

## The First Zoeal Stage of Four Species of *Trapezia* (Crustacea, Brachyura, Xanthidae)

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**ABSTRACT.** Ovigerous females of four species of *Trapezia* Latreille were obtained from Red Sea corals collected by scuba divers in Obhor Creek, near Jeddah, Saudi Arabia. The species concerned are *Trapezia cymodoce* (Herbst), *T. ferruginea* Latreille, *T. digitalis* Latreille and *T. tigrina* Eydoux and Souleyet.

Laboratory hatchings were obtained for each species, but attempts to rear the larvae further were not successful. The first zoeal stages were compared with each other and with published descriptions.

The oral appendages of the four species are very similar, but differences in the carapace spines and the telson processes may be used to separate the species.

### Introduction

The Xanthidae (*sensu lato*) is one of the largest brachyuran families, containing over 130 genera and approximately 1000 species (Rice 1980). Descriptions of one or more larval stages have been published for about 49 of these species (Martin 1984), additional xanthid descriptions was listed by Martin (1988), bringing the number up to about 70 species). Approximately 123 species of Xanthidae have been recorded from the Red Sea, and Vine (1986) includes the following species of the subfamily Trapeziinae: *Tetralia glaberrima* (Herbst 1790) [= *Tetralia cavimana* (Heller, 1861)], *Trapezia cymodoce* (Herbst, 1801) *T. rufopunctata* (Herbst 1799), *T. ferruginea* Latreille, 1825, *T. digitalis* Latreille, 1825, *T. guttata* Ruppell, 1830 and *T. intermedius* Miers, 1886. Vine (1986) lists the latter species as a subspecies of *T. cymodoce*. To

this list must be added *T. tigrina* Eydoux and Souleyet, 1842, recorded from both the northern and southern Red Sea by Galil and Lewinsohn (1984). The species of *Trapezia* live in close association with corals and are therefore difficult to collect. It is unlikely that this is a complete list of species of this genus from the Red Sea.

Three previous accounts of larvae of *Trapezia* have been based on specimens from Al-Ghardaqa, northern Red Sea. Gurney (1938) described the first zoeal stage of *T. cymodoce* and *T. guttata*, and Al-Kholy (1963) described the first zoeal stage of *T. maculata* (Mcleay). The synonymy of *T. maculata* is confused (see Galil and Lewinsohn 1984) and the parentage of Al-Kholy's larvae is uncertain. Clark and Galil (1988) redescribed larvae of *T. cymodoce* from Gurney's specimens stored in the British Museum. In the present paper, descriptions are given of the first zoeal stage of *T. ferruginea*, *T. cymodoce*, *T. tigrina* and *T. digitalis*. The first species is described in detail and differences in the other species are noted.

### Material and Methods

The corals, *Pocillopora verrucosa* (Ellis and Solander, 1786) and *Stylopora pistillata* (Esper 1797) are very common in Obhor Creek (21°40'N, 39°12'E), about 20 km north of Jeddah, Saudi Arabia. Coral samples, consisting mostly of these species, were collected from the creek by scuba divers using hammers and chisels between 12 and 26 February 1989. In the laboratory, ovigerous females of *T. ferruginea*, *T. cymodoce*, *T. tigrina* and *T. digitalis* were removed from the corals to separate aerated aquaria, each containing about 5 liters of filtered seawater of 39‰ salinity, temperature  $25 \pm 2^\circ\text{C}$ , with a 12/12h light/dark cycle. Small pieces of corals were provided, and the crabs spent most of their time among the corals. Water was changed every second day until larvae hatched. The larvae were removed to other containers and fed on *Artemia* nauplii, but none survived beyond the first stage.

Measurements were made of carapace length (from forehead to posterior margin) and spine to spine tips (between tips of dorsal and rostral spines) for 15 specimens of each species. Drawings were made using a Wild M11 microscope with a camera lucida.

### Descriptions of First Zoeas

#### *Trapezia ferruginea* Latreille (Figs. 1A, 2A, 3A, 4A-G)

Carapace length 0.52-0.53 mm; spine-spine tips 1.38-1.46 mm. Carapace (Figs. 1A, 2A): with dorsal, rostral and lateral spines. Rostrum about 2/3 dorsal spine, with small spinules. Lateral spines about 1/2 rostrum, each with 2 (occasionally 1) spinules. One pair of posterodorsal carapace setae. Ventral margin with minute denticles.

Antennule (Fig. 4A): uniramous, unsegmented, with 3 long and 2 short terminal aesthetascs.

Antenna (Fig. 4B): with spinous process shorter than rostrum, distally spinulate;

exopod more than  $\frac{1}{4}$  length of spine, with 3 unequal terminal processes.

Maxillule (Fig. 4C): coxal endite with 7 setae; basal endite with 2 strong spines, each with several denticles, 3 setae and 2 minute teeth; no outer seta. Endopod 2-segmented: proximal segment small, with 1 seta; distal segment long, with 1 subterminal and 4 terminal setae.

Maxilla (Fig. 4D): proximal lobe of coxal endite with 5 setae, distal lobe with 3 setae; proximal and distal lobes of basal endite each with 4 setae; outer lobe of endopod with 2 setae, inner lobe with 3 setae; scaphognathite with 4 marginal setae and a long setose posterior process.

First maxilliped (Fig. 4E): basis with 2, 2, 3, 3 setae; endopod 5-segmented, with 2/0, 2/0, 1/0, 2/0, 4/1 inner/outer setae; exopod with 4 plumose natatory setae.

Second maxilliped (Fig. 4F): basis with 3 setae; endopod 3-segmented, with 0/0, 1/0, 4/0 inner/outer setae; exopod with 4 plumose natatory setae.

Third maxilliped undeveloped.

Abdomen (Figs. 1A, 4G) of 5 free somites: somites 2-5 each with pair of dorsolateral processes, larger on somites 2 and 3 than on 4 and 5; somites 3-5 each with a pair of posterolateral spines and a small tooth on posterolateral margins; somites 2-5 with a pair of minute setae on posterodorsal margin. Sixth somite fused with telson.

Telson (Fig. 3A) bifurcate, with rather shallow median indentation; 1st process (lateral spine), 2nd (dorsolateral spine) and 3rd (dorsal spine) of relative lengths 3:1:1. Prong (4th process) about twice length of 1st process. Three pairs of inner setae, outermost (5th process) about  $\frac{3}{4}$  length of prong.

#### ***Trapezia cymodoce* (Herbst) (Figs. 1B, 2B, 2B)**

Carapace length 0.52-0.53 mm; spine-spine tips 1.46-1.55 mm. Carapace (Figs. 1B, 2B) similar to that of *T. ferruginea* but rostrum slightly longer and each lateral spine bears 5 or occasionally 6 spinules.

Telson (Fig. 3B) longer than that of *T. ferruginea*, with prong (4th process) about 3 times length of lateral spine (1st process) and almost twice length of outermost seta (5th process).

#### ***Trapezia tigrina* Eydoux and Souleyet (Figs. 1C, 2C, 3C)**

Carapace length 0.52-0.53 mm; spine-spine tips 1.31-1.38 mm. Carapace (Figs. 1C, 2C) similar to that of *T. ferruginea* except that each lateral spine bears 4 or occasionally 5 spinules, slightly bigger than those of *T. ferruginea*.

Telson (Fig. 3C) with 1st process (lateral spine) less than twice length of 2nd (dorsolateral spine); prong (4th process) about 2.4 times length of 1st process.

#### ***Trapezia digitalis* Latreille (Figs. 1D, 2D, 3D)**

Carapace length 0.52-0.53 mm; spine-spine tips 1.36-1.38 mm. Carapace (Figs. 1D, 2D) similar to that of *T. ferruginea* except that each lateral spine has 3 or occa-

sionally 2 spinules.

Telson (Fig. 3D) with 1st process (lateral spine) 3 times length of 2nd (dorsolateral spine), prong (4th process) less than twice length of 1st process, and outermost seta (5th process) about as long as prong.

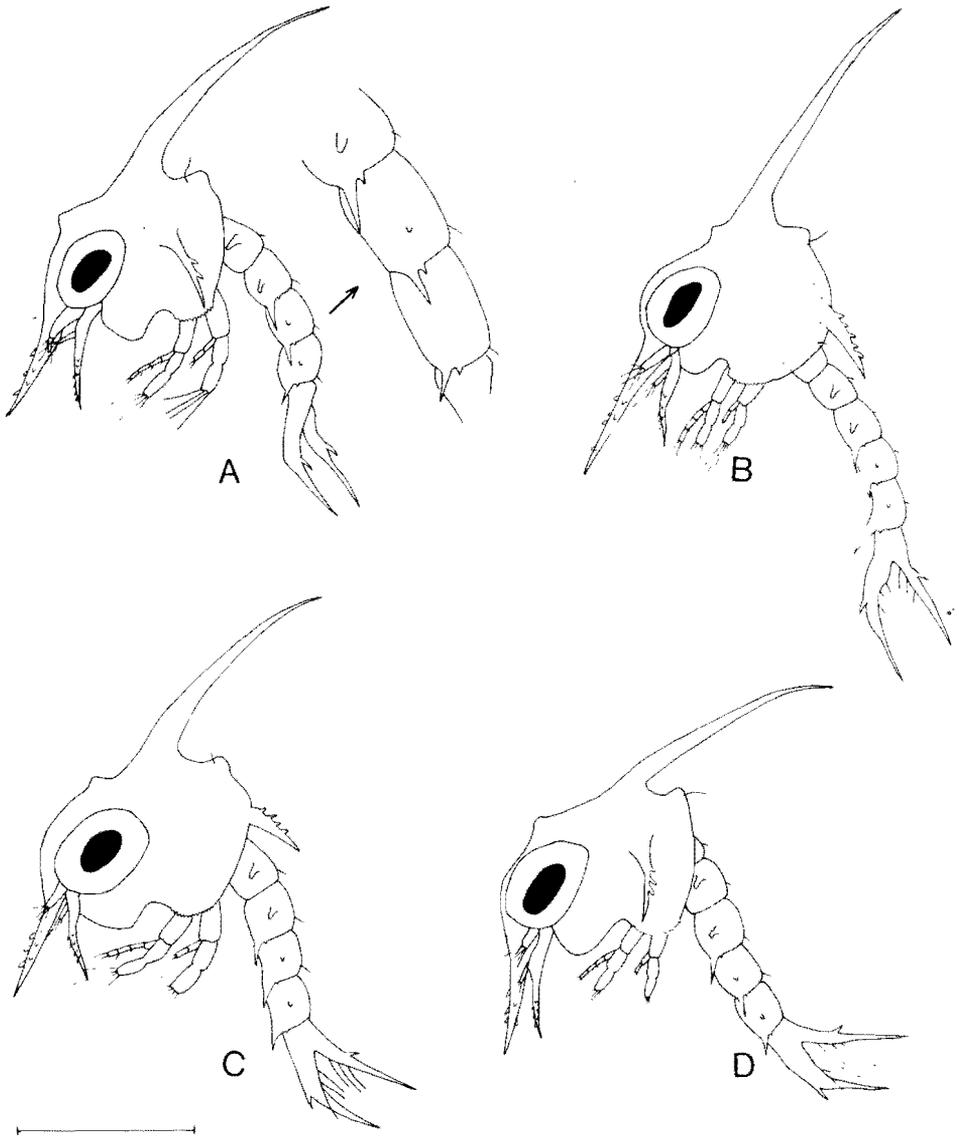


FIG. 1. Stage I larvae in lateral view. A, *Trapezia ferruginea*, with enlarged view of part of abdomen; B, *T. cymodoce*; C, *T. tigrina*; D, *T. digitalis*. Scale bar = 0.5 mm.

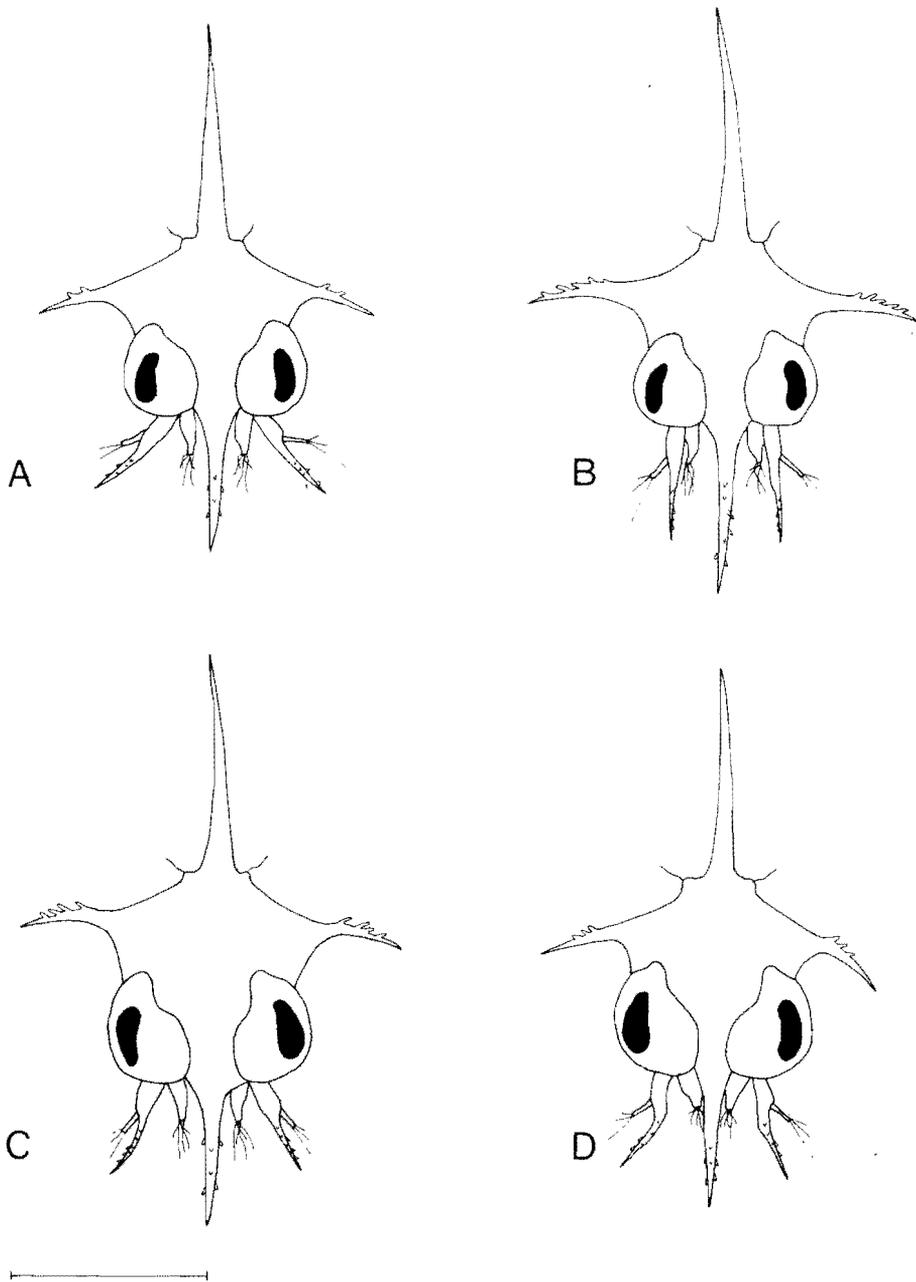


FIG. 2. Stage I larvae in anterior view. A, *Trapezia ferruginea*; B, *T. cymodoce*; C, *T. tigrina*; D, *T. digitalis*. Scale bar = 0.5 mm.

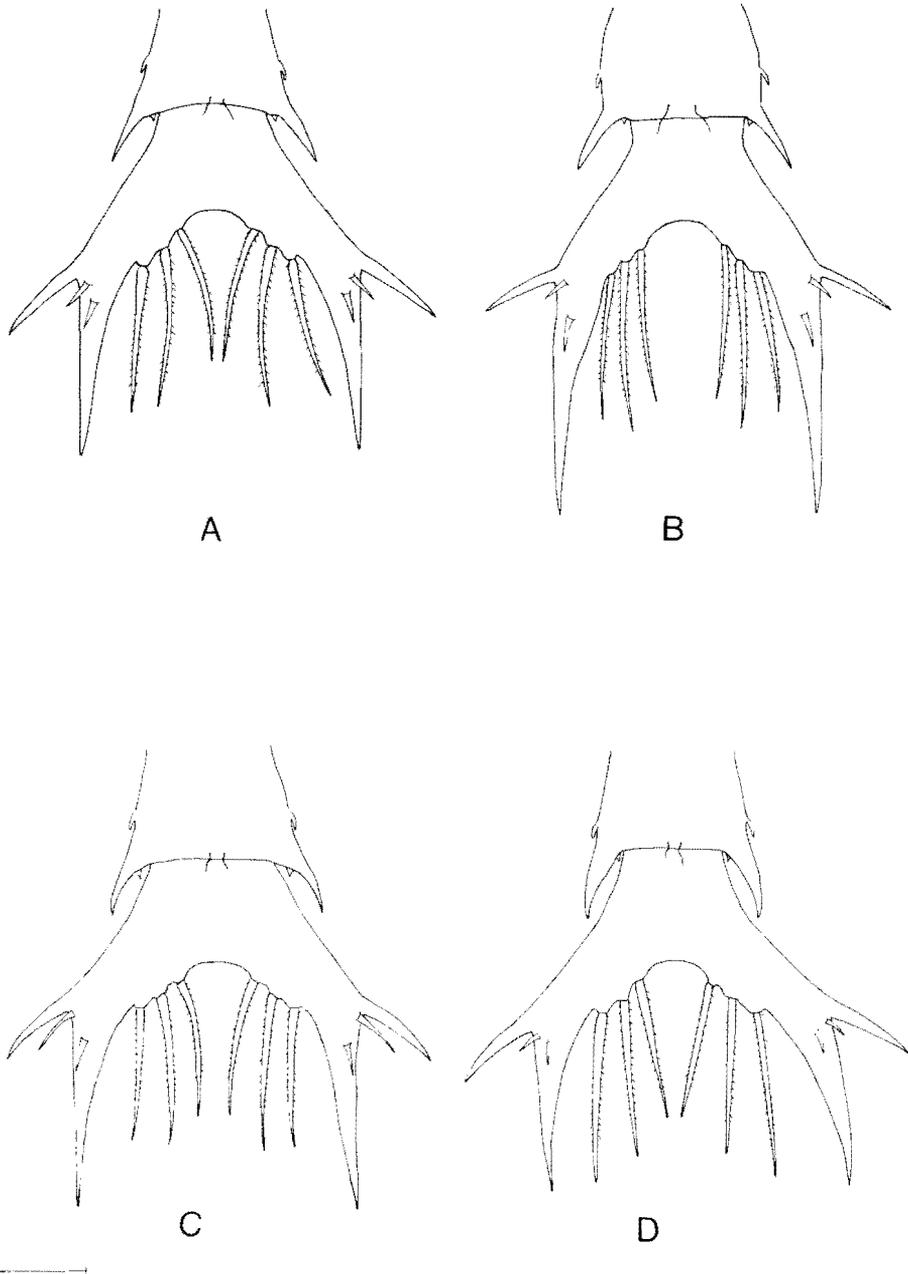


FIG. 3. Telsons of stage I larvae in dorsal view. A, *Trapezia ferruginea*; B, *T. cymodoce*; C, *T. tigrina*; D, *T. digitalis*; Scale bar = 0.1 mm.

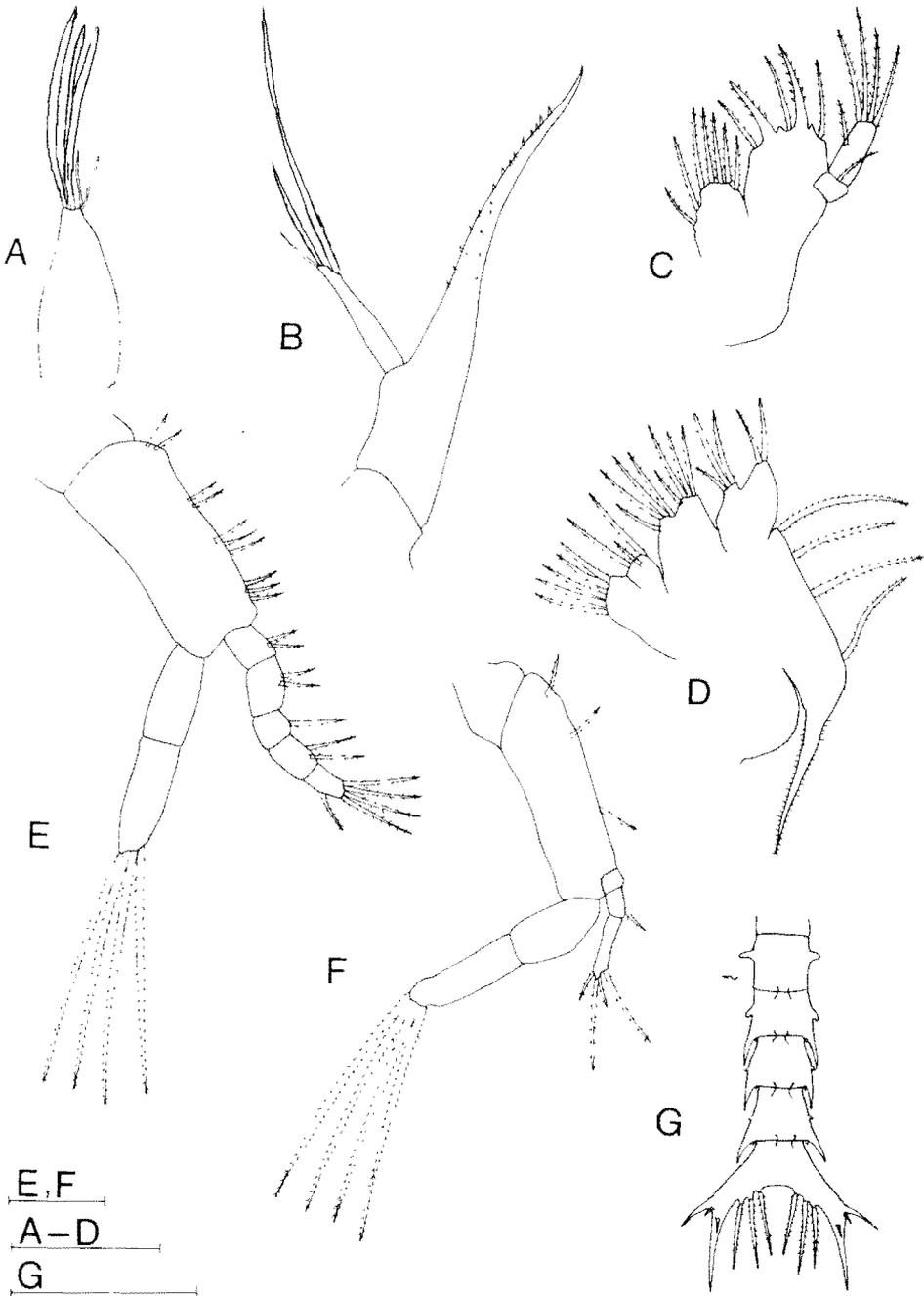


FIG. 4. Appendages and abdomen of zoea I of *Trapezia ferruginea*. A, antennule; B, antenna; C, maxillule; D, maxilla; E, first maxilliped; F, second maxilliped; G, abdomen and telson. Scale bars (from top): E, F = 0.1 mm; A-D = 0.1 mm; G = 0.5 mm.

### Discussion

Xanthid zoeas have been divided into groups based on the morphology of the antennal exopod and the spination of the telson. Rice (1980) suggested that at least four such groups can be distinguished, and Martin (1984) recognized six, but one of those groups was later removed (combined into one of the other groups) by Martin *et al.* (1985). As pointed out by Clark and Galil (1988), the zoeas of *Trapezia* fall within Martin's group III, in which the antennal exopod has three unequal setae.

Both Gurney (1938), in his descriptions of larvae of *T. guttata* and *T. cymodoce*, and Al-Kholy (1963), in his description of larvae of *T. maculata*, mentioned dorsolateral processes on abdominal somites 2 and 3 but not on somites 4 and 5. Clark and Galil (1988), however, noted smaller processes on somites 4 and 5 in *T. cymodoce*, and in the present work such process were found to be present in the four species investigated. None of the previous workers on larvae of *Trapezia* from the Red Sea mentioned the small tooth on the posterolateral margins of abdominal somites 3-5 noted in the present work.

The description of the first zoea of *T. cymodoce* by Clark and Galil (1988) is in complete agreement with the specimens of *T. cymodoce* examined in the present study, except that they interpreted the antennule as ending in 4 aesthetascs and 1 seta (as opposed to 3 long and 2 short aesthetascs) and the setation on the basis of the first maxilliped is given as 2, 2, 3, 3 (as opposed to 2, 2, 3, 2). The drawings of the appendages and their setation given by Al-Kholy (1963) show a number of differences from the descriptions in Gurney (1938), Clark and Galil (1988), and the present work.

It was noted that the four species studied here are found in the same habitat and breed at the same time of year. Their larvae are, therefore, likely to occur together in plankton samples, but they may be identified by the characters given in Table 1.

TABLE 1. Identification of Four species of *Trapezia* in zoea I.

	<i>T. ferruginea</i>	<i>T. cymodoce</i>	<i>T. tigrina</i>	<i>T. digitalis</i>
Length tip of dorsal spine to tip of rostral spine (mm)	1.38 - 1.46	1.46 - 1.55	1.31 - 1.38	1.36 - 1.38
Number of spinules on lateral spines	2(1)	5(6)	4(5)	3(2)
Lateral telson spine/prong ratio	1/2	1/3	1/2.4	1/1.9
Outermost telson seta/prong ratio	3/4	1/2	3/4	1/1
(Figures in brackets apply to the minority.)				

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## الطور الأول لأربعة أنواع من الترابيزا (القشريات ، براكيورا ، زانتيدي)

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المستخلص . تم تجميع إناث أربعة أنواع مختلفة من الترابيزا عن طريق الغوص بمياه شرم أبحر القريب من مدينة جدة بالمملكة العربية السعودية . الأنواع الأربعة هي ترابيزا سيمودس ، ترابيزا فريوجينا ، ترابيزا دجتاليس و ترابيزا تجرينا . تم الحصول على يرقات هذه الأنواع بعد التفقيس داخل المعمل وقد جرت محاولات لتتبع تطور هذه اليرقات ولكن لم تنجح . كما تم مقارنة أشكال الأطوار الأولى للأنواع الأربعة المختلفة ، بالإضافة إلى مقارنتها بالأبحاث المنشورة . وقد وجد أن هناك تشابه في أعضاء الفم الداخلية للأنواع الأربعة إلا أنه يمكن تمييزها من خلال الأشواك الموجودة على القصعة والزوائد الخارجة من المؤخرة .