DEVELOPMENTAL STAGES OF TRACHYPENAEUS CURVIROSTRIS
(STIMPSON, 1860) (DECAPODA, PENAEIDAE) REARED IN
THE LABORATORY

BY
JESSE DAPON RONQUILLO
College of Fisheries, University of the Philippines in the Visayas, Miag-ao, Iloilo, Philippines 5023

and
TOSHIO SAISHO
Faculty of Fisheries, Kagoshima University, Kagoshima City, Japan 890

ABSTRACT
The embryonic and post-embryonic development of Trachypenaeus curvirostris were observed in
the laboratory. The eggs hatched as first nauplii after about 15 hours at 25.8°-26.2°C and 32.5 g
kg⁻¹ salinity. The larvae were fed only with Chaetoceros gracilis and Tetraselmis tetrathele until early
postlarval stage. Six naupliar, three protozoal, three mysis, and one post-larval stages were
described and illustrated in detail. The larval morphological characteristics were compared with
those of other species of Trachypenaeus, Metapenaeopsis and Penaeus.

RÉSUMÉ
Le développement embryonnaire et postembryonnaire de Trachypenaeus curvirostris a été observé
au laboratoire. L’éclosion des œufs est atteinte après quinze heures d’incubation à une tempéra-
ture variant entre 25,8 et 26,2°C et une salinité de 32,5 g kg⁻¹. Les larves ont été nourries avec
Chaetoceros gracilis et Tetraselmis tetrathele jusqu’au début du premier stade postlarvaire. Six nauplii,
trois protozoés, trois mysis et le premier stade post-larvaire sont décrits et illustrés en détail. Les
caractéristiques larvaires sont comparées avec celles décrites chez d’autres espèces des genres
Trachypenaeus, Metapenaeopsis et Penaeus.

INTRODUCTION
The southern rough shrimp, Trachypenaeus curvirostris (Stimpson, 1860), is a
small marine penaeid species with hard, pubescent shell, found in coastal
waters. This species is considered to be of commercial importance in Japan
(Yasuda, 1949; Hayashi, 1974; Baba et al., 1986), Korea (Yoshida, 1941),
North China (Liu, 1955, cf. Holthuis, 1980), and Taiwan (Yu & Chan, 1986).
Fishery of this species has also been reported in Madagascar, the Red Sea, the
Gulf of Aden, and the Arabian Sea (Longhurst, 1970). In Australia (New South
Wales, Queensland and Western Australia), this species is abundant; but is
rendered commercially unimportant due to its small size (Racek, 1957). It is
also considered as of minor importance in the fishery catch in India (Kurian &
Sebastian, 1976).
Trachypenaeus curvirostris is found both in Indo-West Pacific (Eastern Africa, Red Sea to Arabian Sea, India, Malay Archipelago, Hong Kong, Taiwan, Korea, Japan and northern Australia) and Eastern Atlantic regions (eastern Mediterranean, Egypt, Israel and Turkey) (Kubo, 1949; Holthuis, 1980; Yu & Chan, 1986).

Very little is known about the early life history of this species. There has been no detailed description of the complete early developmental stages of *T. curvirostris*. George & Paulinose (1973) reported about the mysis substages of this species based on planktonic samples; but failed to provide a detailed description. Paulinose (1982a) reconstructed and described from planktonic specimens two protozoeal, three mysis and a post-larval stage of what he doubtfully identified as *Trachypenaeus curvirostris*. Ishikawa & Imabayashi (1991) spawned *T. curvirostris* but failed to rear the larvae beyond the first protozoeal stage. Ronquillo & Saisho (1992) reported the occurrence of embryonized nauplius and protozoea stages including the unusual early life history of this species.

The aim of this study is to provide a detailed description and illustration of the complete early larval stages of laboratory-reared *T. curvirostris*.

**MATERIALS AND METHODS**

Experimental animals. — From July 1991 until August 1993, several *Trachypenaeus curvirostris* with well-developed pinkish or light violet ovaries were procured live from a fish market. Only those which had “stoppers” or spermatophores in the grooves of the transverse plate below the median plate of the thelycum were brought to the laboratory for spawning and larval rearing. The shrimps were caught using a “gochi” net (a Japanese kind of closing seine net) from southern Yatsuhiro Sea (32° 13′N 130° 13′E), southwest of Kyushu Island, Japan. Morphological characteristics of *T. curvirostris* spawners were compared with published descriptions (Kubo, 1949; Dall, 1957; Hall, 1962; Racek & Dall, 1965; Hayashi & Toriyama, 1980; Hayashi, 1982, 1992; Miyake, 1982; Baba et al., 1986; Yu & Chan, 1986) for proper identification. The female shrimps (N = 132) used in this study had average carapace length, body length and body weight of 42 ± 2.39 mm, 81.99 ± 6.67 mm, and 9.51 ± 2.28 g, respectively.

Spawning. — Several gravid female shrimps were placed individually in 30-l plastic tanks or in groups of 10-20 females in 500-l fiberglass tanks filled with filtered seawater and aerated vigorously. The spawned eggs were incubated in the same spawning tanks after taking out the spent spawner(s). Before metamorphosing into first protozoea, the nauplii were stocked at a density of 50-100 individuals/l in 30-l capacity fiberglass tanks.

The spawned eggs were counted and incubated at 25.8°-26.2°C and 32.5 g kg⁻¹ salinity. As embryonic development progressed, samples were taken, photomicrographed, measured and preserved in 4% buffered formalin (Omori & Ikeda, 1984).

Larval rearing. — The larvae from first protozoea until first postlarval stages