burrow. Whether it lived independently or associated with another goby he does not know.

**Discussion.** The presence of movable spines on the merus of the third leg is rare in the genus *Alpheus* — we can recall only *A. philoctetes* De Man and *A. lanceoloti* Coutière in the Diadema Group and *A. alcyone* De Man in the Crinitus Group bearing them — and they do not occur in any Indo-Pacific members of the Edwardsii Group, yet the sculpturing of the chela in this species plainly places it within the last group.

The species within the Edwardsii Group that have a rostrum similarly flattened dorsally are *A. bisincisus* De Haan (see Banner and Banner 1982:263, Fig. 81), *A. proseuchirus* De Man (1908:111; 1911:407, Fig. 96) and *A. spatulatus* Banner and Banner (1968:146, Fig. 3). Of these three, *A. stantoni* is somewhat similar in the rostral base to *A. proseuchirus*, but in the latter species the sculpturing on the large chela is greatly reduced — for example, the inferior shoulder on the outer face is lacking and the third legs are more slender and elongate. In *A. bisincisus* the rostral base does not overhang the orbitorostral grooves and the sculpturing of the large chela is heavier with the inferior shoulder protruding as an acute tooth. *A. spatulatus* can most easily be distinguished by the spatulate condition of the dactyli of the third and fourth legs as well as by the length of the rostrum and proportions of the meri of the large and small chelae.

In our key to the genus *Alpheus* from Australia (1982:30) this species can be separated easily by inserting the following dichotomy after couplet 51:

- 52(1). Meri of third and fourth legs bearing movable spines ..... *A. stantoni*  
 Meri of third and fourth legs perhaps bearing a fixed tooth but not movable spines ..... 52a.

Then the present couplet 52 can be remembered as 52a and the following key be continued in its present form.

This species has been named for its collector, presently a doctoral candidate in the Department of Zoology, University of Hawaii.

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#### REFERENCES

- Alcock, A. and Anderson, A.R. 1899 An account of the deep-sea Crustacea dredged during the surveying-season of 1897-98. XLIII. Natural history notes from H.M. Royal Indian Marine Survey Ship "Investigator", Commander T.H. Heming, R.N., commanding. Series III, No. 2. *Annals and Magazine of Natural History* (7) **3**:278-292.
- Banner, A.H. and Banner, D.M. 1968 Three new species of the genus *Alpheus* (Decapoda, Alpheidae) from the International Indian Ocean Expedition. *Crustaceana* **15**(2):141-148.
- 1981 Decapod Crustacea, Alpheidae. In: *Resultats des campagnes MUSORSTOM. I. Philippines (18-28 Mars, 1976)*. *Memoirs ORSTOM* **91**:217-235.
- Banner, D.M. and Banner, A.H. 1982 The alpheid shrimp of Australia. Part III. The remaining alpheids principally the genus *Alpheus*, and the family Ogyrididae. *Records of the Australian Museum* **34**(1):1-357.
- Banner, A.H. and Banner, D.M. 1983 An annotated checklist of the alpheid shrimp from the Western Indian Ocean. *Travaux et Documents ORSTOM* **158**:1-164.
- Coutière, H. 1905 Les Alpheidae. In: J.S. Gardiner (ed.) *The fauna and geography of the Maldives and Laccadive Archipelagos* **2**(4):852-921. University Press: Cambridge, England.
- De Man, J.G. 1908 Diagnosis of new species of macrurous decapod Crustacea from the "Siboga-Expedition." III. *Notes Leyden Museum* **30**(14):98-112.
- 1911 The Decapoda of the Siboga Expedition. Part II. Family Alpheidae. *Siboga-Expeditie* **39a**<sup>1</sup>(2):133-465.
- 1915 Supplement...Explanation of plates of Alpheidae. *Siboga-Expeditie* **39a**<sup>1</sup>(2):23 plates.

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