

1965
Griffith + Yaldwyn

Dr. Ferns A. Chase — with the compliments of us
both, John Yaldwyn and

D. J. G. Griffin

17 May 1965

TRANSACTIONS
OF THE
ROYAL SOCIETY OF NEW ZEALAND

ZOOLOGY

VOL. 6

No. 4

APRIL 9, 1965

A Record of the Majid Brachyuran Genus *Achaeus* from New Zealand with Notes on the Australian Species

By D. J. G. GRIFFIN,

Zoology Department, University of Tasmania

and

J. C. YALDWYN

The Australian Museum, Sydney

[Received by the Editor, 15 June 1964.]

LIBRARY
DIVISION OF ZOOLOGICAL SCIENCES

INVERTEBRATE
ZOOLOGY
Crustacea

Abstract

Stenorhynchus fissifrons Haswell, previously recorded from New Zealand waters, is here firmly established as an authentic New Zealand species also occurring in eastern Australia and Japan, and is transferred to the genus *Achaeus* Leach. A key to the New Zealand and Australian species of this genus is given. *Achaeus fissifrons* is redescribed and figured, and diagnoses of other Australian species and discussions of their synonymy are added. The ecology of *A. fissifrons* is briefly discussed as is also the distribution of the genus.

INTRODUCTION

IN the latter years of the last century a new species of majid spider crab, *Stenorhynchus fissifrons*, was described from Auckland, New Zealand, by W. A. Haswell (1879), then recently arrived in Australia from Edinburgh. In two subsequent papers (Haswell, 1880a, 1882) the meagre description was repeated and the species was recorded in addition from Port Jackson, Sydney, New South Wales. Following this, *S. fissifrons* was not again recorded in the literature from additional specimens. On the whole, New Zealand workers on Brachyura seemed inclined to regard this species as an authentic part of the New Zealand fauna. Thus it was not included in the list of doubtful species published by Hutton (1882), the so-called "black-list"; it was included in the list of species prepared by Thomson and Chilton for Hutton's (1904) "Index", and finally Chilton and Bennett in their review of New Zealand Brachyura (1929) stated that it probably did occur in the fauna, though the type was presumably lost. A half-day's search by E. W. Bennett in the collections of the Macleay Museum, Sydney, where Haswell indicated the New Zealand specimen had been deposited, had at that time revealed

Published by the Royal Society of New Zealand, c/o Victoria University of Wellington, P.O. Box 196, Wellington.

no trace of this type specimen. In a later paper Bennett (1930) noted that, according to Mr F. A. McNeill of the Australian Museum, Sydney, the specimen from Port Jackson was in the Australian Museum collections. Richardson (1949) included the species in his "Guide", presumably on the basis of Chilton and Bennett's (1929) remarks.

In June, 1956, one of us (J.C.Y.) collected a number of specimens of a small majid crab from the deck and nets of the fishing boat M. T. "Admiral" (A. Dickinson) and recognised them as a novelty probably close to the genus *Achaeopsis* Stimpson, 1857. This material, consisting of several males and two females, had been trawled off the west coast of the North Island of New Zealand between Foxton and Wanganui, at a depth of about 50 fathoms. The majid, and a series of other interesting decapods, were associated on the bottom where the trawler was working, with large growths of a striking pink and white corraline alga, then unknown to local workers. Later, during a systematic study of the New Zealand majids by one of us (D.J.G.G.), the material was placed in the subfamily Inachinae and provisionally assigned to the genus *Achaeopsis*. Since it did not correspond completely to the descriptions available of any already known species, including that of *Stenorhynchus fissifrons*, the material was regarded as comprising a new species. Some time later, however, when the holotype of Haswell's species was located by us in the collections of the Macleay Museum, comparison of the "new" species with it revealed that the two were conspecific. Thus *Stenorhynchus fissifrons* is now firmly established as part of the New Zealand fauna.

After examination of other material in the Australian Museum, and of the literature, it has been decided that *Stenorhynchus fissifrons* is most appropriately referred to the genus *Achaeus* Leach, 1817. In this connection it should be noted here that Haswell (1879) originally regarded this species as belonging to the genus *Stenorhynchus* Latreille, 1825, and expressly states this in the opening sentence of his paper. However, it is rather confusing to find that in the last of the three papers of Haswell mentioned above (Haswell, 1882), this species and the Australian one described at the same time, *S. brevirostris*, are placed in *Stenorhynchus* Lamarck, 1818. This latter placing must be regarded as an error on Haswell's part, for Latreille's genus, now regarded as a synonym of *Macropodia* Leach, 1814 (see Balss, 1957: 1621), is characterised by a bifid rostrum, the situation in both of Haswell's species, while in Lamarck's genus (for suggested stabilisation see Garth & Holthuis, 1963), the rostrum is single. Miers (1886), on the other hand, seems to have recognised Haswell's original placing of both species as erroneous for, despite the short descriptions, he included *S. fissifrons* in his list of species of *Achaeopsis* and *S. brevirostris* in the list of *Achaeus* species.

Three species of *Achaeus*, apart from the two mentioned above (*A. fissifrons* and *A. brevirostris*), have already been recorded from Australian waters: *A. laceratosus* Stimpson, 1857 (= *A. breviceps* Haswell, 1880) from Port Jackson, N.S.W. (type locality); *A. affinis* Miers, 1884, from Queensland waters, Port Jackson and western Australia, and *A. tenuicollis* Miers, 1886, from Port Phillip, Victoria (type locality) and Bass Strait. The species of *Stenorhynchus*, *S. curvirostris*, from Bass Strait described by A. Milne Edwards (1873) is far too inadequately known to allow positive identification with any of the material yet examined and its status must therefore, for the present, remain uncertain. It was regarded by Miers (1886: 18) as possibly a species of *Achaeopsis*, a genus otherwise represented in Australia by *A. thomsoni* (Wyville-Thomson, 1873) and *A. ramusculus* (Baker, 1906).

In this paper, *Achaeus fissifrons*, up till now known as *Stenorhynchus fissifrons*, is redescribed and figured from New Zealand material and notes on its ecology and distribution are given. *Achaeus affinis* Miers and *A. tenuicollis* Miers are

recognised as synonyms of *A. brevirostris* (Haswell) and *A. fissifrons* (Haswell) respectively. Other probable synonymies of New Zealand and Australian species (including *A. fissifrons* and *A. lacertosus*) are discussed, and a key to the Australian species of the genus is given with brief diagnoses. It is intended that the remaining species of this genus occurring in Australia will be redescribed by one of us (D.J.G.G.) in a future paper.

The terminology employed here follows that used by Rathbun in her papers and that used previously by Griffin (1963, 1964). The measurement "carapace length" includes the length of the rostrum in each case.

SYSTEMATICS

Family MAJIDAE Samouelle, 1819

Subfamily INACHINAE Macleay, 1838

Genus ACHAEUS Leach, 1817

Achaeus Leach, 1817: pl. XXII C. H. Milne Edwards, 1834: 281. Miers, 1879c: 643; 1886: 8. Haswell, 1880a: 433; 1882: 3. Alcock, 1895: 169. Balss, 1929: 5. Sakai, 1938: 209. Bouvier, 1940: 359. Barnard, 1950: 18. Forest & Zariquiey Alvarez, 1955: 63.

Stenorhynchus, Haswell, 1879: 408; 1880a: 432; 1882: 2 (in part). Not *Stenorhynchus* Latreille, 1825 = *Macropodia* Leach, 1814 (*vide* Balss, 1957). Not *Stenorhynchus* Lamarck, 1818.

DIAGNOSIS. Carapace pyriform to elongate subtriangular, somewhat narrowed behind orbit as a "neck", sometimes bearing a few tubercles but never long spines. Rostrum of two short, acute or rounded spines. Orbit consisting above of a narrow supraorbital cave, laterally spinulated or smooth; postorbital spine if present not prominent. Eyestalks long, non-retractile, cornea obliquely subterminal, slightly ventral, large, ovoid. Basal antennal article extremely slender, smooth, weakly tuberculate, spinulose or armed with spines laterally.

Merus of third maxillipeds subovate, not notched distally, palp articulating at summit.

Chelipeds greatly enlarged in adult male, usually spinose. Ambulatory legs of extreme length and slenderness, dactyli of third and fourth legs usually falcate and ventrally spinulated.

Abdomen of six segments in both sexes, male abdomen widest at middle of third segment.

Male first pleopod bluntly pointed, aperture located subterminally in a groove.

RANGE. East Atlantic Ocean and Mediterranean Sea, Indo-West Pacific (South Africa, India, China, Japan, Australia and New Zealand).

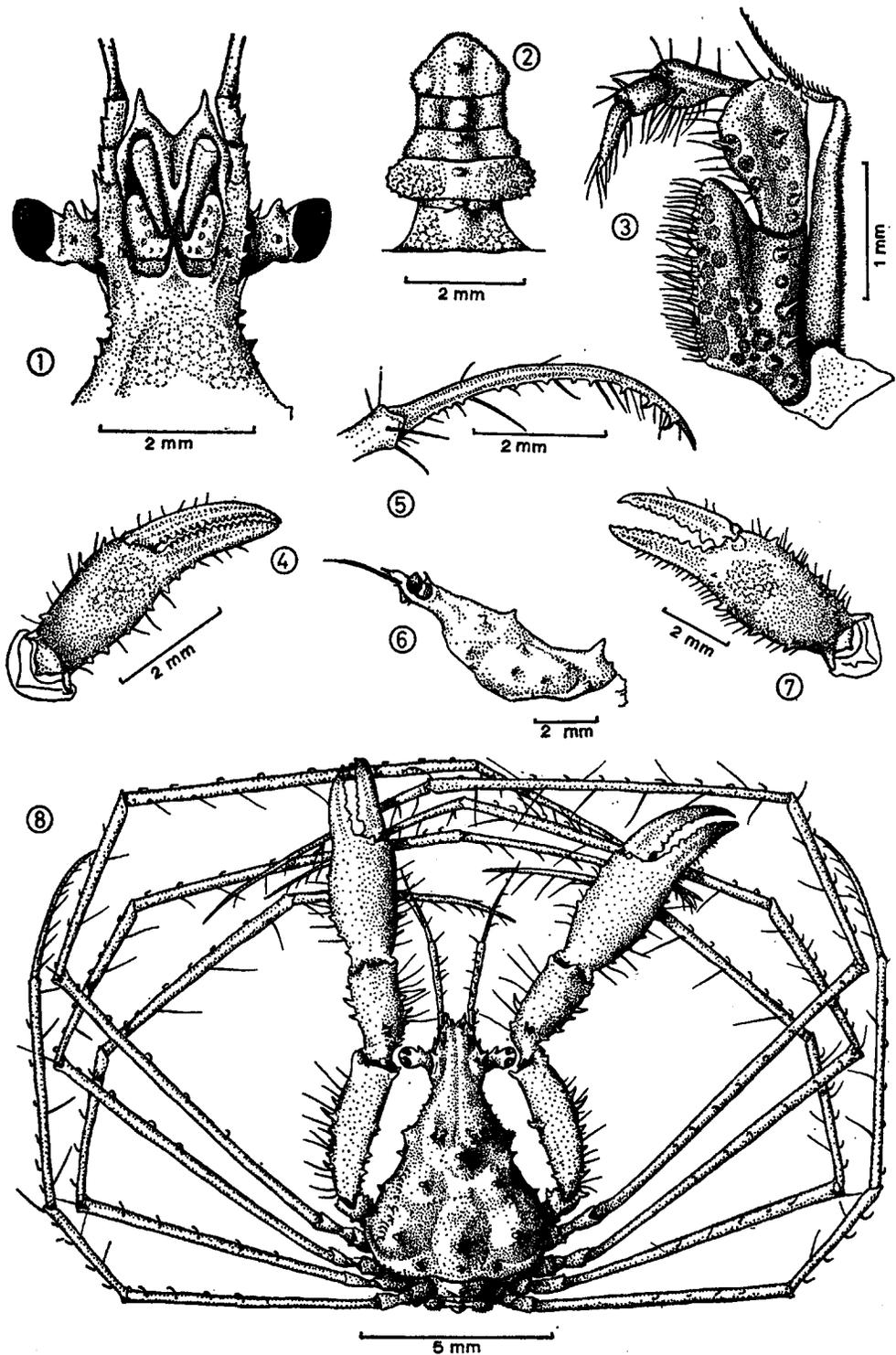
TYPE SPECIES. *Achaeus cranchii* Leach, 1817, by monotypy; a north-eastern Atlantic and Mediterranean species.

REMARKS. The genus *Achaeus*, a rather typical inachine, stands closest to the Atlantic genus *Macropodia* Leach, 1814, from which it differs in the much shorter rostral spines, and to the virtually cosmopolitan genus *Achaeopsis* Stimpson, 1857, and the Atlantic *Inachus* Weber, 1795, from both of which it differs in the absence of a prominent postorbital spine. The western Atlantic and eastern Pacific *Podochela* Stimpson, 1860, is superficially similar to *Achaeus* but differs in the important respect that the rostrum in the former is single and not double.

Achaeus includes about 20 rather small species inhabiting mostly continental shelf waters. Some of the included species are now comparatively well known, the Japanese ones having been treated by Sakai (1938) and the South African ones by Barnard (1950), but there appears to be still room for revision of some of the species. The type species has recently been redescribed by Forest and Zariquiey Alvarez (1955). The genus as at present understood seems a compact and natural one, the species agreeing in many important features such as form of the rostrum and orbit, ornamentation of the carapace, shape of the male abdomen and form of the male first pleopod.

KEY TO THE NEW ZEALAND AND AUSTRALIAN SPECIES OF THE GENUS *Achaeus*

- 1 (2) Rostrum of two short acute spines. Supraorbital eave bearing laterally a prominent spine and several minute spinules; several small postorbital spinules present. Eyestalk with a prominent tubercle midway along anterior surface. Carapace with several tubercles dorsally including a prominent cardiac tubercle sometimes surmounted by two spinules and a small tubercle close to posterior margin of carapace. Dactyli of ambulatories 3 and 4 not markedly falcate, ventrally spinulated for entire length *A. fissifrons* (Haswell, 1879)
- 2 (1) Rostrum of two rounded lobes. Supraorbital eave usually minutely spinulated laterally but lacking a prominent spine. Postorbital spinules absent. Eyestalk smooth or tuberculate.
- 3 (4) Carapace smooth, lacking prominent tubercles. Eyestalk lacking tubercle. Basal antennal article smooth. Rostral lobes with a series of spinules distally. Posterior margin of supraorbital eave and hepatic margin minutely spinulated. Dactyli of ambulatories 3 and 4 very strongly falcate, almost semicircular, ventrally spinulated for distal two-thirds only *A. lacertosus* Stimpson, 1857
- 4 (3) Carapace with at least two prominent submedial cardiac tubercles. Eyestalk with a prominent tubercle midway along anterior surface. Basal antennal article spinulated. Rostral lobes without a series of spinules. Dactyli of ambulatories 3 and 4 falcate, but not semicircular, ventrally spinulated for entire length.
- 5 (6) Rostrum of two strong, but blunt lobes, separated by a narrow V- or U-shaped hiatus, and often weakly convergent distally. Cardiac submedial tubercles followed immediately behind by a small intestinal tubercle; carapace otherwise with a few scattered tubercles. Chelipeds smooth except for a few tubercles on medial and lateral surfaces of merus and carpus and dorsal surface of propodus; dactyl in mature male with a prominent basal tubercle, fixed finger deeply excavated, a strong tooth at each end of excavation *A. brevirostris* (Haswell, 1879),
(= *A. affinis* Miers, 1884)



TEXT-FIGS. 1-8.—*Achaeus fissifrons* (Haswell). 1, ventral view of front. 2, male abdomen. 3, left third maxilliped. 4, right chela of female. 5, right fourth ambulatory dactyl. 6, lateral view of carapace. 7, left chela of male. 8, dorsal view of whole male specimen. Fig. 4 from 7.2mm female, remainder from 8mm male, between Foxton and Wanganui.

- 6 (5) Rostrum of two pointed lobes, each with a small, sharp distal projection. No intestinal tubercle; carapace otherwise with a strong gastric tubercle. Female cheliped spinous, with a comb-like row of enlarged spines ventrally along merus and ischium (male cheliped unknown)

Achaeus sp., possibly new.
(Known from a single female specimen from Gibson Reef, off Cairns, Queensland, 28 fms, coll. W. E. J. Paradise, 1924. To be described by D.J.G.G. in a future paper.)

Achaeus fissifrons (Haswell, 1879), new combination (Figs. 1-8)

Stenorhynchus fissifrons Haswell, 1879: 409; 1880a: 432; 1880b: 145; 1882: 2. Whitelegge, 1889: 225. Chilton & Bennett, 1929: 735. Bennett, 1930: 255. Richardson, 1949: 63.

Achaeopsis fissifrons (Haswell), Miers, 1886: 6.

Achaeus tenuicollis Miers, 1886: 9, pl. 1, figs. 3a-c. Alcock, 1895: 170. Whitelegge, 1900: 140. Fulton & Grant, 1906: 16. Rathbun, 1918: 4. Stephensen, 1945: 97, figs. 18A, B.

Achaeus elongatus Sakai, 1938: 223, fig. 13.

TYPES. *A. fissifrons*—Holotype, female, carapace length 8mm, a dry specimen mounted on glass sheet with handwritten label, "Stenorhynchus fissifrons, Haswell. Auckland". Carapace, abdomen and both chelipeds in place but ambulatory legs broken from mount and, except for some fragments, missing. Macleay Museum, University of Sydney. (Note: There is a dry specimen from Port Jackson, N.S.W., in the Australian Museum, registered as G.5088, and labelled as type of *Stenorhynchus fissifrons* Haswell. This cannot have type status as *S. fissifrons* was described from a single New Zealand specimen. G.5088 is from the Haswell collection and is probably the basis of Haswell's (1880a) Port Jackson record; it is now identified by us as *Achaeus brevirostris* (Haswell). We suggest that specimens G.5088 and G.5089 have had their labels exchanged at some time in the past (see note on types of *A. brevirostris*).

A. tenuicollis: The four syntypes are all extant in the British Museum (Natural History), old reg. No. 84. 31 (Dr I. Gordon, pers. comm.). We select as Lectotype the male, carapace length 8mm (new reg. No. 1964. 5.11.1) from off entrance to Port Phillip, Victoria, 38° 22' 30" S., 144° 36' 30" E., 33 fms, "Challenger" Expedition. Specimen in spirit in glass tube; the carapace and abdomen are intact but the legs are all detached except for the proximal half of the right cheliped; the remaining part of the right cheliped and the whole of the left cheliped and perhaps some of the ambulatory legs are in a separate glass tube with the two paralectotype females from off East Moncoeur Island, Bass Strait. The male is the specimen on which the original description and figure of the species were based by Miers (1886), but it cannot be considered a holotype in the absence of a specific statement on its status by Miers.

A. elongatus: Holotype, male, carapace length 5.2mm, between Ito and Hatusima, Japan, 100 metres, "Misago".

MATERIAL EXAMINED. A total of 57 specimens as follows:

New Zealand: Dominion Museum, Wellington. Between Foxton and Wanganui, 50 fms, 7/6/1956, trawled M.T. "Admiral", bottom of coralline alga and sponge, 10 ♂♂, 6.5–8.2mm, 2 ♀♀, 5–7.2mm (Z. Cr. 1113, 1114); two males from this sample are now in Australia Museum, P. 14046. Remaining material collected by Dr R. B. Pike and others, N.Z. Marine Department, Wellington: 13–16 miles off Cape Brett, North Auckland, 88–92 fms, 5/7/1963, 1 ovig. ♀, 8mm; 10 miles NNE of Flat Head, North Auckland, 85 fms, 16/6/1963, 3 ♂♂, 6–6.5mm (one now in Australian Mus., P.14516); Colville Channel, Hauraki Gulf, 25 fms, 14/11/1962, 1 ♂, 7mm (Z. Cr. 1350); Tasman Bay, Nelson, 40° 15' S., 173° 20' E., 44 fms, 2/9/1963, 4 ovig. ♀♀, 8 mm; off Farewell Spit, Nelson, 40° 08' S., 173° 03' E., c. 55 fms, 2/9/1963, 1 ♂, 7mm, 1 ovig. ♀, 8mm.

Australia: Australian Museum. 11 miles SE of Crowdy Head, northern N.S.W., 5 fms, trawled, Captain K. Moller, March, 1947, 1 ♂ (P.11745). Port Jackson, N.S.W., old collections, no data, 1 ♀ (G.5089), 1 ♂, 2 ovig. ♀♀ (P.164), 2 ♂♂, 1 ♀ (P.1442). Near Sow and Pigs Reef, Port Jackson, 4 fms, dredged, F. A. McNeill, 16/1/1928, 1 ♂ (P.9050). Off Botany Bay, N.S.W., between 22 and 52 fms, trawled, "Thetis" Exped. Stn. 35, 1 ♂, 1 ♀ (G.2338); Stn. 37, 2 ♂♂, 8 ♀♀ (some ovig.) (G.2337) (see Whitelegge, 1900). 3–4 miles off Eden, N.S.W., 25–30 fms, trawled, A. A. Livingstone and H. O. Fletcher, July 1922, 1 ♂, 2 ovig. ♀♀ (P.5791). Off Twofold Bay, N.S.W., 45–50 fms, trawled, Captain K. Moller, Oct. 1929, 2 ♀♀ (one ovig.) (P.9396). 12–22 miles NE of Green Cape, southern N.S.W., trawled, Livingstone and Fletcher, Aug. 1924, 1 ♂, 1 ovig. ♀ (P.7376). 5 miles off Green Cape, trawled, Captain Moller, June 1930, 2 ovig. ♀♀ (P.9649). Off Cape Everard, Victoria, 70–75 fms, trawled, H. O. Fletcher, July 1930, 1 ♂, 1 ovig. ♀ (P.9679). Eastern slope of Bass Strait, 70–80 fms, trawled, "Endeavour" Exped., 1 ovig. ♀ (E.4826) (see Rathbun, 1918).

Macleay Museum. Auckland, New Zealand, 1 ♀ (dry), Holotype.

LOCALITIES PREVIOUSLY REPORTED. Iranian Gulf, 40–49m (Stephensen); Andaman Islands (Alcock); off southern Japan, 100 m (Sakai); Port Jackson, N.S.W. (Haswell); Port Jackson and Botany Bay, 22–52 fms (Whitelegge); off Eden, N.S.W., 60–100 m (Stephensen); off Port Phillip, Victoria and Bass Strait, 33–38 fms (Miers); eastern slope of Bass Strait, 70–80 fms (Rathbun); Auckland, N.Z. (Haswell).

DISTRIBUTION. New Zealand, southern and eastern Australia, north to Japan. Perhaps extending west to the Andaman Islands and Iranian Gulf in the Indian Ocean area.

DIAGNOSIS. Carapace elongate subtriangular. Rostrum of two short acute spines separate from base. Supraorbital eave bearing laterally a prominent slender spine followed by several postorbital spinules; eyestalk bearing a prominent tubercle midway along anterior surface. Hepatic margin bearing a single acute spine and several small spinules. Carapace with several small tubercles including a prominent cardiac one. Basal antennal article with a few spinules. Chelipeds very long in adult male, a few long spines distributed mostly along dorsal and ventral surfaces. Dactyli of ambulatories 3 and 4 not markedly falcate, ventrally spinulated for entire length, two distal spinules usually larger than others.

DESCRIPTION. Carapace elongate subtriangular in dorsal aspect (length 1.3 times width), narrowed and almost truncate anteriorly, moderately broad posteriorly, branchial regions weakly swollen. Margins with a few prominent spines and several tubercles, dorsal surface weakly tuberculate, short curled hairs around base of rostrum, in a longitudinal row on each protogastric region and subdorsally along anterolateral margins of branchial region. Regions of carapace well demarcated.

Rostrum of two very short slender acute spines ($\frac{1}{8}$ length of carapace), separate from base, basal width twice length, distal width hardly exceeding basal width.

Hepatic margin with a single acute spine surrounded by several smaller spinules, one of which may be subequal with main spine. Branchial margin with two spines, slightly larger than hepatic spine, towards posterior part of anterolateral margin, first at a slightly lower level than either hepatic spine or second branchial spine. Posterolateral margins of carapace minutely spinulated.

Dorsal surface with three mid-dorsal tubercles, one on posterior part of mesogastric region just behind level of marginal hepatic spine, one centrally surmounting tumid cardiac region just behind widest part of carapace, sometimes bearing two small submedial spinules, and one small tubercle on intestinal region between cardiac tubercle and posterior margin of carapace. Four tubercles on each side of midline, one small protogastric pair opposite marginal hepatic spine forming an inverted triangle with medial gastric tubercle and three paired branchials, one just behind level of medial gastric tubercle and two posteriorly close to margin of carapace, first just in front of cardiac tubercle, second just behind, and lateral to, medial intestinal tubercle.

Orbit consisting above only of narrow supraorbital cave, incomplete below. Eave bearing midway along a short, but prominent, slender, supraorbital spine, weakly curved upwards and forward, several minute spinules sometimes also present, of which one or two in front of spine may be slightly enlarged. Several small postorbital spinules, one usually larger than others. Eyestalk long and stout, completely visible in both dorsal and ventral view, bulbous basally, bearing midway along anterior surface a large blunt tubercle, a small tubercle level with this on both dorsal and ventral surfaces; cornea obliquely subterminal, slightly ventral, large, ovoid, a very small tubercle dorsally at distal extremity of eyestalk.

Basal antennal article long and slender, subrectangular, anterolateral angle armed with a single strong spine directed forward and slightly outward; outer surface weakly excavated basally as wide shallow groove, a small spinule close to medial edge near base; antennal flagellum inserted beside rostrum and completely visible on each side of it, half length of carapace, slender, two basal segments short and stouter than following with one or two spines on lateral surface, third segment very long, almost half total length of flagellum, following segments decreasing in length and tapering gradually; a few short curled hairs extending along dorsal surface of first three segments.

Antennular fossae very large, longitudinally subovate, narrow, basal segment of antennules bearing somewhat medially a row of 3 to 5 minute tubercles on outer surface; interantennular spine strong, projecting downwards as a blunt tooth, anterior surface deeply excavated; anterior process of epistome short, slender, sharply pointed.

Epistome slightly longer than wide, widening posteriorly. Mouthfield subrectangular, narrowing posteriorly, anterior margin almost transverse, weakly concave medially. Pterygostomian regions triangular, weakly excavated at posteromedial corner, separated from subhepatic region by a shallow groove, a small tubercle, visible in dorsal view, midway along lateral margin.

Third maxillipeds almost meeting in midline. Ischium large, broadly subrectangular, medial half of distal edge greatly extended anteriorly, rounded, lateral half weakly concave to bear merus; medial edge with large, irregularly shaped teeth overlaid, but not concealed, by a fringe of very long hairs; outer surface covered basally and toward medial and lateral edges by flattened plates of irregular shape and size, those at base and along lateral edge bearing short sharp spinules; a shallow groove, narrow posteriorly, extending longitudinally along middle of outer surface. Merus longitudinally subovate, narrow basally, as long as, and distally as wide as, ischium, about 4 spinules along lateral edge distally; outer surface excavated as a shallow longitudinal groove medially, a few rounded plates bordering groove, some bearing short spinules, a few scattered hairs along medial edge of merus. Palp articulating at summit of, and slightly lower than, merus, cylindrical and stout, bearing long hairs along medial and lateral surfaces.

Chelipeds very long (twice length of carapace in adult male), stout, surfaces granular, spines and long hairs scattered along dorsal and ventral surfaces. Ischium short with a few scattered spinules. Merus long and stout, almost $\frac{1}{3}$ total length of cheliped, subtrigonal, a row of long and short spines along ventrolateral edge, a few smaller spines along ventromedial and dorsal edges, a small spine dorsally overlying distal articulating edge. Carpus

$\frac{3}{8}$ merus, slightly stouter, subtrigonal, ventral surface flat, ventrolateral and dorsal edges with a few curved spines, a short spine on lateral surface near base. Chela almost $\frac{1}{2}$ total length of propodus, compressed, palm deep in male, bearing short spines along dorsal and ventral surfaces; fingers acute, curved inward distally, lateral and medial surfaces with a prominent shallow longitudinal groove, adjacent inner edges irregularly toothed for entire length, teeth larger basally; dactyl slightly less than $\frac{1}{2}$ chela in male, slightly longer than $\frac{1}{2}$ chela in female.

Ambulatory legs of extreme length and slenderness, first leg the longest (almost 5 times carapace length), following legs decreasing in length posteriorly, fourth leg the shortest (3 times carapace length), meri and propodi subequal in length, each about $\frac{3}{7}$ total length of leg, dactyli slightly shorter than carpi; curled hairs scattered singly along dorsal surface of meri, carpi and propodi, carpi and following segments bearing scattered long hairs. Dactyli in anterior legs almost straight, in posterior legs weakly falcate and ventrally spinulated for entire length, spinules small proximally, larger and curved distally, in fourth ambulatory leg, distal 2, rarely 3, spinules of dactyl clearly larger than more proximal ones which are sometimes reduced or absent.

Sternum large, excavated anteriorly on each side of midline, posterior sternites covered by small scattered tubercles.

Abdomen extending anteriorly to opposite bases of chelipeds, of six segments in both sexes, segments 6 and 7 coalesced. Male abdomen narrow, segments wider than long; segments 1 and 3 subequal in length (almost $\frac{1}{5}$ total length of abdomen), segment 2 very short, segments 4 and 5 subequal in length, slightly shorter than segment 1, last segment very long, twice length of segment 1; segment 1 wide basally, narrowing distally, segment 2 narrow, abdomen widest at middle of laterally convex segment 3, segment 4 narrowing abruptly, segment 5 with sides subparallel, last segment widening basally, subtriangular, tip rounded. Surface of abdomen weakly elevated in midline, surmounted in all segments by a tubercle, large in first, very small in second, and in remaining segments slightly smaller than in first, sometimes occupying whole of length of segment 5; lateral surfaces of segments 3 and 6 elevated, spinous in third, smooth in last, surfaces otherwise granular. Female abdomen wide, subovate, extending laterally to bases of ambulatories.

Male first pleopod slender, compressed, outwardly curved and weakly expanded distally, fleshy flaps of expansion enclosing a long narrow groove on sternal surface, aperture small and circular, at end of groove, tip of pleopod narrowing abruptly and bluntly pointed, surface naked except for some minute setae scattered along abdominal surface close to tip.

MEASUREMENTS. Study male, length 8mm, width 6mm, rostral length 0.5mm, rostral width 1mm, cheliped 16.2mm, chelar length 7mm, chelar height 2.2mm, dactyl 3.5mm, first ambulatory leg 38.5mm.

Female, length 7.2mm, cheliped 10mm, chelar length 4.5mm, chelar height 1.5mm, dactyl 2.8mm, first ambulatory leg 28mm. The carapace of this specimen is mutilated; the smaller female from the Foxton-Wanganui sample measures 5mm in length and 3.5mm in width.

REMARKS. Haswell's first description of this species (1879: 409) mentions a blunt, sub-bifid tooth on the lateral border of the carapace with two small teeth below and behind it. Similarly, in our material (see above description), one of the spinules surrounding the hepatic spine is often almost as large as the main spine. In Haswell's second description (Haswell, 1880a: 432) the upper orbital border is described as armed with three small, acute teeth on its outer surface. Examination of the series available to us shows the spinulation of the supraorbital eave to be a rather variable feature, some specimens from both New Zealand and Australia having the eave almost smooth except for the main spine, while some are minutely, yet distinctly, spinulated and still others have one or even two well-developed, though smaller, spines in front of the supraorbital spine. A lack of bilateral symmetry in this feature is apparent in some specimens, one specimen having two large supraorbital spines on the right side but only one on the left, and two others have three large supraorbital spines on one side and only one or two on the other. Detailed examination of the holotype of *Stenorhynchus fissifrons* and the specimen from Port Jackson confirms that the additional New Zealand specimens belong to Haswell's species.

Detailed comparison of Miers's (1886: 9, Pl. 1, fig. 3) description of *A. tenuicollis* with the specimens of *A. fissifrons* reveals only the following major differences: in *A. tenuicollis* the postorbital "neck" is slightly narrower, a prominent tubercle is not described on the anterior surface of the eyestalk though dorsal and ventral spinules are mentioned, there is only a single postorbital spinule and finally the posterolateral angle of the basal antennal article bears a strong acute spine. In other features, including spinulation of the third maxillipeds and shape of the last abdominal segment, the two species appear to agree completely. Examination of the numerous species mentioned above and previously identified as Miers's species shows that while they may certainly be referred to Haswell's species, there is some considerable variation in all the features mentioned as separating the two, the width of the carapace behind the orbit being exactly as in Miers's (1886: fig. 3) figure in some specimens while in others it is as illustrated in the present account (Fig. 8). Further, some of the specimens show a reduction in size of the postorbital spinules, so that only one may appear to be present. The disposition of the smaller tubercles of the carapace in *A. tenuicollis* (according to Miers, 1886: fig. 3) disagrees slightly with that noted in the present account, but Miers's figures are not consistent concerning this feature, so that too much reliance cannot be placed on such a difference. The lectotype of *A. tenuicollis* has kindly been checked for us by Dr Isabella Gordon (British Museum (Natural History), London) who states that it agrees quite well with the present material. In the lectotype of Miers's species the large tubercle on the anterior surface of the eyestalk is not visible in dorsal view but appears as soon as the specimen is tilted backward. The abdomen has a small tubercle on the second segment and the tubercles on the fourth and fifth segments are quite large, that on the fifth being quite a large rounded boss occupying most of the length of the segment.

During the course of the description of *A. elongatus*, Sakai (1938: 223) mentions a few differences which separate his species from *A. tenuicollis*. The basis for the differences stated by Sakai resides in material of the latter species sent from the Australian Museum. Examination of the remainder of this series shows that the two species can no longer be regarded as separate. Sakai (fig. 13a) shows the cardiac region surmounted by three spinules (two submedial followed by one medial (intestinal in this account)), and states that while *A. elongatus* has the dactyli of the third and fourth ambulatory legs ventrally spinulated for the entire length, in *A. tenuicollis* there are only two teeth ventrally situated near the tip of the dactyl. The whole series available to us has been examined in detail to determine the amount of variation existing in this last character. In all specimens the last two teeth on the dactyl of the fourth ambulatory are well-developed, more so than any of the others. However, as far as these other spinules are concerned there is some considerable variation, as noted above. Thus, some actually do lack all spinules except the terminal two. Moreover, in the series from which the material sent to Sakai was taken, smaller proximal spinules are present in nearly all specimens. In some of the other specimens in which smaller spinules in addition to the large distal two were present they were somewhat concealed by numerous short setae. The two small spinules on the cardiac region shown in Sakai's (1938: fig. 13a) figure are also shown in Miers's figure of *A. tenuicollis* and are present in several of the specimens available to us while others possess a single rounded tubercle on the cardiac region. Lastly there is some variation in the number of spinules of the basal antennal article so that although this appears more spinous in the figure given by Sakai of *A. elongatus* than in the material illustrated here, such a difference is not important. We therefore consider that there can be no doubt that *Achaeus elongatus* Sakai and *A. tenuicollis* Miers are conspecific with each other and with *A. fissifrons* (Haswell).

Stephensen (1945: 97, fig. 18 A-B) has identified three specimens from the Iranian Gulf as *A. tenuicollis* Miers. Stephensen states that the male first pleopod tapers towards the apex which bears a groove. In the material we have examined, the pleopod does taper apically but the groove does not give to the tip quite the appearance shown in Stephensen's figure (18A). The discrepancy may possibly be due to Stephensen having viewed the pleopod slightly laterally.

This species stands closest to the much stouter *A. akanensis* Sakai from Japan, which differs also in the lack of spinules on the branchial margin.

NOTES ON THE FAUNAL ASSOCIATION OF THE NEW ZEALAND MATERIAL. As described above, the 1956 New Zealand material was trawled at about 50 fms between Foxton and Wanganui on a bottom with extensive sponges and numerous, characteristic, finger-like growths of a striking pink and white coralline alga. The associated decapods taken from this restricted ecological assemblage (7/6/1956 and again on 14/6/1956) were of great interest as many of these small and rather insignificant looking forms were either quite new to these waters, or known animals previously regarded as rare, or regarded as characteristically found in other, differing, habitats. The three species listed below as undescribed are animals known to us from additional, and often extensive, continental shelf material, and will be described in due course. The 12 recorded decapods from this faunule are as follows:

Fam. Alpheidae: *Alpheus socialis* Heller, 1865.

Alpheopsis sp. (see Richardson & Yaldwyn, 1958: 36; an undescribed species).

Axiidae: *Axiopsis* (*Axiopsis*) ? n. sp. (genus new to New Zealand).

Galatheididae: *Galathea pusilla* Henderson, 1885.

Porcellanidae: *Petrolisthes novaezealandiae* Filhol, 1885.

Dromiidae: *Petalomera wilsoni* (Fulton & Grant, 1902).

Majidae: *Achaeus fissifrons* (Haswell, 1879).

Notomithrax minor (Filhol, 1885), ex. *Paramithrax*, see Griffin, 1963.

Hymenosomatidae: *Halicarcinus* ? n.sp. (a not uncommon shelf species with a prominent tridentate rostrum, apparently undescribed).

Elamena longirostris Filhol, 1885.

Portunidae: *Nectocarcinus antarcticus* (Jacquinot, 1853); this record consists of the smallest ovigerous female of this species examined by us, carapace length 8.5mm.

Macropipus corrugatus (Pennant, 1777), = *Portunus borradalei* of Richardson's key, *Tuatara* II (1): 31.

Alpheus socialis, *Petrolisthes novaezealandiae*, *Petalomera wilsoni* and *Nectocarcinus antarcticus* are known intertidally, or at least immediately subtidally, but the remaining species are all characteristically shelf animals. *A. socialis* and *N. antarcticus* are the only members of the whole group recorded from the archibenthal slope in New Zealand waters, where they are known down to at least 300 fms (Richardson & Yaldwyn, 1958) and 120 fms (Dell, 1963) respectively. *P. wilsoni* is, however, known down to 470 fms off the New South Wales coast (Rathbun, 1923).

Dr R. K. Dell, of the Dominion Museum, reports (pers. comm.) that the Colville Channel specimen of *Achaeus fissifrons* was also associated with *Petalomera wilsoni*, and that the Tasman Bay material was taken with *P. wilsoni*, the leucosiid crab *Ebalia* sp., and the two majids *Eurynome bituberculata* Griffin, 1964 and *Leptomithrax* sp. (possibly new, aff. *L. longipes* (Thomson)). It is interesting to note that *Petalomera wilsoni* occurs in each of the three collections we have details on. This easily overlooked sponge crab, from being one of the rarely recorded New Zealand species, has recently been recognised as widely occurring, though not perhaps abundant, shelf and occasionally intertidal, species.

For an Australian comparison, the "Endeavour" Reports reveal that the single "Endeavour" specimen of *A. fissifrons* identified by Rathbun (1918: 4) from "the eastern slope of Bass Strait in 70–80 fathoms", was taken in association with the following decapods (Brachyura only, from Rathbun, 1918, 1923; no other identifications available): the leucosiid *Merocryptus lambriformis* A. M. Edw., 1873: the majid *Scyramathia fultoni* (Grant, 1905); the xanthid *Pilumnus tomentosus* Latreille, 1825, and the goneplacid *Carcinoplax meridionalis* Rathbun, 1923. Of these only *M. lambriformis* (see Bennett, 1964) is known from New Zealand waters, though other species of *Pilumnus* and *Carcinoplax* occur.

Achaeus lacertosus Stimpson, 1857

Achaeus lacertosus Stimpson, 1857: 218; 1907: 20, Pl. III, fig. 7. Haswell, 1882: 3. Miers, 1884: 188; 1886: 8. Alcock, 1895: 172. Whitelegge, 1889: 225. Henderson, 1893: 341. Grant and McCulloch, 1906: 26, Pl. III, fig. 1. Rathbun, 1910: 316; 1924: 2. (?) Stephensen, 1945: 98, fig. 18C. Barnard, 1950: 19, figs. 3a, 3b.

Achaeus breviceps Haswell, 1880a: 433; 1880b: 146.

Achaeus spinifrons Sakai, 1938: 212, fig. 6.

TYPES. *A. lacertosus*: All Stimpson's type material, in the Chicago Academy of Sciences, was destroyed by fire in 1871. The type material of this species was taken in Port Jackson, N.S.W., in 6 fms on a muddy bottom. Stimpson's description is based on a male.

A. breviceps: The types of *A. breviceps* cannot now be identified with complete certainty. However, two specimens in the Australian Museum Collections, labelled as *A. lacertosus* (A.M. reg. G.5091, male, carapace length 8mm; female, carapace length 8mm, Port Jackson), were registered in 1905 with a large collection of Haswell's material containing the great majority of the types of his 1880a paper. By 1882, Haswell had already recognised his *A. breviceps* as a synonym of *A. lacertosus*, and as these two specimens are the only specimens of *A. lacertosus* registered with the collection, it is reasonable to assume that they are the types of *A. breviceps*. The type locality was Port Jackson. We confirm the identification of these two specimens as *A. lacertosus*.

A. spinifrons: Holotype, ovigerous female, carapace length 6.3mm, Nagasaki, Japan, Mr I. Kaneko. Two Paratypes, southern Japanese localities, 1 ovigerous female and 1 male.

MATERIAL EXAMINED. All material examined is from Australian localities and in the Australian Museum, Sydney. A total of 16 specimens as follows: Masthead Island, Capricorn Group, Queensland, 1 ♀ (G.5940), (see Grant and McCulloch, 1906). Port Stephens, N.S.W., old collection, 1 ♂, 1 ovig. ♀. (P.162) (probably basis of Haswell's (1882) record). Port Stephens, dredged, E. A. Briggs, Jan. 1920, 1 ♂ (P.4871). Off Red Rocks, Port Stephens, 3–7 fms, dredged,

A. Musgrave, 30/8/1920, 1 ♂ (P.4928). Port Jackson, N.S.W., old collection, 1 ♂, 1 ♀ (G.5091), 1 ♂ (P.13808). Port Jackson, F. E. Grant, 1 ♀ (G.5939), 1 ♂ (G.5639) (figured specimen, Grant and McCulloch, 1906). Shell Beach, Balmoral, Sydney, T. Whitelegge, 1 ♀ (P.1700). Walsh Bay, Port Jackson, 5 fms, on submerged timber, D. Moore, 5/5/1942, 1 ♂ (P.11567). Sow and Pigs Reef, Port Jackson, A. R. McCulloch, Feb. 1909, 1 ♂, 1 ♀ (P.2069). Near Roebuck Bay, Broome, Western Australia, 5–8 fms, Lithothamnion reef bottom, dredged, A. A. Livingstone, 26/9/1929, 1 ♂, 1 ♀ (P.14015).

LOCALITIES PREVIOUSLY REPORTED. Durban Bay and Delagoa Bay, South Africa (Barnard); ? Iranian Gulf, 3–5m (Stephensen); Andaman Is., Palk Straits and Orissa Coast (Alcock); Gulf of Martaban, Burma (Henderson); Gulf of Siam, 3–30 fms (Rathbun); southern Japan (Sakai); W. Australia, 45 fms (Rathbun); Dundas Strait, N. Australia (Miers); Masthead Id., Capricorn Group, Queensland (Grant and McCulloch); Port Stephens, N.S.W. (Haswell); Port Jackson, N.S.W. (Stimpson, Haswell, Miers).

DISTRIBUTION. Eastern, northern and western Australia, Japan, India and east coast of South Africa.

DIAGNOSIS. Carapace elongate subtriangular. Rostrum of two rounded lobes fused basally, usually armed with a series of small spinules distally. Supraorbital cave lacking a prominent spine but minutely spinulated or denticulate posteriorly, postorbital spinules absent; eyestalk smooth, lacking tubercles. Hepatic margin strongly convex, rounded, sometimes minutely spinulated or denticulate. Carapace smooth, nowhere elevated into prominent tubercles. Basal antennal article smooth except for a few minute denticulations laterally. Chelipeds very long in adult male, weakly spinous. Dactyli of ambulatories 3 and 4 very strongly falcate, almost semicircular, ventrally spinulated for distal two-thirds.

REMARKS. The description of Sakai's (1938: 212, fig. 6) *A. spinifrons* differs from the descriptions of *A. lacertosus* given by Stimpson (1907: 20, Pl. III, fig. 7) and by Barnard (1950: 19, figs. 3a, 3b) in two important features only, the rostrum is prominently spinulated distally and the supraorbital cave and hepatic margin are also minutely spinulated. Examination of numerous specimens (labelled *A. lacertosus*) in the collections of the Australian Museum, including many from Port Jackson, reveals that small specimens of this species are minutely spinulated along the posterior part of the supraorbital border and along the hepatic margin as in Sakai's figure of *A. spinifrons* and that these spinules are reduced to denticles or become obsolete in the adult. Further, in the great majority of specimens the rostrum bears small, but nevertheless prominent, spinules around the distal margins of the lobes. These prominent spinules of the rostrum, although not described by either Stimpson or Barnard, may safely be presumed to have been present in the material of at least the former author since his type material was also from Port Jackson. A minor difference between the figure given by Sakai and descriptions and figures of *A. lacertosus* is the slightly more abrupt widening of the hepatic margin anteriorly. However, considering the important similarities between Sakai's material and that examined during this study there can be little doubt that they are conspecific. Comparison of the male first pleopod of Australian specimens of *A. lacertosus* with that of a South African specimen as illustrated by Barnard (1950, fig. 3b), does not show any important differences between the two; Australian specimens have the bluntly pointed tip and fringe of setae along the lateral surface close to the tip shown in Barnard's figure. However, pleopods of specimens from the Iranian Gulf identified as this species and illustrated by Stephensen (1945: fig. 18C) are somewhat different and the status of these must therefore remain uncertain for the present.

Grant and McCulloch's figure (1906: Pl. 3, fig. 1) of a male of *A. lacertosus*, carapace length 11mm, from Port Jackson, is very good in its general features and shows the characteristically smooth carapace and non-tuberculated eyestalk of this species, as well as the extreme form of the individually swollen cheliped segments seen in large males. However, it should be pointed out that the acute rostral lobes shown are completely inaccurate, the rostrum of the figured specimen (Australian Museum, G.5639) being formed of two rounded, minutely spinulated, lobes as usual in this species.

The most closely related species appears to be the Japanese *A. japonicus* de Haan, from which it is distinguished by the spinulated rostrum, non-tuberculated eyestalk, more convex hepatic margin and more strongly curved ambulatory dactyli.

Achaeus brevirostris (Haswell, 1879)

Stenorhynchus brevirostris Haswell, 1879: 408; 1880a: 432, Pl. XXVII, fig. 5; 1882: 3. Whitelegge, 1889: 225.

Achaeus brevirostris (Haswell), Miers, 1886: 8, 18.

Achaeus affinis Miers, 1884: 188; 1886: 8. de Man, 1887: 218. Whitelegge, 1889: 225. Henderson, 1893: 341. Ortmann, 1894: 37. Alcock, 1895: 172. Calman, 1900: 33. Nobili, 1905: 7. Rathbun, 1910: 316; 1924: 2. ? Chopra, 1931: 323. Not *Achaeus* cf. *affinis*, Barnard 1950: 19.

TYPES. *A. brevirostris*: The following specimens have syntype status. Australian Museum, Sydney. Originally three or four specimens registered as P.163 and labelled as types of "*Stenorhynchus brevirostris*, Hasw. Port Jackson, N.S.W." by A. R. McCulloch. Only two of the specimens now remain and one, a male, carapace length 14mm, in spirit, is here selected as Lectotype. The other is now identified by us as *Achaeus lacertosus* Stimpson and has been registered as P.13808.

Macleay Museum, University of Sydney: Originally two dry specimens mounted on glass sheet with handwritten label "*Stenorhynchus brevirostris*, Hasw. Port Jackson". The left specimen is now missing except for fragments of two legs; the right specimen, carapace length 10.5mm, is almost certainly a male and consists of carapace, right cheliped and part of one leg; the abdomen and other legs are missing. The latter specimen is now a Paralectotype.

The status of a dry specimen in the Australian Museum, registered as G.5089 and labelled as type of *S. brevirostris* (but not recognised as such by McCulloch) is not known: this specimen is now identified by us as *Achaeus fissifrons* (Haswell).

A. affinis: All Miers's original 1884 material in the British Museum (Natural History) is syntypic, and includes material from Thursday Island and Prince of Wales Channel, Torres Strait; Port Denison and Moreton Bay, Queensland; Port Jackson, N.S.W.; Shark Bay, Western Australia, as well as additional "Australian specimens without special indication of locality in the Museum collection". Dr Isabella Gordon and Mr R. W. Ingle report (pers. comm.) that the male syntype from Thursday Island, 3-4 fms, "Alert" Exped., R. W. Coppinger (old reg. No. 82.7), is clean and clearly shows all the diagnostic rostral, orbital and ocular features of *A. brevirostris*. We thus select this spirit specimen (new reg. No. 1964.5.11.5) as the Lectotype of *A. affinis* Miers. The remainder of the British Museum material are all Paralectotypes.

MATERIAL EXAMINED. A total of 30 specimens, all from Australia, as follows: Australian Museum. Darwin, Northern Australia, from marine growths on wharf piles, W. E. J. Partridge, Dec. 1923, 1 ovig. ♀ (P.6816). Off Peak Point,

Albany Passage, Cape York, 3–6 fms, dredged, M. Ward, 1/9/1928, 4 ♂♂, 7.5–10.5mm. Bowen Harbour, Queensland; E. H. Rainford, 1922, 1 ♂ (P.5692). Bowen, Port Denison, from growths on wharf piles, Rainford, Feb. 1924, 2 ♂♂ (P.7030). Port Denison, Rainford, 1 ovig. ♀, 10mm (P.14624). Off Lindeman Island, Whitsunday Passage, Queensland, 9 fms, dredged, M. Ward, Jan. 1929, 1 ♂ (P.14014). Port Jackson, N.S.W., 1 ♂ (P.163), Lectotype. Port Jackson, old collection, 1 ovig. ♀ (P.167), 1 ♂ (G.5088). Near Fremantle, Western Australia, ex W. Aust. Museum, 1 ♀ (P.3670). Between Broome and Wallal (Ninety Mile Beach), Western Australia, 7 fms, dredged, Capt. R. Bourne, 1931, 1 ♂ (P.10006). Broome, W. Aust., Dr H. L. Clark and E. W. Bennett, 1 ♀ (P.10207). Remaining 6 lots all dredged by A. A. Livingstone from near Broome, W. Aust., during 1929: off Gantheaume Point, 30 Aug., 3 ♂♂ (P.14008); between Cape Jaubert and Wallal, Sept., 1 ♂, 1 ♀ (P.14009); off Roebuck Bay, 5–9 fms, June–Oct., 2 ♂♂ (P.14010); off Gantheaume Point, 4 fms, Aug., 2 ♂♂, 1 ovig. ♀ (P.14011); near entrance Roebuck Bay, 5–8 fms, 26 Sept., 1 ♂, 1 ovig. ♀ (P.14012); off Broome Wharf, 4 fms, dredged, 29 Aug., 1 ovig. ♀ (P.14013).

LOCALITIES PREVIOUSLY REPORTED. Zanzibar (Nobili); ? Andaman Is., from cloaca of holothurian (Chopra); Gulf of Martaban, Burma (Henderson); Singapore and Gulf of Siam, 5–30 fms (Rathbun); Noordwachter Id., Java, 14 fms (de Man); Shark Bay and off Cape Jaubert, Western Australia, 11 fms (Miers, Rathbun); various Torres Strait localities, 3–20 fms (Miers, Ortmann, Calman); Port Denison, 4 fms, and Moreton Bay, Queensland (Miers), and Port Jackson, N.S.W., 5–7 fms (Miers).

DISTRIBUTION. Eastern, Western and Northern Australia; Indonesia and the Gulf of Siam, westward to Burma and across the Indian Ocean to East Africa.

DIAGNOSIS. Carapace elongate subtriangular, constricted behind orbit. Rostrum of two short rounded lobes separated from base by a narrow V- or U-shaped space but with a tendency to converge distally. Supraorbital eave lacking prominent spine or spinulations, postorbital spinules absent; eyestalk with a prominent tubercle midway along anterior surface. Hepatic margin acute or with two short spines and several minute spinules. Carapace with several prominent tubercles scattered over dorsal surface and along margins; cardiac region with a transverse pair of very prominent submedial tubercles followed immediately behind by a very small tubercle. Basal antennal article with numerous small tubercles towards lateral edge. Chelipeds very long in adult male, weakly tuberculate or spinous; male dactyl with 1 or sometimes 2 prominent teeth basally, fixed finger with a deeply concave excavation basally, excavation bounded at each end by a prominent tooth. Dactyli of ambulatory legs 3 and 4 falcate but not semicircular, ventrally spinulated for entire length.

REMARKS. Although this species bears some resemblance to *A. spinosus* Miers, 1879, so far recorded from Japan, the Maldives and the Iranian Gulf and first illustrated by Sakai (1938: 217, text-fig. 9 a-c), there are some differences which at present seem important enough to separate the two. These include the shape of the gap between the rostral lobes, lack of an intestinal tubercle in *A. spinosus*, a more slender "neck" in *A. brevisrostris*, more numerous spinules on the dactyli of the third and fourth ambulatories in *A. brevisrostris*, and finally the shape and ornamentation of the male abdomen.

The original description of *A. affinis* by Miers (1884: 188) was quite detailed. Miers (1884: 189) stated "the bilobed prominence on the cardiac region and tuberculated eye peduncles serve to distinguish this species". These are all characters shown by *A. brevisrostris* (Haswell). Although numerous workers have identified material as belonging to Miers's species, as can be seen from the above synonymy, a distinction between the two is, in fact, difficult to maintain. Dr

Isabella Gordon and Mr R. W. Ingle have compared the syntypes of Miers's species with material from Western Australia, firmly identified by us as Haswell's species, and also sent us a camera lucida drawing of the front of the specimen here chosen as lectotype of *A. affinis*. As a result, there can be no doubt that *A. affinis* Miers is a synonym of *A. brevirostris* (Haswell).

Chopra (1931) gives a long description of material which he identifies as *A. affinis* Miers. There is no clear disagreement between this description and the material we have examined of *A. brevirostris*, except that Chopra mentions a male specimen, carapace length 3.7mm, in which the characters of the chela, particularly the arrangement of teeth on the fingers, are typical only of mature specimens so far as we can ascertain. However, no specimen with a carapace length of less than c. 8mm that we have seen possesses such characters.

Specimens which Barnard (1950: 19, figs. 3 d-f) has described as "*Achaeus* cf. *affinis* Miers", are clearly not conspecific with *A. brevirostris*. Among the numerous differences between our material and Barnard's are the outwardly splayed antenular fossae in the latter.

GENERAL DISCUSSION

The species of *Achaeus* as now understood, show a pattern of distribution found in many other Indo-West Pacific continental shelf invertebrates. The largest concentration of species of the genus is in temperate and sub-tropical northern latitudes around Japan, Sakai (1938: 210) listing no less than twelve species (reduced to 10 by the studies reported here), compared with five from South Africa (Barnard, 1950: 18) and four from Australia (present report). Of the three well known Australian species, one, *A. lacertosus*, appears to have an extraordinarily wide distribution, extending from eastern South Africa to Japan to Australia. The remaining two, *A. brevirostris* and *A. fissifrons*, have, outside Australia, a slightly more limited range, extending from Japan to India and the Iranian Gulf. Within Australia, *A. lacertosus* and *A. brevirostris* are both known from western, northern and eastern waters. The genus has not been recorded from western south Australian waters. *A. fissifrons* extends south-eastward from Australia to northern and central New Zealand. Presumably this species entered New Zealand in fairly recent times although its extension to southern New Zealand waters may be prevented by a lack of temperature tolerance. The presence of two species of *Achaeus* in the Mediterranean and north-western Atlantic points to the genus having evolved before the disappearance of the Tethys link between the Mediterranean and north-west Indian Ocean.

Other majid spider crab genera with a distribution similar to that shown by *Achaeus*, include the small pisine *Eurynome* Leach which contains only comparatively few species in South Africa, China, Japan, and Australasia and two species in the Mediterranean and east Atlantic (see Griffin, 1964). The majine *Chlorinoides* Haswell (syn. *Acanthophrys* A. Milne Edwards, in part), with about 12 species is distributed throughout the Indo-West Pacific, the majority being found in Japan and northern Australia, at least one of which, *C. longispinus* (de Haan, 1839), extends westward to South Africa. As in the case of *Eurynome*, New Zealand possesses a distinct species, *C. filholi* (A. Milne Edwards, 1876). The majine *Leptomithrax* Miers extends throughout the eastern part of the Indo-West Pacific from Japan to New Zealand, but unlike *Achaeus* shows little sharing of species between major coastal shelf faunas and possesses the bulk of its species in Australasia. These genera are in contrast with the majine *Notomithrax* Griffin

(formerly *Paramithrax* H. Milne Edwards, in part; see Griffin, 1963) whose species do not extend north of Australia or along southern Australia west of Victoria. Two species of this genus, *N. minor* (Filhol, 1885) and *N. ursus* (Herbst, 1788), are shared between New Zealand and eastern Australia, while one distinct species is found in New Zealand, one at Norfolk Island, and one at the island of Juan Fernandez, off the coast of Chile.

This report brings to six the number of species of New Zealand Brachyura which very probably extend through Australia to Japan. The five others are the raninid *Lyreidus tridentatus* de Haan, the majid *Cyrtomaia hispida* (Borradaile), the portunids *Ovalipes punctatus* (de Haan) and *Macropipus corrugatus* (Pennant) and the goneplacid *Ommatocarcinus macgillivrayi* White. About twenty species of New Zealand Brachyura, or about half the total number (excluding the poorly known Hymenosomatidae) are now known to be shared between New Zealand and Australia, particularly south-eastern Australia.

ACKNOWLEDGMENTS

We wish to express our gratitude to Dr Isabella Gordon and Mr R. W. Ingle, of the British Museum (Natural History), London, for detailed information on the type material of *Achaeus tenuicollis* and *A. affinis*, and to Dr R. K. Dell, of the Dominion Museum, Wellington, for the generous loan of additional New Zealand material of *A. fissifrons*, and for extensive information on other decapods associated with this material. One of us (D.J.G.G.) wishes to thank the Director of the Australian Museum, Dr J. W. Evans, and his Trustees, for granting facilities to work on some of this material during May and August, 1962, and January, 1963.

This work was initiated and partly carried out at the Zoology Department, Victoria University of Wellington, and both authors wish to thank Professor L. R. Richardson for his helpful guidance and enthusiasm during the early stages of their respective researches on New Zealand and Australian Crustacea Decapoda.

REFERENCES

- ALCOCK, A. W., 1895. Materials for a Carcinological Fauna of India. I. The Brachyura Oxyrhyncha. *J. Asiat. Soc. Beng.* 64: 157-291, Pls. 3-5.
- BALSS, H., 1929. Decapoden des Roten Meeres IV. Oxyrhyncha und Schlussbetrachtungen. *Denkschr. Akad. Wiss. Wien. (Math.-nat. Kl.)* 102: 1-30, text-figs. 1-9, 1 pl.
- 1957. Abteilung Brachyura, Borradaile, 1907. In H. G. Bronn's *Klassen und Ordnungen des Tierreichs* 5(1) 7, Decapoda 12: 1599-1672.
- BARNARD, K. H., 1950. Descriptive Catalogue of South African Decapod Crustacea (Crabs and Shrimps). *Ann. S. Afr. Mus.* 38: 1-837, figs. 1-154.
- BENNETT, E. W., 1930. Notes on New Zealand Brachyura and related Crustaceans. *Rec. Canterbury (N.Z.) Mus.* 3(4): 255-261.
- 1964. The Marine Fauna of New Zealand: Crustacea Brachyura. *N.Z. Dep. sci. industr. Res. Bull.* 153: 1-120, figs. 1-141.
- BORRADAILE, L. A., 1903. The Spider Crabs (Oxyrhyncha). In J. S. Gardiner's *The Fauna and Geography of the Maldive and Laccadive Archipelagos* 2(2): 681-690, Pl. XLVIII.
- CALMAN, W. T., 1900. On a Collection of Brachyura from Torres Straits. *Trans. Linn. Soc. Lond. (Zool.)* (Ser. 2) 8: 1-50, Pls. 1-3.

- CHILTON, C., and BENNETT, E. W., 1929. Contributions for a Revision of the Crustacea Brachyura of New Zealand. *Trans. N.Z. Inst.* 59: 731-778.
- CHOPRA, B., 1931. Further Notes on Crustacea Decapoda in the Indian Museum. II. On some Decapod Crustacea found in the cloaca of Holothurians. *Rec. Ind. Mus.* 33(3): 303-324.
- DELL, R. K., 1963. Some Deep-water Crabs (Crustacea, Brachyura) from New Zealand. *Rec. Dom. Mus.* 4(18): 243-253, figs. 1-13.
- FOREST, J., and ZARIQUIEY ALVAREZ, R., 1955. Sur les *Achaeus* de Méditerranée: *A. cranchi* Leach et *Achaeus gordonae* sp. nov. *Publ. Inst. Biol. apl.* 20: 63-76, figs. 1-6.
- GARTH, J. S., and HOLTHUIS, L. B., 1963. *Stenorhynchus* Lamarck, 1818 (Crustacea, Decapoda): Proposed Validation under the Plenary Powers with Designation of *Cancer seticornis* Herbst, 1788, as Type Species. *Bull. zool. Nomencl.* 20(6): 424-428.
- GRANT, F. E., and McCULLOCH, A. R., 1906. On a Collection of Crustacea from the Port Curtis District, Queensland. *Proc. Linn. Soc. N.S.W.* 31(1): 1-53, 4 pls.
- GRIFFIN, D. J. G., 1963. *Notomithrax* gen. nov. and the Status of the Genus *Paramithrax* H. Milne Edwards (Crustacea, Brachyura, Majidae). *Trans. roy. Soc. N.Z. Zool.* 3(22): 220-237.
- 1964. A Review of the Genus *Eurynome* Leach (Decapoda, Majidae) and a New Species from New Zealand. *Crustaceana* 6(3): 195-206, 11 figs.
- HASWELL, W. A., 1879. On two new species of the genus *Stenorhynchus*. *Proc. Linn. Soc. N.S.W.* 3: 408-409.
- 1880a. On the Australian Brachyura Oxyrhyncha. *Proc. Linn. Soc. N.S.W.* 4: 431-458, Pls. 25, 27.
- 1880b. Notes on the Australian Maioid Brachyura. *Ann. Mag. nat. Hist. (Ser. 5)* 5: 145-147.
- 1882. Catalogue of the Australian Stalk- and Sessile-eyed Crustacea. Australian Museum, Sydney. 324, pp., 4 pls.
- HENDERSON, J. R., 1893. A contribution to Indian Carcinology. *Trans. Linn. Soc. Lond. (Zool.) (Ser. 2)* 5: 325-458, Pls. 36-40.
- HUTTON, F. W., 1882. The Stalk-eyed Crustacea of New Zealand. *N.Z. J. Sci.* 1(6): 263-264.
- 1904. *Index Fauna Novae-zealandiae*. Dulau & Co., London. 372 pp.
- LEACH, W. E., 1815-1875. *Malacostraca Podophthalmata Britanniae; or Descriptions of such British Species of the Linnaean Genus Cancer as have their Eyes elevated on Footstalks*. J. Sowerby & B. Quaritch, London. 124 pp., 45 pls.
- MAN, J. G. DE, 1887. Bericht über die von Herrn Dr. J. Brock in indischen Archipel gesammelten Decapoden und Stomatopoden. *Arch. Naturgesch.* 1: 215-600, pls. 7-22.
- MIERS, E. J., 1879. On a collection of Crustacea made by Capt. H. C. St. John, R.N., in the Corean and Japanese Seas. I. Podophthalmia. *Proc. zool. Soc. Lond.* 1879: 18-60, Pls. 1-3.
- 1884. Crustacea. In *Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. "Alert", 1881-2*: 178-322, 513-575, Pls. XVIII-XXXIV, XLV-LII. British Museum (Natural History), London.
- 1886. Report on the Brachyura collected by H.M.S. "Challenger" during the years 1873-1876. *Rep. Voy. Challenger Zool.* 17: 1-362, Pls. 1-29.
- MILNE EDWARDS, A., 1873. Descriptions de quelques crustacés nouveaux ou peu connus provenant du Musée de M. C. Godefroy. *J. Mus. Godefroy* 1(4): 253-264, Pls. 12-13.
- NOBILI, G., 1905. Crostaci di Zanzibar. *Boll. Mus. Zool. Anat. Torino* 20(506): 1-12.

- ORTMANN, A., 1894. Crustaceen. In R. Semon's *Zoologische Forschungsreisen Australien und dem Malayischen Archipel*. 5(1): 30-80, 3 Pls. (*Denkschr. med. naturw. Ges. Jena* 8: 1-80).
- RATHBUN, M. J., 1910. The Danish Expedition to Siam 1899-1900. 5. Brachyura. *K. Dan. Vidensk. Selsk. Skr.* 7, *Naturv. Math.* 5(4): 301-368, 2 pls.
- 1911. The Percy Sladden Trust Expedition to the Indian Ocean in 1905: Marine Brachyura. *Trans. Linn. Soc. Lond. (Zool.)* (Ser. 2) 14(2): 191-261, Pls. 15-20.
- 1918. Report on the Spider Crabs obtained by the F.I.S. "Endeavour" on the Coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. *Biol. Res. Endeavour* 1909-14 V(1): 1-29, 15 pls.
- 1923. Report on the Crabs obtained by the F.I.S. "Endeavour" on the coasts of Queensland, New South Wales, South Australia and Tasmania. *Biol. Res. Endeavour* 1909-14 V(3): 95-156, 27 pls.
- 1924. Results of Dr E. Mjoberg's Swedish Scientific Expeditions to Australia 1910-1913. 37. Brachyura, Albuneidae and Porcellanidae. *Ark. Zool.* 16(23): 1-33, 1 pl.
- RICHARDSON, L. R., 1949. A Guide to the Oxyrhyncha, Oxystoma and lesser Crabs. *Tuatara* 2(2): 58-69, figs. 25-51.
- and YALDWYN, J. C., 1958. A Guide to the Natant Decapod Crustacea (Shrimps and Prawns) of New Zealand. *Tuatara* 7(1): 17-41, figs. 1-50.
- SAKAI, T., 1938. *Studies on the Crabs of Japan*. III. *Brachygnatha, Oxyrhyncha*: 193-364, text-figs. 1-55, Pls. 1-41. Yokendo Co., Tokyo.
- STEPHENSEN, K., 1945. The Brachyura of the Iranian Gulf, with an Appendix: The Male Pleopoda of the Brachyura. *Danish. sci. Invest. Iran* IV: 57-237, 60 figs.
- STIMPSON, W., 1857. *Prodromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Sententrionalem, e Republica Federata missa, C. Ringgold et J. Rodgers Ducibus, observavit et descripsit*. III. Crustacea Maiioidea. *Proc. Acad. nat. Sci. Philad.* 9(25): 216-221.
- 1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition. *Smithson. misc. Coll.* 49: 1-240, Pls. i-xxvii.
- WHITELEGGE, T., 1889. List of the Marine and Fresh-water Invertebrate Fauna of Port Jackson and Neighbourhood. *Proc. roy. Soc. N.S.W.* 23(2): 163-323 (issued separately with pagination 1-161; p. 225 = p. 63).
- 1900. Scientific Results of the Trawling Expedition of H.M.C.S. "Thetis", off the Coast of New South Wales, in February and March, 1898. Crustacea. Part I. *Mem. Aust. Mus.* IV: 135-199, Pls. 32-35.
- YOKOYA, Y., 1933. On the Distribution of Decapod Crustaceans inhabiting the Continental Shelf around Japan, chiefly based upon the Materials collected by S.S. Sôyô-Maru, during the year 1923-1930. *J. Coll. Agric. Tokyo Imper. Univ.* 12: 1-226, text-figs. 1-71.

D. J. G. GRIFFIN,
Zoology Department,
University of Tasmania,
Box 252-C, G.P.O., Hobart,
Tasmania, Australia.

J. C. YALDWYN,
The Australian Museum,
6-8, College Street,
Sydney, N.S.W., Australia.