

Cyclopoid Copepods of Genus *Oithona* in Korean Waters

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한국 근해에 분포하는 *Oithona*속의 요각류

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적  요

한국 근해의 10개 지역에서 채집된 시료를 동정한 결과 *Oithona*속의 18종이 밝혀졌으며, 이들 종에 대한 검색표를 작성하였다. 그 중 다음의 9종을 미기록종으로 보고한다: *Oithona atlantica*, *O. attenuata*, *O. davisae*, *O. hamata*, *O. longispina*, *O. oculata*, *O. simplex*, *O. tenuis*, *O. vivida*.

Key words: Copepoda, Cyclopoida, *Oithona*, Marine, Zooplankton, Systematics, Korea

INTRODUCTION

Family Oithonidae comprises two subfamilies, namely, Oithoninae and Limnoithoninae, however the latter was not observed in the present study. Subfamily Oithoninae is divided into the genera *Oithona* and *Paroithona*. A species of the genus *Paroithona* was recorded by Shim and Lee (1986) in the southeastern waters of the Korean peninsula, but it was not observed in the present study. Until now, nine species of the genus *Oithona* in Korean waters have been recorded in some ecological papers (Park, 1956; Hue, 1967; Lee, 1972; Ro, 1982; Park & Lee, 1982; Shim & Ro, 1982; Shim & Park, 1982; Shim & Lee, 1986). The object of this study is to identify the species

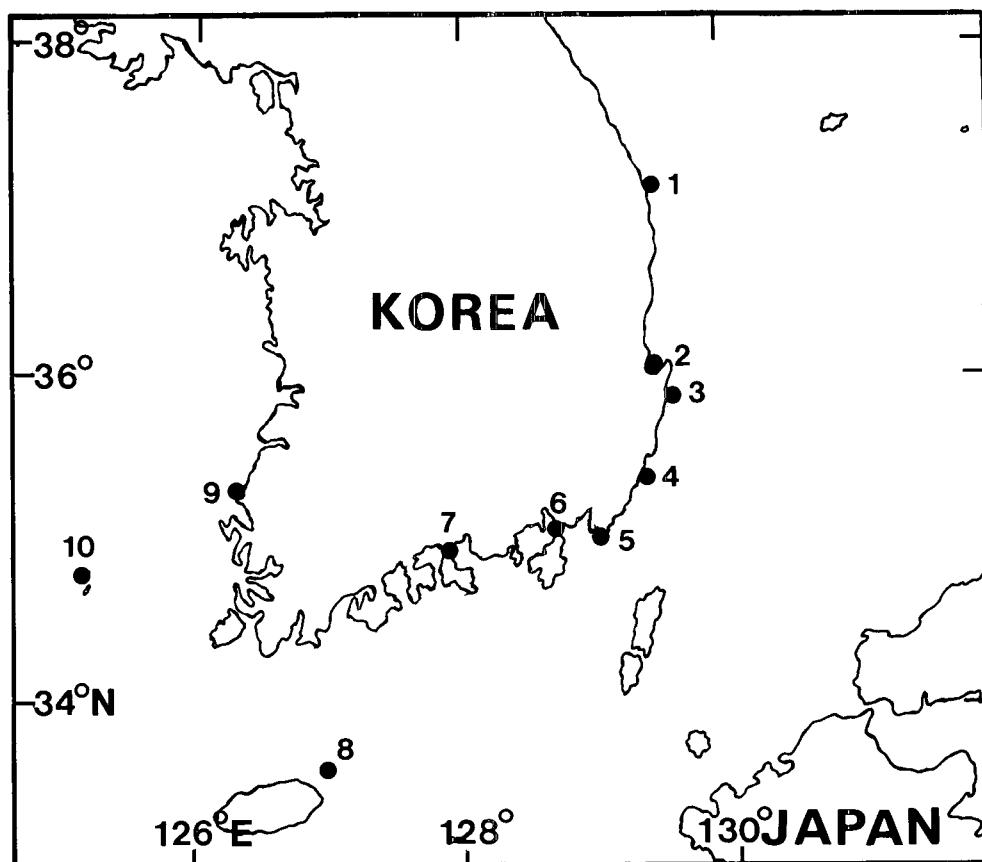


Fig. 1. A map showing sampling localities. 1. Uljin; 2. P'ohang; 3. Kamp'o; 4. Kijang; 5. Pusan; 6. Chinhae; 7. Kwangyang; 8. Cheju; 9. Youngkwang; 10. Hongdo.

of *Oithona* in Korean waters and to examine the distribution.

The materials examined in this study were collected at 10 localities in Korean waters during the period from March, 1987 to February, 1989 (Fig 1). The samples of sites 8 and 9 were obliquely hauled with a Bongo net 60cm in diameter with 0.33 mm mesh. The samples of the rest site were vertically hauled with a conical net 30 cm in diameter with 0.2mm mesh.

SYSTEMATIC ACCOUNTS

Class Maxillopoda Dahl, 1956

Subclass Copepoda Milne Edwards, 1840

Order Cyclopoida Burmeister, 1834

Family Oithonidae Dana, 1853

Genus *Oithona* Kiefer, 1928

1. *Oithona atlantica* Farran, 1908

Oithona atlantica: Bradford, 1972 (p. 48, fig. 14.1-14.3); Nishida et al., 1977 (p. 126, fig. 2a-h); Nishida, 1985 (p. 17, figs. 3-4).

Oithona spinirostris Sars, 1913. (p. 6, pls. 1-2).

Oithona plumifera: Mori, 1937 (p. 109, figs. 3, 5-15).

Material examined. Kamp'o, 5♀♀, Nov. 1987; Kijang, 5♀♀, Apr. 1988; Cheju, 10♀♀, Aug. 1988; Hongdo, 3♀♀, Oct. 1988.

Distribution. Bering Sea, Northern Pacific, Sea of Japan, and Subantarctic and antarctic waters of the Pacific Ocean.

Remarks. *O. atlantica* in most characters is difficult to distinguish from *O. longispina* Nishida et al., 1977. The morphological differences between two species are in size and ratio of terminal spine vs. marginal spine in exopod 3rd segment of leg 4. In the body length *O. atlantica* ranged between 1.10 and 1.32 mm, whereas *O. longispina* between 0.98 and 1.07 mm. The ratio of terminal spine vs. marginal spine was more than 0.87 in *O. atlantica*, whereas it was less than 0.68 in *O. longispina*. According to Shuvalov (1975), the body length and length of marginal spine in exopod 3rd segment of leg 4 varies in proportion to latitude. He observed that the length of marginal spine in samples of tropical waters was longer than in the higher and lower latitude, and the body length was smaller. But it seemed that he mistook *O. longispina* in samples of tropical waters for *O. atlantica*. When we compare his illustrations, it seems that the specimen in the higher and lower latitude than tropical water were not *O. atlantica* but *O. longispina*. Nishida & Marumo (1982) reported that *O. atlantica* and *O. longispina* in the Sea of Japan and Suruga Bay cooccurred, however, they inhabited different depth zones with little overlap. In the present study, both species were observed in the nearly same area.

2. *Oithona attenuata* Farran, 1913

Oithona attenuata: Sewell, 1947 (p. 253); Chen et al., 1974 (p. 34, pl. 2, figs. 13-15, pl. 3, figs. 1-3); Nishida et al., 1977 (p. 128, fig. 3a-e); Nishida, 1985 (p. 21, figs. 5-10).

Material examined. Uljin, 5♀♀, Aug. 1988; P'ohang, 2♀♀, Jun. 1988; Kamp'o, 5♀♀, Aug. 1988; Kijang, 5♀♀, Jun. 1988; Cheju, 3♀♀, Oct. 1987; Hongdo, 1♀, Oct. 1988.

Distribution. Equatorial waters of the Indian and Western Pacific Oceans.

Remarks. *O. attenuata* divided into two forms, namely typical and stocky form. The typical form appeared from P'ohang, Kamp'o, Kijang and Hongdo, and the stocky form from Uljin, Kijang, Cheju and Hongdo.

3. *Oithona brevicornis* Giesbrecht, 1891

Oithona brevicornis: Wilson, 1932 (p. 315, fig. 190a-d); Rose, 1933 (p. 280, fig. 353); Sewell, 1947 (p. 253); Wellershaus, 1969 (p. 279, figs. 103-119); Chen et al., 1974 (p. 36, pl. 4, figs. 1-6, 8); Nishida et al. 1977 (p. 129, figs. 4c-h, 5b); Nishida & Ferrari, 1983 (p. 72, fig. 1); Nishida, 1985 (p. 30, figs 11-16).

Oithona spinulosa: Ferrari, 1981 (p. 1246, figs. 1a-c, 2a-d, 3a-d, 4a-c, 5a-f, 6a-d, 7a-d).

Material examined. Uljin, 10♀♀, Jan. 1989; P'ohang, 2♀♀, Apr. 1988; Kijang, 5♀♀, Mar.

1988; Pusan, 1♀, Apr. 1988; Chinhae, 2♀♀, Jul. 1988; Cheju, 2♀♀, Oct. 1987; Youngkwang, 1♀, Jul. 1988; Hongdo, 1♀, Oct. 1988.

Distribution. Coast of South Yemen, Hong Kong Harbor, Persian Gulf, Colombo Harbor, Penang Harbor, Tokyo Bay, East China Sea, Cochin Backwater, Coast of Madras and South China Sea.

4. *Oithona davisae* Ferrari & Orsi, 1984

Oithona davisae: Ferrari & Orsi, 1984 (p. 114, figs. 6-9).

Oithona brevicornis f. *minor*: Nishida et al., 1977 (p. 131, figs. 4a-b, 5a, c).

Material examined. Uljin, 5♀♀, Aug. 1988; P'ohang, 5♀♀, Jun. 1988; Kamp'o, 2♀♀, Aug. 1988; Kijang, 5♀♀, Jun. 1988; Pusan, 3♀♀, Jul. 1988; Chinhae, 10♀♀, Aug. 1988; Kwangyang, 10♀♀, Aug. 1988.

Distribution. Tokyo Bay and Coast of California.

Remarks. *O. davisae* is very similar to *O. brevicornis* Giesbrecht, 1891 except some differences: body length, length of first spine in maxilulle inner lobe 1, and the location of outer marginal seta in caudal rami. Body length of *O. brevicornis* ranged between 0.64 and 0.73 mm, whereas that of *O. davisae* between 0.48 and 0.58 mm. Length of first spine in maxilulle inner lobe 1 of *O. brevicornis* is equal to that of the rest spines, but that of *O. davisae* is two times as long. And the location of outer marginal seta in caudal rami is near the base of caudal rami in *O. brevicornis*, whereas the location in *O. davisae* is in the middle between base and terminal part.

5. *Oithona decipiens* Farran, 1913

Oithona decipiens: Mori, 1937 (p. 111, pl. 61, figs. 9-14); Chen et al., 1974 (p. 32, pl. 2, figs. 1-5); Nishida et al., 1977 (p. 133, fig. 7a-h); Ferrari & Bowman, 1980 (p. 10, fig 5); Nishida, 1985 (p. 38, figs. 17-18).

Material examined. Kijang, 2♀♀, Sep. 1987; Cheju, 3♀♀, Oct. 1987.

Distribution: Tropical and subtropical waters of the Pacific and Indian Oceans.

6. *Oithona fallax* Farran, 1913

Oithona fallax: Mori, 1937 (p. 112, pl. 62, figs. 13-18); Sewell, 1947 (p. 253); Tanaka, 1960 (p. 57, pl. 25, figs. 1-7); Chen et al., 1974 (p. 31, pl. 1, figs. 8-11); Nishida et al., 1977, (p. 134, figs. 8a-g, 9a-f); Nishida, 1985 (p. 42, figs. 19-20).

Material examined. Kamp'o, 4♀♀, Apr. 1988; Kijang, 5♀♀, May 1988; Cheju, 5♀♀, Oct. 1987; Hongdo, 3♀♀, Oct. 1987.

Distribution. Tropical Indian Ocean, Coastal waters of the western Pacific, and Eastern tropical Pacific.

7. *Oithona hamata* Rosendorn, 1917

Oithona hamata: Nishida, 1985 (p. 49, figs. 23-24).

Material examined. Cheju, 1♀, Oct. 1987.

Distribution. Tropical and subtropical Pacific and Indian Oceans.

8. *Oithona longispina* Nishida, 1977

Oithona longispina Nishida et al., 1977 (p. 136, fig. 10a-h); Nishida, 1985 (p. 52, figs. 25-26).
Material examined. Kamp'o, 10♀♀, Aug. 1988; Kijang, 10♀♀, Sep. 1988; Cheju, 6♀♀, Oct. 1987.

Distribution. Between 10°N and 40°N of the Pacific Ocean.

9. *Oithona nana* Giesbrecht, 1892

Oithona nana: Wilson, 1932 (p. 316, fig. 190c-d); Rose, 1933 (p. 281, fig. 357); Mori, 1937 (p. 113, pl. 63, figs. 1-8); Sewell, 1947 (p. 254) Wilson, 1950 (p. 271); Tanaka, 1960 (p. 59, pl. 26, figs. 1-4); Gonzalez & Bowman, 1965 (p. 272, fig. 20c-g); Chen et al., 1974 (p. 33, pl. 2, figs. 6-12); Nishida et al., 1977 (p. 138, figs. 11a-h, 12a-h); Ferrari & Bowman, 1980 (p. 14, fig. 8); Dawson & Knatz, 1980 (p. 76, pl. 63); Nishida, 1985 (p. 52, figs. 27-32).

Material examined. P'ohang, 2♀♀, Jun. 1988; Kamp'o, 1♀, Aug. 1988; Kijang, 5♀♀, Sep. 1988; Pusan, 2♀♀, Jul. 1988; Chinhae, 1♀, May 1987; Cheju, 5♀♀, Oct. 1987; Hongdo, 1♀, Oct. 1988.

Distribution. Tropical and subtropical Pacific and Indian Oceans.

10. *Oithona oculata* Farran, 1913

Oithona oculata: Sewell, 1947 (p. 254); Tanaka, 1960 (p. 60, pl. 26, figs. 5-10); Vervoort, 1964 (p. 25); Gonzalez & Bowman, 1965 (p. 273, figs. 20h-i, 21a-e); Nishida et al., 1977 (p. 139, fig 13a-i); Ferrari & Bowman, 1980 (p. 4, fig 1a-d); Dawson & Knatz, 1980 (p. 77, pl. 64); Nishida, 1985 (p. 63, figs. 33-36).

Material examined. Uljin, 1♀, Aug. 1988; P'ohang, 3♀♀, Jul. 1988; Kijang, 1♀, Jul. 1988; Pusan, 2♀♀, Aug. 1988; Hongdo, 2♀♀, Oct. 1988.

Distribution. Coast of South Yemen, Persian Gulf, Noumea Harbor, Kabira Bay, Coast of Japan, Ifaluk Atoll, Samoa, Christmas Island, Nicobar Island, Madagascar, Cape of Good Hope, Coast of the tropical America, Brazilian coast, and Coast of California.

11. *Oithona plumifera* Baird, 1843

Oithona plumifera: Scott, 1909 (p. 194); Farran, 1929 (p. 282); Wilson, 1932 (p. 311, fig. 187); Rose, 1933 (p. 282, fig. 358); Sewell, 1947 (p. 255); Wilson, 1950 (p. 270); Tanaka, 1960 (p. 61, pl. 26, figs. 11-13); Owre & Foyo, 1967 (p. 107, figs. 784-788); Nishida et al., 1977 (p. 140, figs. 14a-i, 15a-g); Ferrari & Bowman, 1980 (p. 17, figs. 3-6); Dawson & Knatz, 1980 (p. 78, pl. 65); Nishida, 1985 (p. 68, figs. 37-38).

Material examined. Uljin, 10♀♀, Nov. 1987; P'ohang, 5♀♀, Sep. 1988; Kamp'o, 10♀♀, Nov. 1988; Kijang, 10♀♀, Aug. 1988; Cheju, 10♀♀, Oct. 1987; Hongdo, 2♀♀, Oct. 1988.

Distribution. Tropical and subtropical waters of the Pacific and Indian Oceans.

12. *Oithona rigida* Giesbrecht, 1896

Oithona rigida: Scott, 1909 (p. 194); Mori, 1937 (p. 113, pl. 63, figs. 9-12); Sewell, 1947 (p. 256); Wellershaus, 1970 (p. 469, figs. 29-36); Chen et al., 1974, (p. 35, pl. 3, figs. 10-13);

Nishida, 1985 (p. 72, figs. 42-43).

Material examined. Hongdo, 1♀, Oct. 1987.

Distribution. Red Sea, Colombo Harbor, Penang Harbor, Surabaya Harbor, Gulf of Thailand, Society Islands, Bay of Bengal, and South China Sea.

13. *Oithona robusta* Giesbrecht, 1891

Oithona robusta: Rose, 1933 (p. 283, fig. 359); Mori, 1937 (p. 110, pl. 61, figs. 1-8); Wilson, 1950 (p. 270); Owre & Foyo, 1967 (p. 108, fig. 789); Nishida et al., 1977 (p. 144, fig. 17a-h); Nishida, 1985 (p. 79, figs. 44-45)

Material examined. Cheju, 1♀, Oct. 1987.

Distribution. Tropical and subtropical Pacific and Indian Oceans.

14. *Oithona setigera* (Dana, 1849)

Oithona setigera: Farran, 1929 (p. 282); Rose, 1933 (p. 284, fig. 360); Mori, 1937 (p. 110, pl. 60, figs. 1-2, 4); Sewell, 1949 (p. 257); Owre & Foyo, 1967 (p. 108, figs. 790-792); Chen et al., 1974 (p. 37, pl. 5, figs. 1-2); Nishida et al., 1977 (p. 147, figs. 19a-i, 20a-h); Ferrari & Bowman, 1980 (p. 19, fig. 11a-c); Nishida, 1985 (p. 82, figs. 46-49).

Material examined. Uljin, 5♀♀, Nov. 1987; Kamp'o, 5♀♀, Nov. 1988; Kijang, 10♀♀, Oct. 1988; Cheju, 10♀♀, Oct. 1987.

Distribution. Tropical and subtropical waters of the Pacific and Indian Oceans.

15. *Oithona similis* Claus, 1866

Oithona similis: Farran, 1929 (p. 283); Wilson, 1932 (p. 314, fig. 189); Mori, 1937 (p. 112, pl. 62, figs. 1-12); Wilson, 1950 (p. 271); Vervoort, 1951 (p. 148); Tanaka, 1960 (p. 62, pl. 26, figs. 1-9); Bradford, 1972 (p. 48, fig. 14.4-14.6); Chen et al., 1974 (p. 30, pl. 1, figs. 1-7); Nishida et al., 1977 (p. 149, figs. 21a-h, 22a-c); Dawson & Knatz, 1980 (p. 79, pl. 66); Nishida, 1985 (p. 88, figs. 50-51).

Oithona helgolandica: Sars, 1913 (p. 8, pl. 3)

Material examined. Uljin, 10♀♀, Jan. 1989; P'ohang, 10♀♀, Apr. 1988; Kamp'o, 10♀♀, Jan. 1989; Kijang, 10♀♀, Apr. 1988; Pusan, 10♀♀, Apr. 1988; Chinhae, 10♀♀, Apr. 1988; Kwangyang, 10♀♀, Feb. 1989; Cheju, 10♀♀, Oct. 1987; Youngkwang, 5♀♀, Feb. 1989; Hongdo, 3♀♀, Oct. 1988.

Distribution. Subarctic and subantarctic waters of the Pacific and Indian Oceans, Antarctic, and Eastern equatorial Pacific.

Remarks. *Oithona similis*, *O. fallax* and *O. decipiens* is hardly distinguished in morphological characters. The body length of *O. decipiens* ranged between 0.68 and 0.75 mm, *O. similis* between 0.65 and 0.86 mm, whereas *O. fallax* between 0.88 and 1.04 mm. *O. fallax* is distinguished from other two species in body length. Distinguishing *O. decipiens* and *O. similis* on the basis of external morphology is very difficult. But the number of marginal spine in legs 1-4 exopod of *O. decipiens* is different from that of *O. similis*. Namely, *O. decipiens* has the arrangement of 1-0-2; 1-1-2; 1-0-1; 0-0-0, whereas *O. similis* has 1-1-2; 1-0-1; 1-0-1; 0-0-1.

16. *Oithona simplex* Farran, 1913

Oithona simplex: Tanaka, 1960 (p. 64, pl. 28, figs. 1-6); Gonzalez & Bowman, 1965 (p. 274, fig. 21f-i); Chen et al., 1974 (p. 34, pl. 3, figs. 4-9); Nishida et al., 1977 (p. 151, fig. 23a-n); Ferrari & Bowman, 1980 (p. 19, fig. 12a-d); Nishida, 1985 (p. 88, figs. 52-57).

Material examined. Cheju, 1♀, Oct. 1987.

Distribution. Tropical and subtropical Pacific and Indian Oceans.

17. *Oithona tenuis* Rosendorn, 1917

Oithona tenuis: Farran, 1929 (p. 282); Chen et al., 1974 (p. 38, pl. 5, figs. 3-8); Nishida et al., 1977 (p. 153, fig. 24a-h); Nishida, 1985 (p. 99, figs. 58-59).

Material examined. Uljin, 2♀♀, Jan. 1989; Kamp'o, 1♀, Nov. 1987; Kijang, 2♀♀, Dec. 1988; Cheju, 2♀♀, Oct. 1987.

Distribution. Tropical and subtropical Pacific and Indian Oceans.

18. *Oithona vivida* Farran, 1913

Oithona vivida: Chen et al., 1974 (p. 39, pl. 5, figs. 9-14); Nishida et al., 1977 (p. 154, fig. 25a-g); Nishida, 1985 (p. 102, figs. 60-61).

Material examined. Cheju, 1♀, Oct. 1987.

Distribution. Tropical and subtropical Pacific and Indian Oceans.

Key to the species of *Oithona* of Korea (female)

1. Anterior part of prosome produced into pointed rostrum in dorsal view (Key-fig. 2A) 2
Anterior part of prosome rounded in dorsal view (Key-fig. 2B) 9
2. Exopod 3rd segment of leg 1 with 2 outer marginal spines (Key-fig. 2C) 3
Exopod 3rd segment of leg 1 with 3 outer marginal spines (Key-fig. 2D) 7
3. Exopod of mandible with 2 setae, and prosome length more than 3.4 times of prosome width (Key-fig. 2E) *O. tenuis*
Number of setae in exopod of mandible more than 3, and prosome length less than 3.0 times of prosome width (Key-fig. 2F) 4
4. Outer marginal spine in exopod 3rd segment of leg 4 curved smoothly (Key-fig. 2G) 5
Outer marginal spine in exopod 3rd segment of leg 4 curved straight near base (Key-fig. 2H)
..... 6
5. Endopod of mandible with 3 setae, genital segment ventrally with tuft of hairs (Key-fig. 2I)
..... *O. plumifera*
Endopod of mandible with 4 setae, genital segment ventrally without tuft of hairs
..... *O. hamata*
6. Length of marginal spine in exopod 3rd segment of leg 2 less than 0.7 times of that of terminal spine (Key-fig. 2J) *O. longispina*
Length of marginal spine in exopod 3rd segment of leg 2 more than 0.8 times of that of terminal spine (Key-fig. 2H) *O. atlantica*
7. Exopod 3rd segment of leg 4 with 1 spine (Key-fig. 2G) *O. setigera*

- Exopod 3rd segment of leg 4 with 2 spines (Key-fig. 2K) 8
 8. Exopod 3rd segment of leg 3 with 2 setae *O. vivida*
 Exopod 3rd segment of leg 3 with 3 setae *O. robusta*
 9. Rostrum pointed (Key-fig. 2L) 10
 Rostrum blunt (Key-fig. 2M) 14
 10. Length of antennule shorter than that of prosome 11
 Length of antennule longer than that of prosome 12
 11. Length of first spine in inner lobe 1 of maxillule same as that of other spines (Key-fig. 2N)
 *O. brevicornis*
 Length of first spine in inner lobe 1 of maxillule more than 2 times of that of other spines (Key-fig. 2O) *O. daviseae*
 12. Exopod 2nd segment of leg 1 without spine *O. decipiens*
 Exopod 2nd segment of leg 1 with 1 spine 13
 13. Exopod 3rd segment of leg 2 with 2 spines *O. fallax*
 Exopod 3rd segment of leg 2 with 1 spine *O. similis*
 14. Leg 5 with 1 seta (Key-fig. 2I) 15

Table 1. Distribution of the Korean *Oithona* species.

SPECIES	SAMPLING SITE									
	EAST				SOUTH				WEST	
	1	2	3	4	5	6	7	8	9	10
<i>Oithona atlantica</i>		*	*					*		*
<i>O. attenuata</i> (typical form)	*	*	*							*
(stocky form)	*			*				*		*
<i>O. brevicornis</i>	*	*		*	*	*		*	*	*
<i>O. daviseae</i>	*	*	*	*	*	*	*			
<i>O. decipiens</i>				*				*		
<i>O. fallax</i>			*	*				*		*
<i>O. hamata</i>								*		
<i>O. longispina</i>			*	*				*		
<i>O. nana</i>	*	*	*	*	*	*		*		*
<i>O. oculata</i>	*	*		*						*
<i>O. plumifera</i>	*	*	*	*				*		*
<i>O. rigida</i>										*
<i>O. robusta</i>								*		
<i>O. setigera</i>	*		*	*				*		
<i>O. similis</i>	*	*	*	*	*	*	*	*	*	*
<i>O. simplex</i>								*		
<i>O. tenuis</i>	*		*	*				*		
<i>O. vivida</i>								*		

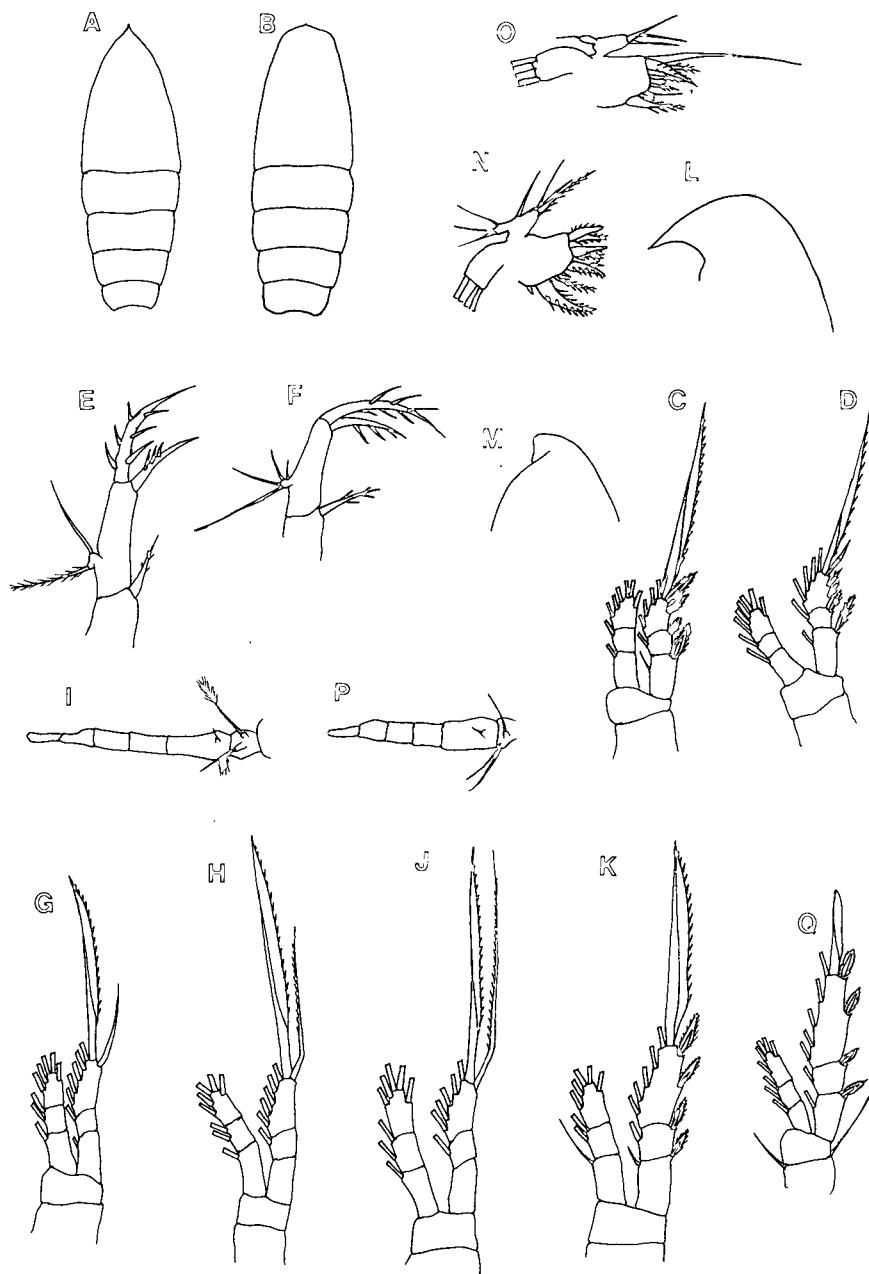


Fig. 2. Illustrated key to the species of the genus *Oithona* of Korea (female). A. *Oithona atlantica*, prosome, dorsal view; B. *O. fallax*, prosome, dorsal view; C. *O. atlantica*, leg 1; D. *O. setigera*, leg 1; E. *O. tenuis*, mandible; F. *O. longispina*, mandible; G. *O. setigera*, leg 4; H. *O. atlantica*, leg 4; I. *O. plumifera*, abdomen, lateral view; J. *O. longispina*, leg 4; K. *O. robusta*, leg 4; L. *O. fallax*, rostrum, lateral view; M. *O. nana*, rostrum, lateral view; N. *O. brevicornis*, maxillule; O. *O. davisae*, maxillule; P. *O. oculata*, abdomen, lateral view; Q. *O. rigida*, leg 4.

Leg 5 with 2 setae (Key-fig. 2P)	17
15. Length of antennule same as that of prosome	16
Length of antennule less than 0.7 times of that of prosome	<i>O. simplex</i>
16. Length of first spine in inner lobe 1 of maxilulle same as that of other spines	<i>O. nana</i>
Length of first spine in inner lobe 1 of maxilulle more than 2 times of that of other spines	<i>O. attenuata</i>
17. Length of exopod 3rd segment in legs 1-4 shorter than that of terminal spine of exopod 3rd segment	<i>O. oculata</i>
Length of exopod 3rd segment in legs 1-4 longer than that of terminal spine of exopod 3rd segment (Key-fig. 2Q)	<i>O. rigida</i>

ABSTRACT

The genus *Oithona* was investigated taxonomically in samples collected from 10 regions of the Korean waters. In result, 18 species of the genus *Oithona* were identified, and a key table on 18 species was given. Of these following nine species were new records for Korean waters: *Oithona atlantica*, *O. attenuata*, *O. davisae*, *O. hamata*, *O. longispina*, *O. oculata*, *O. simplex*, *O. tenuis*, *O. vivida*.

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