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Stomach Content Analysis of Longnose Lancetfish, *Alepisaurus ferox* in the Eastern Indian Ocean and the Coral Sea

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Abstract Stomach contents of 35 specimens of longnose lancetfish *Alepisaurus ferox* Lowe collected by tuna-longline in the eastern Indian Ocean and the Coral Sea were observed and compared with published accounts from various areas. Food organisms of the lancetfish from the eastern Indian Ocean and the Coral Sea consist of Mollusca, Crustacea, Annelida, and Pisces. Five species of fishes are in common as the food in the eastern Indian Ocean and the Coral Sea. *Alepisaurus* young were notably absent from the stomachs of eastern Indian and the Coral Sea lancetfish, whereas, they were found frequently in stomachs from the North Atlantic, the southeastern Pacific, and the southwestern Pacific. The myctophids, believed to be a common prey for piscivorous fishes, were scarcely found in the present study and also published data. Three species of fishes, *Sternoptyx diaphana, Anoplogaster cornuta*, and *Diplospinus multistriatus* were found in common from lancetfish from four widely separated oceans, excluding the northwestern Pacific. Fish composition eaten by the lancetfish from the eastern Indian Ocean were found close to that from the southwestern Pacific Ocean including the Coral Sea.

Introduction

Haedrich (1964) reported food organisms obtained from 40 specimens of lancetfish caught by longline in the North Atlantic Ocean from the offing of New England to the Azores, and Haedrich and Nielsen (1966) investigated fishes found in the stomachs of 140 *Alepisaurus* from the southeastern Pacific Ocean (86~132° W). They noticed a remarkable similarity in piscivorous habits beween the southeastern Pacific and the North Atlantic lancetfish. Fourmanoir (1969) also examined the stomach contents of 110 specimens of *Alepisaurus ferox* caught in the adjacent waters of New Caledonia and New Hebrides, in the southwestern Pacific Ocean, finding a similar phenomenon in preference of food items between the North Atlantic and the southwestern Pacific populations. Kubota and Uyeno (1970) examined the food of 36 *Alepisaurus ferox* stranded on the beach of Miho Beach in the Suruga Bay, Honshu, Japan facing the northwestern Pacific, and presented the interesting fact that their stomachs contained no fish specimens in common with the lancetfish of the North Atlantic and of the southeastern Pacific.

During the winter of 1972 to 1973, the training vessel Umitaka-maru, Tokyo University of Fisheries engaged in fishery surveys of the eastern Indian Ocean and the Coral Sea, and collected 58 specimens of lancetfish.

In the present work the stomach contents of the lancetfish were studied, and compared with the records from other regions.

Material and method

The total of 35 specimens of lancetfish were used in the present study, of which 28 were collected in the eastern Indian Ocean, and 7 in the Coral Sea, Southwest Pacific, all of them taken by tuna-longline.

The longlines in operation were positioned usually from the surface down to about 142 m in depth; the gear was set between 05:00 and 07:00 and hauled up before 17:00 in each operation. The saury (*Cololabis saira*) used as bait was attached to 600 hooks per set of longline. The specimens were fixed in formalin solution (1:9) on board by the first author. The stations of longline operation where lancetfish were hooked are listed in Table 1, and the position shown in Fig. 1.

The size in fork length of the lancetfish collected and the numbers of specimens in parentheses giving first data from the Indian Ocean followed by that from the Coral Sea are as follows:

Table 1. The log of tuna-longline operations by the Umitaka-maru, Tokyo University of Fisheries, in the eastern Indian Ocean and the Coral Sea, 1972～1973 with the number of *Alepisaurus ferox*. Figures in parentheses for *A. ferox* show the number of stomachs containing food items. At each station 600 hooks in total were applied.

Station	Date	Location S. Lat., E. Long.	Estimated maximum depth of gear (m)	Depth of bottom (m)	Number of *A. ferox*
Eastern Indian Ocean:					
1	8 Dec. '72	17°11′, 104°56′	121.8	5760	24 (14)
2	10 Dec. '72	15°53′, 109°16′	76.8	5670	3 (2)
3	11 Dec. '72	15°32′, 111°09′	111.8	5450	14 (10)
4	13 Dec. '72	12°19′, 114°47′	96.8	5100	3 (1)
5	14 Dec. '72	14°19′, 114°55′	94.8	5640	3 (1)
6	15 Dec. '72	14°15′, 117°14′	91.8		1 (0)
Coral Sea:					
7	6 Jan. '73	14°03′, 147°44′	96.8		1 (0)
8	7 Jan. '73	13°00′, 146°34′	113.8	2980	1 (0)
9	9 Jan. '73	16°13′, 152°15′	141.8	1790	6 (6)
10	10 Jan. '73	15°27′, 150°24′	114.8	1490	1 (1)
11	12 Jan. '73	16°25′, 151°22′	131.8	995	1 (0)

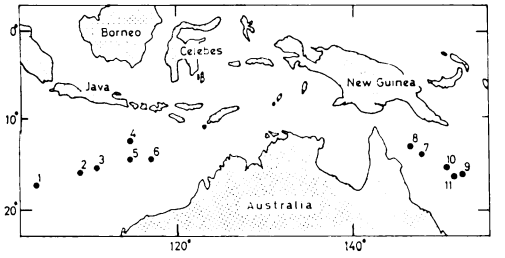

Fig. 1. Position of tuna-longline Stations of the Umitaka-maru, Tokyo University of Fisheries, in the eastern Indian Ocean (St. 1～6) and the Coral Sea (St. 7～11) where *Alepisaurus ferox* were collected, December 1972～January 1973.

400～450 mm (1, 0), 450～500 mm (1, 0), 600～650 mm (0, 1), 650～700 mm (3, 2), 700～750 mm (5, 0), 750～800 mm (3, 3), 800～850 mm (4, 1), 850～900 mm (6, 0), 900～950 mm (2, 0), 950～1000 mm (2, 0), 1000～1050 mm (1, 0).

Each item of food organisms, fishes and invertebrates, was identified to species level when possible, also, size of food fishes was measured (Table 2), and the data were analysed by the frequency of occurrence. Invertebrates were mostly identified by Dr. Takashi Okutani, Tokai Regional Fisheries Research Laboratory and Dr. Masaaki Murano, Tokyo University of Fisheries, and the fishes were identified by the present authors.

Result

Lancetfish were caught most frequently from waters about 112 m to 142 m in depth (Table 1). All lancetfish taken in the eastern Indian Ocean and the Coral Sea were identified as *Alepisaurus ferox* Lowe as diagnosed by Gibbs (1960) and Gibbs and Wilimovsky (1966). Of the 58 specimens hooked by longline the stomachs of 23 specimens were found void.

The lancetfish preyed on various sorts of animals, including more than 80 species of invertebrates and fishes but with no discrimination as to their sizes. For instance, one measuring 730 mm in fork length swallowed one *Eumecichthys fiski* 545 mm long, which showed several wounds on the body inflicted by sharp teeth. Another measuring 830 mm in fork length had eaten one *Lactoria fornasini* 13 mm long. Also, almost no differences were noted in composition of food neither in quality nor quantity according to the body size of the lancetfish.

In lancetfish caught in the eastern Indian Ocean 47.4% of the total individuals taken as food items were constituted by crustacea (Table 2). Crustaceans were represented by *Phrosina semilunata* by as high as 54.6% of the total crustaceans identified. While, Mollusca, including Heteropoda, Pteropoda, and Cephalopoda amounted to 26.4% of the total food organisms, and *Carinaria lamarcki* (Heteropoda) was dominant among molluscs by 59.7% and *Ancistroteuthis lichtensteini* by 42.1% of cephalopods identified. A total of 178 fishes were found, amounting to 21.8% of the total food organisms

Table 2. Food items identified from 35 stomachs of *Alepisaurus ferox* with number and size in TL or SL (fishes only).

	Eastern Indian Ocean							Coral Sea			
	Number of individuals by Station							Number of individuals by Station			
Station No.	1	2	3	4	5	Size of	Total No.	9	10	Size of	Total No.
No. of specimens	14	2	10	1	1	food fishes (mm)	28	6	1	food fishes (mm)	7
Range of fork length (mm)	655～953	456～830	415～1020	835	970			660～830	605		
Mollusca							216				40
							(26.4%)				(23.2%)
Heteropoda											
Carinaria lamarcki	83	9	36		1		129	4			4
Pterotrachea sp.								4	2		6
Pteropoda											
Cavolinia tridentata	1	4	1		1		7	3			3
Cacolinia globulosa	1						1				
Diacria sp.	1						1				
Unidentified pteropods	11	9	1				21	5			5
Cephalopoda											
Heteroteuthis sp.								1			1
Octopoteuthis sp.	3		1				4				
Ancistroteuthis lichtensteini	12	1	8		3		24	1	2		3
Chaunoteuthis mollis	1				1		2				
Histioteuthis sp.								1			1
Ctenopteryx siculus	1		1				2				
Ornithoteuthis volatilis					2		2				
Symplectoteuthis oualaniensis			3				3	1			1
Eucleoteuthis luminosa	2						2				
Thysanoteuthis rhombus	1						1				
Chiroteuthis sp.			1				1				
Liocranchia reinhardti			1				1				
Unidentified squids	3						3	1			1
Tremoctopus violaceus	1						1				
Ocythoe tuberculata		1					1	1			1
Macrotritopus sp.								2	1		3
Argonauta argo	3						3				
Unidentified octopods	5	2					7	4	7		11
Annelida							37				8
							(4.5%)				(4.7%)
Polychaeta worms	30	1	5		1		37	5	3		8

Table 2. (Continued)

	Eastern Indian Ocean							Coral Sea			
	Number of individuals by Station							Number of individuals by Station			
Station No.	1	2	3	4	5	Size of	Total No.	9	10	Size of	Total No.
No. of specimens	14	2	10	1	1	food fishes (mm)	28	6	1	food fishes (mm)	7
Range of fork length (mm)	655～953	456～830	415～1020	835	970			660～830	605		
Arthropoda							388 (47.4%)				55 (32.0%)
Crusteacea											
Phrosina semilunata	167	6	32		7		212	12	9		21
Phronima sedentaria?	6	1	3				10	4			4
Brachyscelus sp.	2						2	1			1
Parapronoe sp.	1						1				
Platyscelids	53	8	62		22		145	14	2		16
Shrimp larvae				3			3				
Unidentified shrimp	2		1		2		5				
Crab larvae	2		1		6		9	3	10		13
Mantis crab				1			1				
Pisces							178 (21.7%)				69 (40.9%)
Clupeiformes											
Sternoptyx diaphana	8		10	1		SL 25.5～58.5	19		3	SL 44.0～51.0	3
Argyropelecus lynchus sladeni	1					SL 50.0	1				
Vinciguerria nimbaria	1					SL 29.5	1				
Myctophiformes											
Omosudis lowei								1		SL 81.0	1
Stemonosudis elongata	1					SL 163.0	1				
Lestidiops mirabilis			1			SL 96.0	1				
Lestidiops sp.	2					SL 61.0, 87.5	2				
Lestidium atlanticum			1			SL 120.0	1				
Chlorophthalmus sp.	1					SL 49.0	1				
Miripinnatiformes											
Eutaeniophorus festivus	1	2	1			SL 37.0～71.0	4				
Parataeniophorus gulosus		1				SL 35.0	1				
Anguilliformes											
Young anguilliforms	6		16			TL 97.5～220.0	22	5		TL 160.0～220.0	5
Syngnathiformes											
Trachyrhamphus serratus								1		SL 142.0	1

Table 2. (Continued)

	Eastern Indian Ocean							Coral Sea			
	Number of individuals by Station							Number of individuals by Station			
Station No.	1	2	3	4	5	Size of	Total No.	9	10	Size of	Total No.
No. of specimens	14	2	10	1	1	food fishes (mm)	28	6	1	food fishes (mm)	7
Range of fork length (mm)	655～953	456～830	415～1020	835	970			660～830	605		
Fistularia villosa									2	SL 147.0, 160.0	2
Beryciformes											
Diretmus argenteus		1				SL 19.5	1				
Anoplogaster cornuta	6					SL 18.0～65.0	6	2		TL 30.0, 30.0	2
Lampridiformes											
Trachipterus iris	1	1				SL 44.0～177.0	2				
Trachipterus misakiensis			1			SL 60.0	1				
Eumecichthys fiski	1					SL 545.0	1				
Regalecus russellii		1				TL ca 260	1				
Perciformes											
Hoplolatilus sp.					1	SL 18.0	1				
Cubiceps gracilis	4		3			SL 26.0～51.0	7				
Cubiceps sp.								2	1	SL 25.0～46.5	3
Psenes sp.			1			SL 53.0	1				
Gempylus serpens			1			SL 93.0	1				
Nealotus tripes			1			SL 53.0	1				
Diplospinus multistriatus					1	SL 161.0	1				
Brama orcini	14	2	8	1		SL 24.0～61.5	25	3	1	SL 33.5～39.5	4
Brama dussumieri		1	1			SL 34.0, 43.0	2				
Brama sp.								3	2	SL 17.2～39.0	5
Pterycombus petersii	5	2	3			SL 17.0～44.0	10	3	1	SL 19.0～32.5	4
Taractichthys steindachneri	3	1	2			SL 11.0～48.0	6				
Pteraclis verifera	1		1			SL 27.0, 158.0	2				
Pseudopriacanthus niphonius								1	1	SL 21.0, 21.0	2
Priacanthus macracanthus									2	SL 16.5, 30.0	2
Naso sp.								1		TL 38.0	1
Young uranoscopid								1	1	SL 20.0, 28.0	2
Young chaetodontid								1	1	SL 18.0, 21.0	2
Young histiopterid ?								2		SL 20.0, 22.0	2
Young scomberomorid ?			1			SL 45.0	1				
Cottiformes											
Rogadius asper								5	2	SL 21.0～28.0	7

Table 2. (Continued)

	Eastern Indian Ocean							Coral Sea			
	Number of individuals by Station							Number of individuals by Station			
Station No.	1	2	3	4	5	Size of	Total No.	9	10	Size of	Total No.
No. of specimens	14	2	10	1	1	food fishes (mm)	28	6	1	food fishes (mm)	7
Range of fork length (mm)	655～953	456～830	415～1020	835	970			660～830	605		
Hoplichthys fasciatus								1		SL 60.0	1
Pterygotrigla sp.								1		SL 26.5	1
Parapterygotrigla sp.								1		SL 25.5	1
Lepidotrigla sp.								1	1	TL 22.5, 25.5	2
Satyrichthys sp.								3		SL 41.0～57.0	3
Tetraodontiformes											
Arotrolepis sp.								1	1	SL 25.5, 25.5	2
Triacanthodes sp.								1	1	SL 14.2～20.0	2
Sphoeroides spp.	19					SL 15.0～22.5	19				
Liosaccus cutaneous								1		TL 16.0	1
Tetraodon stellatus								1		TL 16.0	1
Balistes sp.									1	SL 17.0	1
Lactoria fornasini	1	1				SL 13.0, 17.5	2	1		TL 13.0	1
Rhinesomus concatenatus								1		TL 19.0	1
Ranzania laevis	4	1	1			SL 14.0～33.0	6				
Gadiformes											
Physiculus sp.								1		SL 41.0	1
Bregmaceros macclellandii			1			SL 74.5	1				
Odontomacrurus murrayi			3			TL 130～180	3				
Lophiiformes											
Lophiodes mutilus ?			1			SL 28.5	1				
Halieutaena sp.									1	SL 21.5	1
Diceratias bispinosus		3				SL 19.5～30.5	3				
Melanocetus johnsoni		2				SL 19.0, 20.5	2				
Himantolophus groenlandicus	4	6				SL 26.5～42.0	10				
Unidentified fishes	4		2	1			7	2			2

identified. Most important fishes consumed were as follows: *Brama orcini* 14.0%; leptocephalus larae 12.4%; *Sternoptyx diaphana* 10.7; *Sphoeroides* spp. 10.7%; *Himantolophus groenlandicus* 5.6%; *Cubiceps gracilis* 3.9%; *Anoplogaster cornuta* 3.4%; *Ranzania laevis* 3.4%. The fishes in the family Bramidae, including genera *Brama, Pterycombus, Taractichthys*, and *Pteraclis* amounted to 25.3% of all the fishes encountered.

Food items found in a total of 7 lancetfish from the Coral Sea included the same groups of animals as those from the eastern Indian Ocean, viz., Pisces 40.1%, Crustacea 32.0%, and Mollusca 23.2% of total individuals. *Phrosina semilunata* predominated, making up 38.2% of the Crustacea identified. Dominant food fishes among Coral Sea lancetfishes were: *Rogadius asper* 10.1%; leptocephalus larvae 7.2%; *Brama* sp 7.2%; *Brama orcini* 5.8%; *Pterycombus petersii* 5.8%; *Sternoptyx diaphana* 4.3%. Bramid fishes occupied 18.8% of Pisces identified.

The following five species, excepting leptocephalus, were found as food common to the two oceans; *Sternoptyx diaphana, Anoplogaster cornuta, Brama orcini, Pterycombus petersii*, and *Lactoria fornasini*.

Discussion

Nearly 100 species of animals were taken as food by specimens of *Alepisaurus ferox* studied here. The fact that a large fish, *Eumecichthys fiski*, was found in the stomach bearing several cuts on the body suggests that the daggerlike large teeth of the lancetfish have a distinct relation to their feeding behavior as pointed out by Kubota and Uyeno (1970).

Lancetfish stomachs from the eastern Indian and the Coral Sea frequently contained hyperiid amphipods, heteropods, and *Sternoptyx* similar to finding from the North Atlantic reported by Haedrich (1964). Of the total of 35 stomachs, hyperiid amphipods were present in 86% of stomachs, heteropods 69%, and *Sternoptyx* 46%. Other food organisms such as *Ancistroteuthis, Brama, Pterycombus*, and *Cubiceps* were also found commonly in the two oceans under study.

Table 3. Number of fishes eaten by *Alepisaurus ferox*. Data are compared with previously published data.

Oceanic areas	E. Indian	S. W. Pacific		N. Atlantic	N. E. Pacific	S. E. Pacific
Authors	Present paper	Present paper	Fourmanoir (1969)	Haedrich (1964)	Kubota and Uyeno (1970)	Haedrich and Nielsen (1966)
No. of stomachs examined	28	7	110	40	36	140
Clupeiformes	21 (11.8%)	3 (4.3%)	149 (21.7%)	80 (29.9%)	21 (8.7%)	66 (35.5%)
Myctophiformes						
Alepisaurus young			75 (10.9%)	42 (15.7%)		25 (13.4%)
Other alepisauroids	5 (2.8%)	1 (1.5%)	27 (3.9%)	70 (26.1%)	6 (2.5%)	49 (26.3%)
Myctophoids	1 (0.6%)		2 (0.3%)	1 (0.4%)	12 (5.0%)	2 (0.3%)
Siluriformes					1 (0.4%)	
Miripinnatiformes	5 (2.8%)					3 (1.6%)
Anguilliformes	22 (12.4%)	5 (7.3%)	32 (4.7%)	5 (1.9%)	1 (0.4%)	2 (1.1%)
Beloniformes					1 (0.4%)	
Syngnathiformes		3 (4.3%)		1 (0.4%)	3 (1.2%)	
Beryciformes	7 (3.9%)	2 (2.9%)	41 (5.9%)	4 (1.5%)	97 (40.1%)	6 (3.2%)
Lampridiformes	5 (2.8%)		4 (0.6%)	1 (0.4%)	4 (1.7%)	2 (1.1%)
Zeiformes					4 (1.7%)	
Perciformes	58 (32.6%)	27 (39.1%)	307 (44.7%)	50 (18.7%)	44 (18.2%)	23 (12.4%)
Cottiformes		15 (21.7%)	3 (0.4%)	2 (0.7%)	5 (2.1%)	
Tetraodontiformes	27 (15.2%)	9 (13.0%)	29 (4.3%)	1 (0.4%)	8 (3.3%)	
Pleuronectiformes			2 (0.3%)	1 (0.4%)		
Gadiformes	4 (2.2%)	1 (1.5%)	9 (1.3%)	6 (2.2%)		8 (4.3%)
Lophiiformes	16 (9.0%)	1 (1.5%)	7 (1.0%)	4 (1.5%)	26 (10.7%)	
Unidentified fish	7 (3.9%)	2 (2.9%)			9 (3.9%)	
Total	178 (100%)	69 (100%)	687 (100%)	268 (100%)	242 (100%)	186 (100%)

Ancistroteuthis amounted to 40%, *Brama* 49%, *Pterycombus* 34%, and *Cubiceps* 26% of the stomachs examined. The abundance of those animals, in stomach contents from both seas would suggest that they inhabit the same depths of water as do the lancetfish.

The food fishes utilized by *Alepisaurus* taken from 6 different oceanic waters are enumerated (Table 3) in terms of higher taxonomic groups (the Order) based on the original and published accounts, in order to throw a light on the understanding of some ecological features of prey and predator relations as commented below.

Comparison of prey fishes between the eastern

Table 4. Genera and species of fishes eaten by *Alepisaurus ferox* recorded in common among 4 different oceanic areas. Records (original) from the Coral Sea are given in parentheses in the column S. W. Pacific. In cases where more than two species are dealt with, only generic names are given.

Oceanic areas Authors	N. Atlantic Haedrich (1964)	E. Indian Present paper	S. W. Pacific Fourmanoir (1969) and Present paper	S. E. Pacific Haedrich and Nielsen (1966)
Argyropelecus	+	+		
Sternoptyx diaphana	+	+	+ (+)	+
Vinciguerria		+	+	
Stemonosudis elongata		+	+	
Lestidiops		+	+	
Macroparalepis	+		+	+
Omosudis lowei			+ (+)	+
Alepisaurus brevirostris	+		+	+
Alepisaurus ferox	+		+	+
Scopelarchus			+	+
Eutaeniophorus festivus		+		+
Lepidion	+		+	
Odontomacrurus murrayi		+	+	
Physiculus			+ (+)	
Bregmaceros		+	+	
Regalecus	+	+		
Trachipterus		+	+	+
Anoplogaster cornuta	+	+	+ (+)	+
Diretmus argenteus	+	+		
Brama	+	+	+ (+)	+
Pteraclis verifera		+	+	
Chiasmodon	+		+	
Nealotus tripes		+	+	+
Gempylus serpens		+	+	
Diplospinus multistriatus	+	+	+	+
Cubiceps	+	+	+ (+)	+
Hoplolatilus		+	+	
Priacanthus			+ (+)	
Chaetodon			+ (+)	
Naso			+ (+)	
Psenes		+	+	
Ranzania laevis		+	+	
Balistes			+ (+)	
Triacanthodes			+ (+)	
Rhinesomus			+ (+)	
Lactoria fornasini		+	+ (+)	
Tetraodon			+ (+)	

Indian Ocean and the Coral Sea indicates the occurrence of characteristic fish groups in respective regions. Fishes of Myctophiformes, Lampridiformes, Miripinnatiformes, and Lophiiformes are found as prey from the eastern Indian Ocean, whereas, they have never appeared, or are almost negligible, in those from the Coral Sea (Tables 2 and 3). On the other hand the Syngnathiformes and Cottiformes are shown only in lancetfish from the Coral Sea. *Brama* and *Sphoeroides* are more frequently present in lancetfish from the eastern Indian Ocean than from the Coral Sea (Table 2). Stomach contents of the lancetfish may reflect relative abundances of food fishes in respective waters. Lancetfish in the two waters under study did not devour their own youngs in contrast to the same fish in other waters, *e.g.* southwestern Pacific, southeastern Pacific, and North Atlantic, where the young are eaten in considerable numbers (Table 3). Lancetfish in the two seas under study were not exposed to the young stage at the time of the present collection of adults due, perhaps, to missing their season of their spawning.

Myctophid fishes were negligible as the food of lancetfish in the two seas under study as well as in the North Atlantic, the southeastern Pacific, and the southwestern Pacific. As Haedrich (1964) considered, *Alepisaurus* is probably a day-time feeder, so that the chance of the lancetfish's meeting with myctophids would be low. The characteristic middle-layer fishes, Gonostomatidae, Stomiatidae, or Chauliodontidae, were found in none of the lancetfish encountered. If lancetfish range widely in ocean layers, from near surface to 1280 m deep (Hart, 1973), the fishes collected in these two seas would have eaten such middle-layer fishes as noted above. Instead epipelagic fishes such as *Brama, Pterycombus*, and *Cubiceps* were common items found in their stomachs. This fact, then, can only be explained by the assumption that the lancetfish in these two seas are dwellers in upper layers despite the depths of the seas (955 to 5760 m).

Species and genera of fishes found commonly in the stomachs of lancetfish collected in different oceanic areas are listed in Table 4. Three species *Sternoptyx diaphana, Anoplogaster cornuta*, and *Diplospinus multistriatus* occurred in stomachs taken from four distant oceanic regions. This fact will indicate that these species of fishes are circumequatorial or world wide in distribution.

Although only 7 specimens of lancetfish were collected in the Coral Sea, 4 species and 10 genera of fishes were in common in the stomachs collected from the adjacent waters of New Caledonia and New Hebrides Is. in the southwestern Pacific Ocean. Simple adding of the numbers of species of fishes occurring in common in different oceanic areas indicates the following relationships:

Eastern Indian Ocean— Southwestern Pacific	19.
Eastern Indian Ocean— Southeastern Pacific	8.
Eastern Indian Ocean— North Atlantic	8.

Assuming that the abundance and occurrence of species of fishes may be different in different oceanic regions in the world, the above findings may be interpreted to mean that the food fishes of lancetfish are more than twice as closely related in the eastern Indian Ocean and southwestern Pacific than in the Indian Ocean and the southeastern Pacific or the North Atlantic Oceans.

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Literature cited

Fourmanoir, P. 1969. Contenus stomacaux d'*Alepisaurus* (Poissons) dans le Sud-ouest Pacifique. Cah. O. R. S. T. O. M., ser. Oceanogr., 7(4): 51～60.

Gibbs, R. H., Jr. 1960. *Alepisaurus brevirostris*, a new species of lancetfish from the western North Atlantic. Breviora, (123): 1～14, figs. 1～3.

Gibbs, R. H., Jr. and N. J. Wilimovsky. 1966. Family Alepisauridae, in Fishes of the western North Atlantic. Sears Found. Mar. Res., Mem., 1, part 5: 482～497, figs. 173～176.

Haedrich, R. L. 1964. Food habits and young stages of North Atlantic *Alepisaurus* (Pisces, Iniomi). Breviora,(201): 1～15, figs. 1～2.

Haedrich, J. G. and J. G. Nielsen. 1966. Fishes eaten by *Alepisaurus* (Pisces, Iniomi) in the southeastern Pacific Ocean. Deep-Sea Research, 13: 909～919, fig. 1.

Hart, J. L. 1973. Pacific fishes of Canada. Fish. Res. Bd. Canada, Bull., 180: 1～740, figs., pls.

Kubota, T. and T. Uyeno. 1970. Food habits of lancetfish *Alepisaurus ferox* (Order Myctophiformes) in Suruga Bay, Japan. Japan. J. Ichthyol., 17(1): 22～28.

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東部インド洋およびサンゴ海でとれたミズウオの餌料生物

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東京水産大学研究練習船海鷹丸が 1972 年 12 月に東部インド洋で，1973 年 1 月にサンゴ海でミズウオ 58 尾を漁獲した．それらの胃内容物を分類し，種類ごとに出現個体数を調べた．そして，特に魚類についてすでに報告されている北大西洋，南東太平洋，南西太平洋のミズウオの胃内容物と比較した．東部インド洋とサンゴ海のミズウオは軟体動物，甲殻類，環形動物，魚類の 4 動物群を捕食していた．東部インド洋のミズウオ 28 尾の胃から 178 尾の魚類が見られ，種まで判明したものは 31 種，属まで明らかにできたものを含めると 37 種であった．一方，サンゴ海産のミズウオ 7 尾の胃から 69 尾の魚類が得られ，種まで判明したものは 16 種，属まで明らかとなったものを含めると 29 種類であった．この両海域のミズウオの胃から共通に得られた魚類は 5 種類であった．北大西洋，南東太平洋，南西太平洋産のミズウオは，ミズウオ自身の幼魚も捕食していると報告されているが，この両海域のミズウオにはこの現象が認められなかった．肉食性魚類が普通に捕食していると考えられるハダカイワシ類は今まで報告されている海域と同様にこの両海域でも餌料生物としては出現していない．捕食されていた魚類のうち，*Sternoptyx diaphana, Anoplogaster cornuta, Diplospinus multistriatus* の 3 種類は北大西洋，南東太平洋，南西太平洋産のミズウオの胃にもみられていることから，これらの魚類は非常に広範囲に分布するものと推定される．東部インド洋のミズウオが捕食していた魚類は他の海域のそれと較べるとサンゴ海を含む南西太平洋のミズウオが食べていた魚類の組成に最も類似していた．

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