Pelagic Amphipods, Infraorder Physosomata (Crustacea : Amphipoda : Hyperiidea) from the CSK International Zooplankton Collection (western North Pacific), with the Description of Four New Species of Scina

AUTHOR(S):

Zeidler, Wolfgang

CITATION:

Zeidler, Wolfgang. Pelagic Amphipods, Infraorder Physosomata (Crustacea : Amphipoda : Hyperiidea) from the CSK International Zooplankton Collection (western North Pacific), with the Description of Four New Species of Scina. PUBLICATIONS OF THE SETO MARINE BIOLOGICAL LABORATORY 1990, 34(4-6): 167-200

ISSUE DATE:

1990-08-31

URL:

http://hdl.handle.net/2433/176167

Pelagic Amphipods, Infraorder Physosomata (Crustacea: Amphipoda: Hyperiidea) from the CSK International Zooplankton Collection (western North Pacific), with the Description of Four New Species of *Scina*

By

Wolfgang Zeidler

South Australian Museum, North Terrace, Adelaide, South Australia 5000

With Text-figures 1–10 and Tables 1–3

Abstract Physosomata were poorly represented in the CSK (Cooperative Study of the Kuroshio and Adjacent Regions) collections as samples were restricted to the upper 150 m and most Physosomata are deep-water species. Nineteen species were identified, all belong to the family Scinidae and, except for *Acanthoscina birsteini*, the genus *Scina*. The collection is remarkable in that four of the species are new to science and another ten are new records for the western North Pacific. An annotated list of species is given, the new species are described and a newly constructed key to the world species of *Scina* is provided.

This study concerns the hyperiid amphipods of the infraorder Physosomata collected by the CSK (Cooperative Study of the Kuroshio and Adjacent Regions) during 1965–74. The general area surveyed in the western North Pacific ranged from the Timor, Arafura and South China Sea to just east of Japan. Further details concerning the CSK International Zooplankton Collection are given by Chuang (1977), Kubota (1984), Motoda (1980) and Yamazi (1971).

Previous records of Physosomata from the western North Pacific are given by Bulycheva (1955), Vinogradov (1957) and Yoo (1971). In all, 35 species in 12 genera representing all 7 families have been recorded from this general area. In the CSK collections Physosomata were rare probably because the collections were restricted to the upper 150 m and most Physosomata are deep-water species (Vinogradov, 1957). Of the 2,749 plankton samples, containing hyperiid amphipods, examined, only 169 contained Physosomata resulting in 202 specimens. All belong to the family Scinidae. I have determined 19 species; *Acanthoscina birsteini* and 18 species of *Scina* including 4 species new to science. Apart from the new species the following are new records for the general area surveyed, *Acanthoscina birsteini*, *Scina damasi*, *S. excisa*, *S. inermis*, *S. marginata*, *S. nana*, *S. oedicarpus*, *S. similis*, *S. stenopus* and *S. tullbergi*.

Of the four new species that I describe here three are small (2.0 mm or less) but appear to be fully developed specimens with clear, distinctive features. The discovery of these new species of 2.0 mm or less is not surprising as some species of *Scina* attain

Publ. Seto Mar. Biol., 34(4/6), 167–200, 1990. (Article 8)

maturity at a very small size, e.g. Thurston (1976) found a female of *S. pusilla* measuring only 1.5 mm with fully developed oostegites, and in the present collection there is an ovigerous female of *S. tullbergi* measuring only 1.8 mm.

A key to the world species of *Scina* is provided. This key has been constructed using the specimens and literature available to me. Where possible I have avoided characters likely to be lost during the collection of specimens.

Zooplankton samples were collected from the Kuroshio and adjacent regions during the period 1965–74 by 12 participating countries as part of CSK (Chuang, 1977; Kubota, 1984; Motoda, 1980; Yamazi, 1971).

Plankton samples were mostly collected using a specified standard method, i.e. 0–150 m vertical haul with a Norpac net, 45×180 cm, conical, made of filtering cloth with 0.33 or 0.35 mm mesh. Subsamples were sorted in Tokyo (National Science Museum) and Singapore (Regional Marine Biological Center) and responsibility for maintenance and curatorial work on the CSK International Zooplankton Collection was transferred in 1978 to the Marine Biological Center, Tokai University, Shimizu, Japan.

Of the 3,302 zooplankton samples collected during CSK, 2,749 contained hyperiid amphipods. Physosomata were extracted from these samples and stored in 2% formaldehyde/propylene glycol solution. A station list for this material is given in Tables 1 and 2.

Specimen length was measured from the anterior extremity of the head to the posterior limit of the telson. Pereopod lengths, for comparative purposes, exclude the dactyl.

For the description of new species dissected appendages were taken from the left hand side of the animal (when viewed dorsally) unless indicated otherwise and mounted on a microscope slide in polyvinyl-lactophenol mountant.

A reference collection of identified specimens, including paratypes of the new species is held by the Marine Biological Center, Tokai University, Shimizu, Japan, the remainder including holotype material is stored in the collections of the South Australian Museum (SAM).

The following additional abbreviations are used in the text and figures. CSN=Centre Serial Number—samples sorted in Singapore; NSM=National Science Museum—samples sorted in Japan; A1=antenna 1; A2=antenna 2; Md=mandible; Mx1=maxilla 1; Mx2=maxilla 2; Mxp=maxilliped; P1–7=pereopods 1–7; Us=urosome.

Systematics

Suborder Hyperiidea H. Milne Edwards, 1830

Infraorder Physosomata Pirlot, 1929

Superfamily Scinoidea Bowman & Gruner, 1973

Family Scinidae Stebbing, 1888

Genus *Scina* Prestandrea, 1833

S. borealis (Sars, 1882)

(Fig. 1A, B)

Material examined. Thirty nine females (1.2–5.0 mm), fourteen males (1.6–4.8 mm) from the following stations;
CSN: 51, 68, 69, 446, 453, 816, 848, 850, 852, 854, 863, 967, 984, 992, 994, 1001, 1016, 1034, 1073, 1208, 1229, 1298, 1312, 1313, 1316, 1320, 1325, 1482, 1491, 1499, 2067, 2475.
NSM: 3, 91, 98, 133, 192, 241, 267, 283, 298, 339, 340, 443, 480, 528, 544, 584, 626.

Table 1. CSN Station data.

Stn	Position		General area	Date	Time
5	33°01.6′N	141°50.2′E	S. of Japan	18/9/67	0103
28	10°00′N	142°00′E	S.W. of Guam	18/1/68	0635
32	13°00′N	142°00′E	" "	19/1/68	2004
33	13°00′N	142°00′E	" "	19/1/68	2004
51	18°59′N	141°59′E	E. of Marianas Is.	24/1/68	2309
68	24°59′N	141°59′E	S. of Bonin Is.	28/1/68	2040
69	24°59′N	141°59′E	" "	28/1/68	2040
335	21°20′N	115°06′E	South China Sea	21/9/68	0518
353	18°49′N	112°10′E	" " "	23/9/68	2149
382	24°00′N	125°00′E	Eastern China Sea	17/8/67	0900
386	26°30′N	125°00′E	" " "	19/8/67	1300
398	34°46.1′N	139°34.3′E	S. of Japan	29/7/67	0340
406	34°46.1′N	139°34.3′E	" "	29/7/67	1933
422	03°56′S	150°12′E	Bismarck Sea	5/2/68	1800
428	08°56′N	150°42′E	N.W. of Truk Is.	11/2/68	0610
436	32°00′N	142°00′E	S. of Japan	17/6/67	1830
446	31°06.6′N	131°59′E	Hiuga-nada	19/8/67	2042
453	30°25.3′N	131°45.7′E	" "	22/8/67	1909
484	30°00.7′N	124°15.5′E	Eastern China Sea	21/7/67	1110
496	28°00′N	131°37′E	Southern Sea of Kyushu	26/8/67	2235
812	26°00′N	137°01′E	S.W. of Bonin Is.	17/1/68	0000
816	16°00′N	137°00′E	N.W. Pacific Ocean	19/1/68	—
821	06°58′N	137°02′E	S.E. of Palau Is.	22/1/68	1738
830	03°32′N	128°12′E	N. Molucca Sea	29/1/68	1408
832	05°27′N	127°03′E	S. of Mindanao	30/1/68	0830
836	07°30′N	129°00′E	E. of Mindanao	8/2/68	0047
840	04°30′N	130°00′E	N.E. of Moluccas	9/2/68	0715
846	01°59′N	133°28′E	S. of Palau Is.	12/2/68	0335
848	04°00′N	133°26′E	" "	13/2/68	0105
849	05°08′N	133°35′E	" "	13/2/68	1542
850	06°00′N	133°29′E	" "	14/2/68	0400
852	08°02′N	133°22′E	N.W. of Palau Is.	14/2/68	1212
854	11°58′N	133°30′E	" "	15/2/68	2337
857	18°00′N	133°30′E	Philippine Sea	17/2/68	1900
863	08°58′N	129°56′E	N.E. of Mindanao	5/3/68	0509
866	11°59′N	126°57′E	E. of Samar	8/3/68	0720
883	28°01.4′N	125°00.2′E	East China Sea	24/5/68	0825
888	27°56′N	131°58′E	Southern Sea of Kyushu	1/6/68	1230
923	28°55.5′N	127°47′E	" " "	1/9/68	0415
924	28°32.3′N	128°05.5′E	" " "	31/8/68	2150
925	28°16.2′N	128°25.5′E	" " "	31/8/68	1645
936	30°00′N	125°00′E	East China Sea	24/8/68	0710
951	27°45′N	126°30′E	" " "	23/11/68	1648
954	07°59′N	129°03′E	E. of Mindanao	22/11/68	0129
963	01°00′N	142°00′E	N. of New Guinea	2/1/69	0139
966	04°00′N	141°48′E	South N.W. Pacific	4/1/69	0400

Table 1. (continued)

Stn	Position		General area	Date	Time
967	05°00′N	142°00′E	South N.W. Pacific	4/1/69	1915
968	06°03′N	141°52′E	" " "	5/1/69	0644
969	08°01′N	141°58′E	" " "	6/1/69	0648
976	32°59′N	137°06′E	S. of Japan	15/1/69	1745
977	32°00′N	137°02′E	" "	16/1/69	0150
980	27°00′N	136°58′E	N.W. Pacific Ocean	17/1/69	1505
981	24°54′N	136°58′E	" " "	18/1/69	0415
984	19°00′N	136°59′E	" " "	19/1/69	2040
986	15°00′N	136°58′E	" " "	20/1/69	2235
989	09°01′N	136°58′E	N.E. of Palau Is.	22/1/69	1325
992	04°30′N	137°59′E	S.E. of Palau Is.	25/1/69	0028
993	03°29′N	136°58′E	N. of Irian Jaya	25/1/69	1320
994	02°28′N	136°58′E	" " "	25/1/69	2352
997	00°31′S	137°00′E	" " "	27/1/69	2002
1001	03°00′S	133°30′E	Teluk Berau, Irian Jaya	31/1/69	0428
1002	03°58′S	133°31′E	E. Ceram Sea	31/1/69	1610
1004	06°00′S	133°24′E	E. Banda Sea	1/2/69	1720
1006	08°05′S	133°21′E	N.W. Arafura Sea	2/2/69	1330
1010	11°00′S	126°00′E	Timor Sea	6/2/69	1953
1013	08°58′S	127°51′E	N.E. of Timor	13/2/69	—
1015	07°28′S	128°38′E	" " "	14/2/69	1935
1016	07°28′S	127°36′E	" " "	15/2/69	0420
1019	04°40′S	127°40′E	N. Banda Sea	17/2/69	0103
1021	00°58′S	129°59′E	E. Halmahera Sea	18/2/69	0956
1028	07°58′N	129°56′E	E. of Mindanao	22/2/69	0405
1034	19°03′N	130°00′E	W. of N.W. Pacific Ocean	27/2/69	0125
1038	12°03′N	127°00′E	S.E. of Luzon	9/3/69	1920
1060	19°01.3′N	120°50′E	Luzon Strait	23/5/68	0128
1062	20°27′N	120°51′E	" "	23/5/68	1731
1071	15°50.6′N	121°50.5′E	E. of Luzon	28/5/68	0857
1073	16°24′45″N	122°24′45″E	" "	28/5/68	1807
1077	18°50.3′N	124°58′E	N.E. of Luzon	30/5/68	0349
1088	13°45′N	124°38′45″E	S.E. of Luzon	3/6/68	0304
1095	16°25′N	127°55′E	E. of Luzon	11/6/68	2236
1097	14°30′N	128°27′E	" " "	12/6/68	2244
1099	13°06.5′N	127°01′E	S.E. of Luzon	13/6/68	1839
1103	10°48.3′N	126°00.9′E	N. of Mindanao	15/6/68	0113
1123	08°27′N	130°18′E	E. of Mindanao	12/7/68	1958
1124	08°27′N	131°12′E	" "	13/7/68	0447
1126	06°45′N	130°09′E	" "	14/7/68	0234
1138	03°50′N	128°07′E	N.E. Molucca Sea	19/7/68	0016
1139	04°35′N	127°23′E	" "	19/7/68	0632
1143	06°02.3′N	125°58.3′E	S.E. of Mindanao	20/7/68	0033
1151	19°29.5′N	120°50′E	E. Luzon Strait	27/1/69	2335
1156	19°29.5′N	122°54′E	Luzon Strait	30/1/69	0540
1158	18°01.5′N	122°54′E	" "	30/1/69	2153

Table 1. (continued)

Stn	Position		General area	Date	Time
1192	13°45′N	123°59′E	Sorsogon Bay, Philippines	12/2/69	2125
1200	15°14′N	129°10.5′E	E. of Luzon	21/2/69	2242
1206	11°43′N	125°33.5′E	E. of Samar	23/2/69	1916
1208	11°04.5′N	126°30′E	" "	25/2/69	1930
1214	11°54′N	131°21′E	Philippine Sea	28/2/69	0530
1216	10°53.5′N	129°34′E	" "	28/2/69	2126
1217	10°13′N	128°41′E	N.E. of Mindanao	1/3/69	0607
1220	09°22′N	126°54′E	E. of Mindanao	2/3/69	0700
1227	08°27′N	130°11′E	" "	14/3/69	0806
1228	08°27′N	131°11′E	" "	14/3/69	1600
1229	06°45.5′N	131°11′E	S.W. of Palau Is.	15/3/69	0300
1240	04°27.5′N	130°02′E	N.W. of Halmahera	18/3/69	1837
1241	03°10′N	128°12′E	N. of Halmahera	19/3/69	0703
1245	06°05′N	125°57.5′E	Davao Gulf, Mindanao	21/3/69	0255
1246	08°19′N	126°42′E	E. of Mindanao	21/3/69	0747
1277	26°00′N	121°32′E	N. of Taiwan	7/6/68	—
1281	24°25′N	123°09′E	N.E. of Taiwan	14/5/68	—
1289	22°45′N	121°45′E	S.E. of Taiwan	19/5/68	—
1290	22°45′N	122°15′E	E. of Taiwan	21/5/68	—
1294	22°15′N	123°45′E	" "	21/5/68	—
1298	21°45′N	122°15′E	S.E. of Taiwan	22/5/68	—
1299	21°45′N	121°49′E	" "	23/5/68	—
1306	25°25′N	122°05′E	N.E. of Taiwan	10/9/68	—
1312	23°45′N	122°45′E	E. of Taiwan	13/9/68	—
1313	23°45′N	122°15′E	" "	13/9/68	—
1316	22°44′N	121°15′E	S.E. of Taiwan	16/9/68	—
1320	22°45′N	123°15′E	E. of Taiwan	7/10/68	—
1325	21°45′N	121°15′E	" "	6/10/68	—
1329	21°45′N	119°45′E	S.W. of Taiwan	18/9/68	—
1330	22°10′N	119°32′E	" "	19/9/68	—
1334	25°05′N	122°27′E	N.E. of Taiwan	13/4/69	—
1345	22°47′N	122°05′E	E. of Taiwan	3/5/69	—
1359	22°12′N	119°30′E	S.W. of Taiwan	12/5/69	—
1407	23°45′N	123°15′E	E. of Taiwan	28/9/66	1150
1482	34°00′N	149°00′E	Pacific (Kuroshio)	26/7/68	0210
1491	24°00′N	138°12′E	" (S.W. of Bonin Is.)	11/8/68	0430
1494	22°00′N	149°00′E	N.E. of Marianas Is.	16/8/68	2030
1499	31°00′N	149°00′E	N.E. of Bonin Is.	20/8/68	0440
1530	33°00′N	138°12′E	S. of Japan	22/11/68	0745
1536	30°00′N	138°10′E	" "	23/11/68	2200
1548	21°00′N	149°00′E	N.E. of Marianas Is.	2/12/68	2230
1808	20°45′N	115°29′E	Shelf S. of Hong Kong	27/8/71	1755
2067	04°52′N	122°31.6′E	N. Celebes Sea	13/6/72	2149
2069	04°58.9′N	124°53.5′E	S. of Mindanao	15/6/72	1011
2475	31°30′N	143°29′E	N. of Bonin Is.	25/8/71	0020
2552	12°07′02″N	109°34′04″E	W. South China Sea	19/10/73	1110

Table 2. NSM Station data.

Stn	Position		General area	Date	Time
3	20°58′N	133°04′E	N.E. of Halmahera	30/6/65	0530
91	31°15′N	143°02′E	E. of Japan	14/7/65	2340
98	29°58′N	151°02′E	" "	24/7/65	2120
133	28°00′N	125°00′E	East China Sea	2/8/65	1959
171	22°11′N	142°14′E	S. of Bonin Is.	18/1/66	1831
173	23°48′N	141°59′E	" " "	20/1/66	1845
189	34°00′N	150°46.5′E	E. of Japan	25/1/66	2230
192	34°00′N	149°34′E	" " "	25/1/66	0445
241	33°27′N	135°15′E	S. of Japan	19/2/66	2000
267	28°44′N	132°13′E	S.W. of Japan	18/3/66	0038
283	37°56.1′N	149°00′E	E. of Japan	22/2/66	0925
295	31°43′N	138°12′E	S. of Japan	27/3/66	0530
298	28°00′N	138°12′E	E. of Bonin Is.	28/3/66	2150
339	33°01.5′N	153°00′E	E. of Japan	21/4/66	1900
340	27°53.3′N	130°16.4′E	S.W. of Japan	10/6/66	0100
358	22°56′N	132°31′E	S.E. of Daito Is.	20/7/66	2316
385	28°45′N	132°14′E	S.W. of Japan	6/6/66	0145
391	22°00.7′N	122°59.7′E	E. of Taiwan	7/7/66	2335
442	43°00′N	164°00′E	N.E. of Japan	13/7/66	1750
443	34°00′N	143°40′E	E. of Honshu	13/7/66	2335
474	27°57.9′N	137°24.9′E	S. of Japan	10/8/66	2312
480	31°20′N	135°13′E	" " "	1/8/66	1945
481	32°01′N	135°13′E	" " "	2/8/66	0220
490	29°08.5′N	129°25.8′E	Southern Sea of Kagoshima	19/8/66	1935
528	35°58′N	143°58′E	E. of Honshu	16/9/66	0013
544	37°06′N	143°37′E	" " "	29/9/66	—
554	28°14′N	132°48′E	N. of Daito Is.	28/10/66	0020
584	34°00′N	164°00′E	E. of Japan	14/1/67	1015
612	23°30′N	124°56.5′E	E. of Taiwan	21/1/67	2145
614	22°30′N	125°00′E	" " "	22/1/67	0535
626	21°00′N	142°00,E	N.W. of Marianas Is.	26/1/67	1925

Remarks. This was the most common species of Physosomata in the CSK collections. Vinogradov (1957) and Yoo (1971) also recorded this as the most common Physosomata in the western North Pacific Ocean.

Some small specimens (less than 2.0 mm) identified here as this species have pereopods with relatively shorter and wider articles. In addition article 2 of pereopod 5 sometimes had a smooth anterior margin (Fig. 1A) and uropod 1 had only two large spines on the interior margin (Fig. 1B). These differences might have been considered of specific significance except that specimens with characters intermediate between this and typical adult *S. borealis* were also present in the collection. They are therefore regarded as juvenile features of this species.

This is a cosmopolitan species found in all oceans including the Arctic and

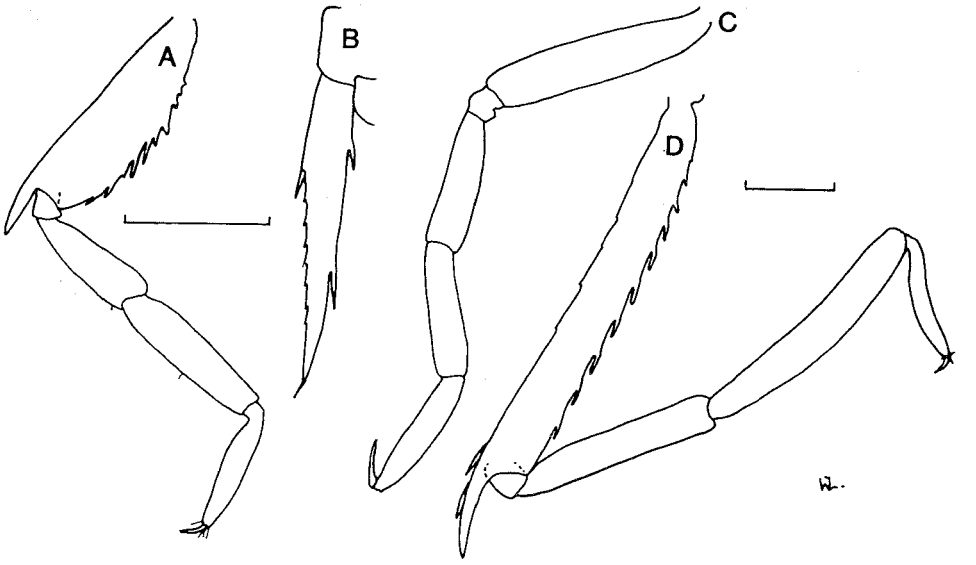

Fig. 1. A,B. *Scina borealis*, pereopod 5 and uropod 1; C,D. *S. crassicornis*, pereopod 6 and pereopod 5. Scale bars=0.2 mm.

Antarctic (Vinogradov, 1957). It has a wide vertical range with juveniles often occurring in the top layers (Thurston, 1976) which is consistent with the present findings.

S. crassicornis (Fabricius, 1775)

(Fig. 1C, D)

Material examined. Eleven females (1.6–11.9 mm), one male (5.9 mm) from the following stations;
CSN: 5, 28, 33, 924, 1158, 1206, 1313.
NSM: 171, 295, 391, 612.

Remarks. A characteristic feature of specimens in this collection was the long dactyl of pereopod 6 which was often curved upwards (Fig. 1C). The serrations on the posterior margin of article 2 of pereopod 5 varied with some specimens having much larger teeth than those illustrated by Wagler (1926) and others (Fig. 1D). Variations in the relative lengths of articles 4–6 of pereopod 6, tending towards *S. curvidactyla* Chevreux, 1914, were also noticed. Similar variations in the relative lengths of segments of pereopods 5–7 have been noted by previous authors but are not considered to be of taxonomic significance (Hurley, 1956; Thurston, 1976; Brusca, 1978).

This is a cosmopolitan species occurring approximately between the polar circles (Brusca, 1978). It is frequently found at the surface (Vinogradov, 1957) particularly at night (Thurston, 1976). Vinogradov (1957) and Yoo (1971) found it restricted to the warm waters of the Kuroshio region (south and southeast of Japan).

S. curvidactyla Chevreux, 1914

Material examined. Three females (4.9–10.6 mm), one male (4.9 mm) from stations CSN 963, 966, 1019 and 1126.

Remarks. The specimens in this collection agree with the original description given by Chevreux (1914) but differ from the description of Wagler (1926) in that uropod 2 is slightly longer and the pereopod articles are slightly broader. In particular the articles of pereopods 3 and 4 are much broader and article 3 is much shorter than article 4 (about two-thirds) whereas Wagler illustrates article 3 equal to or slightly longer than 4.

A widely distributed species preferring warm waters (Vinogradov, 1957). Vinogradov (1957) gives a depth range of 500–2000 m but the species has been captured near the surface at night (Thurston, 1976). Vinogradov (1957) and Yoo (1971) found it restricted to the warm waters of the Kuroshio region.

S. damasi Pirlot, 1929

Material examined. One female (2.9 mm) from station NSM 554.

Remarks. This specimen agrees generally with the figures of Pirlot (1929) and keys out to *S. damasi* according to Vinogradov *et al.* (1982); however, article 6 of pereopod 6 is slightly shorter than article 5 whereas Pirlot illustrates it as slightly longer.

This is apparently a rare species. It has been recorded from the North Atlantic, between Madeira and the Azores, by Pirlot (1929), from near Fiji by Hurley (1960) and from near the Canary Islands by Thurston (1976). It is a new record for the western North Pacific Ocean.

S. excisa Wagler, 1926

Material examined. One male (3.6 mm) from station CSN 1015.

Remarks. This specimen agrees in all respects with Wagler's (1926) figures of this species except for article 2, of pereopod 5 which has a slightly longer antero-distal projection.

A rare species. Known records are from tropical and temperate regions (Dick, 1970). Thurston (1976) recorded it from depths of 250–410 m and depth data given by Vinogradov (1960, 1964) suggest that the species is usually found between 200 and 600 m. The CSK specimen came from the south Banda Sea and is a new record for the Asian region.

S. inermis Chevreux, 1919

Material examined. Two females (2.0, 3.6 mm) from stations NSM 442 and 481.

Remarks. This species is readily distinguished by pereopod 6 which is much longer than pereopod 5 and is without a dactyl.

A rare species; it has been recorded from the North Atlantic near Morocco in 0–1800 m (Chevreux, 1919) and from the north and equatorial region of the Indian Ocean in depths of 0–200, 200–500 and 500–1000 m (Vinogradov, 1964). The CSK specimens represent a new record for the Pacific Ocean.

S. marginata (Bovallius, 1885)

Material examined. Three females (4.6, 4.3 & 4.7 mm) from stations CSN 816, 888 and 2552.

Remarks. A relatively common species known from scattered records in tropical and temperate regions of the world's oceans (Dick, 1970). Vinogradov (1960) showed that this species is confined to depths shallower than 500 m. It is a new record for the western North Pacific Ocean and the South China Sea.

S. nana Wagler, 1926

Material examined. Six females (1.2–2.3 mm) and nine males (1.4–2.6 mm) from the following stations;
CSN: 353, 846, 923, 936, 981, 1013, 1028, 1060, 1088, 1156, 1306, 1359, 1407.
NSM: 173.

Remarks. This species is very similar to *S. similis* Stebbing, 1895. The CSK specimens demonstrate considerable variation in the relative lengths of the articles of pereopod 6. Article 6 ranged from about 100–120% of article 4 and 130–160% of article 5. Wagler (1926) illustrates article 6 as 114% of article 4 and 164% of article 5 for *S. nana* and 103% of article 4 and 117% of article 5 for *S. similis*. The CSK material thus exhibits some overlap between the two species and the distinction between *S. nana* and *S. similis* is not as clear as Wagler (1926) or Vinogradov *et al.* (1982) suggest. Best distinguishing features are the short dactyls of pereopods 5–7, the relatively longer exopod of uropod 1 which is similar to uropod 2 and the presence of an antero-distal spine on article 2 of pereopod 5, adjacent to the antero-distal projection. Three small (1.2, 1.2 & 1.4 mm) specimens without an antero-distal spine on article 2 of pereopod 5 have been identified as this species rather than *S. similis* on the basis of the exopod of uropod 1. Two of these (CSN 846 & 1060) also have a short dactyl on pereopods 5–7, the other one (CSN 1407) has pereopods 5–7 with rather long dactyls but this may be a juvenile feature.

Two ovigerous females (CSN 1088 & 1359) were present in the collections; they measure 2.2 mm and 2.3 mm respectively and were captured in June and May.

A rare species known from widely separated records in tropical and temperate regions of the world's oceans (Dick, 1970). Wagler (1927) recorded it from depths of 0–250 m and Dick (1970) from 0–150 m which is in accordance with the present findings. The CSK material represents new records for the western North Pacific Ocean, the Banda Sea and the East and South China Sea.

S. oedicarpus Stebbing, 1895

Material examined. One male (3.2 mm) from station CSN 832.

Remarks. Although only one, slightly damaged, specimen is available it agrees in all respects with the characteristic features illustrated for this species by Stebbing (1895) and Wagler (1926).

A relatively uncommon species recorded mainly from the tropical regions of the Atlantic (Dick, 1970) but also from the Pacific (Vinogradov, 1960) and Indian (Vinogradov, 1964) Oceans. Thurston (1976) recorded it from depths of 400–800 m and Vinogradov *et al.* (1982) give a depth range of 200–500 m.

It is a new record for the western North Pacific Ocean.

S. similis Stebbing, 1895

Material examined. One female (2.2 mm) from station CSN 1004.

Remarks. The similarity of this species to *S. nana* has already been discussed under that species. The specimen at hand agrees with the more figures given for this species by Stebbing (1895) and Wagler (1926).

A rare species recorded from the Mediterranean and the tropical regions of the Atlantic and Indian Oceans (Dick, 1970). It appears to be confined to depths shallower than 500 m (Vinogradov *et al.*, 1982).

The CSK specimen came from the east Banda Sea and is a new record for the Asian region. It has yet to be found in the Pacific Ocean.

S. stebbingi Chevreux, 1919

Material examined. One female (2.3 mm) from station CSN 1006.

Remarks. This specimen agrees in general with the original description given by Chevreux (1919), but differs slightly from the description given by Wagler (1926). In particular article 6 of pereopod 5 is relatively longer, about two-thirds length of article 5 whereas Wagler illustrates it as about two-fifths length of article 5. However, the observed differences between this and Chevreux's specimens and those of Wagler may be related to maturity as Wagler's description is based on a much larger specimen (13 mm from head to end of uropods).

A relatively uncommon species. It has been recorded from the tropical Atlantic, northwest Pacific, southwest Bering Sea and the Mediterranean but not from the Indian Ocean (Vinogradov *et al.*, 1982). When closing nets have been used this species has been found restricted to depths of 100–500 m (Vinogradov, 1956) and 1000–1500 m (Vinogradov, 1970) however, Chevreux (1919) recorded his specimens from near the surface and Thurston (1976) recorded specimens from 40 m and 350 m which, like the present data, suggests a much shallower bathometric range.

The CSK specimen came from the north western part of the Arafura Sea. Yoo (1971) recorded it from the Oyashio area (east and northeast of Japan).

S. stenopus Stebbing, 1895

Material examined. One female (3.2 mm) from station CSN 428.

Remarks. The characteristic long appendages make this an easily recognisable species.

A relatively common species in the warmer waters of the world's oceans. It seems to have a depth range of at least 200–500 m (Vinogradov, 1960, 1964). Thurston (1976) found it to be relatively abundant in depths of 85–625 m and Dick (1970) in depths of 0–150 m. It is a new record for the western North Pacific Ocean.

S. submarginata Tattersall, 1906

Material examined. One male (3.9 mm) from station CSN 836.

Remarks. A relatively common, widely distributed species (Vinogradov, 1957). Vinogradov (1964, 1970), using closing nets, recorded it from depths of 200–500, 500–750 and 1000–4000 m but Thurston (1976) recorded some specimens from 40 and 150 m which, like the present data shows that the species also occurs in the surface layers. Yoo (1971) found it mainly in the Kuroshio region.

S. tullbergi (Bovallius, 1885)

Material examined. Twenty six females (1.1–2.7 mm), fifteen males (1.2–3.7 mm) from the following stations;
CSN: 32, 335, 382, 386, 422, 496, 866, 883, 954, 969, 977, 992, 997, 1010, 1038, 1077, 1103, 1123, 1139, 1214, 1216, 1220, 1229, 1245, 1246, 1277, 1281, 1289, 1299, 1316, 1334, 2552.
NSM: 385, 391, 474, 490, 614.

Remarks. This was the second most common species of Physosomata in the CKS collections and it is surprising that it was not recorded by Vinogradov (1957) or Yoo (1971).

Wagler (1926) synonymized *S. pacifica* (Bovallius, 1887) and *S. concors* Stebbing, 1895 with *S. tullbergi*. The CKS material agrees in all respects with the form *pacifica* as illustrated by Bovallius (1887) and Wagler (1926), even when juvenile. The form *pacifica* may therefore be a valid species. However, as I have not seen examples of the other forms I am unable to reach a conclusion here. Both Bovallius (1887) and Stebbing (1895) distinguish *pacifica* by the antero-distal tooth on the anterior margin of article 2 of pereopod 5 which, according to them, is absent in the other forms.

Six ovigerous females (CSN 32, 1038, 1077 (2), 1245 & 1246) were captured in January, March and May and ranged in size from 1.8–2.4 mm.

This is a surface/shallow mesopelagic species (Thurston, 1976) widely distributed in the tropical and temperate regions of the world's oceans (Dick, 1970). It is a new record for the western North Pacific Ocean and Asian region.

Scina curvidactyloides sp. nov.

(Figs 2–3)

Material examined. Holotype, female, 4.2 mm (SAM C 4190) from station CSN 967. Four paratypes, all females, 2.0, 2.4, 3.1 & 2.6 mm from stations CSK 398, 821, 1001 & 1329 respectively, the latter one in SAM (C 4191).

Description of holotype. Body. Very slender, slightly flattened dorso-ventrally. Head slightly longer than maximum width of first pereonite, truncate antero-ventrally. Eye relatively small consisting of one central facet surrounded by eight wedge-shaped facets. Pereonite 1 with anterior bulge mid-laterally. Pereonites 2–4 with slight projection of postero-distal corner. Pereon length twice pleon. Pleonites rounded ventrally, successively less broad and shorter. Urosomite 1 length about two-thirds fused urosomites 2 and 3; equivalent to twice urosomite 2 and subequal to urosomite 3.

Antenna 1. Length equal to head and pereonites 1–6; length second article more than five times basal article, tapering to a sharp point. Article 2 triangular in cross-section with a row of 13–15 teeth along each edge, increasing in size distally. Numerous aesthetascs along inside face.

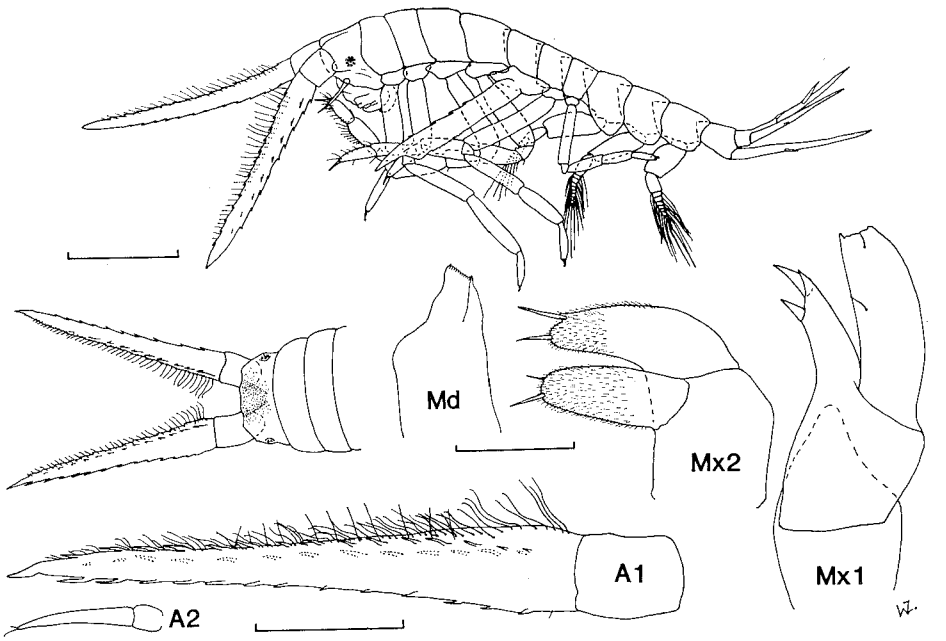

Fig. 2. *Scina curvidactyloides* sp. nov. Holotype female, 4.2 mm. Scale bars=0.5 mm and 0.1 mm respectively.

Antenna 2. Very short, folded across face; a third longer than basal article of antenna 1. Second article length four times basal article, gradually tapering to a point with two short bristles terminally.

Maxilla 1. Inner plate rounded, about half length outer plate, with a sparse

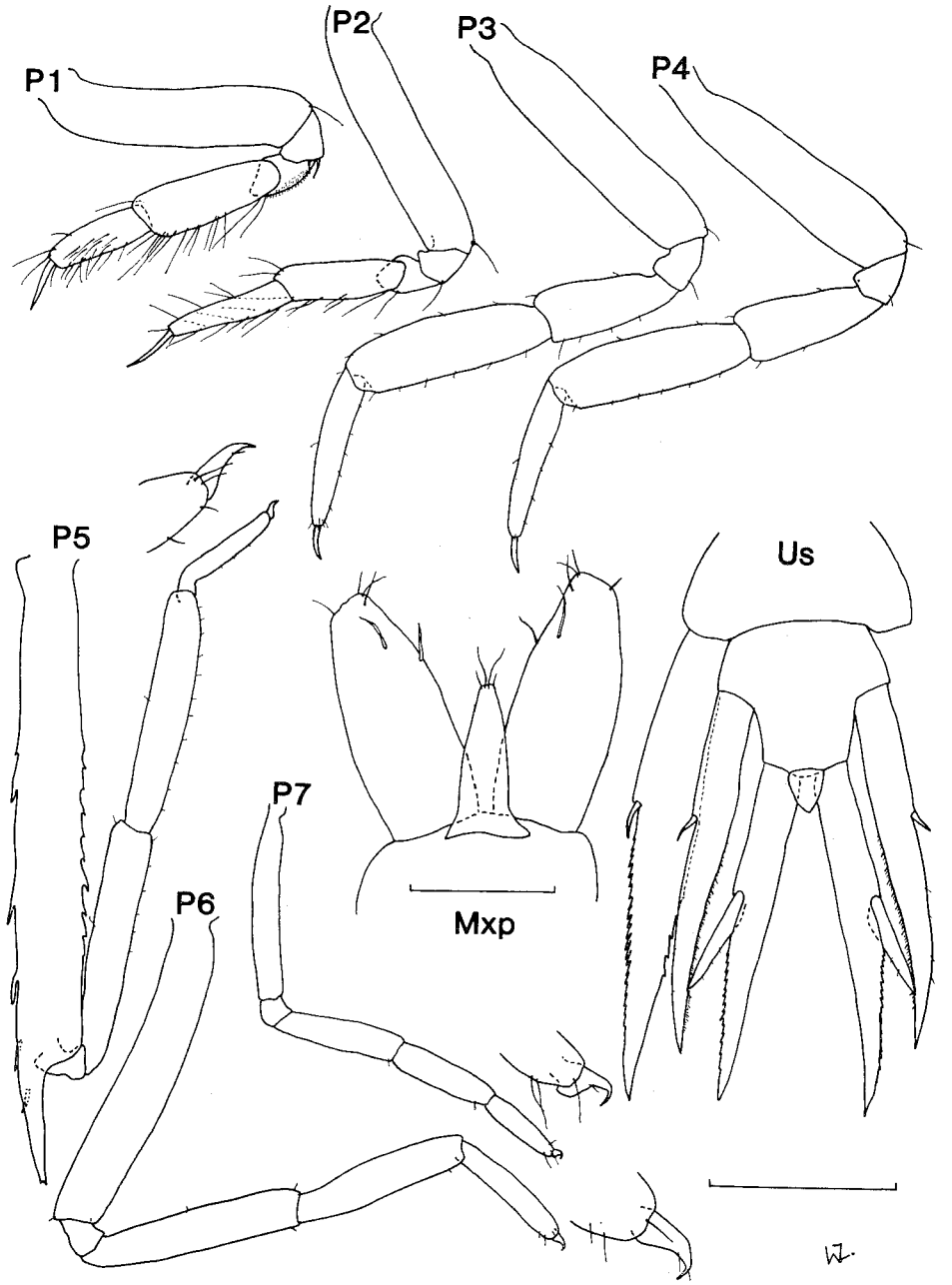

Fig. 3. *Scina curvidactyloides* sp. nov. Holotype female, 4.2 mm. Scale bar Mxp= 0.1 mm, pereopods and urosome=0.5 mm.

covering of short bristles distally. Outer plate with three large teeth at different levels, the terminal one distinctly larger than the other two. Palp extending beyond outer plate, terminal margin straight except for a small tooth at each corner, the inner tooth being slightly larger than the outer one.

Maxilla 2. Inner plate evenly rounded with two terminal spines, the outer one larger than the inner one; distal two-thirds covered in short bristles. Outer plate larger than, but similar to, inner plate but with two subequal terminal spines.

Mandible. Incisor with single row of small, rounded teeth ending in two slightly larger teeth on outer margin.

Maxilliped. Outer lobes slightly truncate, ovate, slightly more than twice as long as wide, with three bristles near inner corner, one bristle near outer conrer and two slightly stronger bristles about three-quarters from the base, one on the inner margin and the other on the outside face. Inner lobe about twice as long as wide, reaching middle of outer lobes, with two pairs of terminal bristles, the inner pair being about four times longer than the outer pair.

Pereopod 1. Length about half pereopod 5. Coxa 1 semicircular, about twice as long as deep. Article 2 slightly longer than articles 5 and 6 combined. Article 4 with short close-set bristles on posterior margin. Article 6 length about three-quarters article 5; both articles with several long setae posteriorly. Dactyl length half article 6.

Pereopod 2. Like pereopod 1 but marginally longer, also articles 5 and 6 equal in length and with fewer setae.

Pereopods 3–4. Homopodous. Length about three-quarters pereopod 5. Coxae 3–4 elongate, slightly more truncate posteriorly, about three times as long as deep. Article 2 slightly shorter than articles 4 and 5 combined. Article 4 length about two-thirds article 5. Article 6 length nearly four-fifths article 5; both articles 5 and 6 keeled on inside face. Dactyl length about one-fifth article 6.

Pereopod 5. Coxa 5 rhomboid, slightly truncate posteriorly, partly overlapping pereonite and coxa 6; about twice as long as deep. Article 2 slightly longer than articles 4 and 5 combined, with three large, and one small, teeth on anterior margin and two large teeth on inner keel at beginning and middle of antero-distal projection which extends to almost half article 4; posterior margin with about ten irregular, small teeth. Articles 4 and 5 about equal in length. Article 6 length slightly less than half article 5. Dactyl small, curved; length about one-sixth article 6.

Pereopod 6. Length almost four-fifths pereopod 5. Coxa 6 small, quadrangular, about twice as long as deep. Article 2 length about four-fifths articles 4 and 5 combined. Article 4 slightly longer than article 5. Article 6 length about seven-tenths article 5. Dactyl small, curved; length about one-seventh article 6.

Pereopod 7. Length three-fifths pereopod 6. Coxa 7 very small, rectangular, slightly longer than deep. Article 2 length about four-fifths articles 4 and 5 combined. Article 4 slightly longer than article 5. Article 6 length nearly three-quarters article 5. Dactyl small, swollen at base, curved; length about one-seventh article 6.

Uropod 1. Extending just beyond tip of uropod 3. Outer margin between exopod and tip with moderate teeth or serrations. Inner margin with few serrations near distal half. Exopod length almost one-eighth endopod and about one-third exopod of uropod 3.

Uropod 2. Extending short of uropod 3. Outer margin smooth except for a few setae distally. Inner margin between position of exopod and tip armed with regularly spaced, small spines interspersed with comb of short bristles. Exopod length similar to that of uropod 1.

Uropod 3. Outer margin serrate between exopod and tip. Inner margin smooth. Exopod length slightly more than half endopod.

Telson. Length about one-eighth uropod 3; slightly longer than wide; apex evenly rounded.

Variations. The paratypes vary slightly in the serration of the posterior margin of article 2 of pereopod 5, and two specimens have article 2 slightly shorter than articles 4 and 5 combined. The most significant difference between the holotype and all of the paratypes however, is that in the paratypes article 6 of pereopod 7 is slightly longer than article 5; all other features are very similar.

Remarks. This species is very similar to *S. curvidactyla* Cheverux, 1914 but can be distinguished from it by the characters given in Table 3. The features of pereopod 5, especially the teeth on the anterior margin of article 2, and the long exopod of uropod 1 are particularly distinctive. In addition the pereopods of *S. curvidactyla* are relatively longer but this feature can only be appreciated by comparing both species together. The male is unknown.

Table 3. Characters distinguishing *Scina curvidactyla* from *S. curvidactyloides* sp. nov.

Character	*S. curvidactyla*	*S. curvidactyloides*
Antenna 1, length	equal to pereon & first pleonite	equal to pereonites 1–6
Pereopod 5, article 2 length	4/5 or less than articles 4 & 5	subequal to articles 4 & 5 combined
Pereopod 5, article 6	slim, weak, length about 1/3 article 5	reduced, normal, slightly less than 1/2 article 5
Pereopod 7, length	less than 1/2 pereopod 6 (40%–50%)	more than 1/2 pereopod 6 (about 60%)
Uropod 1, exopod length	1/12 or less endopod; less than 1/5 exopod of uropod 3	about 1/8 endopod; 1/4–1/3 exopod of uropod 3

Etymology. The specific name, *curvidactyloides*, refers to the similarity of this species to *S. curvidactyla*.

Scina parasetigera sp. nov.

(Figs 4–5)

Material examined. Holotype, female, 1.8 mm (SAM C 4192) from station CSN 1038.

Description of holotype. Body. Slender, rounded. Head about as long as first one and a half pereonites. Eye relatively small consisting of one central facet surrounded by seven wedge-shaped facets. Pereonite 1 with slight anterior bulge mid-laterally. Pereonites 2–4 with slight projection of postero-distal corner. Pereon length one and a half times pleon. Pleonites rounded ventrally, successively less broad and shorter. Urosomite 1 length about equal to fused urosomites 2 and 3. Equivalents of urosomite 2 and 3 subequal in length.

Antenna 1. Length equal to head and first five and a half pereonites; length second article about four and a half times basal article, tapering to a sharp point. Article 2, triangular in cross-section with a row of 11–13 teeth along each edge, increasing in size distally. Numerous aesthetascs along inside face.

Antenna 2. Very short, about half as long as basal article of antenna 1. Second article length almost five times basal article, terminally round; without bristles or aesthetascs.

Maxilla 1. Features difficult to discern. Inner plate rounded, about half length outer plate with few bristles terminally. Outer plate with three (maybe only two) large teeth at different levels, the terminal one distinctly larger than the other two; five or six stout bristles between proximal and terminal tooth. Palp shorter than outer plate, rounded with several bristles terminally.

Maxilla 2. Inner plate evenly rounded with several short bristles terminally. Outer plate slightly larger than, but similar to, inner plate.

Mandible. Incisor with single of small, rounded teeth ending in two slightly larger teeth on outer margin.

Maxilliped. Outer lobes long, semi-circular, maximum width about one-third

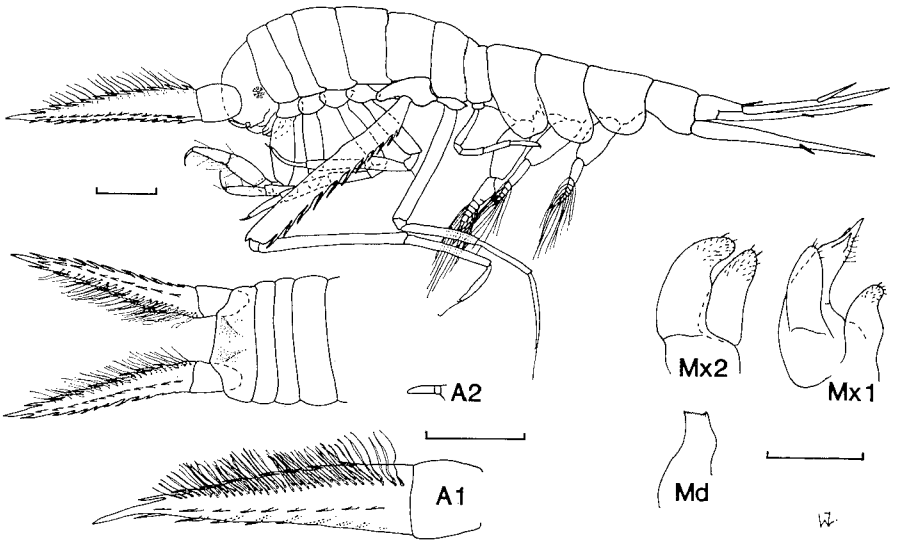

Fig. 4. *Scina parasetigera* sp. nov. Holotype female, 1.8 mm. Scale bars=0.2 mm and 0.05 mm respectively.

length, with one terminal and one sub-terminal bristle on the outer margin. Inner lobe not discernible, very small (?).

Pereopod 1. Length about one-third pereopod 5. Coxa 1 rectangular almost twice as long as deep with slight forward projection of antero-distal corner. Article 2 slightly shorter than articles 5 and 6 combined. Articles 5 and 6 equal in length;

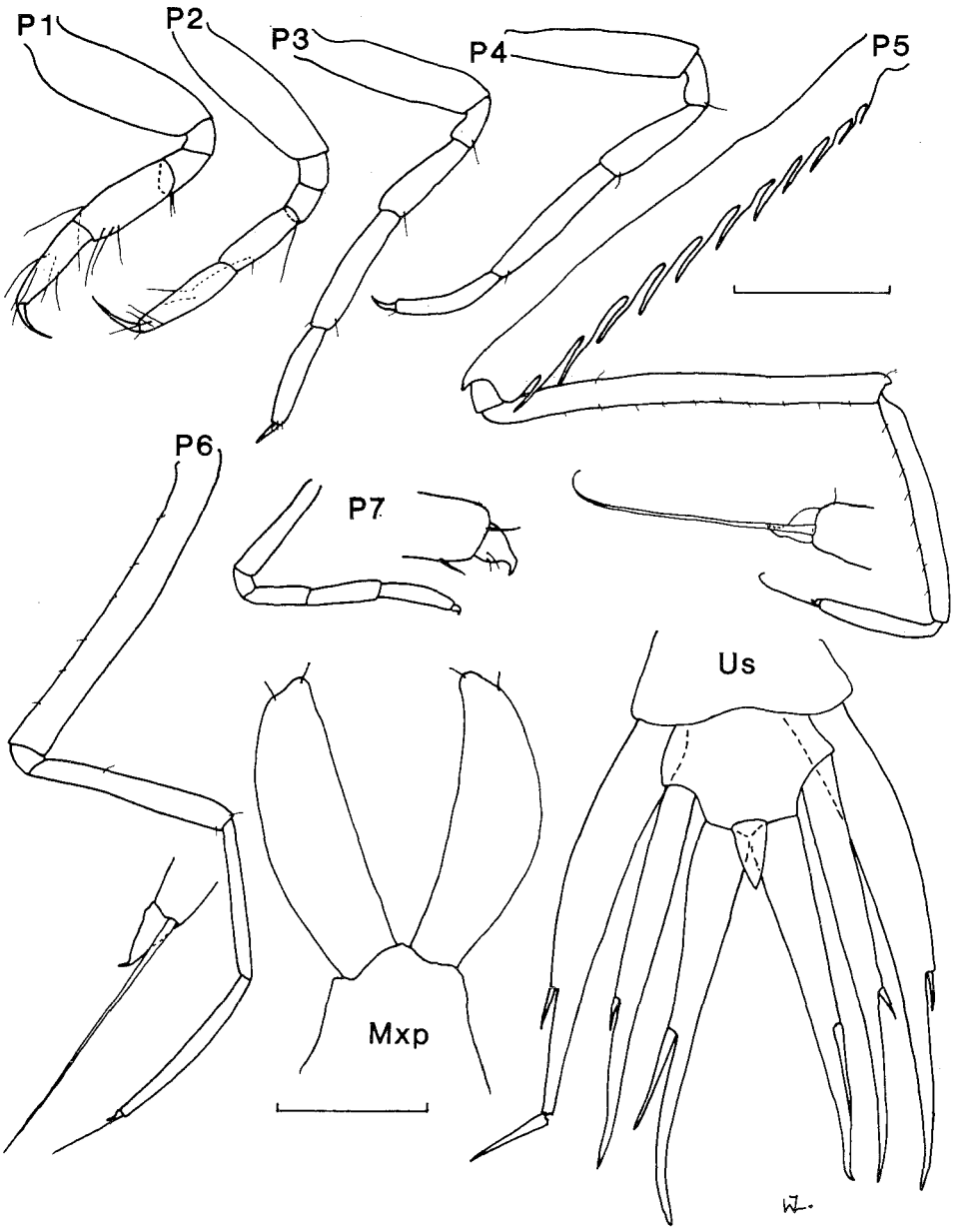

Fig. 5. *Scina parasetigera* sp. nov. Holotype female, 1.8 mm. Scale bar Mxp=0.05 mm, pereopods and urosome=0.2 mm.

both articles with a few long setae, mainly distally. Dactyl length half article 6.

Pereopod 2. Like pereopod 1 but all articles slightly more slender and article 6 is slightly longer than article 5.

Pereopods 3–4. Homopodous. Length nearly half pereopod 5. Coxa 3 semi-circular, coxa 4 truncate posteriorly; both about twice as long as deep. Article 2 length nearly twice article 4. Article 4 slightly longer than two-thirds article 5, equal to article 6. Dactyl length about one-quarter article 6.

Pereopod 5. Coxa 5 rhomboid, truncate anteriorly; length about twice maximum depth. Article 2 length equal to article 4 and half article 5; anterior margin smooth with very short antero-distal projection; posterior margin with eleven regularly spaced, long teeth, Article 4 length about three-quarters article 2. Article 5 length slightly less than half article 2. Article 6 length slightly more than half article 5 with long bristle from postero-distal corner equal in length to about three-fifths article 6. Dactyl very small, swollen at base, distally curved; length less than one-tenth article 6.

Pereopod 6. Length seven-tenths pereopod 5. Coxa 6 small, quadrangular, truncate anteriorly and posteriorly, length about three times maximum depth. Article 2 length slightly shorter than articles 4 and 5 combined. Article 5 length about four-fifths article 4 and about nine-tenths article 6. Article 6 with long bristle from postero-distal corner equal in length to nearly half article 6. Dactyl short, tapering to sharp point; length one-tenth article 6.

Pereopod 7. Length equivalent to article 2 pereopod 6. Coxa 7 very small, oval in shape, a little longer than deep. Article 2 length about twice article 4. Article 4 length three-quarters article 5. Articles 5 and 6 equal in length. Dactyl very small, swollen at base, distally curved; length about one-eighth article 6.

Uropod 1. Extending to tip of uropod 3. All margins smooth. Exopod length about one-fifth endopod and nearly half exopod of uropod 3.

Uropod 2. Extending almost to tip of uropod 3. All margins smooth. Exopod length about one-fifth endopod.

Uropod 3. Similar in length to uropod 2. All margins smooth. Exopod length slightly more than half endopod.

Telson. Length about one-sixth uropod 3; triangular in shape, length twice maximum width; apex pointed.

Remarks. Although the holotype is small and unique, all of the characteristic features are clearly defined. In many respects this species is similar to *S. setigera* Wagler, 1926 particularly in the relative lengths of the articles of the pereopods. However, it is readily distinguished from *S. setigera* by the completely different shape of the outer lobes of the maxilliped, by the lack of 2 anterodistal teeth on article 2, pereopod 5, by the relatively shorter pereopod 7 (much longer than article 2, pereopod 5 in *S. setigera*) and by the shorter exopods of the uropods, especially uropod 1.

S. setigera and *S. parasetigera* are the only species of *Scina* with a long bristle on pereopods 5 and 6.

According to Vinogradov *et al.* (1982) and a recent literature search, *S. setigera* is still only known from the unique type, a female, captured near the Seychelles, Indian Ocean. This fact and the discovery of a similar species in the CKS collections suggests that these species may have been overlooked in the past due to their small size.

Etymology. The specific name, *parasetigera*, refers to the similarity of this species to *S. setigera*.

Scina hurleyi sp. nov.

(Figs 6–7)

Material examined. Holotype, female, 1.9 mm (SAM C 4193) from station CSN 1298. One paratype, female, 2.0 mm from station CSN 1494.

Description of Holotype. Body. Slender, rounded. Head about as long as first one and a half pereonites, truncate antero-ventrally. Eye relatively small consisting of one central facet surrounded by seven wedge-shaped facets. Pereonite 1 with anterior bulge mid-laterally. Pereonites 2–7 with slight projection of postero-distal corner. Pereon length one and two-thirds times pleon. Pleonites rounded ventrally, successively less broad, subequal in length. Urosomite 1 length about two-thirds

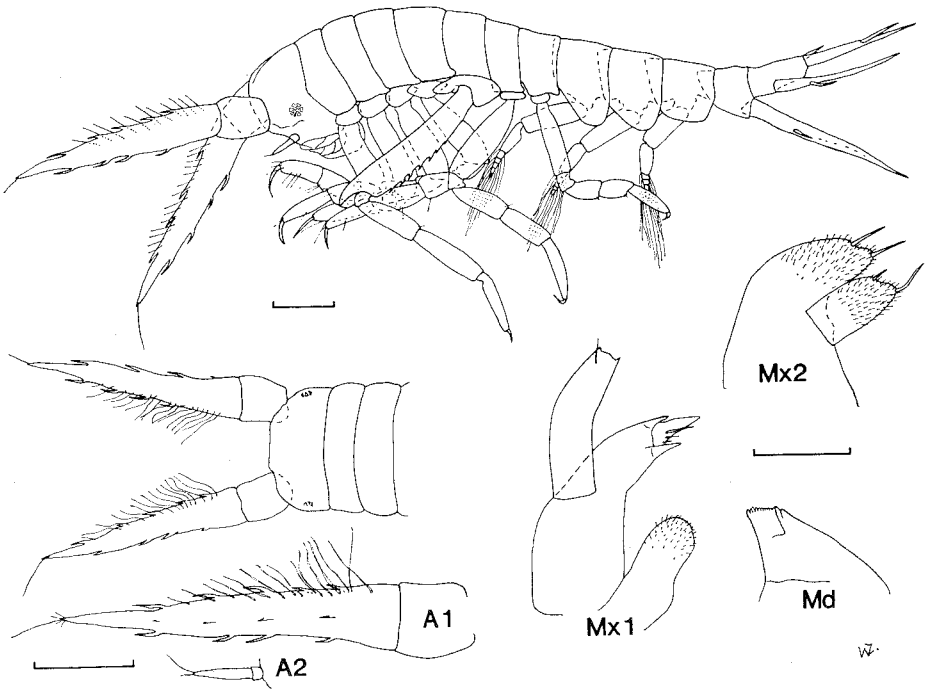

Fig. 6. *Scina hurleyi* sp. nov. Holotype female, 1.9 mm. Scale bars=0.2 mm and 0.05 mm respectively.

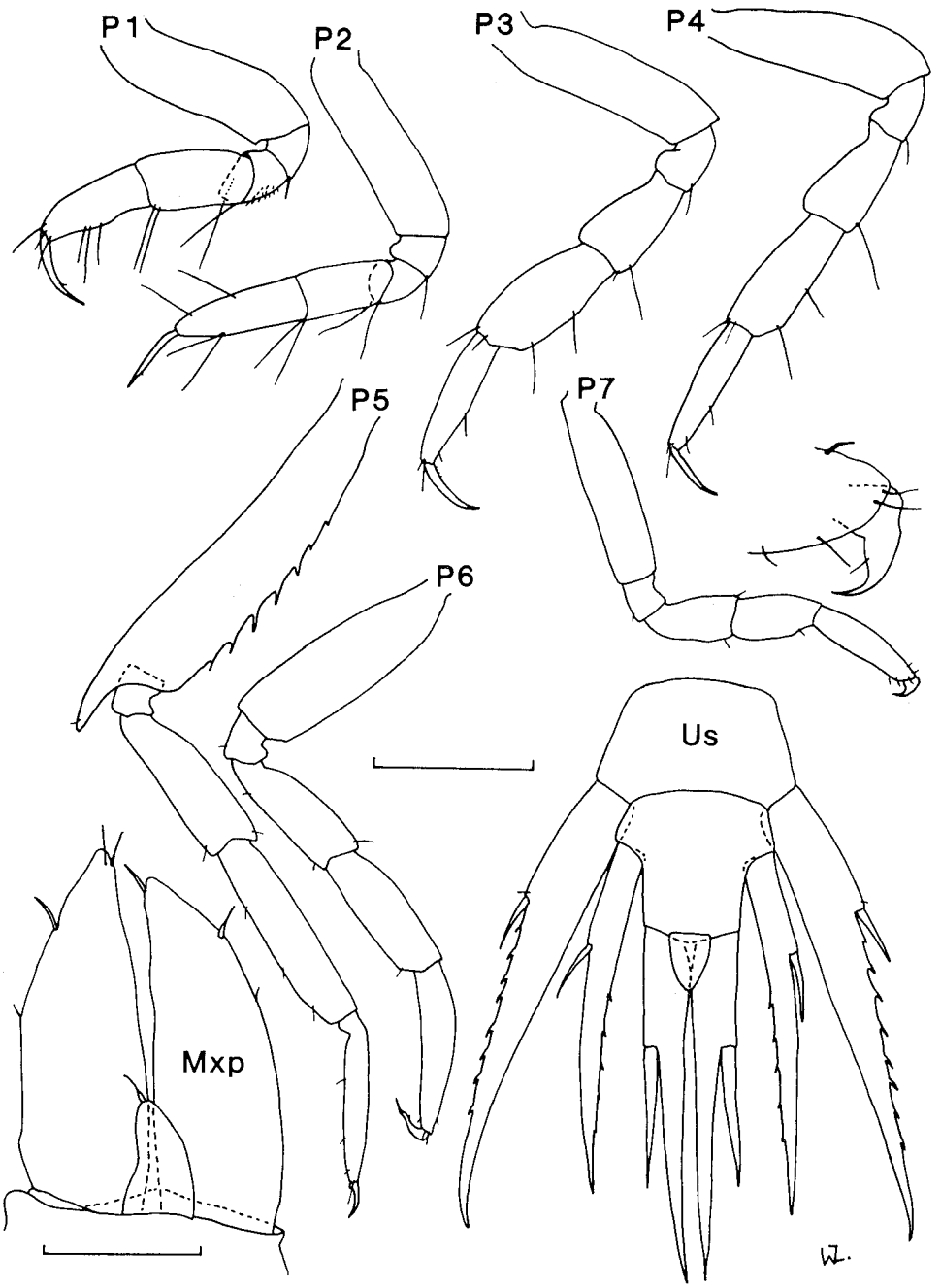

Fig. 7. *Scina hurleyi* sp. nov. Holotype female, 1.9 mm. Scale bar Mxp = 0.05 mm, pereopods and urosome = 0.2 mm.

fused urosomites 2 and 3; equivalent to twice urosomite 2 and subequal to urosomite 3.

Antenna 1. Length equal to head and first five and a half pereonites; length second article slightly more than four and a half times basal article, tapering to a point with a terminal bristle about one-quarter as long as second article. Article 2 triangular in cross-section with a row of 4–5 teeth along each edge, increasing in size distally. Several aesthetascs along inside face, particularly numerous for proximal half; one slightly larger aesthetasc arising about one-third from tip.

Antenna 2. Very short, almost as long as basal article of antenna 1. Second article length five times basal article, gradually tapering to a point with two short bristles terminally.

Maxilla 1. Inner plate rounded, about half length outer plate with a sparse covering of short bristles distally. Outer plate with three large teeth at different levels, the terminal one distinctly larger than the other two; two small and one longer, stout bristle between proximal and terminal tooth. Palp extending beyond outer plate, terminal margin straight except for a small tooth at each corner, the inner tooth being slightly larger than the outer one.

Maxilla 2. Inner plate evenly rounded with two terminal spines, the outer one larger than the inner one; distal two-thirds covered in short bristles. Outer plate larger than, but similar to inner plate but with two subequal terminal spines.

Mandible. Incisor with single row of small, rounded teeth ending in two slightly larger teeth on outer margin.

Maxilliped. Outer lobes long, almost semi-circular, maximum width slightly more than one-third length, with one or two terminal bristles, another similar bristle on outer margin about three-quarters from base and a smaller one about half-way along outer margin. Inner lobe gradually tapering, maximum width about three-fifths length, reaching to almost one-third of outer lobes with one (or two?) terminal bristle.

Pereopod 1. Length about half pereopod 5. Coxa 1 semi-circular, about twice as long as deep. Article 2 length almost twice article 5. Article 4 with short close-set bristles on posterior margin. Articles 5 and 6 equal in length; both articles with a few long setae posteriorly. Dactyl length three-quarters article 6.

Pereopod 2. Like pereopod 1 but article 6 slightly longer than article 5 and dactyl length only three-fifths article 6.

Pereopods 3–4. Homopodous. Length seven-tenths pereopod 5. Coxae 3–4 elongate, slightly more truncate posteriorly, about twice as long as deep. Article 2 length nearly twice article 4. Article 4 length two-thirds article 5 with one long bristle on postero-distal corner. Article 5 with a long bristle on postero-distal corner and midway along posterior margin. Article 6 slightly shorter than article 5 with two slightly shorter bristles as for article 5. Dactyl length about half article 6.

Pereopod 5. Coxa 5 rhomboid, slightly more truncate anteriorly partly overlapping pereonite 6 and coxa 4; about twice as long as deep. Article 2 length equal

to articles 4 and 5 combined; anterior margin smooth with blunt antero-distal projection just reaching beyond article 3; posterior margin with seven irregular teeth. Article 4 length about two-fifths article 2. Article 5 length about three-fifths article 2. Article 6 length equal to article 4. Dactyl with slightly swollen base, curved; length slightly more than one-fifth article 6.

Pereopod 6. Length about three-quarters pereopod 5. Coxa 6 small, quadrangular, almost three times as long as deep. Article 2 length slightly less than articles 4 and 5 combined. Article 4 length a little less than article 5, almost three-fifths article 2. Article 6 length one-sixth longer than article 5. Dactyl sharp, curved upwards; length nearly one-third article 6.

Pereopod 7. Length slightly more than half pereopod 5 or two-thirds pereopod 6. Coxa 7 small, quadrangular, about twice as long as deep. Article 2 length equal to articles 3–5 combined. Articles 4 and 5 equal in length and two-thirds length article 6. Dactyl sharp, wide at base, curved upwards; length one-fifth article 6.

Uropod 1. Extending beyond uropod 2 but not quite reaching tip of uropod 3. Outer margin between exopod and tip with eight moderate teeth or serations. Inner margin smooth. Exopod length one-fifth or one-sixth endopod and nearly half exopod of uropod 3.

Uropod 2. Outer margin smooth. Inner margin between position of exopod and tip with five regularly spaced teeth interspersed with a comb of short bristles. Exopod length about one-quarter endopod, similar to that of uropod 1.

Uropod 3. Outer and inner margins smooth. Exopod length three-fifths endopod with five, short setae on distal half of inner margin.

Telson. Length about one-quarter uropod 3; maximum width three quarters length; apex evenly rounded.

Variations. The paratype shows no variation from the holotype.

Remarks. Characteristic features of this species are, the structure of the maxilliped; the relatively long dactyls of pereopods 1–6, especially pereopods 1–4; the upwardly curving dactyl of pereopod 6; the general form of pereopod 5 and the relatively long exopod of uropod 1.

S. hurleyi resembles *S. wagleri* Behning, 1939 and *S. typhlops* Wagler, 1926 with respect to the long dactyls of pereopods 1–4 and the long exopods of uropod 1. However it is readily distinguished from *S. wagleri* by the structure of the maxilliped, the serrations on article 2 of pereopod 5, the shape of the dactyl of pereopod 7 and the lack of teeth on the inner margin of uropod 1 and from *S. typhlops* by the maxilliped, pereopod 5 and the relatively shorter exopods of uropods 1 and 2. Pereopod 5 of *S. hurleyi* is also similar to that of juvenile *S. borealis* (Fig. 1A) but apart from other minor differences very small specimens of *S. borealis* ($<$1.5 mm) can be distinguished by at least some large teeth on the inner margin of uropod 1.

The male is unknown.

Etymology. This species is named for Dr D.E. Hurley, New Zealand Oceano-

graphic Institute, in recognition for his contribution to the understanding of hyperiid amphipods.

Scina exospina sp. nov.

(Figs 8–9)

Material examined. Holotype, female, 1.6 mm (SAM C 4194) from station CSN 1016.

Description of holotype. Body. Slender, rounded. Head as long as first two pereonites, truncate antero-ventrally. Eye relatively small, circular, consisting of one central facet surrounded by several indistinguishable wedge-shaped facets. Pereonite 1 with slight anterior bulge mid-laterally. Pereonites 2–7 with slight projection of postero-distal corner. Pereon length almost twice pleon. Pleonites rounded ventrally, successively less broad and shorter. Urosomite 1 length subequal to fused urosomites 2 and 3.

Antenna 1. Length equal to head, pereon and half of peronite 1 combined; second article length about seven times basal article, tapering to a point; terminal portion missing. Article 2 triangular in cross-section with a row of 5–8 teeth along each edge, increasing in size distally. Several aesthetascs and bristles along inside face; one relatively large aesthetasc arising between one-third and one half from tip.

Antenna 2. Very short, only half length basal article of antenna 1. Second

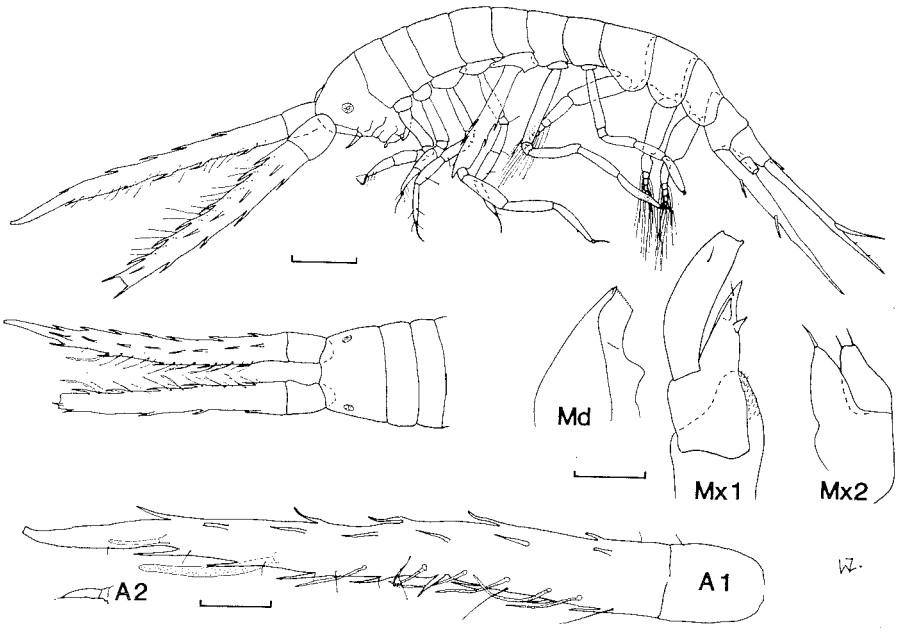

Fig. 8. *Scina exospina* sp. nov. Holotype female, 1.6 mm. (A1 from right). Scale bars=0.2 mm, 0.1 mm and 0.05 mm respectively.

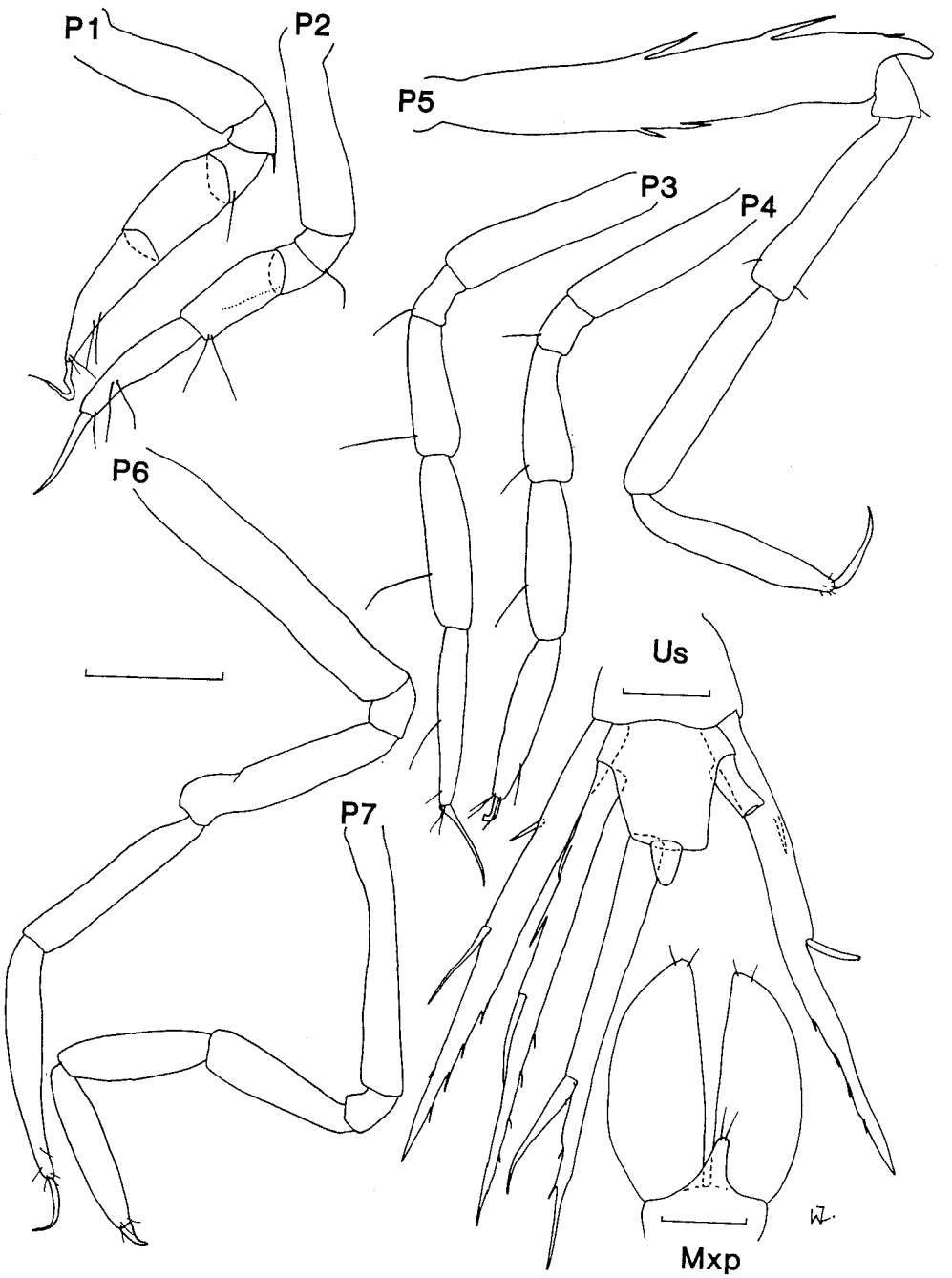

Fig. 9. *Scina exospina* sp. nov. Holotype female, 1.6 mm. (P 3–5 & 7 from right). Scale bar Mxp=0.05 mm, pereopods and urosome=0.1 mm.

article length four times basal article, gradually tapering to a point with one short, terminal bristle.

Maxilla 1. Inner plate rounded, about half length outer plate with a sparse covering of short bristles distally. Outer plate with three large teeth at different levels, the terminal one distinctly larger than the other two; one small bristle between proximal and terminal tooth. Palp extending beyond outer plate, terminal margin straight except for a small tooth at each corner, the inner tooth being slightly larger than the outer one.

Maxilla 2. Inner plate evenly rounded with one (maybe two), terminal spines; distal two-thirds covered in short bristles. Outer plate larger than, but similar to, inner plate, but with two subequal terminal spines.

Mandible. Incisor with single row of small, rounded teeth ending in two slightly larger teeth on outer margin.

Maxilliped. Outer lobes semi-circular, maximum width about two-fifths length, with two bristles terminally. Inner lobe small, maximum width about two-thirds length, reaching to almost one-fifth of outer lobes; gradually tapering to rounded apex with two terminal bristles.

Pereopod 1. Length slightly more than two-fifths pereopod 5. Coxa 1 semi-circular, slightly longer than deep. Article 2 length almost twice article 5. Article 5 length nearly three-quarters article 6. Article 6 with a few long setae posteriorly and distally. Dactyl length about three-fifths article 6.

Pereopod 2. Like pereopod 1 but article 5 length about four-fifths article 6.

Pereopods 3–4. Homopodous. Length about three-fifths pereopod 5. Coxae 3–4 elongate, slightly more truncate posteriorly, more than twice as long as deep. Article 2 length about two-thirds articles 4 and 5 combined. Article 4 length four-fifths article 5. Articles 5 and 6 equal in length. Dactyl, thin, sharp; length half article 6.

Pereopod 5. Coxa 5 rhomboid posteriorly and truncate anteriorly, partly overlapping pereonite 6 and coxa 4; about twice as long as maximum depth. Article 2 length equal to articles 4 and 5 combined; anterior margin with two long teeth medially and a smaller one on inner face of antero-distal projection; posterior margin also with two long teeth medially; antero-distal projection short, rounded, barely reaching limit article 3. Article 4 length equal to article 6, slightly shorter than article 5. Dactyl, thin, sharp; length nearly two-fifths article 6.

Pereopod 6. Length only one-tenth shorter than pereopod 5. Coxa 6 small, quadrangular, about twice as long as deep. Article 2 length a little shorter than articles 4 and 5 combined. Article 4 slightly longer than article 5. Article 6 slightly longer than article 4. Dactyl, thin, sharp; length one-third article 6.

Pereopod 7. Length about two-thirds pereopod 5. Coxa 7 small, quadrangular, about twice as long as deep. Article 2 length a little shorter than articles 4 and 5 combined. Articles 4 and 5 equal in length. Article 6 slightly longer than article 5. Dactyl sharp, wide at base, curved upwards; length about one-sixth article 6.

Uropod 1. Not quite extending to tip of uropod 2. Outer margin with one

large tooth medially between base and exopod and a smaller tooth between exopod and tip; otherwise smooth. Inner margin with four small, evenly spaced, teeth between position of exopod and tip. Exopod length two-fifths endopod and about three-quarters exopod of uropod 3.

Uropod 2. Not quite extending to tip of uropod 3. Outer margin with two large, evenly spaced, teeth between base and exopod; otherwise smooth. Inner margin with four small, evenly spaced, teeth between position of exopod and tip. Exopod length two-fifths endopod, like that of uropod 1.

Uropod 3. Outer margin with two, evenly spaced, teeth between exopod and tip. Inner margin smooth. Exopod length seven-tenths endopod.

Telson. Triangular, twice as long as maximum width; length one-tenth uropod 3; apex rounded.

Remarks. Although the holotype is small and probably juvenile, all of the characteristic features are clearly defined. The most distinctive feature is the presence of large teeth on the outer margins of uropods 1 and 2 which, except perhaps for *S. rattrayi* Stebbing, 1895, is unique in the genus *Scina*. Other characters that distinguish this species are the general form of pereopod 5, the long dactyls of pereopods 1–6, the relatively long pereopods 6 and 7 compared to pereopod 5 and the long exopods of uropods 1 and 2.

Etymology. The specific name, *exospina,* refers to the distinctive spines on the outer margins of uropods 1 and 2.

Scina sp.

(Fig. 10)

Material examined. Exoskeleton of female, 1.9 mm (SAM C 4195) from station NSM 358.

Description. General body shape and some mouthparts not discernible for accurate description.

Antenna 1. Length equal to head and pereonites 1–6, length second article four and a half times basal article, tapering to a point with a terminal bristle. Article 2 sparsely covered in short bristles with three evenly spaced teeth on inner margin; one long aesthetasc arising from about middle of inner margin and a slightly larger one from the ventral surface near the tip; both aesthestascs more than one-third as long as article 2.

Antenna 2. Short, length a half longer than basal article of antenna 1. Second article length almost eight times basal article, gradually tapering to a point with two short bristles terminally.

Maxilliped. Outer lobes long, ovate, about twice as long as maximum width with two bristles terminally. Inner lobe small, very short, length about one-sixth outer lobes with two short terminal bristles.

Pereopod 1. Length half pereopod 5. Article 2 length almost twice article 5.

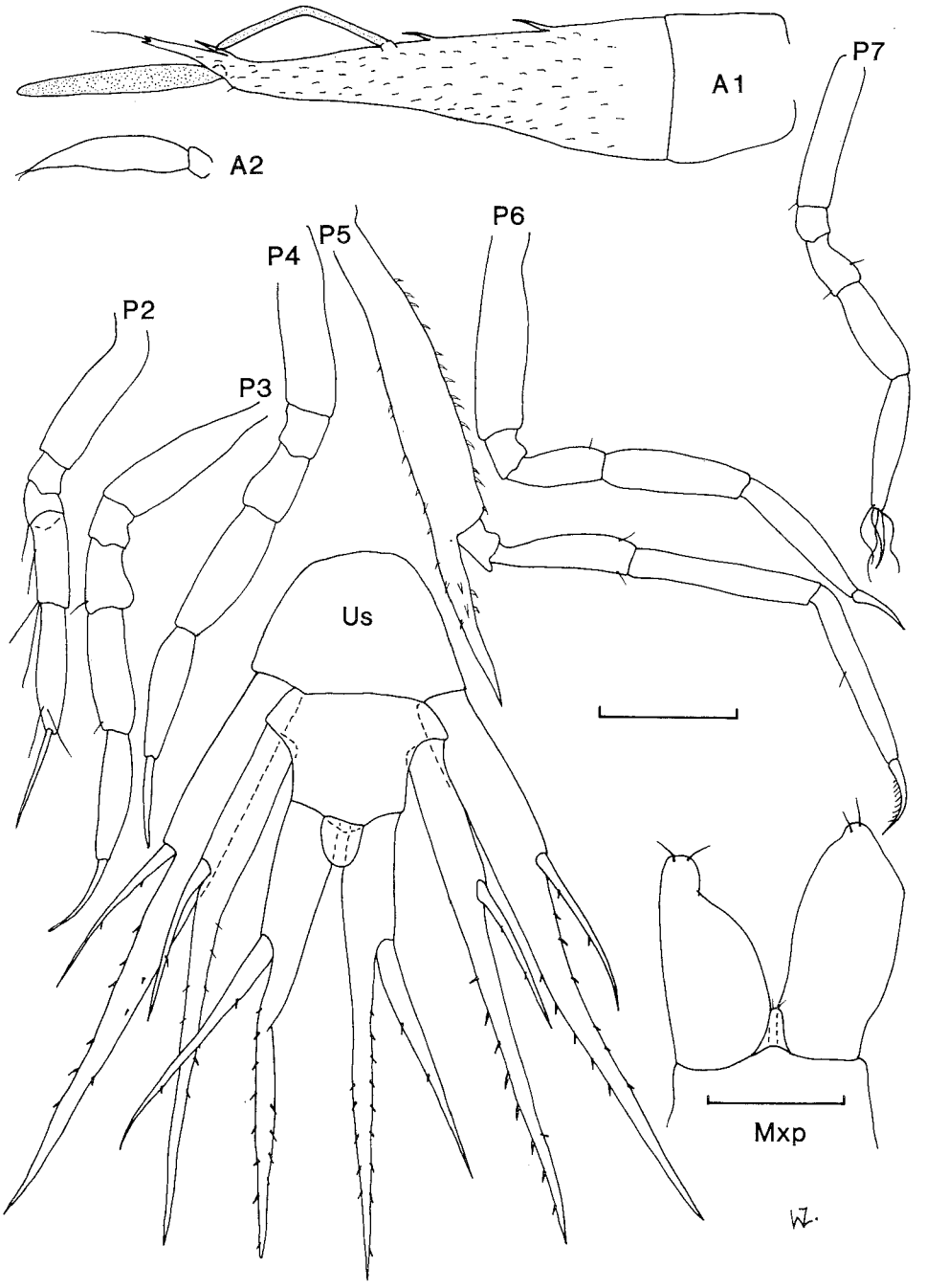

Fig. 10. *Scina* sp. Female, 1.9 mm. (P 2–4 from right). Scale bar Mxp=0.05 mm, A 1–2, pereopod and urosome=0.2 mm.

Articles 5 and 6 equal in length with a few long bristles distally and on posterior margin. Dactyl length about three-quarters article 6.

Pereopod 2. Like pereopod 1 but article 5 length only about three-quarters article 6.

Pereopods 3–4. Homopodous. Length three-fifths pereopod 5. Article 2 length equal to articles 4 and 5 combined. Article 4 length only half article 5. Articles 5 and 6 equal in length. Dactyl length about two-thirds article 6.

Pereopod 5. Article 2 length slightly longer than articles 4 and 5 combined; anterior and posterior margins with small, irregular teeth; antero-distal projection sharp, extended to distal margin of article 4, slightly longer than remaining half article 2, also with small, irregular teeth on all faces. Article 4 length two-fifths article 2. Article 5 length slightly more than half article 2. Article 6 length equal to article 5. Dactyl with comb of short setae on anterior margin; length two-fifths article 6.

Peropod 6. Length seven-tenths pereopod 5. Article 2 length slightly less than articles 4 and 5 combined. Article 4 length slightly more than half article 5. Articles 5 and 6 equal in length. Dactyl narrow, pointed; length two-fifths article 6.

Pereopod 7. Length slightly more than half pereopod 5. Article 2 length equal to articles 4 and 5 combined. Article 4 length half article 5. Article 5 length three-quarters article 6. Article 6 with three long hairs distally at base of dactyl. Dactyl narrow, pointed; length two-fifths article 6.

Uropod 1. Extending just beyond uropod 3. Inner and outer margins between exopod and tip, and inner margin of exopod, with several well-spaced teeth. Exopod length nearly half endopod and about two-thirds exopod of uropod 3.

Uropod 2. Extending to uropod 3. Armed like uropod 1. Exopod length nearly half endopod.

Uropod 3. Armed like uropod 1. Exopod length three-quarters endopod.

Telson. Almost semi-circular, maximum width equal to length; length one-eleventh uropod 3.

Remarks. I hesitate to describe this as a new species as the unique material consists of a moulted exoskeleton. However most of the taxonomic features are clearly present and there is no reason to believe that they would differ from a complete specimen. The description here draws attention to the existence of this possibly new species and hopefully this will be confirmed with future collections.

The form of pereopod 5 together with the relatively long dactyls and exopods of the uropods distinguish this from all other species of *Scina*. Particularly distinctive is the long antero-distal projection of article 2, pereopod 5. In no other species of *Scina* does the length of this projection even approach half the length of article 2 and only in *S. indica* Vinogradov, 1964 does it extend to the limit of article 4. Generally it most closely resembles *S. vosseleri* Tattersall, 1906 in the form of pereopod 5 and in the general proportions of the pereopod articles but is readily distinguished by the lack of serrations on the inner margin of uropod 1 and by the longer exopods

of uropods 1 and 2. The uropods are most similar to *S. typhlops* but most other characters are quite different.

Scina species (unidentifiable)

Material examined. Fifty unidentifiable juveniles (0.5–1.3 mm with most<1.0 mm) or damaged specimens from the following stations.
CSN: 406, 436, 484, 840, 849, 857, 925, 951, 968, 976, 980, 986, 989, 993, 1002, 1021, 1062, 1071, 1095, 1097, 1099, 1124, 1138, 1143, 1151, 1156, 1192, 1200, 1216, 1217, 1227, 1228, 1229, 1240, 1241, 1245, 1290, 1294, 1312, 1330, 1334, 1345, 1359, 1530, 1536, 1548, 1808, 2069.
NSM: 189.

Remarks. Most of these specimens exhibited characteristics which I consider to be juvenile features and should be taken into account when identifying very small specimens. In particular the articles of all pereopods were shorter and broader, and the dactyls and exopods of uropods 1 and 2 relatively longer, than observed in adult specimens.

Key to World Species of *Scina*

1. Pereopods and uropods very long, thin. Uropod 3 length about three times urosomites 1 & 2 combined.....*S. stenopus* Stebbing
   Pereopods and uropods not necessarily long or thin. Uropod 3 length about twice (or less) than urosomites 1 & 2 combined 2
2. Pereopod 5, articles 5 & 6 very short, forming subchelate appendage .....*S. chelata* Vinogradov
   Pereopod 5, articles 5 & 6 not necessarily short, normal, not forming subchelate appendage 3
3. Pereopod 6 considerably longer than pereopod 5, dactyl absent .....*S. inermis* Chevreux
   Pereopod 6 slightly longer or shorter than pereopod 5, dactyl present 4
4. Pereopods 5 & 6 with articles thickly setose.....*S. pubera* Wagler
   Pereopods 5 & 6 with articles sparsely setose or with few or no setae 5
5. Pereopods 5 & 6 with long bristle extending well beyond dactyl..... 6
   Pereopods 5 & 6 without long bristle at base of dactyl..... 7
6. Pereopod 5, article 2, anterior margin with two teeth distally. Uropod 1, exopod length about two-thirds endopod and twice exopod of uropod 2.....*S. setigera* Wagler
   Pereopod 5, article 2, anterior margin smooth. Uropod 1, exopod length about one-fifth endopod, similar to exopod of uropod 2..... .....*S. parasetigera* sp. nov.
7. Uropods 1 & 2, outer margin with one or two long teeth (no serrations) .....*S. exospina* sp. nov.

Uropods 1 & 2, outer margin smooth or with regular serrations 8

8. Uropod 1, inner margin with enlarged tooth, at about same distance from base as exopod, in addition to serrations 9
Uropod 1, inner margin smooth or with regular serrations 10

9. Pereopod 6 as long as pereopod 5. Maxilliped with narrow, long outer lobes (length 8x width).....*S. wolterecki* Wagler
Pereopod 6 distinctly shorter than pereopod 5. Maxilliped with outer lobes about three times as long as wide.....*S. oedicarpus* Stebbing

10. Uropod 1, exopod length about half (or more) than exopod of uropod 3 11
Uropod 1, exopod reduced to small spine, length much less than half exopod of uropod 3 12

11. Uropod 1, inner margin with large serrations.....*S. wagleri* Behning
Uropod 1, inner margin smooth.....*S. typhlops* Wagler

12. Pereopod 5, article 2 distinctly longer than articles 3–7 combined.....13
Pereopod 5, article 2 as long or much shorter than articles 3–7 combined 14

13. Pereopod 5, article 2, anterior margin smooth except for three teeth on antero-distal process; dactyl a small rounded article.....*S. alberti* Chevreux
Pereopod 5, article 2, anterior margin serrate; dactyl normal .....*S. indica* Vinogradov

14. Pereopod 5, article 2 with smooth margins. Pereopod 6, article 6 shorter than article 5 .....*S. stebbingi* Chevreux
Pereopod 5, article 2 with serrations on one or both margins; if serrations very fine then pereopod 6, article 6 is longer than article 5 15

15. Pereopod 1 or 1 & 2, article 6 extended distally over dactyl (sometimes small) 16
Pereopods 1 & 2, article 6 not extended distally beyond base of dactyl.....19

16. Pereopod 6, article 6 shorter than article 5 17
Pereopod 6, article 6 longer than article 5 18

17. Pereopods 1 & 2, article 6 with wide, sharp projection over dactyl. Pereopods 3 & 4 long and thin.....*S. marginata* (Bovallius)
Pereopod 1, article 6 with small, narrow projection over dactyl. Pereopod 2, article 6 without projection. Pereopods 3 & 4 with thick articles .....*S. submarginata* Tattersall

18. Pereopod 1, article 6 with short antero-distal projection. Pereopod 5, article 4 slightly shorter than article 5.....*S. incerta* Chevreux
Pereopod 1, article 6 with lateral-postero-distal projection. Pereopod 5, article 4 about twice length article 5.....*S. latifrons* Wagler

19. Uropod 1, inner margin smooth for entire length 20
Uropod 1, inner margin with large teeth or fine serrations, sometimes only near tip 25

20. Pereopod 5, article 2, antero-distal projection extending to about middle of article 4 ..... *S. damasi* Pirlot
Pereopod 5, article 2, antero-distal projection not reaching or barely extending beyond proximal margin of article 4 21
21. Pereopod 5, article 4 equal to or slightly shorter than article 5 22
Pereopod 5, article 4 considerably longer than article 5 23
22. Pereopod 5, article 2, anterior margin serrate. Uropod 2, inner margin excised sharply above level of exopod..... *S. excisa* Wagler
Pereopod 5, article 2, anterior margin smooth. Uropod 2, inner margin not excised ..... *S. hurleyi* sp. nov.
23. Pereopod 6, article 6 equal to or shorter than article 5 ..... *S. tullbergi* (Bovallius)
Pereopod 6, article 6 distinctly longer than article 5 24
24. Pereopod 5, article 2, anterior margin with distinct distal tooth. Pereopods 5–7, dactyls very short. Uropod 1, exopod length about one-sixth endopod ..... *S. nana* Wagler
Pereopod 5, article 2, anterior margin smooth or with slight distal notch. Pereopods 5–7, dactyls sharp, of medium length. Uropod 1, exopod reduced to small spine, length about one-tenth endopod ..... *S. similis* Stebbing
25. Pereopod 5, article 4 more than 50% longer than article 5 26
Pereopod 5, article 4 length equal to article 5, sometimes shorter or only slightly longer (<25%) 28
26. Pereopod 6, article 6 equal to or slightly shorter than article 5 ..... *S. langhansi* Wagler
Pereopod 6, article 6 distinctly longer than article 5 27
27. Pereopod 5, article 2, anterior margin with large serrations; article 6 length subequal to article 5..... *S. antarctica* Wagler
Pereopod 5, article 2, anterior margin smooth or with slight serrations except for two teeth distally; article 6 length less than half article 5 ..... *S. rattrayi* Stebbing
28. Pereopod 5, article 6 longer than article 4 29
Pereopod 5, article 6 distinctly shorter than article 4 31
29. Pereopod 5, article 2, antero-distal projection extending to about middle of article 4; dactyl with setose anterior margin..... *S. vosseleri* Tattersall
Pereopod 5, article 2, antero-distal projection not reaching or barely extending beyond proximal margin of article 4; dactyl smooth 30
30. Pereopod 7 shorter than article 2 of pereopod 6. Pereopod 5, dactyl long and thin, length about one-third article 6..... *S. lepisma* (Chun)
Pereopod 7 distinctly longer than article 2 of pereopod 6. Pereopod 5, dactyl short ..... *S. pusilla* Chevreux
31. Pereopod 7 with squat articles; article 6 length about twice width. Pereopods 3 & 4, article 6 with more or less prominent postero-distal incision ..... *S. spinosa* Vosseler

Pereopod 7 articles normal; article 6 length more than twice width. Pereopods 3 & 4 without incision.....32

32. Pereopod 5, article 6 distinctly longer than half article 5. Uropod 1, inner margin with large teeth.....*S. borealis* (Sars)
Pereopod 5, article 6 distinctly shorter than half article 5. Uropod 1, inner margin with serrations but not large teeth 33

33. Pereopod 5, article 6 length slightly less than half article 5. Uropod 1, exopod length about one-eighth endopod.....*S. curvidactyloides* sp. nov.
Pereopod 5, article 6 length about one-third (or less) article 5. Uropod 1, exopod reduced to small spine 34

34. Pereopod 6, dactyl long, sometimes curved upwards. Pereopod 7, dactyl much shorter than that of pereopod 6 but longer than that of pereopod 5 .....*S. crassicornis* (Fabricius)
Pereopods 6 & 7, dactyls of similar length 35

35. Pereopods 3–7, dactyls very short; those of pereopods 6 & 7 convex, hook-shaped. Pereopod 7, article 6 equal to or slightly longer than article 5 .....*S. curvidactyla* Chevreux
Pereopods 3–7, dactyls of medium length, maybe curved but not hook-shaped. Pereopod 7, article 6, distinctly shorter than article 5 ..... *S. curilensis* Vinogradov

Genus *Acanthoscina* Vosseler, 1900

A. birsteini Vinogradov, 1976

Material examined. Three females (2.0, 2.2 & 2.4 mm) from stations CSN 812 & 830.

Remarks. Characteristic features of this species, compared to *A. acanthodes* (Stebbing, 1895), are the long dactyls of pereopods 1 and 2 and the relatively longer article 2 of pereopod 5 (Vinogradov, 1976). It is likely that some previous records of *A. acanthodes* are this species as the genus was considered to be monotypic. In particular the figures given for *A. acanthodes* by Yoo (1971) bear more resemblance to *A. birsteini* than *A. acanthodes*.

The only previous record of this species is the original one by Vinogradov (1976) from the central Pacific Ocean (7°36'N; 162°01'E) in 0–3500 m. It is a new record for the western North Pacific Ocean.

Acanthoscina sp.

Material. One juvenile (1.0 mm) from station CSN 986.

Remarks. The body segments of this specimen are without dorsal spines but it clearly belongs to *Acanthoscina* as articles 4–6 of pereopod 5 are fused. It exhibits some of the juvenile features of *Scina* species in that the articles of the pereopods and uropods are not elongated.

Acknowledgments

I thank Dr. Sigeru Motoda and his successor Dr. Tadashi Kubota, Curator, Marine Biological Center, Tokai University for sending me the hyperiid subsamples from the CSK collections and collection data. I am also grateful to Dr. Val Sergeev, South Australian Department of Fisheries and Dr. Eric Matthews, SAM, for assistance with translating Russian texts.

References

Bovallius, C. 1887. Contributions to a monograph of the Amphipoda Hyperiidea I: 1. The families Tyronidae, Lanceolidae and Vibilidae. K. Svenska Vet.-Akad. Handl., 21: 1–72.

Brusca, G.J. 1978. Contributions to the knowledge of hyperiid amphipods of the family Scinidae from near Hawaii, with a description of a new species, *Scina hawaiensis*. Pac. Sci., 32: 281–292.

Bulycheva, A.I. 1955. Hyperiids (Amphipoda-Hyperiidea) of the north-western part of the Pacific Ocean. Zool. Zh., Dokady Akad. nauk SSSR, 10: 1047–1050. (In Russian)

Chevreux, E. 1914. Sur quelques Amphipodes pélagiques nouveaux ou peu connus, provenant des campagnes de S.A.S. le Prince de Monaco. I. Scinidae. Bull. Inst. Océanogr. Monaco, 291: 1–10.

————. 1919. Révision des Scinidae provenant des campagnes de S.A.S le Prince de Monaco. Bull. Inst. Océanogr. Monaco, 352: 1–24.

Chuang, S-H. 1977. C.S.K. Zoolpankton Data Report No. 5–9. Regional Marine Biological Center, University of Singapore, Singapore Univ. Press.

Dick, R.I. 1970. Hyperiidea (Crustacea: Amphipoda) keys to South African genera and species, and a distribution list. Ann. S. Afr. Mus., 57: 25–86.

Hurley, D.E. 1956. Bathypelagic and other Hyperiidea from Californian waters. Occ. Pap. Allan Hancock Foundn., 18: 1–25.

————. 1960. Pelagic Amphipoda of the N.Z.O.I. Pacific cruise, March 1958. N.Z. J. Sci., 3: 274–289.

Kubota, T. 1984. CSK International Zooplankton Collection deposited in Marine Biological Center Tokai University. Pp. 1–15. Marine Biological Center, Tokai University, Shimizu, Japan.

Motoda, S. 1980. CSK International Zooplankton Collection. Bull. Plankton Soc. Japan, 27: 41–45.

Pirlot, J.M. 1929. Résultats zoologiques de la croisiére Atlantique de l' 'Amauer Hansen'. I Les amphipodes hypérides. Mém. Soc. Roy. Sci. Liége, Ser. 3, 15: 1–196.

Stebbing, T.R.R. 1895. Descriptions of nine new species of amphipodous crustaceans from the tropical Atlantic. Trans. Zool. Soc. London, 13: 349–371.

Thurston, M.H. 1976. The vertical distribution and diurnal migration of the Crustacea Amphipoda collected during the SOND cruise, 1965. II. The Hyperiidea and general discussion. J. Mar. Biol. Ass. U.K., 56: 383–470.

Vinogradov, M.E. 1956. Amphipoda-Hyperiidea of the western Bering Sea. Zool. Zh., Akad. nauk SSSR, 35: 194–218. (In Russian)

————. 1957. Hyperiids (Amphipoda) of the north-western Pacific Ocean. 1. Tribe Hyperiidea Physosomata. Trudy Inst. okeanol., Akad. nauk SSSR, 20: 186–227. (In Russian) (English translation: Marine Biology, pp. 149–184. American Institute of Biological Sciences, Washignton, D.C., 1959)

————. 1960. Hyperiidea Physosomata of the tropical Pacific Ocean. Trudy Inst. okeanol., Akad. nauk SSSR, 41: 198–247. (In Russian)

————. 1964. Hyperiidea Physosomata from the northern part of the Indian Ocean. Trudy Inst. okeanol., Akad. nauk SSSR, 65: 107–151. (In Russian)

————. 1970. New data on the amphipods Hyperiidea Physosomata of the north-western part of the Pacific Ocean. Trudy Inst. okeanol., Akad. nauk SSSR, 86: 382–400. (In Russian) (English translation: Fauna of the Kurile-Kamchatka Trench and its Environment: 398–418. Jerusalem: Israel Program for Scientific Translations, 1972)

————. 1976. New species of hyperiids (Amphipoda Hyperiidea) from the tropical regions of the Pacific Ocean. Trudy Inst. okeanol., Akad. nauk SSSR, 105: 130–134. (In Russian)

————, Volkov, A.F. & Semenova, T.N. 1982. "Amfipody-Giperiidy (Amphipoda, Hyperiidea) Mrovogo Okeana." Opredeliteli Po Faune SSSR, Zool. Inst. Akad. nauk SSSR, No. 132, 492 pp., Leningrad. (In Russian)

Wagler, E. 1926. Amphipoda 2: Scinidae der Deutschen Tiefsee-Expedition. Wiss. Ergebn. Deutsch. Tiefsee-Exped. "Valdivia" 1898–1899, 20: 317–446.

————. 1927. Die Scinidae der Deutschen Sudpolar-Expedition. Deutsch Sudpol.-Exped., 19: 85–111.

Yamazi, I. 1971. Data Rep. and distributional maps of the CSK Standard Zooplankton Samples. Misc. Rep. Nat. Sci. Mus., 6: 1–703.

Yoo, K.I. 1971. Pelagic hyperiids (Amphipoda-Hyperiidea) of the western North Pacific. J. Nat. Acad. Sci. Republ. Korea, Nat. Sci. Ser., 10: 39–89.