



เอกสารอ้างอิง

- ฝ่ายวิชาการ, กองสิ่งแวดล้อมโรงงาน, 2520. โครงการอนุรักษ์แม่น้ำท่าจีน. เอกสารเฉพาะกรมโรงงาน, กระทรวงอุตสาหกรรม.
- ไพเราะ เกาศิริกุล, 2522. อัตราความชุกชุมของแพลงตอนสัตว์และความสัมพันธ์กับสิ่งแวดล้อมบริเวณปากแม่น้ำเจ้าพระยาระหว่างปี 2519 - 2520. รายงานการสัมมนาวิทยาศาสตร์ทางทะเล ครั้งที่ 1. กองสำรวจแหล่งประมง, กรมประมง, กระทรวงเกษตรและสหกรณ์.
- วรรณเกียรติ ทับทิมแดง, 2521 ก. การสำรวจความชุกชุมของลูกกุ้งวัยอ่อนในอ่าวไทย. งานสัตวน้ำอื่น ๆ, กองประมงทะเล, กรมประมง. รายงานวิชาการฉบับที่ 28/2521.
- _____, 2521 ข. การสำรวจแหล่งและฤดูกาลวางไข่ของกุ้งทะเล ชนิดที่มีความสำคัญทางเศรษฐกิจในอ่าวไทย. งานสัตวน้ำอื่น ๆ, กองประมงทะเล, กรมประมง, รายงานวิชาการฉบับที่ 29/2521.
- สง่า วัฒนวิชัย, 2522. ชนิดและความชุกชุมของไข่ปลาและลูกปลาวัยอ่อนบริเวณป่าชายเลนแหลมผักเบี้ย จังหวัดเพชรบุรี. งานจัดและพัฒนาที่กินชายทะเล, กองประมงทะเลและกองประมงน้ำกรวย, กรมประมง, รายงานวิชาการฉบับที่ 4/2522.
- สุเมย์ สุภักษ์, นุสรี ศรีพยัคฆ์ และวิเชียร วิเชียรวรกุล, 2522. แพลงตอนสัตว์ในบริเวณป่าเลน. งานจัดและพัฒนาที่กินชายทะเล, กองประมงทะเลและกองประมงน้ำกรวย, กรมประมง, รายงานวิชาการฉบับที่ 3/2522.
- สุรพล สุภารา, 2504. The Identification and Distribution of Zoea and Megalopa Larvae of Some Anomura and Brachyura in the Gulf of Thailand. วิทยานิพนธ์ปริญญาบัณฑิต, แผนกวิชาชีววิทยา, คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กท.ม.

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ภาคผนวก

External Morphology of Decapod Larvae.

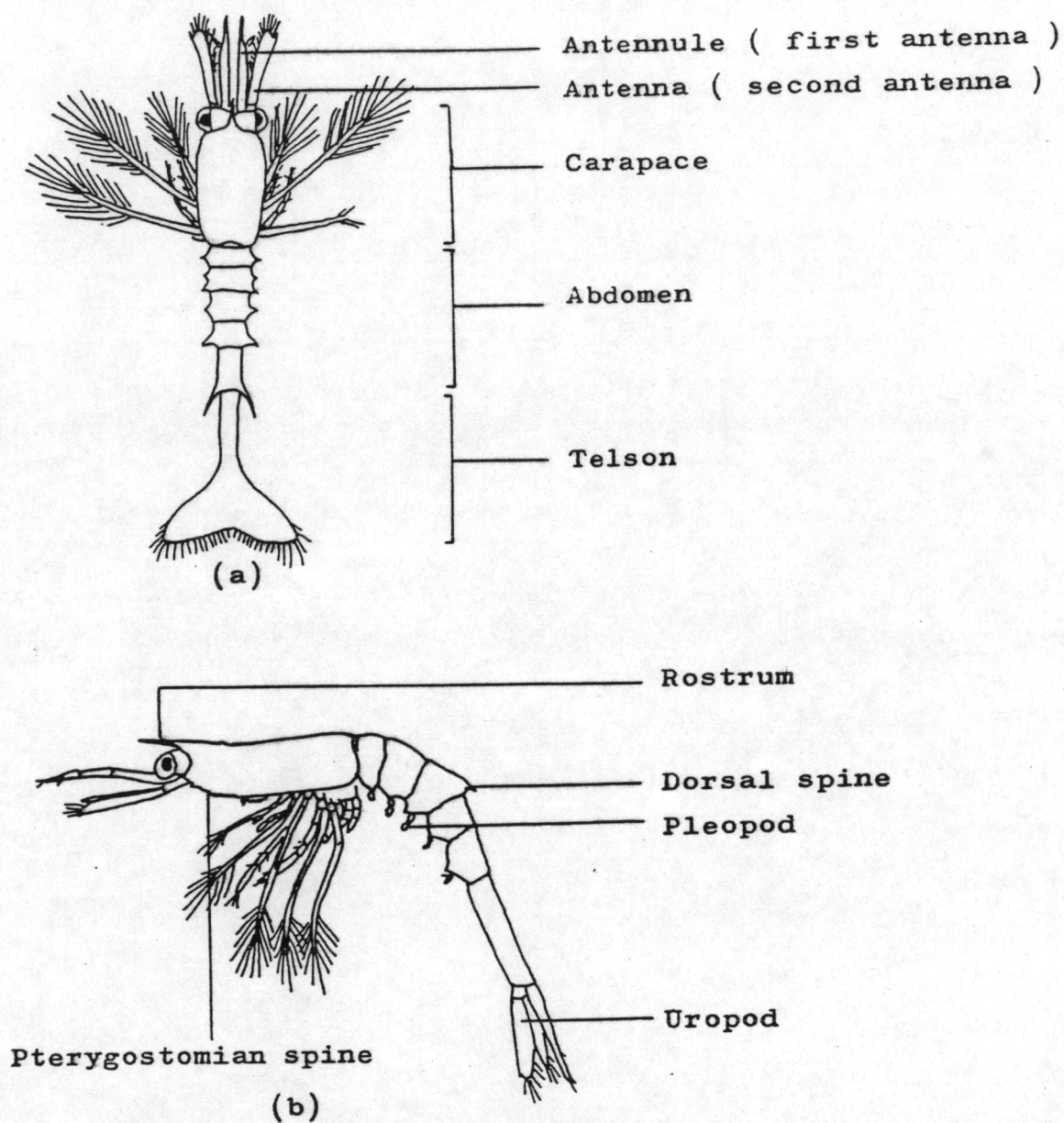


Figure 1 (a) Sabinea septemcarinata stage I, dorsal view;
 (b) Pontocaris cataphractus stage IV, lateral view.
 (after Williamson, 1957)

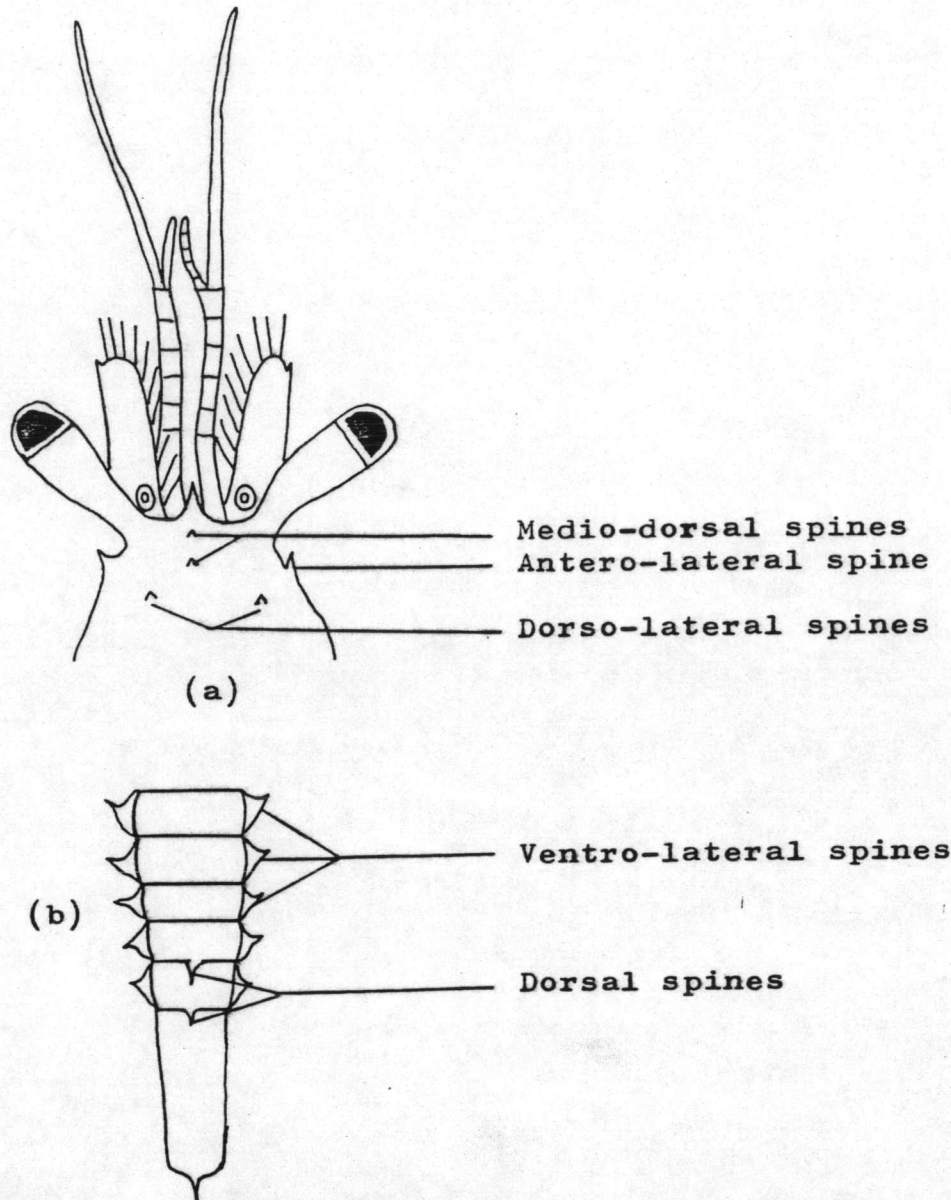


Figure 2 Acetes group B (Present work); (a) frontal view;
 (b) abdomen.

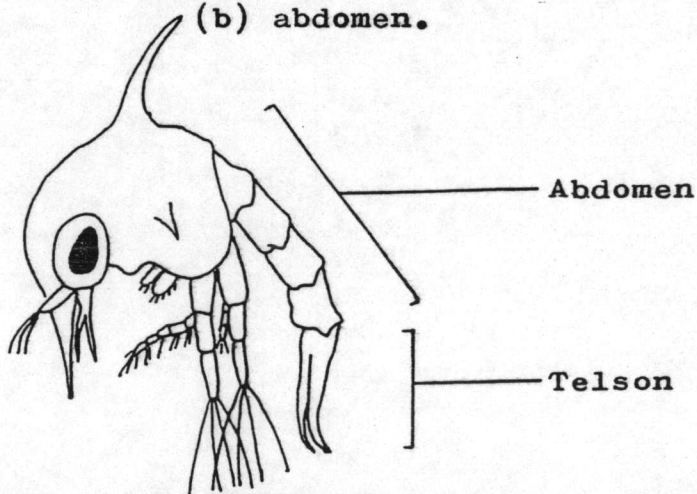
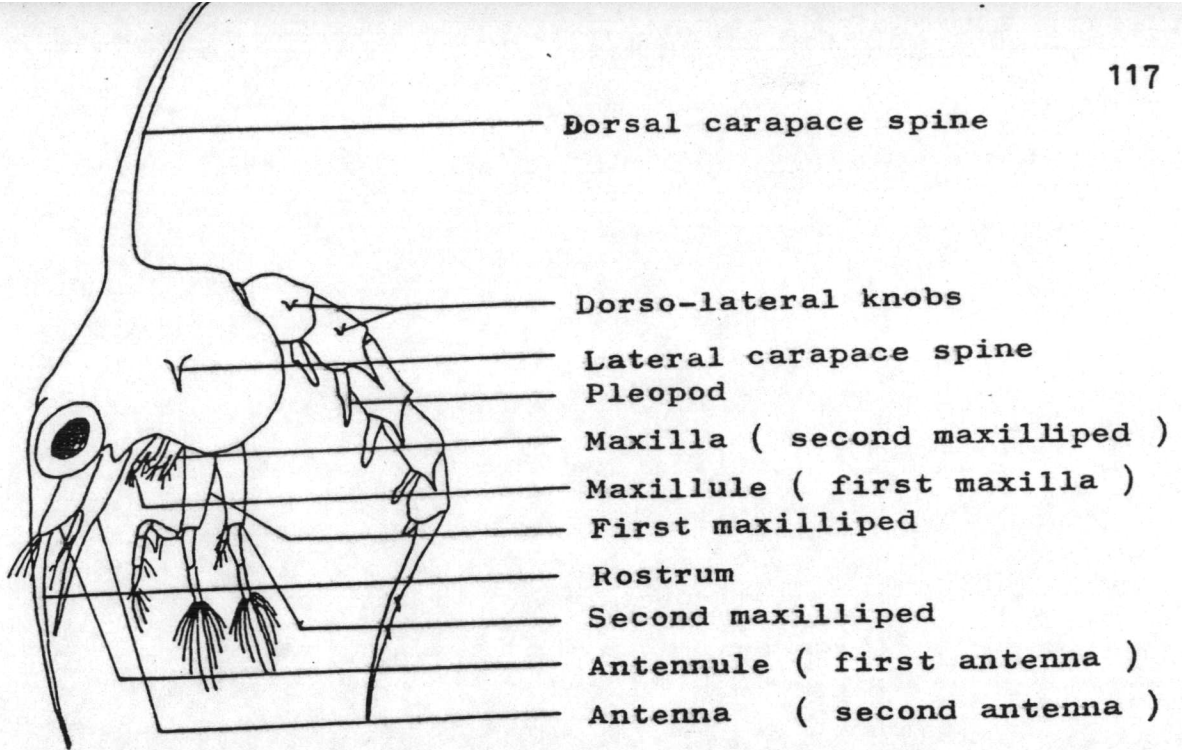


Figure 3 Hemigrapsus sanguineus (after Rice, 1980);
 lateral view.



(a)

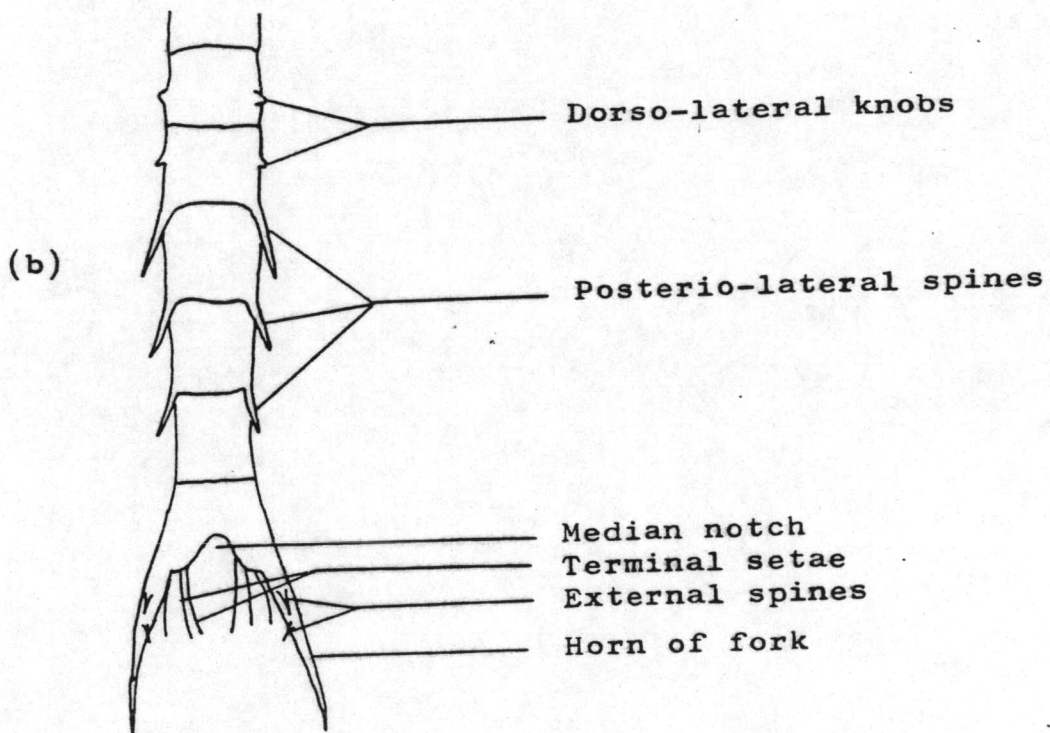


Figure 4 Portunus pelagicus (after Rice, 1980); (a) lateral view; (b) abdomen and telson.

Infraorder Caridea (Based on Williamson, 1957 and Williamson, 1980 Personal Communication).

Family Hippolytidae

Eye stalk cylindrical. Antennules close together and rather short. Bases of antennules separated by not more than width of one of them, peduncles stout and almost straight. None of posterior thoracic appendages elongated or ending in prominent spines. (Lost leg is elongated and expanded in larvae of hippolytid genera Lysmata and Hippolysmata). Leg 1 and 2 show developing clelae in late zoeal stages. Exopods on legs 1 - 4 in late zoeal stages.

Family Alpheidae.

Eyes oval or pointed in lateral view. None of thoracic endopods expanded. Leg 5 much longer than leg 4; endopods of maxilliped 1 very small and unsegmented.

Family Palaemonidae.

Carapace with 1 - 3 large medio - dorsal spines (except in stage 1 in some species). Rostrum long, without spines. Eyes large. Antennules long and close together (longer than in Hippolytidae). Maxilliped 1 and 2 and in prominent spines in early stages. Endopod of maxilliped 1 well developed or only slightly reduced. Leg 5 about equal to leg 4 or shorter than it. Later stages have last two

legs fairly long and ending in spines. Posterior margin of telson straight in all stages.

Infraorder Brachyura (Rice, 1980)

Superfamily Oxyrhyncha

Family Hymenosomatidae

Zoeal characters

Three zoeal stages and no megalopa, at least in those species which have been reared.

Carapace. Rostral, dorsal and lateral carapace spines may be well-developed, but the rostrum is usually reduced and the dorsal and lateral spines are also usually small or absent. Where present, the lateral spines emerge from close to the ventral carapace margin.

Abdomen of five somites in all stages, the fifth somite with pronounced postero-lateral rounded expansions in Elamena. Postero-lateral margins of the abdominal somites never armed with spines. Dorso-lateral knobs or spines never developed on the third somite and only occasionally on the second. Pleopods not developed in any of the zoeal stages.

Telson trapezoid-shaped, narrowing posteriorly; forks short and straight, usually unarmed, but sometimes with a single lateral hair or spine near the base. Posterior telson margin straight, with no median notch and with an

undivided series of 6 setose processes in all stages.

Antennule small and simple, tipped with a single group of aesthetascs and setae in all stages.

Antenna usually very simple, with the exopod represented by a single seta or completely absent.

Maxillule with coxal endite armed with 4 spines or setae; endopod of 2 distinct segments carrying 1 and 4 setae respectively.

Maxilla with endites undivided, the coxal greatly reduced and with a single terminal seta. Endopod stepped and carrying a terminal group of 3 setae and a subterminal group of 2 setae. Scaphognathite with 3 anterior (distal), marginal plumose setae in the first stage, increasing to 7 - 9 in third stage extending about half way along lateral margin; single posterior setose process in first stage replaced by 4 or 5 plumose setae in third stage.

First maxilliped with 8 or 9 medial setae on basis. Endopod segments with 3, 2, 1, 2 and 4 + 1 setae respectively. Natatory setae 4, 7, 8 - 9 in successive stages.

Second maxilliped with 3 or 4 medial setae on basis. Endopod of 3 segments carrying 1, 1 and 5 or 6 setae respectively.

Superfamily Oxystomata

Family Leucosiidae

Zoeal characters

Four zoeal stages

Carapace. Globose, with rostral, dorsal and sometimes lateral spines present in the Philyrinae, but with a very small rostrum and no dorsal or lateral spines in the known Leucosiinae and Ebaliinae.

Abdomen. Five somites in all stages. Somites 2 and 3 carry very small dorso-lateral knobs, and the posterior margins of all of somites are unarmed. Pleopods appear in the third stage.

Telson. A more or less triangular plate with the postero-lateral margins either toothed (Ebalia), smoothly rounded (Leucosia), acute (Philyra) or square (Myra). Posterior margin either more or less straight or slightly concave, with 3 pairs of setae in all stages arranged in a single row with no obvious median separation.

Antenna. Reduced to an unarmed bud, or absent as in the adults.

Maxillule. Endopod usually unsegmented and never armed with more than 4 (and sometimes only 3) terminal setae.

Maxilla. Coxal and basal endites not or only slightly bilobed. Endopod with only 4 or, more usually, 3 setae, but retaining some evidence of distinct groupings. Scaphognathite with 3 or 4 marginal setae in the first stage.

First maxilliped. Basis with 8 medial setae. Endopod segments with 2, 1 or 2, 1, 2 and 4 or 5 setae respectively. Exopods with 4, 5, 6 and 8 natatory setae in successive stages.

Second maxilliped. Basis with 4 medial setae. Endopod unsegmented or incompletely segmented and with 2 - 4 setae restricted to the terminal segment.

Superfamily Brachyrhyncha

Group I Cyclometopa

Family Portunidae

Zoeal characters

Four to seven zoeal stages.

Garapace. Dorsal and rostral spines always, and lateral spines usually, well-developed.

Abdomen. Sixth somite separated from telson in third or fourth stage. Prominent dorsolateral knobs on second somite, smaller ones usually on third somite. Somites 3 - 5 almost always with prominent posteriolateral spines. Pleopod buds appear in third stage or later.

Telson. Forks with at least one and usually two prominent outer spines.

Antenna. Spinous process always at least half length of rostrum, but never longer than it.

Exopod always $1/4 - 3/4$ length of spinous process and always with a long inner and short outer terminal seta.

Maxillule. Endopod always with 6 setae on the distal segment; proximal segment usually with a single seta.

Maxilla. Endopod with 6, 7 or 8 setae. Scaphognathite with 4 marginal setae in first stage, increasing to 30 - 40 in later zoeal stages.

First maxilliped. Proximal segment of endopod with 2 medial setae. Basis almost always with 10 setae arranged 2, 2, 3, 3.

Second maxilliped. Basis with 4 medial setae. Proximal 2 segments of endopod each with a single seta.

Family Xanthidae

Zoeal characters

Four, or rarely five zoeal stages.

Carapace. Almost always four carapace spines; occasionally the laterals and/or the rostral spines are reduced or absent.

Abdomen. Sixth somite separated from telson in third stage; pleopod buds appear at the same time. Dorso-lateral knobs always on somite 2, usually on somite 3 and occasionally on somites 4 and 5. Somite 1 sometimes with mid-dorsal spine. Somites 3, 4 and 5 usually with long, curved, posterio-lateral spines often over-reaching the succeeding somites in later stages. Pleopod buds appear in the third or fourth stage.

Telson. Forks well-developed and often spinulose, usually with all three outer spines. Posterior margin with 3 pairs of posterior processes in first and second stages, 1 or 2 additional pairs appearing in later stages.

Antenna. Spinous process always well developed and usually equal to or longer than rostrum. Exopod either (a) rudimentary or less than $1/4$ spinous process with 1 or 2 terminal seta or unarmed, (b) sub-equal to or longer than spinous process and with a seta more or less mid-way along its length, or (c) $1/3 - 1/4$ spinous process and with 2 or 3 terminal setae.

Maxillule. Proximal segment of endopod always with 1 seta; distal segment almost always with 6 setae of which 2 are not terminal.

Maxilla. Scaphognathite with 4 marginal setae in stage I. Endopod rarely with 6 setae, sometimes with 7 and usually with 8, arranged 3 + 3, 3 + 4 or 3 + 5.

First maxilliped. Basis usually with 10 medial setae. Endopod basal segment almost always with 3 setae.

Second maxilliped. Basal segment of endopod almost always with 1 seta.

Family Atelecyclidae

Sub-family Acanthocyclinae

Zoeal characters

Four zoeal stages in Corystoides, two in Heterozius.

Carapace. Dorsal and rostral spines well-developed, both longer than the carapace in Corystoides, the rostrum somewhat shorter in Heterozius. Lateral spines present in Heterozius, but not in Corystoides.

Abdomen. Sixth abdominal somite separated from the telson in the second stage in Heterozius and in the third stage in Corystoides. Dorso-lateral projections on the second somite only. Posterio-lateral margins apparently smooth or with rounded projections in Corystoides. In Heterozius somites 3 and 4 have acute posterio-lateral spines while somite 5 has prominent posterio-dorsal spines. Pleopods appear in the second stage in Heterozius and in the third in Corystoides.

Telson. Forks larger than in other atelecyclids, each with a single outer spine. First stage with 3 pairs

of posterior processes, second with 4 pairs, later stages in Corystoides with up to 6 pairs.

Antenna. Spinous process much longer than carapace; exopod a very short unarmed spine.

Maxillule. Endopod segments with 1 and 6 setae respectively.

Maxilla. Endopod with 8 setae arranged 3, 2, 3. Scaphognathite with 4 marginal setae in the first stage in Corystoides, 6 in Heterozius; c. 30 in last stage in both species.

First maxilliped. Basis with 8 - 10 medial setae; endopod segments with 3, 2, 1, 2 and 5 setae respectively.

Second maxilliped. Basis with 4 medial setae. Endopod in Corystoides with 3 segments, the proximal two segments each with a single seta and the distal segment with 7 setae, 2 of which are sub-terminal. Endopod in Heterozius of 4 distinct segments carrying 1, 2, 2 and 5 setae respectively.

Sub-family Atelecyclinae

Zoeal characters.

Five zoeal stages.

Carapace. Dorsal, rostral and lateral spines all well-developed and sometimes covered in spinules, both

the dorsal and rostral spines as long as or longer than the carapace.

Abdomen. Sixth somite separated from the telson in the third stage. Dorso-lateral knobs on the second somite (Atelecyclus and Telmessus) or on second and third somites (Erimacrus). Somites 3 - 5 with acute posteriolateral spines, at least in the later stages, more than half as long as the succeeding somites and sometimes over-reaching them. Pleopod buds appear in stage 3.

Telson. Telson forks with 2 (Atelecyclus) or 3 (Telmessus and Erimacrus) outer spines, the anterior ones in Telmessus and Erimacrus being very prominent. Forks and large outer spines each with small spinules. First stage with the usual brachygnathan complement of 3 pairs of posterior process in Atelecyclus and Telmessus, separated by a prominent median notch, but 4 pairs in Erimacrus; one or two additional pairs in the later zoeal stages. Outer pair of posterior processes with tooth-like spinules on the inner distal margin in Atelecyclus, but not in Erimacrus or Telmessus.

Antenna. Spinous process about $3/4$ length of rostrum, exopod $1/4 - 2/3$ length of spinous process and with two unequal terminal setae.

Maxillule. Endopod segments with 1 and 6 setae respectively. Exopod seta present in the first stage.

Maxilla. Endopod clearly stepped, with 3 - 5 setae. Scaphognathite with 30 - 40 or more marginal setae and no plumose posterior process in the first stage.

First maxilliped. Basis with 2, 2, 3 and 3 medial setae, the middle seta of the distal two groups being very small. Endopod segments with 3, 2, 1, 2 and 4 + 1 setae, the lateral seta on the distal segment arising from close to its base. In addition, the merus or merus and carpus each have allong plumose disto-lateral seta.

Second maxilliped. Basis with 4 medial setae. Endopod segments with 1, 1 and 5 setae.

In Erimacrus and Telmessus exopods of both maxillipeds with 4 natatory setae in the first stage, increasing to 8 - 13, 12 - 16, 16 - 18 and 18 - 21 in the succeeding stages. In Atelecyclus the natatory setae increase by 2 in each stage as in most Brachyura.

Group II Catometopa

Family Grapsidae

Zoeal characters.

Three to five zoeal stages.

Carapace. Dorsal and rostral spines always present, but rarely significantly longer than the carapace and often much shorter.

Abdomen. Sixth abdominal somite separated from the telson in the second or third stage and pleopod buds usually appearing at the same time. Dorso-lateral processes always on the second somite, usually on the third, sometimes on the fourth and occasionally on the fifth. Posteriolateral margins of the abdominal somites often rounded or unarmed, rarely with spines more than half as long as the succeeding somites.

Telson. Forks almost always unarmed, but occasionally with 1 or 2 very small seta-like spines.

Antenna. Spinous process always well-developed; exopod either a tapering rod-like spine $1/2 - 3/4$ spinous process with 1 or 2 small subterminal spines, about $1/4 - 1/2$ spinous process and with 2 very unequal terminal setae, rudimentary and with 1 or 2 short terminal setae, or absent.

Maxillule. Endopod distal segment always armed with 4 terminal and 1 sub-terminal setae; basal segment almost always with a single seta.

Maxilla. Endopod with 2 + 2 or 2 + 3 setae.

First maxilliped. Basis with 8, 10 or 12 medial setae; endopod segments usually with 1 or 2, 2, 1, 2 and 5 setae respectively.

Second maxilliped. Basis with 4 medial setae; endopod segments almost always with 0, 1 and 5 or 6 setae

respectively, but basal segment very occasionally armed. Number of natatory setae on the exopods of both maxillipeds usually increasing by 2 at each moult.

Family Ocypodidae

Sub-family Macrophthalminae

First zoeal stage only known.

Carapace. Rostral and dorsal spines slender, straight and shorter than the carapace; lateral spines usually absent.

Abdomen. Somites 2 and 3 with small dorso-lateral projections; none of the somites with pronounced posterio-lateral margins; somite 4 usually slightly broader than the remainder.

Telson. Forks slender, about as long as the telson plate, more or less parallel and never widely divergent. Forks may be armed with small spinules, but usually without outer spines.

Antenna. Spinous process $3/4$ or more length of rostrum; exopod a slender spine, $1/2 - 3/4$ spinous process, usually unarmed or with small spinules, but may have a single seta proximally.

Maxillule. Endopod 2-segmented, normally armed with 1 and 5 setae respectively, and 4 setae respectively

for the terminal segment in Macrophthalmus depressus Rüppell and M. crinitus (Rathbun).

Maxilla. Endopod clearly stepped with 2 + 2 setae.

First maxilliped. Basis with 9 or 10 medial setae; endopod segments normally with 2, 2, 1, 2 and 5 setae respectively.

Second maxilliped. Basis with 4 medial setae; endopod segments with 0 or 1, 1 and 5 or 6 setae respectively.

Sub-family Ocypodinae

Five zoeal stages (based on only one reared species).

Carapace. As in the Macrophthalminae, but lateral spines present in Ocypode and absent in Uca.

Abdomen. Somites 2 and 3 with prominent dorso-lateral processes; somites 3 - 5 with acute postero-lateral margins developing into acute spines in the later stages, those of somites 4 and 5 over-reaching the succeeding somites; somite 4 markedly broader than the remainder; somite 6 separated from telson from third stage.

Telson. As in Macrophthalminae. One pair of posterior processes added in each successive stage, giving 7 + 7 in the fifth stage.

Antenna. Spinous process about 1/2 rostrum; exopod usually less than 1/3 spinous process, with 2 terminal

setae; endopod c. $3/4$ spinous process in last stage.

Maxillule. Endopod 2-segmented with 0 and 4 setae respectively.

Maxilla. Endopod stepped, with 1 + 2 setae; scaphognathite with 4 marginal setae in first stage, increasing to almost 60 in last stage.

First maxilliped. Basis with up to 8 medial setae; endopod segments with 2, 2, 1, 2 and 5 or 6 setae (but see above).

Second maxilliped. Basis with 4 medial setae; endopod segments with 0, 0, and 4 - 6 setae. Natatory setae on the exopods of both maxillipeds increasing 4, 6, 8, 10 and 12 in successive stages.

Sub-family Scopimerinae.

Five zoeal stages (based on only two reared species).

Carapace. Rostral and dorsal spines well-developed sometimes much longer than carapace; lateral spines usually present.

Abdomen. Somites 2 and 3 with small dorso-lateral processes; somites 2 - 5 with short acute postero-lateral spines in the later stages, but never more than $1/4$ succeeding somites. Somite 5 markedly broader than other somites in Dotilla, but not in Scopimera or Ilyoplax.

Telson. Long slender divergent forks usually armed with a single spine in Scopimera and Ilyoplax; telson narrowing posteriorly with forks much shorter than posterior processes in Dotilla. Three pairs of posterior processes in all stages.

Antenna. Spinous process well-developed, but usually less than half rostrum; exopod either absent, or rudimentary with 1 or 2 terminal setae; endopod less than 1/4 spinous process in last stage.

Maxillule. Endopod 2-segmented, carrying 0 and 4 (rarely 5) setae respectively.

Maxilla. Endopod clearly stepped, with 2 + 3 (rarely 2) setae; scaphognathite with 4 marginal setae and a setose posterior process in the first stage, increasing to 30 - 40 marginal setae in the last stage.

First maxilliped. Basis with 10 medial setae arranged 2, 2, 3, 3; endopod segments with 2, 2, 1, 2 and 5 or 6 setae respectively (but see above).

Second maxilliped. Basis with 3 medial setae, endopod of three segments with 0 or 1, 1, and 4 - 6 setae respectively. The exopods of both maxillipeds carry 4, 6, 8, 9 or 10 and 11 or 12 natatory setae in successive stages.

ประวัติผู้เขียน



ชื่อ

นางสาวละออศรี ตรีระเทศา

วุฒิการศึกษา

วท.บ. สาขาชีววิทยา ภาควิชาชีววิทยา คณะวิทยาศาสตร์
มหาวิทยาลัยขอนแก่น

ปีที่สำเร็จการศึกษา

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สถานที่ทำงาน

ภาควิชาชีววิทยา คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น