

## Report on the Fishes Collected by Ring Net and ORI Net during the Seisui-maru Nansei Islands Research Cruise 1992

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### Abstract

A total of 16 surface-horizontal hauls using a 130 cm Ring net and a total of 6 oblique/oblique-horizontal hauls using an ORI net were operated during the Seisui-maru Nansei Islands Research Cruise, November 1992. Fishes collected by these nets were listed and the characteristics of ichthyofaunas along the cross section of the Kuroshio current and off the east coast of the Okinawa Island were commented. A total of 298 fishes were classified into 36 families, >43 genera and >47 species; of these gonostomatid and myctophid fishes were abundant. Additionally, the morphological character of a metamorphosing leptocephalus of Japanese eel, *Anguilla japonica* collected in this cruise was described.

**Key Words:** ichthyofauna • Kuroshio current • Okinawa Island • *Anguilla japonica* • leptocephalus

### Introduction

The T/V Seisui-maru, Mie University, cruised from 17 to 25 November 1992, with a view to study of microorganism, plankton and micronecton in the waters off the Kii Peninsula and around the Nansei Islands (Seisui-maru Nansei Islands Research Cruise: 92-16). In order to investigate the species composition and distribution patterns of fish larvae in the Kuroshio current and waters off the Nansei Islands, a total of 16 surface-horizonta hauls using a 130 cm Ring net and 6 oblique/oblique-horizontal hauls using an ORI net were operated. In this paper, we report the lists of the fishes collected by these nets and comment on the characteristics of ichthyofauna in these regions.

A metamorphosing leptocephalus identified as Japanese eel, *Anguilla japonica* was collected by oblique-horizontal tow of an ORI net off the east coast of the Okinawa Island. The biological characters, such as morphology, spawning ground, distribution area and early growth of Japanese eel at

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leptocephalus stage were made clear, but those at metamorphosing stage are still unknown, there being only one report described by TABETA and TAKAI<sup>1)</sup>. We describe its morphological character.

### Materials and Methods

The fishes were collected by 16 surface-horizontal hauls using a 130 cm Ring net and 6 oblique/oblique-horizontal hauls using an ORI net during the research cruise (Tables 1 and 2). The specimens were fixed in 10 % buffered sea water formalin immediately after collection. Then the fishes were sorted and preserved in 5 % buffered formalin.

The specimens were identified to the lowest taxon possible according to NAKABO<sup>2)</sup> and OKIYAMA<sup>3)</sup> in general. In the observation of leptocephali, myomere counts and measurements followed the methods described by JESPERSEN<sup>4)</sup>, CATSL<sup>5)</sup>, and TABETA and TAKAI<sup>1)</sup>. The specimens used in this study are

Table 1. Station list of a 130 cm Ring net hauls

St.No.	Location		Date	Time		Towing time (min.)	Ship speed (knt.)	Water temp. (°C)	Remarks
	Start	Finish		Start	Finish				
L1-1	33° 53.50'N	33° 53.01'N	Nov.17,1992	16 : 59	17 : 14	15	2	21.0	Net burst
	136° 27.78'E	136° 27.34'E							
L1-2	33° 52.63'N	33° 52.33'N	Nov.17,1992	17 : 25	17 : 40	15	2	21.0	
	136° 26.90'E	136° 26.65'E							
L2-1	33° 41.56'N	33° 41.14'N	Nov.17,1992	19 : 01	19 : 16	15	2	21.0	
	136° 16.00'E	136° 15.58'E							
L2-2	33° 41.05'N	33° 40.74'N	Nov.17,1992	19 : 18	19 : 33	15	2	21.0	
	136° 15.47'E	136° 14.88'E							
L3-1	33° 13.23'N	33° 12.78'N	Nov.17,1992	23 : 02	23 : 17	15	2	23.6	
	135° 50.26'E	135° 50.68'E							
L3-2	33° 13.68'N	33° 11.84'N	Nov.17,1992	23 : 20	23 : 35	15	2	23.6	
	135° 50.73'E	135° 51.26'E							
L4-1	32° 59.31'N	32° 58.89'N	Nov.18,1992	1 : 16	1 : 31	15	2	24.0	
	135° 40.56'E	135° 40.59'E							
L4-2	32° 58.77'N	32° 58.31'N	Nov.18,1992	1 : 35	1 : 50	15	2	24.0	
	135° 40.60'E	135° 40.59'E							
L5-1	32° 45.44'N	32° 45.00'N	Nov.18,1992	3 : 30	3 : 45	15	2	24.0	
	135° 28.11'E	135° 27.83'E							
L5-2	32° 44.91'N	32° 44.48'N	Nov.18,1992	3 : 48	4 : 03	15	2	24.0	
	135° 27.78'E	135° 27.49'E							
L6	26° 02.53'N	26° 02.78'N	Nov.21,1992	11 : 58	12 : 08	10	3	25.1	
	127° 47.39'E	127° 47.52'E							
L7	26° 07.49'N	26° 07.94'N	Nov.21,1992	14 : 29	14 : 49	20	2	25.1	
	127° 58.80'E	127° 59.68'E							
L8	26° 31.78'N	26° 32.71'N	Nov.21,1992	18 : 58	19 : 18	20	2	25.1	
	128° 21.88'E	128° 21.85'E							
L9	26° 33.32'N	26° 34.03'N	Nov.21,1992	19 : 30	19 : 45	15	2	25.1	
	128° 21.84'E	128° 21.86'E							
L10	33° 06.98'N	33° 06.98'N	Nov.24,1992	18 : 21	18 : 36	15	2	23.9	
	134° 49.97'E	134° 49.97'E							
L11	33° 07.25'N	33° 07.25'N	Nov.24,1992	18 : 38	18 : 53	15	2	23.9	
	134° 51.65'E	134° 51.65'E							

Table 2. Station list of a ORI net hauls

St.No.	Location		Date	Time		Wire out (m)	Sampling layer (m)	Ship speed (knt.)	Towing method
	Start	Finish		Start	Finish				
ORI-1	26° 02.76'N 127° 47.01'E	26° 02.02'N 127° 48.38'E	Nov.21,1992	11 : 51	12 : 23	300	0-130	2	Obl.+15 min. Hor.
ORI-2	26° 07.40'N 127° 58.68'E	26° 07.95'N 127° 59.89'E	Nov.21,1992	14 : 25	14 : 57	300	0-140	2	Obl.+15 min. Hor.
ORI-3	26° 07.98'N 128° 00.06'E	26° 08.06'N 128° 00.56'E	Nov.21,1992	15 : 02	15 : 19	300	0-150	2	Obl.
ORI-4	26° 08.24'N 128° 00.76'E	26° 08.00'N 128° 02.04'E	Nov.21,1992	15 : 21	15 : 55	300	0-160	2	Obl.+15 min. Hor.
ORI-5	26° 31.66'N 128° 21.90'E	26° 33.03'N 128° 21.83'E	Nov.21,1992	18 : 55	19 : 25	150	—	2	Obl.+20 min. Hor.
ORI-6	26° 33.23'N 128° 21.83'E	26° 34.40'N 128° 21.85'E	Nov.21,1992	19 : 29	19 : 52	150	0-70	2	Obl.+15 min. Hor.

deposited at the Fisheries Research Laboratory, Mie University (FRLM).

## Results and Discussion

### *General aspects of ichthyofauna in the cruise.*

A total of 298 fishes, collected in the cruise (Tables 3 and 4), were classified into 36 families, >43 genera and >47 species. Of these the families Gonostomatidae and Myctophidae were abundant, comprising about 34 % and 38 %, respectively. Fishes were concentrated in larval and juvenile stages of epi/bathy-pelagic fishes distributed in temperate through tropical waters. The numbers of fishes were averaged ca. 10 and 23 at each haul of a 130 cm Ring net and an ORI net, respectively.

### *Cross sectional survey of Kuroshio current off Kii Peninsula.*

The Kuroshio current was crossed during the stations L1–L5 (Table 1). A total of 106 fishes were collected by surface-horizontal tow of a 130 Ring net during this section.

From surface water temperature, and current draft and speed (water depth of 5, 50 and 100 m), stations L1 and L2 were in the inshore regions of the Kuroshio current, stations L3 and L4 were in the Kuroshio current, and station L5 was in the offshore region of the Kuroshio current. Sampling at station L1-1 was failed because the net bursted and the sampling time at this station was before sunset. Larvae of *Myctophum* spp. (Myctophidae) were predominant (ca. 61 %) in the inshore region of the Kuroshio current (Sts. L1 and L2). In the Kuroshio current (Sts. L3 and L4), tropical/sub-tropical species, such as *Diplophos taenia* (Gonostomatidae) and *Symbolophorus evermanni* (Myctophidae), were abundant. In the offshore region of the Kuroshio current (St. L5), the total number and kinds of fishes decreased. The result of this survey reflected the oceanographic conditions of the Kuroshio regions.

### *Fishes collected off the east coast of Okinawa Island.*

Three stations (Sts. L6–L8) of a 130 cm Ring net and six stations (Sts. ORI-1–ORI-6) of an ORI

Table 3. List of the fishes collected by a 130 cm Ring net during 92-16 research cruise of the T/V Seisui-maru

Order	Family	Species	L1-1	L1-2	L2-1	L2-2	L3-1	L3-2	L4-1	L4-2	L5-1	L5-2	L6	L7	L8	L9	L10	L11	Total	
Anguilliformes	Congridae	Congridae spp.			1				2	1	1	3						2	10	
Clupeiformes	Clupeidae	<i>Etrumeus teres</i>				1													1	
	Engraulididae	<i>Engraulis japonicus</i>					1												1	
	Engraulididae	Engraulididae sp.													1				1	
Gonorynchiformes	Gonorynchidae	<i>Gonorynchus abbreviatus</i>							1										1	
Salmoniformes	Bathylagidae	<i>Lipolagus ochotensis</i>															1		1	
Stomiiformes	Gonostomatidae	<i>Diplophos taenia</i>				4	2	7	7	1					3	2			26	
		<i>Cyclothone</i> sp.										1							1	
		<i>Gonostoma</i> spp.																5	5	
	Astronesthidae	<i>Astronesthes cyaneus</i>					1												1	
	Astronesthidae	<i>A. sp.</i>										1							1	
Aulopiformes	Synodontidae	<i>Trachinocephalus myops</i>							1						1				2	
Myctophiformes	Myctophidae	<i>Centrobranchus andreae</i>													1				1	
		<i>C. brevirostris</i>					1			1							1		3	
		<i>C. chaerocephalus</i>									1									1
		<i>Hygophum proximum</i>									2	1	2							5
		<i>Symbolophorus evermanni</i>				1		2	6	12	6									27
		<i>Myctophum</i> spp.			11	3	3	6	1	1						13	10		1	49
		<i>Myctophidae</i> spp.								1							2			3
	Evermannellidae	Evermannellidae sp.															1		1	
Beloniformes	Hemiramphidae	Hemiramphidae sp.																	1	
		Exocoetidae	Exocoetidae spp.																	2
		Scomberesocidae	<i>Cololabis saira</i>					1												1
Syngnathiformes	Macroramphosidae	<i>Macroramphosus scolopax</i>	1																1	
Perciformes	Serranidae	Serranidae sp.		1															1	
	Labracoglossidae	<i>Labracoglossa argentiventris</i>		4															4	
	Bramidae	Bramidae sp.													1				1	
	Pomacentridae	Pomacentridae sp.							1										1	
	Labridae	<i>Xyrichtys</i> sp.													1				1	
Pleuronectiformes	Bothidae	<i>Bothus</i> sp.					1												1	
Unidentify																	8	8		
Total			1	5	13	5	12	15	26	19	3	7	0	2	19	15	15	6	163	

net were hauled in the area off the Nakagusuku Bay, east coast of the Okinawa Island (see Tables 1 and 2). A total of 156 fishes, collected by these tows (see Tables 3 and 4), were classified into 23 families, >28 genera and >30 species. Of these, larvae of Gonostomatidae were abundant, comprising about 46 %.

These stations established off the Nakagusuku Bay were intended in vain to collect the larvae of coastal species, such as Haemulidae, Gerreidae and Leiognathidae (Perciformes). The kinds and number of coastal fishes were only 3 taxa (*Xyrichtys* sp., Scaridae sp., Gobiidae sp.) and 6 individuals, respectively.

#### Description of Japanese eel metamorphosing leptocephalus.

A metamorphosing leptocephalus identified to Japanese eel, *Anguilla japonica*, (FRLM 13781, Fig. 1) was collected by oblique-horizontal tow of an ORI net at St. ORI-5 (see Table 2). Measurement in mm:

Table 4. List of the fishes collected by an ORI net during 92-16 research cruise of the T/V Seisui-maru

Order	Family	Species	ORI-1	ORI-2	ORI-3	ORI-4	ORI-5	ORI-6	Total
Anguilliformes	Anguillidae	<i>Anguilla japonica</i>					1		1
	Muraenidae	Muraenidae sp.	1						1
	Ophichthidae	Ophichthidae sp.						1	1
	Congridae	Congridae sp.					1		1
	Serrivomeridae	Serrivomeridae sp.					1		1
	Nemichthyidae	<i>Nemichtys scolopaceus</i>		2					2
Stomiiformes	Gonostomatidae	Gonostomatidae spp.	1	1	1			66	69
	Phosichthyidae	<i>Vincigueria nimbaria</i>					1		1
		<i>V. poweriae</i>					1		1
		<i>V. sp.</i>					4	3	7
		Phosichthyidae sp.						1	1
	Chauliodontidae	<i>Chauliodus sp.</i>			1				1
Astronesthidae	<i>Astronesthes sp.</i>		1					1	
Aulopiformes	Scopelarchidae	Scopelarchidae sp.	1	3	1				5
	Notosudidae	<i>Scopelosaurus sp.</i>			2			1	3
Myctophiformes	Myctophidae	Paralepididae sp.					3		3
		<i>Bentosema suborbitale</i>					1	2	3
		<i>Symbolophorus evermanni</i>					1	1	2
		<i>S. sp.</i>					3		3
		<i>Myctophum spp.</i>	1		2				3
		<i>Lampadena luminosa</i>						1	1
Gadiformes	Bregmacerotidae	Bregmacerotidae sp.		1					1
Perciformes	Scaridae	Scaridae sp.					3		3
	Gobiidae	Gobiidae sp.					1	1	2
	Gempylidae	<i>Nesiarchus nasutus</i>			1				1
	Trichiuridae	Trichiuridae sp.				1	1		2
Unidentify				1		2		3	
Total			3	8	9	2	24	89	135

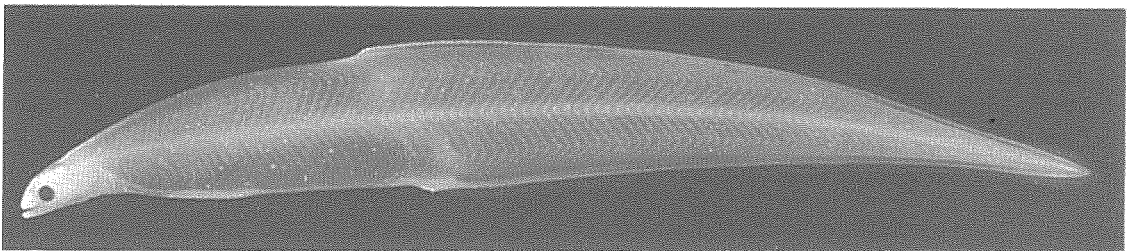


Fig. 1. *Anguilla japonica* metamorphosing leptocephalus, FRLM 13781, 60.0 mm in standard length, collected off the east coast of the Okinawa Island, November 21, 1992.

total length 61.1, standard length 60.0, head length 4.9, snout length 1.1, upper jaw length 1.45, eye diameter 0.8, preanal length 24.0, predorsal length 20.4, depth just before eye 1.89, at pectoral base 3.2, maximum depth 8.4. Total myomeres 117, predorsal 40, preanal 43, 1st vertical blood vessel at 19th myomere, 2nd at 42th myomere, 3rd at 46th myomere. Each fin obvious, dorsal fin rays 249, anal fin rays 202, caudal  $1+2+2+2+2+1=10$ .

Body elongate, compressed. Head and posterior part of tail started to decrease in depth. Head relatively short and rounded like that in adult. The Body color translucent except black pigment confined to the chorionoid of eye. Teeth absent. Thus the present leptocephalus was identified as *A. japonica* from these characteristics of body form, pigmentation and myomere counts. From the body shape, especially round head and slightly decreased depth of the posterior part of the tail, this specimen seems to be just in the metamorphosis and agrees well with the metamorphic stage leptocephalus described by TABETA and TAKAI<sup>1)</sup>.

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### References

- 1) TABETA, O. and T. TAKAI. Leptocephali of *Anguilla japonica* found in the waters south of the Okinawa Islands. *Nippon Suisan Gakkaishi*, 41 (2) : 137-145 (1975).
- 2) NAKABO, T. Fishes of Japan with pictorial keys to the species. Tokai Univ. Press, i-xxxiv+p1-1474 (1993). (In Japanese)
- 3) OKIYAMA, M. An atlas of the early stage fishes in Japan. Tokai Univ. Press, i-xii+p1-1154 (1988). (In Japanese)
- 4) JESPERSEN, P. Indo-Pacific leptocephlids of the genus *Anguilla*: Systematic and biological studies. *Dana Rep.*, 22: 1-128, pls. 1-4 (1942).
- 5) CASTLE, P. H. J. *Anguilla* leptocephali in the southwest Pacific. *Zool. Publ. Vic. Univ. Wellington*, 33: 1-14 (1963).

## 1992年度南西諸島航海における丸稚および ORI ネットによって採集された魚類

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1992年11月に行った三重大学生物資源学部練習船勢水丸の南西諸島航海において, 丸稚ネット表層水平曳 (16回) と ORI ネット傾斜曳および傾斜/水平曳 (6回) によって採集した魚類について, その種組成を明らかにするとともに, 黒潮横断測線に沿った魚類相および沖縄島東海岸沖の魚類相の特徴を記載した. さらに, 本航海で採取したウナギ *Anguilla japonica* 変態期仔魚の形態について記載を行った.