

# First Record of *Cyclothone parapallida* (Gonostomatidae) from the Pacific Ocean, with Notes on Its Geographic Distribution

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*Cyclothone parapallida* Badcock was separated from *C. pallida* Brauer on the basis of tropical eastern Atlantic specimens (Badcock, 1982). Since then, a single specimen from off Madeira, eastern North Atlantic (Swinney, 1987) and 14 specimens from off Angola, western coast of central Africa (Miya, 1994), constitute the only known additional records published of *C. parapallida*.

During the R/V *Hakuho Maru* cruise to the central equatorial Pacific (KH-90-2), sixteen examples of *C. parapallida* were found among 2524 *Cyclothone* individuals. Later examinations of bathypelagic *Cyclothone* specimens from various localities revealed that the species also occurs in western tropical areas of both the Pacific and Atlantic oceans. The range

extension is documented here, along with notes on some selected meristic characters that have been reported as useful for separating *C. parapallida* and *C. pallida*.

In this account, methods for measurements and counts followed Hubbs and Lagler (1949). Institutional abbreviations are as listed in Leviton et al. (1985), with the addition of Natural History Museum and Institute, Chiba (CBM). Abbreviations of sampling gear are as follows: ORI-33/69 (Ocean Research Institute ring net with 1.6-m mouth diameter and 0.33/0.69-mm mesh); 10-ft IKMT (Isaacs-Kidd Midwater Trawl with 10-foot width); S150 (Stramin ring net, 150-cm mouth diameter); E300 (ring-trawl, 300-cm diameter); w.o. = length of wire out in meters.

**Geographic distribution.**—*Cyclothone parapallida* was recorded from 15 localities, representing three major regions (Fig. 1); six stations in the central equatorial Pacific, five in the Solomon and Coral seas, and four off north-east Brazil. *C. parapallida* specimens were not found in bathypelagic *Cyclothone* specimens from the tropical Indian Ocean (seven stations), Flores Sea (four stations) and eastern tropical Pacific Ocean (two stations) (Fig. 1).

In the original description of *C. parapallida*, Badcock (1982) included the possibility of a cosmopolitan distribution of the species, as in *C. pallida*, noting

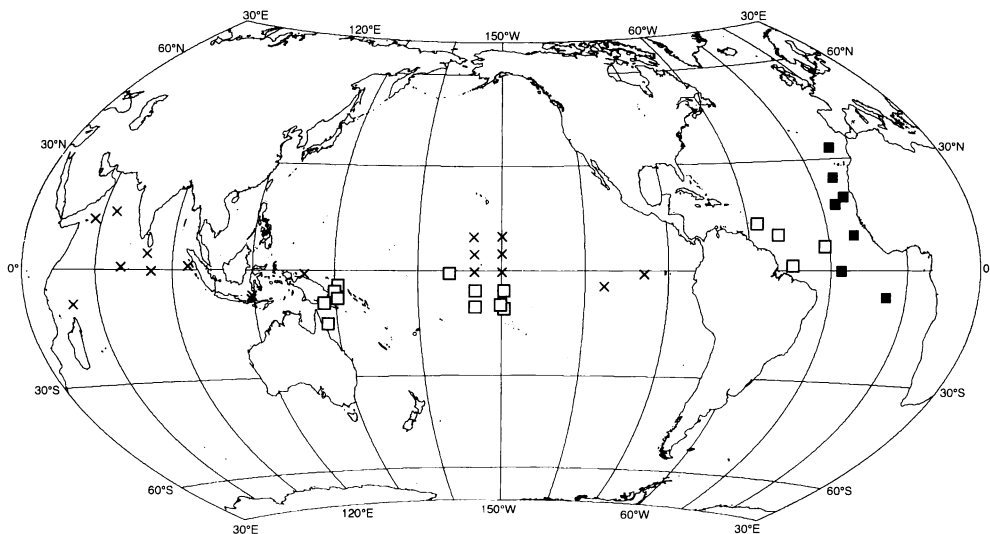


Fig. 1. Geographic distribution of *Cyclothone parapallida*. □: present study; ■: Badcock (1982), Swinney (1987) and Miya (1994); ×: specimens not recorded from samples. Duplicated tows at the same stations are not shown.

the similarity of Atlantic distribution of the former to that of *C. obscura* Brauer. He suggested, however, that further afield, *C. parapallida* distribution may differ from that of the latter, i.e. not being tropical, owing to the possible lower frequencies of “*parapallida*”-type counts in the revisionary studies of Mukhacheva (1964, 1974) and Kobayashi (1973), whose data were primarily of subtropical and tropical origin. Accordingly, he speculated that the distribution of *C. parapallida* may be similar to that of the alternatively deep meso- and shallow bathypelagic sternoptychid, *Sternoptyx pseudodiaphana* Borodulina, which has both a tropical Atlantic population and a circum-global, subtropical convergence population. This speculation, however, is supported nei-

ther by the present study (Fig. 1) nor by an extensive survey of Southern Ocean *Cyclothone*, which failed to record *C. parapallida* from waters around the subtropical convergence (Miya, 1994). The distribution patterns of *C. parapallida* and *C. obscura* in the Pacific and Atlantic were similar in as much as the latter occurred at every station from which the former was recorded. *C. obscura*, however, seems to be a more wide-ranging species, owing to its occurrence in all of the samples examined in the present study, including those collected in the eastern tropical Pacific, Flores Sea and tropical Indian Ocean (Miya, unpubl. data). Future, more extensive surveys of bathypelagic *Cyclothone* species from the latter areas will reveal whether or not *C. parapallida*

Table 1. Selected meristic characters of *Cyclothone parapallida* and *C. pallida* from various localities

Fin rays	Dorsal					Anal								
	<i>n</i>	12	13	14	15	<i>n</i>	16	17	18	19	20			
<i>C. parapallida</i>														
Central Pacific	19	—	—	17	2	19	—	—	2	15	2			
Western Pacific	22	—	3	16	3	23	—	—	12	10	1			
Western Atlantic	9	—	—	9	—	9	—	2	2	5	—			
Eastern Atlantic*	27	—	1	22	4	19	—	—	11	8	—			
<i>C. pallida</i>														
Central Pacific	20	—	—	18	2	30	—	9	19	2	—			
Atlantic*	115	1	27	76	11	114	1	29	74	10	—			
Vertebrae		Precaudal			Caudal			Total						
	<i>n</i>	12	13	14	18	19	20	31	32	33				
<i>C. parapallida</i>														
Central Pacific	19	—	17	2	1	15	3	—	15	4				
Western Pacific	44	—	44	—	—	40	4	—	40	4				
Western Atlantic	9	—	7	2	2	6	1	—	8	1				
Eastern Atlantic*	57	—	—	—	—	—	—	12	40	5				
<i>C. pallida</i>														
Central Pacific	20	2	18	—	3	16	1	4	16	—				
Atlantic*	42	—	—	—	—	—	—	27	14	1				
Gill rakers		Upper			Lower				Total					
	<i>n</i>	8	9	10	13	14	15	16	21	22	23	24	25	26
<i>C. parapallida</i>														
Central Pacific	18	13	5	—	3	15	—	—	4	11	3	—	—	—
Western Pacific	20	1	15	4	8	11	1	—	1	6	10	2	1	—
Western Atlantic	9	4	5	—	6	3	—	—	2	6	1	—	—	—
Eastern Atlantic*	68	—	—	—	—	—	—	—	39	24	5	—	—	—
<i>C. pallida</i>														
Central Pacific	30	2	21	7	2	19	8	1	1	2	17	4	5	1
Atlantic*	237	—	—	—	—	—	—	—	—	17	143	59	17	1

\* Data from Badcock (1982).

exhibits a circum-equatorial distribution.

**Taxonomic remarks.**—*Cyclothone parapallida* was separated from *C. pallida* on the basis of the following characters, as outlined by Badcock (1982): internasal area, and the dorsal and anal fins, and their bases colorless; posterior limit of pigmented meningeal area level with posterior margin of eye. Badcock (1982) reported that *C. parapallida* was also distinguished from *C. pallida* by its lower gill raker count (21–22 [23] vs. 23–24 [22–26]), although such a distinction was less obvious in the specimens examined here (21–23 [21–25] vs. 22–25 [21–26], see Table 1). In addition, considerable overlaps in other meristics, such as dorsal and anal fin ray, and vertebral counts, occurred in the two species (Table 1). It should be noted that significant intraspecific differences in these meristics, except for dorsal-fin ray counts and caudal vertebral counts, occurred between localities (Kruskal-Wallis test,  $p < 0.05$ ).

### Material Examined

*Cyclothone parapallida*.—CBM-ZF (16 specimens, 28.7–59.6 mm standard length [SL], all taken during KH-90-2 cruise, R/V *Hakuho Maru*): 1264, 3775 (2, 48.6, 59.6), 27 Sept. 1990, 0°02.1'S, 170°01.2'W, Sta. 7, ORI-69, depth 0–1862 m; 1323, 3779–3782 (5, 40.3–53.0), 6 Oct. 1990, 5°01.9'S, 160°03.0'W, Sta. 11, 10-ft IKMT, depth 0–1380 m; 498 (1, 33.8), 8 Oct. 1990, 10°01.2'S, 160°01.9'W, Sta. 12, ORI-69, depth 0–1108 m; 1332, 3783–3785 (4, 37.5–56.5), 9 Oct. 1990, 10°02.2'S, 160°00.5'W, Sta. 12, 10-ft IKMT, depth 0–1650 m; 1342 (1, 28.7), 17 Oct. 1990, 10°00.6'S, 149°56.1'W, Sta. 13, 10-ft IKMT, depth 0–1400 m; 1350, 3776 (2, 46.2, 38.6), 18 Oct. 1990, 5°01.6'S, 150°00.5'W, Sta. 14, ORI-69, depth 0–1400 m; 1352 (1, 58.0), 18 Oct. 1990, 5°00.5'S, 149°58.0'W, Sta. 14, 10-ft IKMT, depth 0–1345 m. SIO 61-48 (4 specimens, 55.5–63.4 mm SL), 26 Mar. 1961, 8°05.0'S, 151°44.4'W, 10-ft IKMT, depth 0–2500 m. MCZ (54 specimens, 26.0–75.8 mm SL): 97162 (10, 36.8–43.7), 30 Nov. 1981, Coral Sea, 11°46'S, 145°00'E, R/V *Lady Basten*, depth 0–1130 m; 97172 (5, 37.8–49.5), 6 Dec. 1981, Coral Sea, 15°53'S, 146°44'E, R/V *Lady Basten*, depth 0–825 m; 97186 (7, 38.8–75.8), 23 May 1981, Solomon Sea, 4°55'S, 152°30'E, R/V *Lady Basten*, depth 1180 m; 97187 (13, 33.3–63.6), 15 May 1981, Solomon Sea, 7°24'S, 150°49'E, R/V *Lady Basten*, depth 1190 m; 97189 (10, 32.1–66.1), 14 May 1981, Solomon Sea, 9°41'S, 151°43'E, R/V *Lady Basten*, depth 1170 m; 101856 (2, 38.0, 46.3), 23 July 1983, off Brazil, 7°06.9'N, 33°29.3'W, R/V *Columbus Iselin*, Cruise 8307, 2000 m w.o.; 101857 (3, 33.6–43.3), 29 July 1983, off Brazil, 10°46.8'N, 49°01.3'W, R/V *Columbus Iselin*, Cruise 8307, 2000 m w.o.; 101859 (1, 68.2), 1 Aug. 1983, off Brazil, 13°49.0'N, 56°00.0'W, R/V *Columbus Iselin*, Cruise 8307, 5000 m w.o.; 101860 (3, 26.0–34.2), 14 July 1983, off Brazil, 2°36.3'N, 45°55.4'W, R/V *Columbus Iselin*, Cruise

8307, 1124 m w.o. ZMUC uncataloged (1, 55.3), 1 Mar. 1930, 7°34'S, 8°48'W, Dana Sta. 3998 (9), S150, 3000 m w.o.

*Cyclothone pallida*.—CBM-ZF (30 specimens, 32.1–57.7 mm SL, all taken during KH-90-2 cruise, R/V *Hakuho Maru*): 1241, 3767 (8, 39.7–54.3), 14 Sept. 1990, 5°07.3'N, 179°59.4'W, Sta. 3, 10-ft IKMT, depth 0–843 m; 1353 (3, 43.1–52.5), 18 Oct. 1990, 5°00.5'S, 149°58.0'W, Sta. 14, 10-ft IKMT, depth 0–1345 m; 3755–3757 (3, 46.2–50.0), 6 Oct. 1990, 5°01.9'S, 160°03.0'W, Sta. 11, 10-ft IKMT, depth 0–1380 m; 3758 (1, 50.1), 2 Oct. 1990, 5°02.0'N, 160°02.6'W, Sta. 9, ORI-69, depth 0–1679 m; 3759, 3760 (3, 46.2–57.7), 27 Sept. 1990, 0°08.5'S, 170°06.7'W, Sta. 7D, 10-ft IKMT, depth 0–1645 m; 3761 (1, 53.0), 22 Oct. 1990, 9°58.9'N, 150°00.7'W, Sta. 17, ORI-69, depth unknown; 3762–3764 (3, 34.5–50.8), 8–9 Oct. 1990, 10°02.2'S, 160°00.5'W, Sta. 12, 10-ft IKMT, depth 0–1645 m; 3765, 3766 (2, 36.9, 44.5), 1 Oct. 1990, 0°00.3'N, 160°00.6'W, Sta. 8, ORI-69, depth 0–1197 m; 3768, 3769 (2, 52.2, 32.1), 18 Oct. 1990, 5°01.6'S, 150°00.5'W, Sta. 14, ORI-69, depth unknown; 3770, 3771 (2, 48.4, 52.5), 11 Sept. 1990, 4°58.6'N, 179°57'2E, Sta. 1, ORI-33, depth 0–1125 m; 3772, 3773 (2, 50.2, 51.3), 13 Sept. 1990, 9°58.1'N, 179°57.8'E, Sta. 2, ORI-33, depth 0–957 m.

*Other lots examined*.—CBM uncataloged: R/V *Hakuho Maru*, Cruise KH-85-1, Sta. D, 13 Feb. 1985, 6°40.3'S, 119°57.0'E, 10-ft IKMT, depth 0–1219 m; Sta. E-1, 15 Feb. 1985, 7°22.6'S, 119°35.2'E, 10-ft IKMT, depth 0–1391 m; Sta. E-2, 15 Feb. 1985, 7°22.1'S, 119°38.0'E, 10-ft IKMT, depth 0–1979 m; Sta. E-5, 15 Feb. 1985, 7°30.5'S, 119°42.5'E, 10-ft IKMT, depth 0–1826 m; Cruise KH-89-2, Sta. 16, 23 Jan. 1990, 13°54'N, 57°35'E, 10-ft IKMT, depth 0–1700 m; Sta. 18, 25 Jan. 1990, 15°00'N, 85°01'E, 10-ft IKMT, depth 0–1870 m; Sta. 19, 4 Feb. 1990, 0°00', 80°04'E, 10-ft IKMT, depth 0–1510 m; Cruise KH-90-2, Sta. 8, 1 Oct. 1990, 10°04.6'N, 159°57.1'W, 10-ft IKMT, depth 0–1465 m; Sta. 9, 2–3 Oct. 1990, 4°58.9'N, 160°01.7'W, 10-ft IKMT, depth 0–1370 m; Sta. 10, 4 Oct. 1990, 0°01.0'N, 159°56.9'W, depth 0–1435 m; Sta. 10, 4 Oct. 1990, 0°02.0'N, 159°51.3'W, 10-ft IKMT, depth 0–1550 m; Sta. 15, 20 Oct. 1990, 0°01.4'S, 149°56.5'W, 10-ft IKMT, depth 0–1380 m; Sta. 16, 21 Oct. 1990, 4°56.3'N, 150°06.1'W, 10-ft IKMT, depth 0–1130 m; Sta. 17, 22 Oct. 1990, 9°58.5'N, 150°01.5'W, 10-ft IKMT, 3500 m w.o.

ZMUC uncataloged: Dana Sta. 3558 (1), 18 Sept. 1928, 0°18'S, 99°07'W, E300, 4000 m w.o.; 3571 (1), 24 Sept. 1928, 4°20'S, 116°46'W, E300, 5000 m w.o.; (2), S150, 4000 m w.o.; 3768 (1), 24 July 1929, 1°20'S, 138°42'E, E300, 4000 m w.o.; 3828 (5), 13 Sept. 1929, 1°42'N, 96°05'E, E300, 4000 m w.o.; 3909 (2), 22 Nov. 1929, 5°21'N, 80°38'E, E300, 4500 m w.o.; 3917 (1), 5 Dec. 1929, 1°45'N, 71°05'E, E300, 4200 m w.o.; (2), S150, 3700 m w.o.; 3933 (1), 20 Dec. 1929, 11°18'S, 50°03'E, E300, 4000 m w.o.; (2), S150, 3500 m w.o.

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### 太平洋初記録のヨコエソ科魚類チヒロウスオニハダカ (新称)ならびにその地理分布

宮 正樹

中部赤道太平洋から採集された 2524 個体のオニハダカ属魚類(ヨコエソ科)の試料中に、16 個体のチヒロウスオニハダカ(新称) *Cyclothone parapallida* Badcock が見いだされた。本種は東大西洋熱帯・亜熱帯海域産の標本に基づく原記載以来、大西洋以外からの記録はなく、今回の標本が太平洋からの初記録となる。さらに、三大洋の熱帯海域深層帯から得られたオニハダカ属魚類の標本を調べたところ、ソロモン海とサング海(西太平洋)ならびにブラジル沖(西大西洋)の 2 海域から新たな記録が得られ、本種が太平洋と大西洋の熱帯海域に広く分布することが示唆された。しかしながら、東太平洋およびインド洋熱帯海域における本種の出現を確認できなかったため、同属のクロオニハダカ *C. obscura* のような周赤道分布を示すかどうかは明らかにできなかった。本種とその近縁種ウスオニハダカ *C. pallida* の識別形質として有効であったいくつかの計数形質は、太平洋産のものでは大きく重複し、海域間でも有意な差が認められるため、頭部背面および背鰭と臀鰭の鰭条と基底における色素パターンの違いのみが両種の識別形質として有効であることがわかった。

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