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Fisheries Synopsis No. 5

DFO/S5

SYNOPSIS OF BIOLOGICAL DATA ON THE SCHOOL PRAWN *Metapenaeus macleayi* (Haswell, 1879)

Prepared by
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DIVISION OF FISHERIES AND OCEANOGRAPHY
COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION
Cronulla, Sydney, Australia, 1970

SYNOPSES OF FISHERIES BIOLOGICAL DATA

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CSIRO FISHERIES AND OCEANOGRAPHY
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Metapenaeus macleayi (Haswell, 1879)

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1/ This synopsis has been prepared in accordance with Outline Version No. 2 in H. Rosa Jr, 1965, Preparation of Synopses on the Biology of Species of Living Aquatic Organisms, FAO Fisheries Synopsis 1 (Revision 1).

* As no information was available to the authors, these items have been omitted from the text.

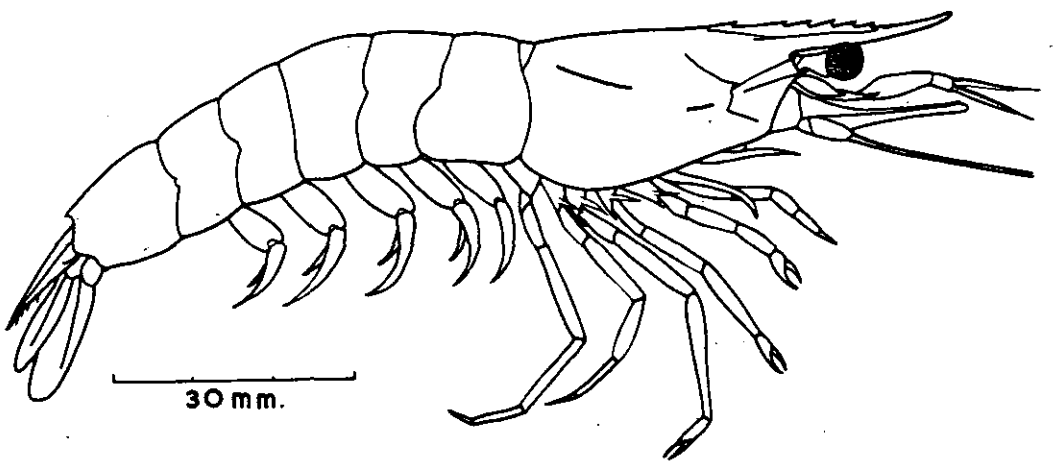

Fig. 1.- Metapenaeus macleayi (Haswell, 1879), female, length 129 mm (from Dall, 1957).

1 IDENTITY

1.1 Nomenclature

1.11 Valid name

Metapenaeus macleayi (Haswell, 1879), Proc. Linn. Soc. N.S.W. 4: 38-44.

1.12 Objective synonymy

Originally published as Penaeus macleayi Haswell, 1879. Placed in synonymy by Alcock (1906), with reasons.

1.2 Taxonomy

1.21 Affinities

- Suprageneric

Phylum Arthropoda
Class Crustacea
Subclass Malacostraca
Series Eumalacostraca
Superorder Eucarida
Order Decapoda
Suborder Natantia
Section Penaeidea
Family Penaeidae
Subfamily Penaeinae

- Generic

Genus: Metapenaeus Wood-Mason and Alcock, 1891, Ann. Mag. nat. Hist. 8(6), 16-34.

Genotype: Penaeus affinis H. Milne Edwards, 1837.

Generic concept is that of Dall (1957, p. 182):

"Rostrum dorsally toothed only. Carapace without longitudinal or transverse sutures, orbital angle usually sharp. Postocular sulcus present, cervical sulcus well defined. Hepatic sulcus not well defined or absent behind level of hepatic spine, but pronounced in front with a well-defined postero-inferior border, usually descending vertically from hepatic spine, then turning towards the pterygostomial angle. Antennal and hepatic spines pronounced. Pterygostomial angle blunt. Telson with deep dorsomedian sulcus, without fixed subapical spines, and with movable dorsolateral spines which may be microscopic and very numerous. First antennular segment without spine

on ventral distomedian border. Antennular flagella shorter than carapace. Maxillulary palp with 2 segments, distal small, basal with convex, foliaceous projections on inner and outer edges, and a long spine on inner edge. First to 3rd pereiopods with basial spines, no exopod on 5th. Ischium and merus of 5th pereiopod often modified in adult male. Petasma tubular with thickened median lobes; lateral lobes thicker than median, forming distolateral spout-like projections, each with a dorsal lobule produced posteriorly into an expanded, plate-like projection; median lobes with dorsal lobule produced into a thin recurved, plate-like, or hood-like structure. Appendix masculina with a knob-like distal piece which bears either a deep posterodistal depression or is sculptured in some way. Thelycum composed of anterior median plate and 2 posterior lateral plates more or less enclosing posterior end of median plate; posterior plates often continuous across sternite. Zygocardiac ossicle with 2 rows of teeth which get progressively smaller. Pleurobranchiae on 3rd to 7th thoracic somites, a rudimentary arthrobranch on 1st, anterior and posterior arthrobranchiae on 2nd to 6th, and an anterior vestigial and a posterior fully developed arthrobranch on 7th thoracic somites; mastigobranchiae on 1st, 2nd, 4th-6th thoracic somites. Body usually with at least a few dorsal setose depressed areas, remainder of body surface varying from being completely glabrous to covered with close irregular setose depressed areas."

- Specific

Type specimen: The authors have been unable to locate the type specimen of Metapenaeus macleayi.

Type locality: Port Jackson, New South Wales.

Diagnosis: M. macleayi is illustrated in Figure 1. A colour illustration is given by Grant (1965, Plate 14). Dall (1957, pp. 196-8) gives the following diagnosis.

"Rostrum.—5-6 teeth + epigastric; epigastric absent in large males, its position indicated by a shallow depression, but present in many immature males. Tip of rostrum often damaged or malformed but when intact reaching $\frac{1}{2}$ 3rd segment of antennular peduncle in male, and as far as tip or exceeding it in female. Rostrum sigmoidal, almost $\frac{1}{2}$ free portion naked and usually strongly upcurved. Adrostral carina almost reaching 1st rostral tooth, sulcus shallow, not well defined, reaching beyond epigastric to 1/3 carapace. Postrostral carina broad and ending at 2/3 carapace.

Carapace.—Postocular sulcus at angle of 35° to rostrum. Orbitoantennal sulcus wide and deep and meeting hepatic below hepatic spine. Hepatic sulcus descending almost vertically with slight posterior curve for 3/7 length then turning sharply forward toward pterygostomial angle, lower part but slightly curved; a small isolated horizontal posterior

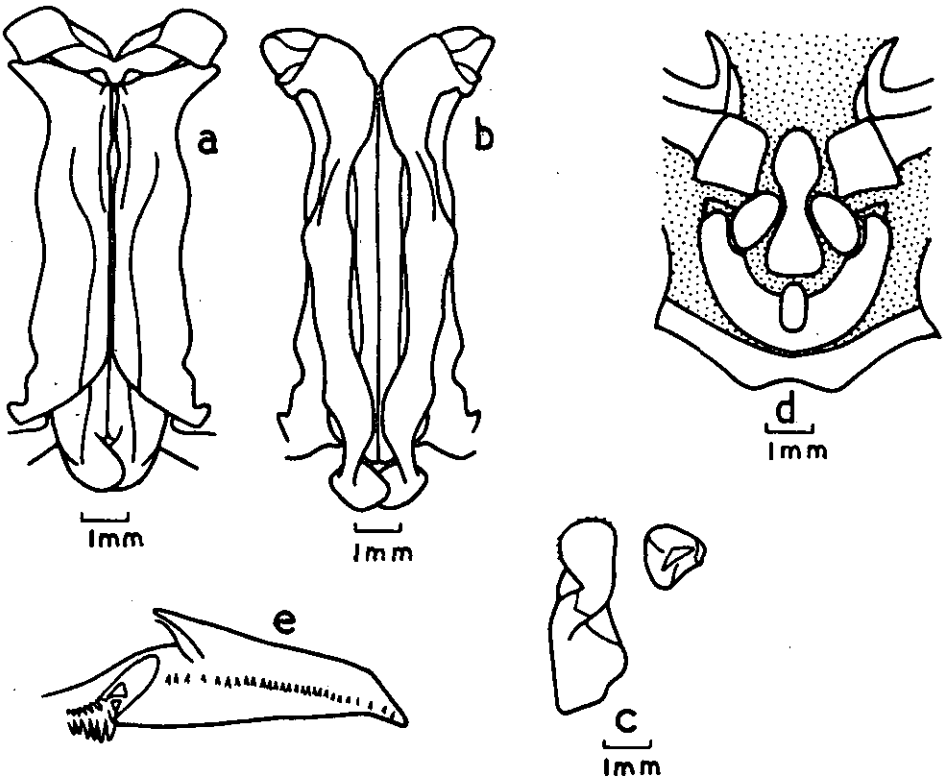

Fig. 2.- Metapenaeus macleayi: a, ventral surface and b, dorsal surface of petasma of male length 112 mm; c, appendix masculina and end view of distal piece; d, thelycum, 132 mm female; e, cardiac plate and zygocardiac ossicle (from Dall, 1957).

hepatic sulcus 1/10 length carapace, its anterior end behind hepatic spine. Cervical sulcus deep, slightly curved, and reaching 0.45 length carapace. Branchiocardial sulcus wide, feeble, 1/4 length carapace, anterior end at 1/3 carapace; branchiocardiac carina barely defined below sulcus.

Antennules.—Flagella equal, slightly longer than $\frac{1}{2}$ peduncle in in male, slightly less than $\frac{1}{2}$ in female. Prosartema reaching as far as tip, stylocerite attaining $\frac{1}{2}$ 1st segment.

Thoracic appendages.—Third maxilliped reaching or slightly exceeding tip, 1st pereiopod reaching base of carpocerite; 2nd pereiopod exceeding carpocerite by $\frac{1}{2}$ dactyl; 3rd reaching as far as tip of 2nd segment of antennular peduncle; 4th reaching from base to tip of carpocerite; 5th reaching from base to tip of 2nd segment of antennular peduncle. Ischium of 5th pereiopod in male with keel almost as long as segment, merus with deep notch, followed by a bulbous tubercle slightly reflected outwards.

Abdomen.—Dorsal carina commencing middle 4th somite. Telson with 4 large lateral spines becoming progressively larger towards tip, base of last pair level with end of median sulcus.

Gastric mill.—Cardiac plate with 19-28 spinules. Zygocardiac ossicle with upper row of 5-7 short tubercles and lower row of 2 conical tubercles separated from remaining 6-8 long tubercles (Fig. 2e). Prepyloric ossicle with 7-10 lateral teeth, most lateral 2-4 minute and spinous.

Petasma.—Reaching from base to $\frac{1}{2}$ basis of 3rd pereiopods. Mediodistal lobes an inverted cup shape, closing very wide openings of distolateral projections, from which they are separated by shallow indentations in edges of distal openings of petasma. Mediodistal projections extending laterally to exceed distolateral projections, distance between lateral extremities of latter $\frac{1}{2}$ total length petasma (Fig. 2a and b).

Appendix masculina.—Distal piece with rounded apex bearing a number of minute setae, and about equal to length basal piece. Ventral depression an elongate triangular shape (Fig. 2c).

Thelycum.—Anterior plate spatulate, the wide part lying anteriorly, concave, and above level of expansions of coxae of 4th pereiopods which bound the narrower part. Coxal expansions produced into a ventral keel. Posterior plates with rounded median process not projecting beyond rest of plate; anterolaterally enclosing 2 prominent ovoid tubercles projecting below level of flat ventral surface of posterior plate. Posterior plate twice as wide as long. Transverse sternite of 5th pereiopods with 2 tufts of long setae (Fig. 2d).

Appearance in life.—A small pubescent patch at top of cervical sulcus, another 2, very small, anterior to this, and a narrow strip of pubescence above the orbito-antennal sulcus, and on either side of the postrostral carinae. Body otherwise glabrous. Body translucent, with olive green chromatophores; tips of uropods blue. Estuarine juveniles (Brisbane River).—Translucent with brown chromatophores, other colours absent."

Material examined by present authors: A male and female from Moreton Bay have been placed in the Queensland Museum (Reg. No. W3165).

Subjective synonymy:

Penaeus haswelli Phillips, 1925, placed in synonymy by Racek (1955), with reasons.

Penaeopsis macleayi Schmitt, 1926, placed in synonymy by Racek (1955), with reasons.

Key to the species of Metapenaeus (Racek and Dall, 1965):

1 Telson armed with 3 or 4 pairs of conspicuous mobile spines 2
Telson armed with a single row of very minute mobile spinules, with or without 1-2 pairs of somewhat larger distal spines 4

2(1) Three pairs of subequal telsonic spines; rostrum straight, teeth extending to its apex 3
Four pairs of telsonic spines, progressively increasing in size posteriorad; rostrum sigmoidal, anterior $\frac{1}{2}$ edentate, styliform ..... M. macleayi (Haswell)

3(2) Branchial region with small pubescent areas; coxal projection of female 4th pereopod long and curved, dagger-like; thelycum with rounded median boss posterior to lateral plates; distomedian petasmal projections without an anterolateral spinous process ..... M. intermedius (Kishinouye)
Branchial region with 2 large pubescent areas; coxal projection of female 4th pereopod on straight conical spine; thelycum without a rounded boss posterior to lateral plates; distomedian petasmal projections with a distinct anterolateral spinous process. M. endeavouri (Schmitt)

4(1) Distomedian petasmal projection with fully developed or vestigial apical filament; thelycum of impregnated females usually with white conjoined pads 5
Distomedian petasmal projection without apical filament; thelycum of impregnated females without white conjoined pads 9

5(4) Rostrum wide and short, not reaching to distal end of basal antennular segment; thelycum with ovoid anterior and lateral plates of subequal size; conjoined pads usually set askew; apical filaments of petasma vestigial, represented by a pair of rounded bosses ..... M. lysianassa (de Man)
Rostrum projecting beyond basal antennular segment, with a marked edentate distal portion 6

6(5) Posterior part of rostrum with distinctly elevated crest; basial spine on male 3rd pereiopod simple 7
Posterior part of rostrum without distinctly elevated crest; basial spine on male 3rd pereiopod long and barbed 8

7(6) Ischial spine on 1st pereiopod subequal to basial spine; telson usually with 1 distal pair of slightly larger spinules; distolateral petasmal projections directed outwards; apical filaments of distomedian projections slender, slightly converging; thelycum with a large anterior, and small lateral plates ..... M. brevicornis (H. Milne Edwards)
Ischial spine on 1st pereiopod much smaller than basial spine; telson usually with 2 distal pairs of slightly larger spinules; distolateral petasmal projections pointing anteriorad; apical filaments of distomedian projections lobe-like; thelycum with a small anterior, and very large lateral plates ..... M. tenuipes Kubo (=M. spinulatus Kubo)

8(6) Apical petasmal filaments not readily visible; anterior thelycal plate tongue-like ..... M. dobsoni (Miers)
Apical petasmal filaments large and lobe-like, curved dorsally; anterior thelycal plate styliform ..... M. joyneri (Miers)

9(4) Branchiocardiac sulcus distinct in at least posterior 1/3 carapace; distomedian petasmal projections flap-like 10
Branchiocardiac sulcus almost completely absent; distomedian petasmal projections anteriorly filiform, each with a serrate ventral margin ..... M. stebbingi (Nobili)

10(9) Ischial spine on 1st pereiopod distinct 11
Ischial spine on 1st pereiopod small or absent 13

11(10) Ischial spine subequal to basial spine; petasmal apices turned at 30° towards midline, semicircular; anterior thelycal plate spoon-like; lateral plates with raised ventral ridges, each with anterolateral and posteromedian spinous process ..... M. suluensis Racek and Dall
Ischial spine much smaller than basial spine; anterior thelycal plate tongue-like 12

12(11) Distomedian petasmal projections directed anteriorad; lateral thelycal plates with raised lateral ridges, each with a posterior inwardly-curved triangular plate; occurrence east of Malacca Strait ..... M. ensis (de Haan) (=M. mastersii (Haswell) =M. incisipes (Bate))
Distomedian petasmal projections directed anterolaterally; lateral thelycal plates with salient and parallel lateral ridges only; occurrence west of Malacca Strait ..... M. monoceros (Fabricius)

13(10) Ischial spine minute and blunt 14
Ischial spine absent 17

14(13) Rostral teeth more or less evenly spaced; thelycal structure posteriorly open 15
Rostral teeth unevenly spaced, anterior 2 teeth separated from each other and from the rostral apex by a much wider space; thelycal structure posteriorly closed ..... M. demani (Roux)

15(14) Distomedian petasmal projections not superficially separated into 2 lobes, almost completely overlying distolateral projections; lateral thelycal plates kidney-shaped, with strongly raised ventrolateral ridges ..... M. conjunctus Racek and Dall
Distomedian petasmal projections more or less superficially separated into 2 lobes, not overlying distolateral projections; lateral thelycal plates ear-shaped, with salient lateral ridges 16

16(15) Distomedian petasmal projections directed anteriorad, parallel, longitudinal sulcus ill-defined; posterior end of salient ridges on lateral thelycal plate curved outwards; spine on merus of male 5th pereiopod slightly bent inwards ..... M. papuensis Racek and Dall
Distomedian petasmal projections directed anterolaterally, diverging, longitudinal sulcus distinct; posterior end of salient ridges on lateral thelycal plates curved inwards; spine on merus of male 5th pereiopod slightly bent outwards ..... M. elegans (de Man) (=M. singaporensis Hall)

17(13) Rostrum with a marked edentate distal portion; anterior thelycal plate bluntly pointed, lateral plates large, separated by a narrow fissure ..... M. eboracensis Dall
Rostrum without edentate distal portion 18

18(17) Branchiocardiac carina distinct, extending from posterior margin of carapace almost to hepatic spine; anterior thelycal plate longitudinally grooved, wider posteriorly than anteriorly; distomedian petasmal projections crescent-shaped ..... M. affinis (H. Milne Edwards) (=M. mutatus (Lanchester); =M. necopinans Hall)
Branchiocardiac carina feeble or ill-defined, anterior end not exceeding posterior 1/3 of carapace 19

19(18) Anterior thelycal plate tongue-like, with a pair of anterolateral rounded tubercles; lateral plates with a characteristic patch of dense setae; distomedian petasmal projections strongly diverging, each forming a broad outwardly-curved tooth ..... M. insolitus Racek and Dall
Anterior thelycal plate flask-shaped, with a longitudinal median ridge; distomedian petasmal projections finger-shaped 20

20(19) Anterior margin of anterior thelycal plate with 3 tubercles 21
Anterior margin of anterior thelycal plate with 2 fang-like teeth and a median indistinct tubercle; petasma with slightly diverging tubular distomedian projections ..... M. dalli Racek

21(20) Median tubercle more prominent than lateral ones; distal margin of anterior thelycal plate distinctly triangular; petasma with almost parallel tubular distomedian projections, their distal $\frac{1}{2}$ twisted dorsoventrally ..... M. bennettae Racek and Dall
All tubercles of equal size; distal margin of anterior thelycal plate convex to indistinctly triangular; petasma with laminose and strongly diverging distomedian projections ..... M. burkenroadi Kubo

1.22 Taxonomic status

M. macleayi is a morphospecies.

1.23 Subspecies

M. macleayi is monotypic.

1.24 Standard common name

The standard common name is school prawn.

1.3 Morphology

1.31 External morphology (For description of spawn, larvae, and juveniles see 3.17; 3.22; 3.23.)

The carapace which covers the cephalothorax bears a prominent dorsally toothed rostrum anteriorly. Two compound eyes arise on each side of the rostrum. Thereafter the following pairs of appendages are found attached to the sternites of the cephalothoracic segments: antennules, antennae, mandibles, maxillae I and II, maxillipeds I to III, and pereiopods I to V. Pereiopods I to III are chelate. The sternites of the segments bearing pereiopods IV and V are modified into a thelycum in the female. The abdomen consists of six individually distinct segments and a telson. The sternites of the first five abdominal segments bear paired pleopods, the 6th bears uropods on its posterior margin. The endopods of the first pair of pleopods of males are modified into a petasma and each of the second pair of pleopods bears an appendix masculina.

There are some small pubescent patches on the carapace but the abdomen is glabrous. The tip of the rostrum is often damaged or malformed.

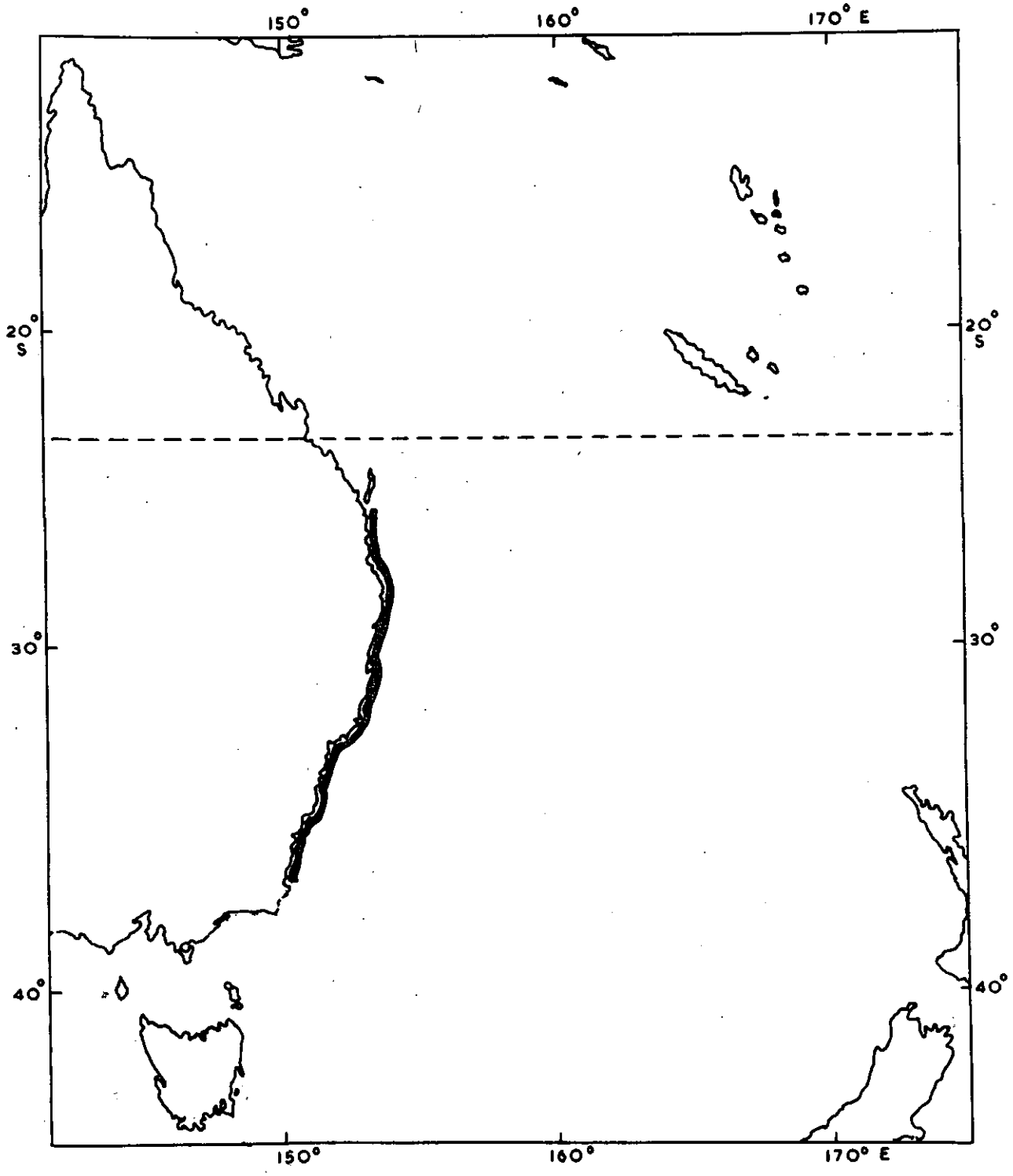

Fig. 3.- Distribution of Metapenaeus macleayi.

2 DISTRIBUTION

2.1 Total area

M. macleayi is confined to the east coast of Australia, as shown in Figure 3. The species occupies estuarine to offshore areas, according to different stages of its life cycle (see 2.2).

TABLE 1

AREAS WHERE M. MACLEAYI OCCURS

Land area	Code (Rosa, 1965)
Queensland	616
New South Wales	615

2.2 Differential distribution

2.21 Spawn, larvae, and juveniles

Eggs and early larvae have been found in depths of about 30 fm (55 m) off the coast of New South Wales. Juvenile M. macleayi are found in estuarine areas during autumn to early spring (Racek, 1959).

2.22 Adults

During the summer months school prawns migrate from the estuaries to the inner littoral area, 1 to 25 fm (2 to 56 m), as they mature. In New South Wales, school prawns are most abundant in the estuaries between October and April, and in the inner littoral area between November and July. School prawns display a lunar periodicity in abundance (see 2.3). In the inner littoral area they often form large irregularly occurring schools. These schools are usually associated with turbid water and a soft, muddy bottom (Racek, 1959).

2.3 Determinants of distribution changes

- Regular movements

The prawns migrate from the estuaries to the inner littoral areas as they mature. School prawns display a lunar periodicity. From the last quarter of the moon, and increasing in numbers towards the new moon, schools of adolescent and adult M. macleayi assemble in the seaward parts of estuaries and migrate towards the inner littoral area. This "run" reaches its peak 12 nights after full moon (Racek, 1959).

School prawn also displays a diurnal periodicity. Catches are most abundant during the daylight hours with peak of abundance at approximately 1100 h (Racek, 1959).

- Irregular movements

Racek (1959) characterized school prawns as "inconsistent prawns": "Inconsistent prawn species are always on the move and show a preference for turbid waters and soft muddy grounds. They form pronounced age groups and dense schools and may occur sporadically in enormous quantities on inner littoral grounds, only to be completely absent from the same grounds the following season. Their optimal habitats are defined by a limited range of depths and they usually do not occur beyond the 35 fm (64 m) line. They are essentially perifluvial forms, and therefore their abundance is closely linked with the occurrence of river floods as well as with certain conditions of weather and sea. Owing to their extensive schooling habits, these species are often caught in great quantities."

River floods decrease salinity and tend to drive prawns from estuarine and perifluvial areas. Five to 10 days after the peak of the flood schools of M. macleayi reappear in these areas, and tend to follow the turbid water as it moves along the coast under the influence of ocean currents (Racek, 1959).

Strong winds, directed against the East Australian Current, cause choppy surface conditions and increase the turbidity of the water. School prawns tend to travel in the same direction as these winds (Racek, 1959). They tend to follow this turbid water as it moves along the coastline under the influence of ocean currents (Racek, 1959).

3 BIONOMICS AND LIFE HISTORY

3.1 Reproduction

3.11 Sexuality

M. macleayi is heterosexual and sexually dimorphic. The male, beside possessing a petasma and appendix masculina, is distinguished by the following characters. In large males the epigastric tooth is absent, its position being indicated by a shallow depression in the carapace. The rostrum, when intact, reaches the first third of the 3rd segment of the antennular peduncle. The antennular flagellae are equal and slightly longer than half the length of the antennular peduncle. The ischium of the fifth pereiopod has a keel almost as long as the segment; the merus of this pereiopod has a deep notch followed by a bulbous tubercle slightly reflected outwards.

The female has a thelycum; the rostrum reaches or exceeds the tip of the antennular peduncle; and the antennular flagellae are slightly less than half the length of the peduncle.

3.12 Maturity

M. macleayi reaches maturity in the inner littoral area during the period February to May, 9 to 10 months after hatching. Mean length at maturity: males, 97 mm; females, 132 mm (Racek, 1959).

3.13 Mating

School prawns mate in depths of about 30 fm (60 m) off the New South Wales coast. Mating is immediately preceded by the ecdysis of the mature females.

There is indirect evidence that there is a lunar rhythm in mating and spawning. Eggs and young larvae are most commonly caught between the last quarter of the lunar month and the new moon. Soft-shelled females and females with attached spermatophores are most common between full moon and the last quarter of the lunar month (Racek, 1959).

3.14 Fertilization

Fertilization is external.

3.15 Gonads

A ripe ovary is olive-green in colour and contains 350,000 eggs (Racek, 1959).

3.16 Spawning

Spawning occurs on the mating grounds shortly after mating (see 3.13).

3.17 Spawn

The eggs are demersal and have been found on a mud bottom in about 55 m off New South Wales. The eggs have a mean diameter of 0.26 mm and are yellow in colour (Racek, 1959).

3.2 Pre-adult phase

3.21 Embryonic phase

The egg takes 12-18 hr to develop into a nauplius larva (Racek, 1959).

3.23 Adolescent phase

Adolescent stages are present in New South Wales estuaries from late autumn. By midsummer the following season average body length is $3\frac{1}{2}$ in. (8.9 cm). At this time they leave the estuaries for the sea, where they mature.

The frequency of moulting, as indicated by the number of soft-shelled prawns in the population, follows a lunar rhythm. Soft-shelled prawns first occur on the 10th day after new moon. Their numbers rise to a peak between the 13th to the 16th day after new moon, then numbers decline rapidly to the 21st day, after which there is a slow decline to the 28th day. Moulting almost ceases after this day.

School prawns also display a lunar periodicity as they migrate from the estuaries to the inner littoral area. These migrations take place each lunar month between the calendar months of November and April. The prawns appear in set-net catches on the third night after full moon. The catches increase in quantity until the 12th night after full moon, then fall till the 19th night after full moon when the migration is presumably completed (Racek, 1959).

3.3 Adult phase

3.32 Hardiness

M. macleayi avoids areas where salinity is decreased because of floods. As the floods abate M. macleayi is the first prawn species to enter the region disturbed by the flood (Racek, 1959).

3.34 Predators

The following species prey upon school prawns: Platycephalus fuscus, Urolophus testaceus, Cnidoglanis macrocephalus, and Sciaena antarctica (Racek, 1959).

3.35 Parasites, diseases, injuries, and abnormalities

- Injuries and abnormalities

The tip of the rostrum is often damaged or malformed (Dall, 1957).

3.4 Nutrition and growth

3.42 Food

An examination of the stomach contents of freshly caught M. macleayi indicates that they feed on annelids and smaller molluscs. In aquaria they favour annelids and liver (Racek, 1959).

3.5 Behaviour

3.51 Migrations and local movement

Juvenile M. macleayi migrate from the estuaries toward the sea as they mature. These migrations take place in the summer between December and May. They follow a pattern which appears to be linked to the lunar cycle (Racek, 1959). Local movements take place under the influence of river flow and weather conditions (Racek, 1959) (see 2.2, 2.3).

3.52 Schooling

M. macleayi schools extensively, mostly in turbid waters over a muddy bottom. These schools usually contain prawns of a single age group (Racek, 1959) (see 2.3).

3.53 Responses to stimuli

- Environmental stimuli

Chemical stimuli: M. macleayi responds to changes in salinity caused by floods (Racek, 1959).

Optical stimuli: M. macleayi reacts to both turbid water and moonlight.

M. macleayi kept in aquaria showed two daily peaks of activity. The first was from 0800 h to 1300 h, and the second was from 2000 h to 2200 h. On the 3rd and 2nd days before full moon the prawns were active all night (Racek, 1959).

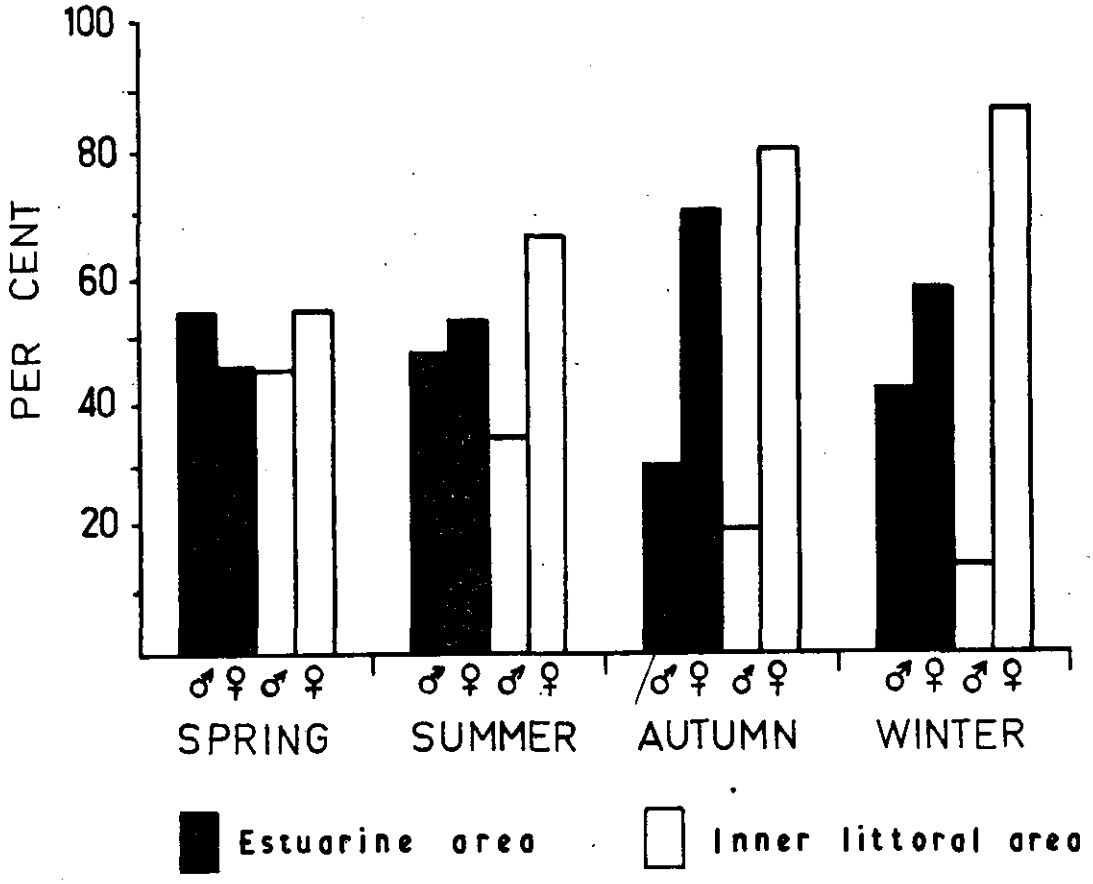

Fig. 4.- Sex ratios of Metapenaeus macleayi.

4 POPULATION

4.1 Structure

4.11 Sex ratio

Figure 4 shows sex ratios of M. macleayi as determined by Racek (1959) in northern New South Wales. The black bars show the changes in the proportions of males and females in estuarine areas for the four seasons of the year. The white bars show the changes in proportions of males and females in the open sea from the shore to a depth of 56 m during the four seasons of the year. Racek (1959) does not describe these changes in sex ratios in a numerical form.

4.3 Natality and recruitment

4.33 Recruitment

The main period of recruitment in New South Wales is during the months December to May (Racek, 1959). It appears that rainfall in the preceding season affects the recruitment in the current season. A high rainfall in the preceding season means a larger catch in the current season; similarly a lower rainfall means a reduced catch (Thomson, 1956).

5 EXPLOITATION

5.1 Fishing equipment

5.11 Gears

In estuaries and coastal lakes on the east coast of Australia M. macleayi are taken by scoop nets, small seines, set nets, beam trawls, and small otter trawls. In the Noosa River in southern Queensland school prawns are beam-trawled for use as live bait. In the open sea and larger bays and estuaries school prawns are taken by otter trawl.

Regulations provide for minimum mesh sizes and maximum net sizes in all States. In Queensland, minimum mesh sizes are 1 in. (2.5 cm) in estuaries, and $1\frac{1}{2}$ in. (3.8 cm) in the open sea. In New South Wales minimum mesh sizes are $1\frac{1}{4}$ in. (3.2 cm) in estuaries and, $1\frac{1}{2}$ in. (3.8 cm) in the open sea. Maximum width of beam trawls in Queensland is 15 ft (5 m). Maximum headrope length of otter trawls is, in Queensland, 8 fm (16 m) in estuarine waters and 20 fm (37 m) in ocean waters, and in New South Wales, 6 fm (12 m).

5.12 Boats

M. macleayi is fished in shallow water, sometimes just outside the surf on open beaches. Boats frequently operate from river mouths blocked by bars. For these reasons boats are manoeuvrable and of shallow draft, usually with a chine bottom.

Boats engaged in the M. macleayi fishery are generally smaller than those used for trawling the larger prawns.

In estuaries boats used for beam and otter trawling are 12-20 ft (4-6 m) long with small inboard petrol engines. Boats fishing in open waters are larger, 20-50 ft (6-15 m) in length, with diesel engines 50-90 h.p.

A winch is situated immediately aft of the wheelhouse and powered by an auxiliary take-off from the main engine. Wire from the winch drums is led to a gallows situated amidships which allows the boat to be used as a stern trawler.

When the trawl is brought aboard the otter boards are winched to the gallows head and the cod-end is brought aboard by means of a derrick and lazy line. The catch is emptied onto the sorting tray, the prawns are sorted and stored on ice. Sometimes the catch is emptied into water tanks on deck and the prawns are kept alive in these until the boat returns to port. This practice is referred to as "swimming" the prawns.

5.2 Fishing areas

5.21 General geographic distribution

M. macleayi is fished on the east coast of Australia throughout its range (see 2.1).

5.22 Geographic ranges

The school prawn is most abundant along the New South Wales coast.

5.23 Depth ranges

School prawn fishing is confined to estuaries and depths less than 50 m.

5.3 Fishing seasons

5.31 General pattern of seasons

The fishery for M. macleayi is a summer and autumn fishery.

5.32 Dates of beginning, peak, and end of seasons

Estuarine fishery: beginning, late November; peak, February; end, April.

Coastal fishery: beginning, December; peak, April; end, July.

5.4 Fishing operations and results

5.43 Catches

The only States for which catch statistics are available are Victoria and Queensland (Table 2).

TABLE 2

ANNUAL PRODUCTION OF M. MACLEAYI

Year	Victoria		Queensland	
	(lb)	(kg)	(lb)	(kg)
1963-4	0	0	0	0
1964-5	1940	882	39,855	18,115
1965-6	0	0	275,737	125,335

6 PROTECTION AND MANAGEMENT

6.1 Regulatory (legislative) measures

6.11 Limitation of total catch

- Limitation on the efficiency of fishing units

Maximum size of trawls is controlled in Queensland and New South Wales (see 5.11).

- Limitation of effort

In Queensland, Moreton Bay waters are closed to professional fishing at weekends, for the sake of amateur anglers.

- Limitation on the number of fishing units, fishermen

None.

- Limitation on total catches (quota)

None.

6.12 Protection of portions of the population

Various closures operate to protect juvenile prawns:

- Closed areas

In Queensland, trawling within one mile of the shore is prohibited. Certain estuaries and bays are totally or partially closed to prawn fishing in Queensland and New South Wales.

- Closed seasons

All Queensland waters south of 25°S. are closed to prawn fishing during daylight between October 1 and February 1. In Queensland and New South Wales portions of inlets and estuaries are closed for periods which usually coincide with the presence of prawns in these areas.

- Limitations on size of efficiency of gear or craft

Regulations provide for minimum mesh sizes and maximum net sizes in all States (see 5.11). Minimum mesh size supposedly allows escape of juveniles, but its success is as yet unproven.

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