

The Biology of *Acetes chinensis* HANSEN (Decapoda: Crustacea) in Korean Waters

1. Systematics and external anatomy

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ABSTRACT

The small shrimp of the genus *Acetes* which is abundantly distributed in shallow waters along the western coast of Korea has long been considered as *Acetes japonicus* KISHINOUE. In the other hand Liu (1956) has suggested that *A. chinensis* was possibly distributed in Korean waters, judging from the information from Yoshida (1941), but none of the specimen was collected from this area.

After careful examination of the specimens of *Acetes* collected from the station (37°39'N, 126°23'E) in Sokmo channel, central part of Korea authors agreed that the population distributed in this area is consists of *Acetes chinensis* HANSEN. In the present paper the diagnosis of Korean species of *Acetes chinensis* has first described with taxonomic revision and it is the new record for Korean waters.

INTRODUCTION

The small shrimp of the genus *Acetes* is very abundant in shallow waters along the western coast (Yellow Sea side) of Korea. This shrimp in Korean waters which has long been considered as *Acetes japonicus* KISHINOUE is one of the most important marine products in Korea. Such marine planktonic organisms as *A. japonicus* are utilized as food, mainly as fermented product, and it is distinguished by its taste for a long time in this country.

Early investigations on the genus *Acetes* in Korean waters has made by Yoshida (1941) in which distribution and importance for fisheries of *A. japonicus* were mentioned. Yoshida (1956), also, has reported on the life-history of *A. japonicus*, especially on maturing, copulation, spawning, and growth for the species collected mainly from Kyunggi province, Korea.

Afterward, Liu (1956) has reported on the *Acetes* from the coasts of North China with the criticism on the Yoshida's text-figure of female genital plate of *A. japonicus* and concluded that it was identical with *A. chinensis*. He has first mentioned that *A. chinensis* was possibly distributed in Korean waters, but has never collected the specimen of *A. chinensis* from this area. Since Yoshida's record of *A. japonicus* from Korean waters in 1941 it was believed that this species was the only species of the genus *Acetes* distributed in Korea. Most recently, Kim and Park (1972) also reported that *A. japonicus* was the only species of genus *Acetes* in Korean waters.

After careful examination of the specimen of *Acetes* collected from the central part of Korea, authors agreed that the population distributed in this area is consists of *A. chinensis*. Nevertheless the importance for the fisheries industry, the biological research of the shrimp of genus *Acetes* in Korean waters is insufficient. Especially, none of the biological studies on *A. chinensis* has been

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attempted.

The purpose of the present study is to describe the synonyms and the external anatomy of *A. chinensis* in Korean waters, as a series of studies which cover the biological studies on Korean species of the genus *Acetes*.

MATERIAL AND METHOD

Samples used in the present study were mainly collected by small stow net (Ankang-mang) from the station (37° 39' N, 126° 23' E) in Sokmo channel, Kanghwa Island, Korea from September through December, 1973 (Fig. 1).

In general, specimens were fixed in 10% formalin on shipboard, and stored in 7% neutralized formalin for preservation in laboratory. For the histological studies the samples were preserved in 70% alcohol solution after fixing with Bouin's solution.

Measurement of the body length was made

from tip of the rostrum to apex of the telson.

Dissected appendages were mounted in Turtox CMC-S mounting medium for permanent preparations and drawings were made with profile projector (Nikon, model 6CT2) and camera lucida.

RESULTS AND DISCUSSION

1. Systematics

Acetes chinensis HANSEN 1919

Acetes chinensis. HANSEN, 1919: 41, pl. 4, figs. 3 a-b. URITA, 1926: 423, fig. YU, 1935: 169. LIU, 1956: 30, pls. 1-3.

Acetes japonicus. YOSHIDA, 1941: 18, text-fig.d.

Since the genus *Acetes* (Decapoda, Natantia, Penaeidae, Sergestidae) was established in 1830 by Milne-Edwards, 11 species and 3 subspecies have been recorded from world ocean. Among them, Hansen (1919) first described *Acetes chinensis* from which collected from Japanese waters (33° 10'N, 129° 18'E) and Formosa Strait as new

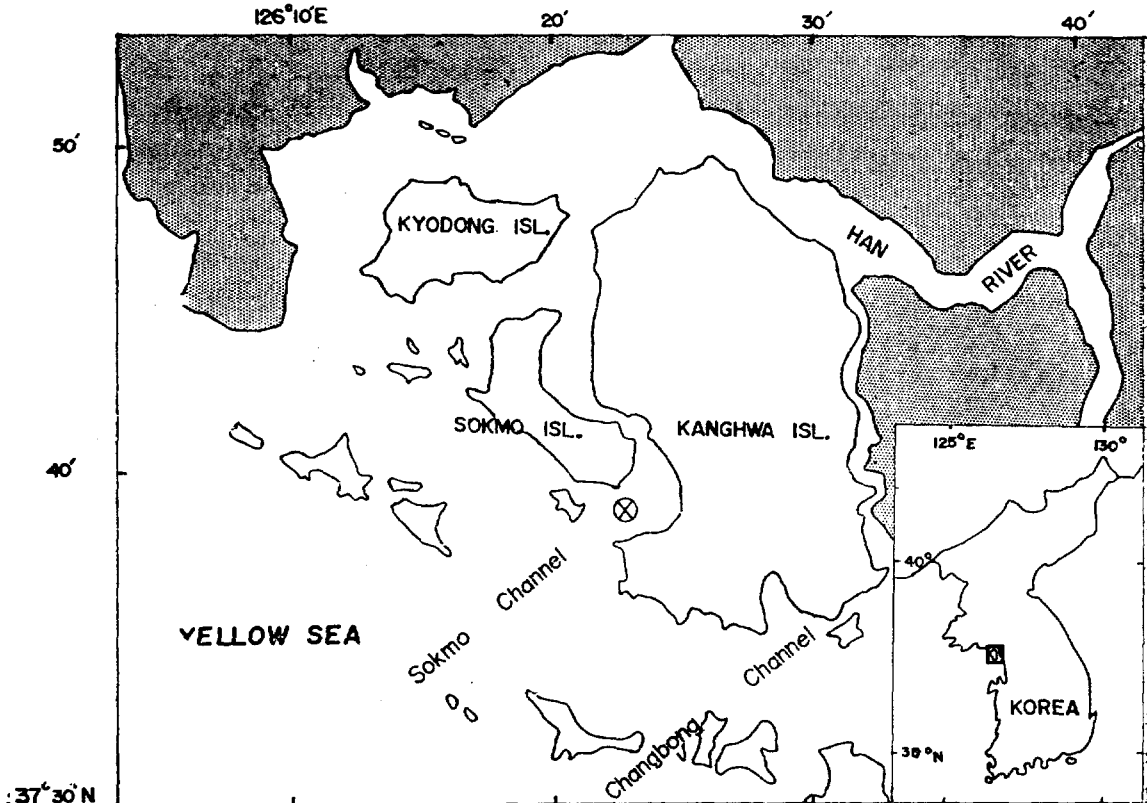


Fig. 1. Sampling point of *Acetes chinensis* near Kanghwa Island (cross mark)

species and Urita (1926) has first recorded it from North China with text figure.

In China *A. chinensis* also has recorded from Amoi by Yu (1935) and from coast of North China, mainly Liaotung Bay and Yellow Sea, by Liu (1956).

In the samples of *A. japonicus* recorded from Korean waters it was included of *A. chinensis*, judging from the figure of female genital plate giving by Yoshida (1941) for *A. japonicus* (Liu, 1956). In our collection this species collected from Sokmo channel (37° 39' N, 126° 23' E) is the new record for Korean waters.

2. Description

Body length: 17.9-31.6 mm in female and 17.6-29.8 mm in male (autumn population).

The **body** is laterally compressed and slender; integument is thin, transparent, but somewhat rigid (Fig. 2). The carapace occupies about 24 % in the body length. The **rostrum** is very short and has two small dorsal teeth on the distal part. The anterior margin of the carapace is furnished with short hairs; there is a pair of small supra-orbital spines at anterior part, and a pair of small hepatic spines at point about one-third of the carapace length from its anterior margin. The **abdomen** is smooth and slender; 1st to 5th segments are subequal, but the 6th one is longest; its posterior corner is terminated at a short spine. The **cornea** is large; it is much broader than width of the eyestalk; length of the eyestalk is about two times as wide as the cornea (Fig. 2-a).

Antenna: **1st antenna** (antennule): The antennular peduncle is subequal to the carapace length. There is a statocyst in the proximal part of the 1st segment (Fig. 2-b); the 1st segment is longest, and it is subequal to the two others put together. The 3rd segment is as long $1\frac{1}{2}$ as the length of the inner margin of the 2nd segment and is jointed to 2 flagella. But the 3rd segment is as long 2.5 times in male. The

structure of the inner flagellum is different in female and male. In the female it is 12-14 segmented, slender and about as long as the inner margin of the 2nd segment of the antennular peduncle. In the male it is somewhat more complicated; there are two finger-like protrusions on the distal part of the outer margin of the 3rd segment (Fig. 2-c). **2nd antenna** (antenna): The antennal scale becomes slender gradually at the distal part and is terminated by a short spine on the outer margin (Fig. 2-d). The antennal peduncle is large; it is as long as $\frac{1}{3}$ the length of the antennal scale. The antennal flagellum, consisting of two parts, is about 3 times the body length; the distal part is about 2 times the length of the proximal one; the two are connected by S-shaped distorted segment; the proximal part is rather stiff, and the segments are furnished with sparse minute setae on the inner margin; each segment of the distal part has a pair of long attenuate plumed setae on its lateral sides. In young individual less than 20 mm the flagellum of antenna shows spiral in form (Fig. 2-e).

Mouthparts: **Labrum** (upper lip): dilated, medially produced and lobes bristled. The **mandible** is composed of pars insiciva (cutting edge) and a pars molaris (grinding process) (Fig. 2-g). The structure of the cutting edge is simple and powerful; the right one has 2 teeth on the outer margin, while the left one has 1 tooth on the identical part. The grinding process is simple, but powerful. The mandibular palp consists of 2 segments; the 1st segment is about twice the length of the 2nd one; both are furnished with many long setae. **Labium** (lower lip): margin medially cleft, its margins strongly bristled (Fig. 2-h). **1st maxilla** (maxillule): possesses a strong spine on the inner margin of the propodite (Fig. 2-i). The **2nd maxilla** (maxilla) has setae on the outer margin of the coxa and basis (Fig. 2-j). The scaphognathite is also fringed with

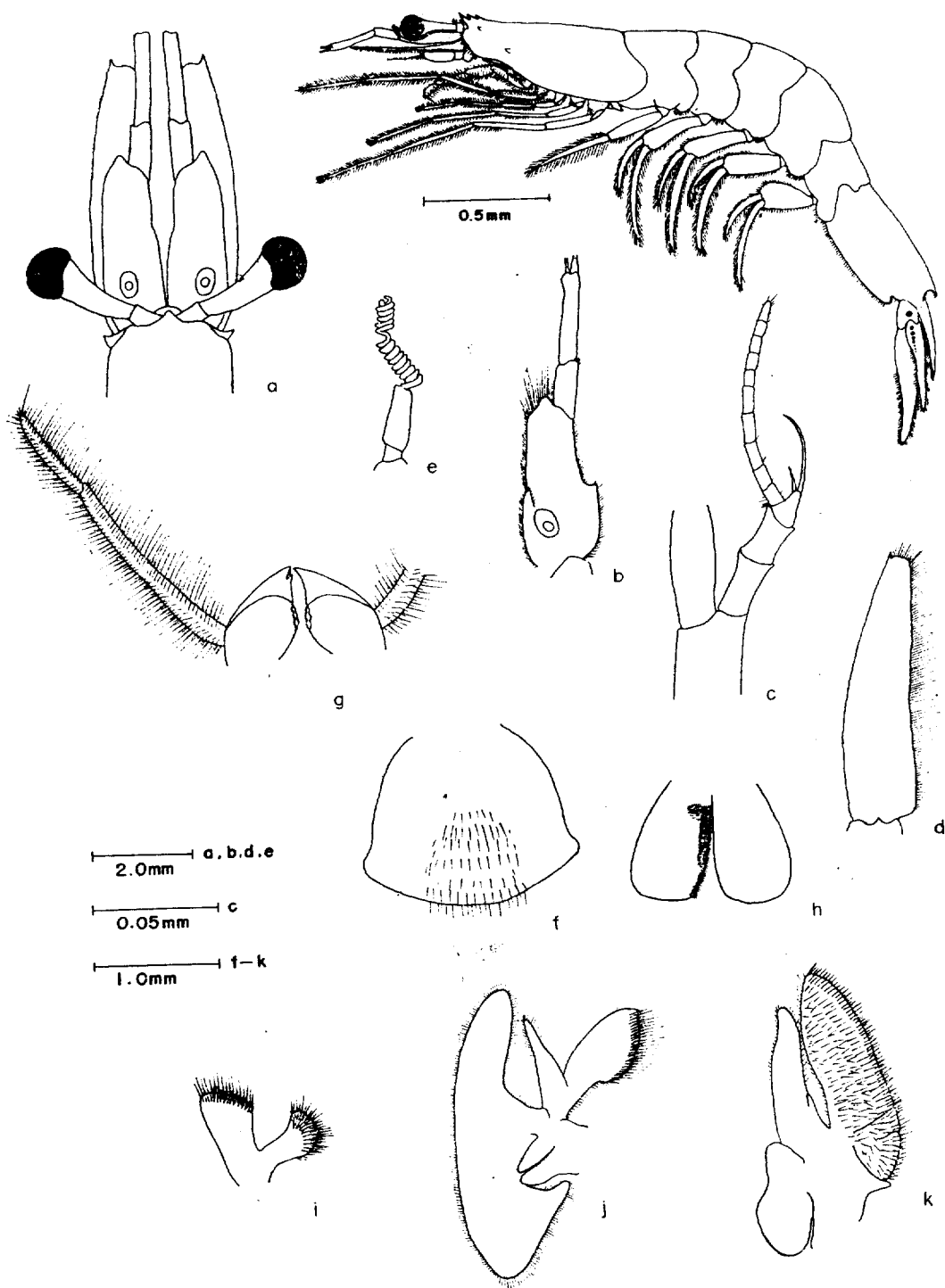


Fig. 2. *Acetes chinensis*, female. a. anterior part of body; b. basal part of antennule (dorsal view); c. inner flagellum of antennule (male); d. antennal scale; e. antenna of young individual; f. labrum; g. inner view of mandible; h. labium; i. 1st maxilla; j. 2nd maxilla; k. 1st maxilliped.

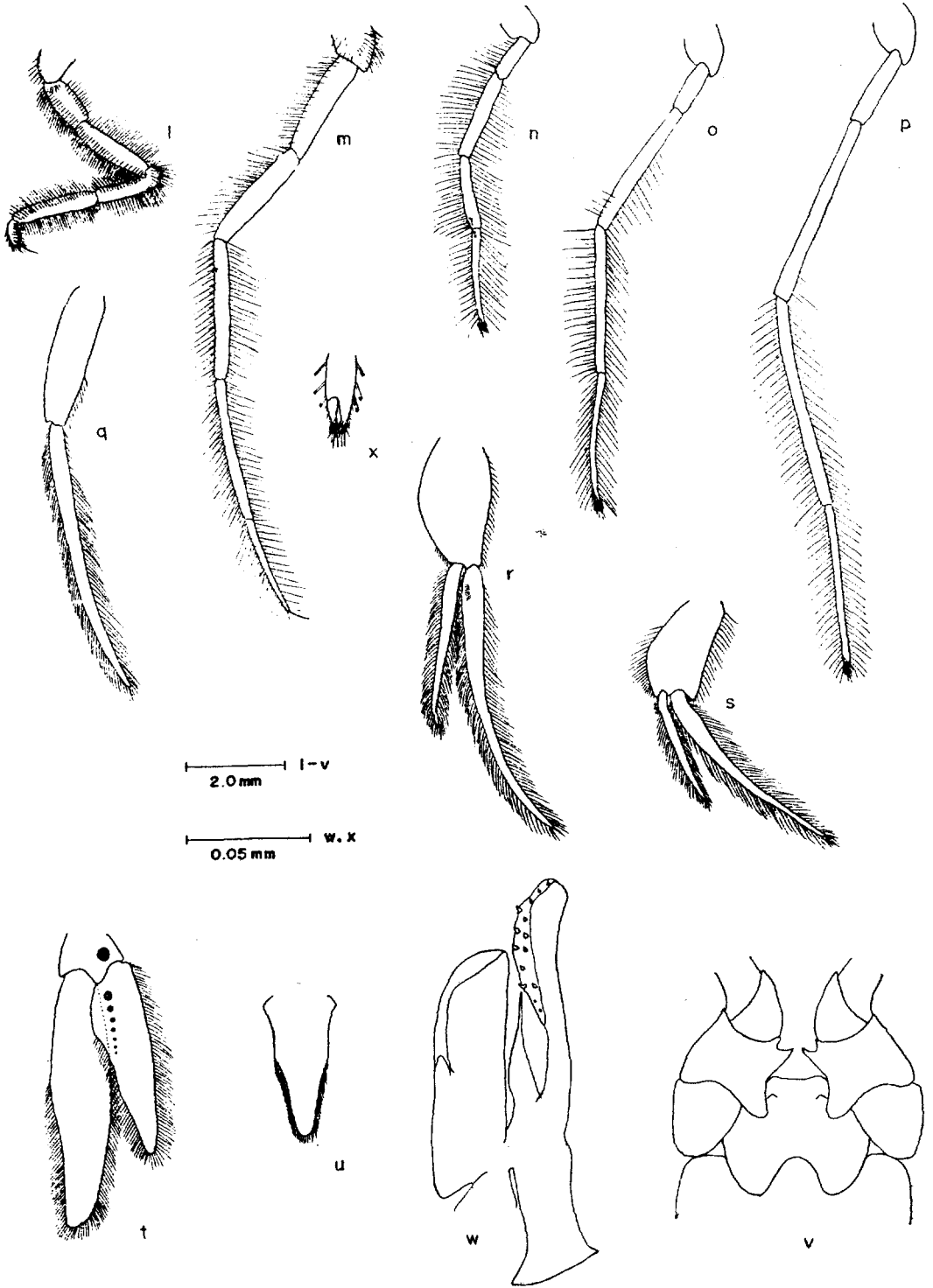


Fig. 3. *Acetes chinensis*, female. t, 2nd maxilliped; m, 3rd maxilliped; n, 1st pereopod; o, 2nd pereopod; p, 3rd pereopod; q, 1st pleopod; r, 3rd pleopod; s, 5th pleopod; t, uropod; u, telson; v, ventral view of genital plate; w, petasma; x, chela of 1st pereopod.

fine setae; its distal margin reaches that of the basis. The endopod is 1-segmented; it is shorter than the basis, and carries a number of short spines on its distal part.

Maxillipeds: The 1st maxilliped is well developed (Fig. 2-k). The inner margin of the coxa and basis is furnished with thickly arranged setae. The exopodite bears setae on the distal part; there is an epipodite on the outside of the coxa. The articulation between endopod and exopod is very incomplete. The 2nd maxilliped, consisting of 7 segments, reaches the distal margin of the antennal peduncle when it is stretched (Fig. 3-l); the ischium, merus and carpus are about the same in length; the propodus is shortest; the dactylus is less than one-third the length of the propodus. Each segment is thickly covered with setae. The 3rd maxilliped consists of 7 segments and is slender; it extends beyond the distal margin of the antennular peduncle. Each segment of the endopod is almost same in length; they bear setae on both inner and outer margins; the dactylus is short (Fig. 3-m).

Pereiopods: The 1st pereiopod has 7 segments; it is shorter than the 3rd maxilliped and reaches to center of the eyestalk. The merus is longest and twice the length of the carpus (Fig. 3-n). A bunch of setae are found on the inner margin near the articulation between the carpus and propodus. The propodus and dactylus forming a little chela (Fig. 3-x). The 2nd pereiopod consists of 7 segments (Fig. 3-o); it is slightly shorter than the 3rd maxilliped, and extends to the 2/3 of antennal scale. The propodus is almost as long as the merus. There is a little chela on its end; the inner margin of propodus and dactylus are smooth; they bear a bunch of setae on the distal margin. The 3rd pereiopod closely resembles the 2nd one, but it is longer than that (Fig. 3-p). The 4th and 5th pereiopods are entirely absent.

Pleopod: The 1st pleopod has no endopod in the female (Fig. 3-q); the exopod carries plumous setae on both outer and inner margins. In the male, the endopod forms **petasma**, the copulatory organ (Fig. 3-w). It consists of two main parts; i. e., pars media and pars externa. The structure of the pars media is very characteristic; processus ventralis is elongated outside of it and is the longest of all processes; distal portion with the inner border slightly concave, outer border slightly expanded and covered with some horned tubercles (hooked spine); distal expanded portion cucumber-shaped, much longer than the smooth and slender basal portion. Capitulum produced from inner side and forms a spinal processus. Female **genital plate** (Fig. 3-v) is less produced posteriorly; posterior border with a deep and broad emargination, thus separating the two mammillary protuberances far apart. The 2nd through 5th pleopods (Fig. 3-r, s) are well developed and similar in structure; each one is biramous carrying plumous setae on its outer and inner margins; the endopod is about half the length of the exopod.

Uropods: The uropod is biramous; the endopod is about two third the length of the exopod; on the exopod the ciliated part occupies a little more than half of the outer margins. A series of 3-12 red spots on the endopodite of the uropod. The **telson** is subtriangular, distally rounded; it is shorter than the uropod; the posterior margin is fringed with plumous setae.

Liu (1956) considers 1) the capitulum of the petasma, 2) female genital plate, 3) red spots on the endopodite of the uropods, and 4) relative length of 3rd maxilliped and 3rd pereiopod to be the most important characteristics which differs from *A. japonicus* distributed in same area. Our specimen agrees well enough with Liu's description and figures of *A. chinensis* from North China.

Localities: Sokmo channel (37° 39'N, 126°

23'E), Korea.

Distribution: China (South China Sea to Liaotung Bay), Korea (west coast), and Japan (33° 10' N, 129° 16' E).

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