

鳥羽水族館年報

Annual Report of Toba Aquarium

No.2

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文部省指定 鳥羽水族館

TOBA AQUARIUM

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1. 組織および施設の概要 Organization and Facilities

1988.12.1 現在

名称 文部省指定 烏羽水族館 Toba Aquarium
 所在地 三重県烏羽市烏羽 3-3-6 Toba 3-3-6. Mie Pref. 517 Japan
 職員数 Member of Employee 135名(パートタイマー5名含む)
 役員 Board Members 取締役館長 中村 幸昭 Haruaki Nakamura, Executive Director
 取締役副館長 片岡 照男 Teruo Kataoka, Executive Vice Director
 非常勤役員 4名
 学芸員 Curator 6名

構成 Organization



入館料 Admissions 大人 1,200円 小人 600円 幼児 300円
 Adults 1,200yen Children 600yen 3-5yrs. 300yen

入館者数 Number of Visitors 1988年 1,449,066 名

施設の概要 Facilities

マリンホール Marine Hall 960.5m ²			
八角水槽	Sardin tank	24m ²	1
六角水槽	Garibaldi tank	1m ²	1
6トン水槽	Sturgeon tank	6m ²	1
壁面水槽	Shorefish tank	0.3~3.7m ²	38
オウムガイ水槽	Nautilus tank	4.8m ²	1
予備水槽	Holding tank	1~1.2m ²	5
マリンスタジアム Marine Studium 1,810m ²			
壁面水槽	Invertebrates tank	5m ²	7
イロワケイルカプール	Commerson's dolphin tank	400m ²	1
アシカショープール	Sea lion show pool	60m ²	1

アシカ飼育プール	Sea lion keeping tank	10.7m ³	1
テラリウム	Terarium	30m ³	1
カエルコーナー	Frog tank	0.5m ³	1
予備水槽	Holding tank		2
スナメリ母子プール Finless porpoise Hall			
スナメリプール	Finless porpoise tank	200m ³	1
アシカ飼育プール	Sea lion tank	4m ³	2
円形水槽	Circular tank	12m ³	1
予備水槽	Holding tank	0.7~4m ³	5
マーメイドホール Mermaid Hall 1,030m ²			
ジュゴンプール	Dugong tank No.1	150m ³	1
ジュゴンプール	Dugong tank No.2	90m ³	1
アザラシプール	Seal tank	20m ³	1
ジャングルプール	Jungle tank	10m ³	1
予備水槽	Holding tank		2
オーシャンホール Ocean Hall 410.6m ²			
ラッコプール	Sea otter tank	162m ³	1
その他 Other tanks			
ウェルカム水槽	Welcome tank	2m ³	1
ゴマフアザラシ水槽	Harbor seal tank	2m ³	1
ヌートリア水槽	Nutria tank	0.2m ³	1
ウミガメプール	Sea turtle tank	10m ³	1
ペンギン池	Penguin pool	40m ³	1
マリンギャラリー Marine Galleries 210m ²			
寺町コレクション Teramachi Shell Collection Hall 170m ²			
研究施設 Labs			
飼育研究室	200m ²	ジュゴン研究室	35m ²
第二研究室	25m ²	調餌室	30m ²
企画室	70m ²	ラッコ調餌室	15m ²
水質検査室	30m ²	標本室	50m ²
食堂休憩施設 Restaurant			
和食堂(100名収容)		喫茶室(25名収容)	
洋食堂(200名収容)			

売店設備 Gift Shop

土産物売店 アクセサリーショップ ラッコキャラクターショップ

その他の施設 Other Facilities

事務室	7	応接室	2	館長室	1	更衣室	1	宿直室	1
倉庫	6	発電機室	1	ポンプ室	3	機械室	3	変電室	1
工作室	1	冷凍庫	1	暗室	1	コンプレッサー室			1
社員寮	2								

所有船舶 Investigation Boat

採集調査船「じゅごん1世」 全長6.9m 定員8名

2. 展示の概要 Major Exhibits

マリンホール Marine Hall

コーナー名称	内 容	展 示 動 物
マイワシの群遊 Japanese Sardins	近海に住む成群性魚類を紹介し、群れの意義を理解する。	マイワシ
クラゲコーナー Jellyfishes	浮遊生活を行うクラゲの生態と種類を紹介する。	ミズクラゲ、アカクラゲ、サカサクラゲ他
オウムガイ Nautilus	「生きている化石」といわれるオウムガイの生態を紹介する。	オオムガイ、オオベソオウムガイ、パラオオウムガイ
近海の魚 Fishes of Kumanonada Sea	伊勢湾や熊野灘に生息する魚を展示し、近海魚の様々な種類とその生態を紹介する。	ドチザメ、ウツボ、イシダイ、クサフグ 他
冷たい海の魚 Fishes of Cold Waters	寒流系の魚やタカアシガニなど、冷水系生物を展示、熊野灘の沿岸性魚類との相違を見せる。	オオカミウオ、ケムシカジカ、タカアシガニ 他
サンゴ礁の魚 Coral Reef Fishes	熱帯、亜熱帯性の魚類を中心に、美しいサンゴ礁の魚を紹介する。	シテナヤッコ、ルリスズメ 他
淡水に住む魚 Fresh Water Fishes	熱帯魚を中心に世界各地の淡水魚を展示し、海産魚類との相違を見せる。	ネオンテトラ、ピラニア 他

マリンスタジアム Marine Stadium

コーナー名称	内 容	展 示 動 物
ジュゴン Dugong	人魚のモデルといわれ、貴重な保護動物であるジュゴンを紹介する。	ジュゴン
バイカルアザラシ Baikal Seal	ソビエトのバイカル湖に住む淡水産のバイカルアザラシを紹介する。	バイカルアザラシ
ジャングルの巨大魚 Fishes in the Tropical Region	巨大魚ピラルクをはじめ、アマゾン水系の大型熱帯魚をジオラマ水槽を使ってその生息環境と共に紹介する。	ピラルク、コロソマ、シルバーアロワナ 他

マリングャラリー Marine Gallery

海洋生物への理解と関心を深めるため、レプリカ、VTRなどを用い、毎年テーマを決めて特集展示を行う。1988年度は「ザ・クジラ展」と題し、鯨類の種類やその生態を紹介した。

Marine Gallery is the place where visitors can expand their imagination on marine life and understand animals through various kinds of display such as replicas and videos etc.

Special exhibition is held according to an annual theme. The theme '88 is "The Whales" introducing ecology of whales.

コーナー名称	内 容	展 示 物
一息3,000メートル How deep can Sperm Whales dive?	鯨類が水生生活に適応した哺乳類であること、肺呼吸でありながら驚くべき潜水能力をもっていることなどをマッコウクジラのレプリカを使って解説する。	マッコウクジラ(レプリカ)
クジラ The Whales	鯨類についての概論を、写真パネルにより解説し、クジラの哺乳類における位置付けを示す。	ザトウクジラ写真パネル
ビデオコーナー Video Corner	ザトウクジラ、サカマタ、イッカクの生態をビデオにより紹介する。	TBSテレビ「わくわく動物ランド」制作のVTR
イッカク The Narwhale	日本で唯一のイッカクの剥製を展示、その形態を紹介する。	イッカク剥製
スナメリの出産 Birth of Finless porpoise (video)	鳥羽水族館で生まれたスナメリの出産の様子をVTRとレプリカを使って紹介する。	VTR およびレプリカ

寺町コレクションホール Teramachi Shell Collection Hall

寺町コレクションホールは京都出身の画家、寺町昭文氏の蒐集した日本産貝類を中心に、外国産の希少種など2,200種4,000点を展示する貝類標本の展示施設としては最大規模のものである。寺町氏の蒐集した標本は7,000種にもおよび、この中から新たに新種であることが確認されたものや、氏に献名されたものも少なくない。

鳥羽水族館では寺町コレクションに加え、世界に十数個体しかないといわれるリュウグウダカラなど外国産貝類も合わせて展示し、貝類の様々な形態とその美しさについて紹介している。

In 1975, Mr. Akifumi Teramachi, an artist of Japanese Kimono motif in Kyoto, donated his significant collection of shells to Toba Aquarium. The donation of 7,000 species covers almost all kinds in Japan except freshwater shells, and very rare species in the world. Some of the shells were first discovered and given names by Mr. Teramachi, himself.

Teramachi Shell Collection rates one of the best and extensive in the world. In addition to 2,200 species; 4,000 specimens of Teramachi's collection, Fulton's Cowry and Rumphius Slit Shell etc., some of the most valuable and rare shells acquired by Toba Aquarium are on exhibit. Providing exciting displays, Teramachi Collection Hall draws visitors' attention with external beauty of the shells.

3. おもなできごと Major Occurrence

- 1月 1日 特集展示 タツノオトシゴ展「はっぴい竜いやあー」オープン, 9種60点を展示 (1月31日まで)。
Jan, 1 The special exhibition of "sea horse". 9 species, 60 fishes were exhibited.
- 1月16日 韓国の麗水水産大学 宗 相鎬教授と慶尚大学校 元 鍾楽教授が来館。
Jan,16 Prof.Sou (Yosu fisheries college, Korea) and Prof.Gen (Kyonsan university, Korea) visited.
- 2月13日 ジュゴン「セレナ(♀)」計測。全長170cm, 体重106kg。
Feb,13 Taking measurment of Dugong "Serena". She had a total length of 170cm and 106kg in weights.
- 2月23日 ラッコのチャチャ(♀)満4歳の誕生日にちなみ, 満4歳の子供の無料入場を実施, また入館先着100名に記念品プレゼント。
Feb,23 4 years old children were admitted free and 100 peoples were presented a souvenir in celebration of 4th birthday of sea otter "Chacha".
- 2月28日 近畿日本鉄道との協賛イベント「高見山といたずラッコ号」実施。
Feb,28 Approval event with Kinki Nippon Railroad was held.
- 3月 1日 「カエルのなかま」コーナー オープン, 南米産のビバをはじめ, モリアオガエルなど7種を展示。
Mar, 1 The section "Frogs around the world" opened. 7 species were exhibited, for example, "Pipa" from south America.
- 3月23日 フィリピン農業改革省タンパロン夫妻来館。
Mar,23 Mr & Mrs Tamparong (The department of Agrarian Reforms, Philippines) was invited.
- 4月29日 スナメリNo.81誕生, 母親が授乳しないため, 5月5日より人工飼育を行うが, 5月10日死亡。
Apr,29 Finless porpoise No.81 was born. her mother didn't look after her. Though we tried to care her artificially from 5th, she died on 10th May.
- 5月16日 2.6kgのジャンボウナギ入館。
May,16 A giant eel weighs 2.6kg were exhibited.
- 5月20日 フィリピン農林水産大臣ドミンゲス氏来館。
May,20 Mr, Dominges (The minister of Agriculture and Forestry, Fishery, Philippines) was invited.
- 6月 2日 静岡県浜名郡の養殖業者より, 白いスッポンを譲り受ける。
Jun, 2 A White soft-shelled turtle was donated from Breeder in Hamana-gun, Shizuoka.

- 6月 4日 カリフォルニアアシカのマヤがオスを出産。
Jun, 4 Californian sea lion "Maya" was delivered of a male baby.
- 7月 4日 アシカショーに女性トレーナー登場
Jul, 4 A first woman trainer made her debut on stage of the Sealion-show at Toba Aquarium.
- 7月14日 オタリアのボン吉がメスを出産。
Jul, 14 Otaria "Ponkichi" was delivered of a female baby.
- 7月22日 岡山市内の百貨店で館外特別展「わくわくマリナランドとアシカショー」オープン,(8月24日まで)
Jul, 22 The special exhibition outside the aquarium, "Exiting Marine Land & Sealion-show" was held at a department store in Okayama city. (till Aug. 24)
- 7月24日 北海道旭川市の遊園地で館外特別展「夏休みたんけん水族館」オープン,(8月21日まで)
Jul, 24 The special exhibiton outside the aquarium, "The expeditionary aquarium in summer vacation." opened at playland in Asahikawa city, Hokkaido. (till Aug, 21)
- 9月11日 ジュゴン「じゅんいち(♂)」飼育満9年。
Sep, 11 Dugong "Junichi". 9th anniversary of his coming to Toba Aquarium.
- 9月20日 スナメリNo.36 (♂) 飼育満15年。
Sep, 20 Finless porpoise No.36. 15th anniversary of his coming to Toba Aquarium.
- 10月 2日 館内イベント「チビっ子魚釣りゲーム」実施。
Oct, 2 The entertainment inside aquarium "Fishing game for kids" was held.
- 10月19日 新島羽水族館建設のための安全祈願祭を行う。
Out, 19 A prayer meeting for safety of construction of new Toba Aquarium.
- 11月11日 三重県博物館協会の主催による「'88移動博」を開催。
Nov, 11 "The transferable exhibition '88" was held under the sponsorship of Museum Association of Mie Pref.
- 12月18日 翌年の巳年にちなみ、ヘビ展オープン。(1989年1月31日まで)
Dec, 18 The special exhibiton "Snakes in water" was held in connection with 12 horary signs. Next year was snake year. (till Jan, 31, 1989)

4. 社会教育のための特別活動 Special Program for Social Education

館外特別展 Special Exhibition Outside the Aquarium

鳥羽水族館では三重県博物館協会や百貨店などの要請を受け、当館の飼育動物および標本、レプリカ、写真パネル、VTRなどを用いた館外特別展を行っている。

At the requests of association of Museum or sponsors, we sometimes dispatch our staffs and presentations outside the aquarium.

This mini aquarium brings lots of excitement and opportunities to the local people to get in touch with the life in the sea.

昭和63年度実施例

催事名 '88夏休みたんけん水族館
開催場所 北海道旭川市神居町 サンパレー遊園地
期間 昭和63年7月24日～8月21日
主旨 催事にありがちな一点目玉主義を避け、名前はポピュラーであるが日頃見ることの少ない生物を中心に展示し、子供の夏休み学習に役立つ内容とした。
展示動物 カブトガニ、パラオオウムガイ、ミズクラゲ、ドチザメ、マアジ他 131種953点



催事名 わくわくマリンランドとアシカショー
開催場所 岡山県岡山市 天満屋百貨店催事場
期間 昭和63年7月22日～8月24日
主旨 海洋生物の様々な生態や形態を紹介し、大人から子供まで幅広く楽しめる内容とした。
展示動物 ヒマワリヒトデ、ミズクラゲ、オオカミウオ、ガリバルディ他 90種約1000点

催事名 移動博'88
開催場所 三重県飯南郡飯高町 B&G海洋センター
期間 昭和63年11月11日～11月13日
主旨 三重県博物館協会主催で、県内各地の博物館施設の少ない地域に仮設博物館を設け、博物館活動の普及、啓蒙をはかる。
展示動物 イセエビ、ウツボ他魚類、無脊椎動物12種41点、貝類標本172種368点、化石標本6点



教材ビデオの制作 Educational Videotaped Program For Children

鳥羽水族館では映像資料の活用を目的とした教材ビデオを昨年に引き続き自主制作した。今回は小学校低学年を対象に「一日しいくがかり」と題し、水生動物の飼育展示の舞台裏を紹介した。このビデオテープは前回と同様、鳥羽市内の小中学校、図書館に無料配付し、また希望があれば他の施設や個人にも貸出し、もしくは実費販売した。

Toba Aquarium completed second educational videotaped program for the purpose of effective use our visual data for lower classes of elementary schools.

We contributed this video tape to regional elementary schools for free and it was rent for other facilities or individuals according to requirements.

5. 鳥羽水族館 飼育動物一覧 Animal Inventory

1988.12.31 現在

哺乳類 Mammalia

和名	学名	♂	♀	不明	計
鯨目 Cetacea					
スナメリ	<i>Neophocaena phocaenoides</i>	2	2		4
イロワケルカ	<i>Cephalorhynchus commersoni</i>	2	1		3
鳍脚目 Pinnipedia					
オタリア	<i>Otaria byronia</i>	4	1		6
カリフォルニアアシカ	<i>Zalophus californianus</i>	3	4		8
アフリカオットセイ	<i>Arctocephalus pusillus</i>	2	4		6
ゴマフアザラシ	<i>Phoca largha</i>	2	1		3
バイカルアザラシ	<i>Pusa sibirica</i>	2	2		
海牛目 Sirenia					
ジュゴン	<i>Dugong dugon</i>	1	1		2
齧歯目 Rodentia					
ヌートリア	<i>Myocastor coypus</i>	1	1		
食肉目 Carnivora					
ラッコ	<i>Enhydra lutris</i>	1	4		5
鳥類 Aves					
フンボルトペンギン	<i>Spheniscus humboldti</i>	3	2	1	6

爬虫類 Reptilia

カメ目 Testudines					
ヌマガメ科 Emydidae					
ニホンイシガメ	<i>Clemmys japonica</i>				8
ミナミイシガメ	<i>C. mutica</i>				12
モリイシガメ	<i>C. insculpta</i>				1
キバラガメ	<i>Pseudemys scripta scripta</i>				1
ミンシッピアカミミガメ	<i>P. scripta elegans</i>				12
ハナガメ	<i>Ocadia sinensis</i>				3
ミツユビハコガメ	<i>Terrapene carolina triunguis</i>				1
クサガメ	<i>Geoclemys reevesii</i>				53
マレーハコガメ	<i>Cuora amboinensis</i>				1

ミスジハコガメ	<i>C. trifasciata</i>	1
ノコヘリマルガメ	<i>Cyclemys dentata</i>	2
セマルハコガメ	<i>C. flavomarginata</i>	3
ブランディングタートル	<i>Emydoidea blandingi</i>	1
カラグール ボルネンシス	<i>Callagur bornensis</i>	1
ヨーロッパスマガメ	<i>Emys orbicularis</i>	1
デンタータマルガメ	<i>Hieremis annandalei</i>	5
オオヤマガメ	<i>Geomyda grandis</i>	5
ホオジロクロカメ	<i>Siebenrockiella crassicollis</i>	1
ダイヤモンドバックテラピン	<i>Malacremys terrapin</i>	11
ニオイガメ	<i>Sternotherus odoratus</i>	1
チュウベイモリガメ	<i>Rhincremys pulcherrina</i>	1
ヒラセガメ	<i>Pyxidea mouhoti</i>	3
フォーアイタートル	<i>Sacaria quadriocellata</i>	2
ヨコクビガメ科 Pelomedusidae		
スマヨコクビガメ	<i>Pelomedusa subrufa</i>	2
クロヨコクビハコガメ	<i>Pelusios niger</i>	3
ドロガメ科 Kinosternidae		
スコーピオンドロガメ	<i>Kinosternon scorpioides</i>	1
スッポン科 Trionychidae		
ニホンスッポン	<i>Trionyx sinensis</i>	2
インドシナスッポン	<i>Perochelys bioroni</i>	1
ヒラタスッポン	<i>Dogania subplana</i>	1
コガシラスッポン	<i>Chitra indica</i>	1
カミツキガメ科 Chelydridae		
カミツキガメ	<i>Chelidra serpentina</i>	7
ワニガメ	<i>Macrolemys temmincki</i>	5
ヘビクビガメ科 Chelidae		
マタマタ	<i>Chelus fimbriatus</i>	2
ヒラリーカエルアタマガメ	<i>Phrynops hirarii</i>	4
ギバカエルアタマガメ	<i>P. gibbus</i>	2
ニューギニアヘビクビガメ	<i>Elseya novaeguineae</i>	3
ナンベイヘビクビガメ	<i>Phrynops maximilianus</i>	1
キザミネヘビクビガメ	<i>Hydromedusa tectifera</i>	1
オオアタマガメ科 Platysternidae		
ビッグヘッドタートル	<i>Platysternon megacephalum</i>	1
ウミガメ科 Cheloniidae		
タイマイ	<i>Eretmochelys imbricata</i>	3
アオウミガメ	<i>Cheronia mydas</i>	7
アカウミガメ	<i>Caretta caretta</i>	3

有鱗目 Squamata

ナミヘビ科 Colubridae

ヒゲミズヘビ

Erpeton tentaculatum

20

両生類 Amphibia

無尾目 Anura

ビバ科 Pipidae

ビバ

Pipa pipa

3

アフリカツメガエル

Xenopus laevis

260

ミナミガエル科 Leptodactylidae

ベルツノガエル

Ceratophrys ornata

4

アマゾンツノガエル

C. . cornuta

1

ヒキガエル科 Bufonidae

コノハガエル

Bufo typhonius

17

ブロンベルグヒキガエル

B. brombegi

3

マレーキノボリヒキガエル

Pedostibes hosii

6

アカガエル科 Ranidae

ウシガエル

Rana catesbeiana

7

アフリカウシガエル

Pyxicephalus adspersus

1

有尾目 Urodela

マルクチサラマンダー科 Ambystomatidae

メキシコサラマンダー

Ambystoma mexicanum

29

魚類 Pisces

軟骨魚綱 Chondrichthyes

ネコザメ目 Heterodontiformes

ネコザメ科 Heterodontidae

ネコザメ

Heterodontus japonicus

6

ネズミザメ目 Lamniformes

トラザメ科 Scyliorhinidae

ナスカザメ

Cephaloscyllium umbratile

3

トラザメ

Scyliorhinus torazame

2

ドチザメ科 Triakidae

ドチザメ

Triakis scyllia

11

ツノザメ目 Squaliformes

ツノザメ科 Squalidae

ツマリツノザメ

Squalus brevirostris

1

エイ目 Rajiformes

アカエイ科 Dasyatidae		
ウシエイ	<i>Dasyatis ushieii</i>	3
アカエイ	<i>D. akajei</i>	3
硬骨魚綱 Osteichthyes		
ニシン目 Clupeiformes		
ニシン科 Clupeidae		
マイワシ	<i>Sardinops melanostictus</i>	3950
カライワシ目 Elopiformes		
カライワシ科 Elopidae		
イセゴイ	<i>Megalops cyprinoides</i>	5
ウナギ目 Anguilliformes		
ウナギ科 Anguillidae		
ウナギ	<i>Anguilla japonica</i>	4
ウツボ科 Muraenidae		
トラウツボ	<i>Muraena pardalis</i>	17
コケウツボ	<i>Enchelicore lichenosa</i>	13
ユリウツボ	<i>Gymnothorax leucostigma</i>	16
アミメウツボ	<i>G. pseudothyrsoides</i>	1
ウツボ	<i>G. kidako</i>	11
ニセゴイシウツボ	<i>G. melanospilus</i>	1
ゴマウツボ	<i>G. flavimarginatus</i>	9
アミウツボ	<i>G. reticularis</i>	161
ヘリツロウツボ	<i>G. albimarginatus</i>	8
ワカウツボ	<i>G. eurostus</i>	11
ハワイウツボ	<i>G. berndti</i>	9
ウツボの一種	<i>G. sp.</i>	2
アナゴ科 Congridae		
マアナゴ	<i>Conger myriaster</i>	212
クロアナゴ	<i>C. japonicus</i>	36
ギンアナゴ	<i>Gnathophis nystromi nystromi</i>	6
チンアナゴ	<i>Heteroconger hassi</i>	10
ウミヘビ科 Ophichthidae		
ダイナンウミヘビ	<i>Ophisurus macrorhynchus</i>	8
ホウライウミヘビ	<i>Ophichthus evermanni</i>	6
スソウミヘビ	<i>O. urolophus</i>	3
イナカウミヘビ	<i>O. asakusae</i>	1
モンガラドオシ	<i>O. erabo</i>	7
ゴイシウミヘビ	<i>Myrichthys aki</i>	1
ミナミホタテウミヘビ	<i>Pisodonophis cancrivorus</i>	3

ナマズ目 Siluriformes		
ゴンズイ科 Plotosidae		
ゴンズイ	<i>Plotosus lineatus</i>	181
ハダカイワシ目 Myctophiformes		
ヒメ科 Aulopodidae		
ヒメ	<i>Aulopus japonicus</i>	5
エソ科 Synodontidae		
アカエソ	<i>Synodus ulae</i>	5
オキエソ	<i>Trachinocephalus myops</i>	2
ヨウジウオ目 Syngnathiformes		
サギフエ科 Macrorhamphosidae		
サギフエ	<i>Macrorhamphosus scolopax</i>	106
ヘコアユ科 Centriscidae		
ヘコアユ	<i>Aeoliscus strigatus</i>	68
ヨウジウオ科 Syngnathidae		
カワヨウジ	<i>Hippichthys spicifer</i>	1
イバラタツ	<i>Hippocampus histrix</i>	61
タラ目 Gadiformes		
チゴダラ科 Moridae		
チゴダラ	<i>Physiculus japonicus</i>	40
アシロ目 Ophidiiformes		
アシロ科 Ophidiidae		
イタチウオ	<i>Brotula multibarbata</i>	3
アンコウ目 Lophiiformes		
イザリウオ科 Antennariidae		
オニイザリウオ	<i>Antennarius moluccensis</i>	1
キンメダイ目 Beryciformes		
ヒウチダイ科 Trachichthyidae		
ハシキンメ	<i>Gephyroberyx japonicus</i>	2
マツカサウオ科 Monocentridae		
マツカサウオ	<i>Monocentris japonica</i>	16
イトウダイ科 Holocentridae		
イトウダイ	<i>Sargocentron spinosissimum</i>	41
アヤメエビス	<i>S. rubrum</i>	1
アカマツカサ	<i>Myripristis berndti</i>	12
エビスダイ	<i>Ostichthys japonicus</i>	5

スズキ目 Perciformes

ハタ科 Serranidae

ツチホゼリ	<i>Epinephelus cyanopodus</i>	1
マハタ	<i>E. septemfasciatus</i>	7
アカハタ	<i>E. fasciatus</i>	18
イヤゴハタ	<i>E. poecilnotus</i>	3
キジハタ	<i>E. akaara</i>	18
ノミノクチ	<i>E. trimaculatus</i>	1
ヤイトハタ	<i>E. malabaricus</i>	1
アカマダラハタ	<i>E. fuscoguttatus</i>	5
クエ	<i>E. moara</i>	4
シモフリハタ	<i>E. rivulatus</i>	1
ホウセキハタ	<i>E. chlorostigma</i>	1
オオモンハタ	<i>E. areolatus</i>	1
サクラダイ	<i>Sacura margaritacea</i>	21
キンギョハナダイ	<i>Franzia squamipinnis</i>	22
スマレナガハナダイ	<i>Pseudanthias pleurotaenia</i>	2
ハナダイの一種	<i>P. sp.</i>	7

ヌノサラシ科 Grammistidae

ルリハタ	<i>Aulacocephalus temmincki</i>	24
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キントキダイ科 Priacanthidae

キントキダイ	<i>Priacanthus macracanthus</i>	4
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テンジクダイ科 Apogonidae

ネンブツダイ	<i>Apogon semilineatus</i>	1
マンジュウイシモチ	<i>Sphaeramia nematoptera</i>	51

アジ科 Carangidae

マアジ	<i>Trachurus japonicus</i>	145
コガネシマアジ	<i>Gnathanodon speciosus</i>	5
イトヒキアジ	<i>Alectis ciliaris</i>	3

ヒメジ科 Mullidae

オキナヒメジ	<i>Parupeneus spilurus</i>	52
タカサゴヒメジ	<i>P. heptacanthus</i>	1

テッポウウオ科 Toxotidae

テッポウウオ	<i>Toxotes jaculator</i>	12
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メジナ科 Girellidae

メジナ	<i>Girella punctata</i>	3
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フエダイ科 Lutjanidae

フエダイ	<i>Lutjanus stellatus</i>	2
クロホシフエダイ	<i>L. russellii</i>	1
ヨスジフエダイ	<i>L. kasmira</i>	5
センネンダイ	<i>L. sebae</i>	1

イサキ科 Pomadasysidae

イサキ	<i>Parapristipoma trilineatum</i>	6
コロダイ	<i>Plectorhynchus pictus</i>	4
ムスジコシヨウダイ	<i>P. diagrammus</i>	1
ヒゲダイ	<i>Hapalogenys nigripinnis</i>	2
シマイサキ科 Teraponidae		
シマイサキ	<i>Rhyncopelates oxyrhynchus</i>	41
コトヒキ	<i>Terapon jarbua</i>	5
ヒメコトヒキ	<i>T. theraps</i>	4
タイ科 Sparidae		
チダイ	<i>Eymnis japonica</i>	1
マダイ	<i>Pagrus major</i>	12
ヘダイ	<i>Sparus sarba</i>	8
クロダイ	<i>Acanthopagrus schlegeli</i>	14
キチヌ	<i>A. latus</i>	1
フエフキダイ科 Lethrinidae		
メイチダイ	<i>Gymnocranius griseus</i>	2
ハマフエフキ	<i>Lethrinus nebulosus</i>	6
イトフエフキ	<i>L. nematacanthus</i>	44
スダレダイ科 Ehippididae		
ツバメウオ	<i>Platax teira</i>	11
カゴカキダイ科 Scorpididae		
カゴカキダイ	<i>Microcanthus strigatus</i>	28
チョウチョウウオ科 Chaetodontidae		
フエヤッコダイ	<i>Forcipiger flavissimus</i>	4
スダレチョウチョウウオ	<i>Chaetodon ulietensis</i>	6
スミツキトノサマダイ	<i>C. plebeius</i>	7
アミメチョウチョウウオ	<i>C. xanthurus</i>	17
ミカドチョウチョウウオ	<i>C. baronessa</i>	3
ベニオチョウチョウウオ	<i>C. mertensii</i>	4
トゲチョウチョウウオ	<i>C. auriga</i>	23
ニセフウライチョウチョウウオ	<i>C. lineolatus</i>	3
チョウハン	<i>C. lunula</i>	8
チョウチョウウオ	<i>C. aaripes</i>	12
シチセンチョウチョウウオ	<i>C. punctatofasciatus</i>	2
アミチョウチョウウオ	<i>C. rafflesi</i>	1
フウライチョウチョウウオ	<i>C. vagabundus</i>	3
ゴマチョウチョウウオ	<i>C. citrinellus</i>	1
シラコダイ	<i>C. nippon</i>	20
アケボノチョウチョウウオ	<i>C. melannotus</i>	4
ゲンロクダイ	<i>C. modestus</i>	5
セグロチョウチョウウオ	<i>C. ehippium</i>	27
コラリスチョウチョウウオ	<i>C. collare</i>	5
カスミチョウチョウウオ	<i>Hemitaurichthys polylepis</i>	5

ハタタテダイ	<i>Heniochus acuminates</i>	4
キンチャクダイ科 Pomacanthidae		
キンチャクダイ	<i>Chaetodontoplus septentrionalis</i>	8
チリメンヤッコ	<i>C. mesoleucus</i>	26
サザナミヤッコ	<i>Pomacanthus semicirculatus</i>	12
アデヤッコ	<i>P. xanthonotopon</i>	1
ソメワケヤッコ	<i>Centropyge bicolor</i>	20
フレームエンゼルフィッシュ	<i>C. loriculus</i>	2
タテジマヤッコ	<i>Genicanthus lamarck</i>	8
カワビシャ科 Pentacerotidae		
ツボダイ	<i>Pentaceros japonicus</i>	1
インダイ科 Oplegnathidae		
インダイ	<i>Oplegnathus fasciatus</i>	22
インガキダイ	<i>O. punctatus</i>	8
インダイ × インガキダイ	<i>O. fasciatus × punctatus</i>	1
スズメダイ科 Pomacentridae		
ハマクマノミ	<i>Amphiprion frenatus</i>	4
ミツボシクロスズメダイ	<i>Dascyllus trimaculatus</i>	127
ミスジリュウキュウスズメダイ	<i>D. aruanus</i>	462
スズメダイ	<i>Chromis notatus notatus</i>	1
デバスズメダイ	<i>C. viridis</i>	189
クロオビスズメダイ	<i>C. retrofasciatus</i>	126
ルリスズメダイ	<i>Chrysiptera cyanea</i>	784
レモンズズメダイ	<i>C. rex</i>	1
シリキルリスズメダイ	<i>C. hemicyanea</i>	397
ネットイスズメダイ	<i>Pomacentrus moluccensis</i>	206
オヤビッチャ	<i>Abudefduf vaiigiensis</i>	7
ガリバルディ	<i>Hypsypops rubicunda</i>	2
ゴンベ科 Cirrhitidae		
オキゴンベ	<i>Cirrhitichthys aureus</i>	1
タカノハダイ科 Cheilodactylidae		
タカノハダイ	<i>Goniistius zomatus</i>	23
ユウダチタカノハ	<i>G. quadricornis</i>	1
ミギマキ	<i>G. zebra</i>	1
ベラ科 Labridae		
イラ	<i>Choerodon azurio</i>	11
コブダイ	<i>Semicossyphus reticulatus</i>	6
ツユベラ	<i>Coris gaimard</i>	5
ムスメベラ	<i>C. picta</i>	1
ササノハベラ	<i>Pseudolabrus japonicus</i>	13
ホンベラ	<i>Halichoeres tenuispinnis</i>	11
キュウセン	<i>H. poecilopterus</i>	109
カミナリベラ	<i>Sethojulis interrupta terina</i>	1

ニシキベラ	<i>Thalassoma cupido</i>	2
ホンソメワケベラ	<i>Labroides dimidiatus</i>	19
テンス	<i>Xyrichtys dea</i>	7
ブダイ科 Scaridae		
アオブダイ	<i>Scarus oviifrons</i>	2
コバンザメ科 Echineidae		
コバンザメ	<i>Echeneis naucrates</i>	1
ツノダシ科 Zanclidae		
ツノダシ	<i>Zanclus cornutus</i>	3
ニザダイ科 Acanthuridae		
ニザダイ	<i>Prionurus scalprus</i>	10
ナンヨウハギ	<i>Paracanthurus hepatus</i>	69
ヒレナガハギ	<i>Zebrosoma veliferum</i>	5
キイロハギ	<i>Z. flavescens</i>	1
ニセカンランハギ	<i>Acanthurus dussumieri</i>	2
アイゴ科 Siganidae		
アイゴ	<i>Siganus fuscescens</i>	7
ヒメアイゴ	<i>S. virgatus</i>	1
ハゼ科 Gobiidae		
キヌバリ	<i>Pterogobius elapoides</i>	1
ハナハゼ	<i>Ptereleotris hanae</i>	2
イソギンボ科 Blenniidae		
ニジギンボ	<i>Petroscirtes breviceps</i>	1
タウエガジ科 Stichaeidae		
ダイナンギンボ	<i>Dictyosoma burgeri</i>	14
ニシキギンボ科 Pholididae		
ギンボ	<i>Pholis nebulosa</i>	6
オオカミウオ科 Anarhichadidae		
オオカミウオ	<i>Anarhichas orientalis</i>	4
カサゴ目 Scorpaeniformes		
フサカサゴ科 Scorpaenidae		
ムラソイ	<i>Sebastes pachycephalus</i>	20
クロソイ	<i>S. schlegeli</i>	6
シマソイ	<i>S. tri vittatus</i>	2
タケノコメバル	<i>S. oblongus</i>	2
メバル	<i>S. inermis</i>	1
ヨロイメバル	<i>S. hubbsi</i>	3
カサゴ	<i>Sebastiscus marmoratus</i>	10
アヤマカサゴ	<i>S. albofasciatus</i>	1
ミノカサゴ	<i>Pterois lunulata</i>	3
ハナミノカサゴ	<i>P. volitans</i>	8
コクチフサカサゴ	<i>Scorpaena miostoma</i>	22

オニカサゴ	<i>Scorpaenopsis cirrhosa</i>	11
オニオコゼ科 Synanceiidae		
オニオコゼ	<i>Inimicus japonicus</i>	9
ハオコゼ科 Congiopodidae		
ハオコゼ	<i>Hypodytes rubripinnis</i>	15
アイナメ科 Hexagrammidae		
ホッケ	<i>Pleurogrammus azonus</i>	2
カジカ科 Cottidae		
オクカヅカ	<i>Myoxocephalus jaok</i>	1
ケムシカヅカ	<i>Hemitripterus villosus</i>	1
ヨコスジカヅカ	<i>Hemilepidotus gilberti</i>	1
アナハゼ	<i>Pseudoblepnis percoides</i>	16
アサヒアナハゼ	<i>P. cottoides</i>	1
ホウボウ科 Triglidae		
ホウボウ	<i>Chelidonichthys spinosus</i>	1
クサウオ科 Liparididae		
クサウオ	<i>Liparis tanakai</i>	1
カレイ目 Pleuronectiformes		
ヒラメ科 Paralichthyidae		
ヒラメ	<i>Paralichthys olivaceus</i>	2
カレイ科 Pleuronectidae		
マコガレイ	<i>Pleuronectes yokohamae</i>	2
クロガシラガレイ	<i>P. schrenki</i>	1
ヌマガレイ	<i>Platichthys stellatus</i>	28
ササウシノシタ科 Soleidae		
ウシノシタの1種	<i>Soleidae</i> sp.	2
シマウシノシタ	<i>Zebrias zebra</i>	3
フグ目 Tetraodontiformes		
モンガラカワハギ科 Balistidae		
モンガラカワハギ	<i>Balistoides conspicillum</i>	1
クロモンガラ	<i>Melichthys vidua</i>	3
アカモンガラ	<i>Odonus niger</i>	3
アミモンガラ	<i>Canthidermis maculata</i>	3
カワハギ科 Monacanthidae		
カワハギ	<i>Stephanolepis cirrhifer</i>	5
フグ科 Tetraodontidae		
トラフグ	<i>Taki fugu rubripes</i>	5
クサフグ	<i>T. niphobles</i>	60
ショウサイフグ	<i>T. vermicularis</i>	2
ユモンフグ	<i>T. poecilonotus</i>	20
ヒガンフグ	<i>T. pardalis</i>	12

サザナミフグ	<i>Arothron hispidus</i>	2
シロサバフグ	<i>Lagocephalus wheeleri</i>	1
ハリセンボン科 Diodontidae		
ハリセンボン	<i>Diodon holocanthus</i>	8
ネズミフグ	<i>D. hystrix</i>	3

淡水魚 Fresh water fishes

硬骨魚綱 Osteichthyes

肺魚目

レビドシレン科

プロトプテルス エチオピクス	<i>Protopterus aethiopicus</i>	1
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チョウザメ目 Acipenseriformes

チョウザメ科 Acipenseridae

シロチョウザメ	<i>Acipenser transmontanus</i>	8
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ホシチョウザメ	<i>A. stellatus</i>	3
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ダウリアチョウザメ	<i>Huso dauricus</i>	2
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ヘラチョウザメ科 Polyodontidae

ヘラチョウザメ	<i>Polyodon spathula</i>	1
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レビソステウス目 Lepisosteiformes

レビソステウス科 Lepisosteidae

ロングノーズ ガー	<i>Lepisosteus osseus</i>	4
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フロリダ ガー	<i>L. tristoechus</i>	2
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スポッテッド ガー	<i>L. oculatus</i>	1
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オステオグロッサム目 Osteoglossiformes

オステオグロッサム科 Osteoglossidae

ピラルク	<i>Arapaima gigas</i>	11
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シルバーアロワナ	<i>Osteoglossum bicirrhosum</i>	9
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ナギナタナマズ科 Notopteridae

インディアンナイフフィッシュ	<i>Notopterus chitala</i>	2
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ロイヤル ナイフフィッシュ	<i>N. branchi</i>	2
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コイ目 Cypriniformes

コイ科 Cyprinidae

ゼブラダニオ	<i>Brachydanio rerio</i>	51
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ロングフィン ゼブラダニオ	<i>B. flankei</i>	100
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タイガーバルブ	<i>Puntius tetrazona</i>	14
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チェリーバルブ	<i>P. titteya</i>	198
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ポストフィッシュ	<i>P. lateristriga</i>	17
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アルジーイーター	<i>Gyrinocheilus aymonieri</i>	587
ドジョウ科 Cobitididae		
クラウンローチ	<i>Botia macracanthus</i>	20
タイガーボーシャ	<i>B. striata</i>	2
カラシン目 Characiformes		
カラシン科 Characidae		
ブラインドケープカラシン	<i>Anoptichthys jordani</i>	20
グローライトテトラ	<i>Hemigrammus erythrozonus</i>	561
ネオンテトラ	<i>Paracheirodon innesi</i>	1322
ブラックテトラ	<i>Gymnocorymbus ternetzi</i>	16
ブラックネオン	<i>Hyphessobrycon herbertaxelrodi</i>	522
コンゴテトラ	<i>Phenacogrammus interruptus</i>	67
シルバーティップテトラ	<i>Hassemania nana</i>	1
ショートノーズクラウンテトラ	<i>Distichodus sexfasciatus</i>	2
ベンギンテトラ	<i>Thayeria boehlkei</i>	348
タイガーフィッシュ	<i>Hydrocymon goliath</i>	3
ピラニアナッテリー	<i>Serrasalmus nattereri</i>	17
コロソマ	<i>Colossoma</i> sp.	21
レッドコロソマ	<i>C.</i> sp.	1
ナマズ目 Siluriformes		
ナマズ科 Siluridae		
ホワイコリドラス	<i>Corydoras paleatus</i>	38
レオバードコリドラス	<i>C. leopardus</i>	1
セルフィンキャット	<i>Pernanichthys perroni</i>	1
レッドテールキャット	<i>Phractocephalus hemiliopterus</i>	1
サカサナマズ	<i>Synodontis nigriventris</i>	8
シャベルノーズ キャットフィッシュ	<i>Sorubim lima</i>	3
トランスルーセント グラスキャットフィッシュ	<i>Kryopterus bicirrhis</i>	65
パールム	<i>Pangestus larnaudii</i>	1
タイガー プレコストムス	<i>Pekditia</i> sp.	9
トリニダート プレコストムス	<i>Hypostomus</i> sp.	20
デンキナマズ科 Malapteruridae		
デンキナマズ	<i>Malapterurus electricus</i>	1
ドラス科 Doradidae		
オキシドラス	<i>Pseudodoras nigel</i>	1
ギムノートゥス目 Gymnotiformes		
デンキウナギ科 Electrophoridae		
デンキウナギ	<i>Electrophorus electricus</i>	1

メダカ目 Cyprinodontiformes

カダヤシ科 Poeciliidae

サンセットブラティ	<i>Xiphophorus maculatus</i> var.	35
レッドソードテール	<i>X. helleri</i> var.	119
タキシードブラティ	<i>X. helleri</i> var.	14
レッドワグブラティ	<i>X. maculatus</i> var.	100
ワグソードテール	<i>X. helleri</i> var.	45
アルビノソードテール	<i>X. helleri</i>	48
ブラックライヤテールモーリー	<i>Poecilia hybrid</i>	74

スズキ目 Perciformes

アカメ科 Centropomidae

グラスフィッシュ	<i>Chanda ranga</i>	106
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サンフィッシュ科 Centrarchidae

オオクチバス	<i>Micropterus salmoides</i>	6
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ロボティ科 Lobotidae

フォーバータイガーフィッシュ	<i>Daniooides quadrfasciatus</i>	3
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シクリッド科 Cichlidae

アイスボッドシクリッド	<i>Cichla ocellaris</i>	2
アストロノータス オセレータス	<i>Astronotus ocellatus</i>	9
フラミンゴシクリッド	<i>Cichlasoma citrinellum</i>	1
シクラソマ マナグエンセ	<i>C. managuense</i>	1

ナンダス科 Nandidae

ナンダス ナンダス	<i>Nandus nandus</i>	7
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ベロンティア科 Belontiidae

パールグーラミィ	<i>Trichogaster leeri</i>	38
シルバークーラミィ	<i>T. microlepis</i>	32
マーブルグーラミィ	<i>T. trichopterus sumatranus</i>	11

オスフロネームス科 Osphronemidae

オスフロネームス グラミィ	<i>Osphronemus gourami</i>	10
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無脊椎動物 Invertebrata

腔腸動物 Coelenterata

鉢クラゲ綱 Scyphomedusae

旗口クラゲ目 Semaestomae

ミズクラゲ科 Urmaridae

ミズクラゲ	<i>Aurelia aurita</i>	43
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オキクラゲ科 Pelagiidae

アカクラゲ	<i>Dactylometra pacifica</i>	1
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根口クラゲ目 Rhizostomae		
タコクラゲ科 Mastigiadidae		
タコクラゲ	<i>Mastigias papua</i>	19
サカサクラゲ	<i>Cassiopea ornata</i>	3
花虫綱 Anthozoa		
イソギンチャク目 Actiniaria		
ウメボシイソギンチャク科 Actiniidae		
ミドリイソギンチャク	<i>Anthopleura fuscoviridis</i>	39
ヒダベリイソギンチャク科 Metridiidae		
ヒダベリイソギンチャク	<i>Metridium senile</i>	2
アクティノストラ科 Actinostolidae		
サンゴイソギンチャク	<i>Parasicyonis actinostoloides</i>	3
スナギンチャク目 Zoantharia		
センナリスナギンチャク科 Parazoanthidae		
センナリスナギンチャク	<i>Parazoanthus gracilis</i>	2
ハナギンチャク目 Ceriantharia		
ハナギンチャク科 Cerianthidae		
ムラサキハナギンチャク	<i>Cerianthus filiformis</i>	1
ヒメハナギンチャク	<i>Pachycerianthus magnus</i>	6
イシワケイソギンチャク	<i>Radianthus maculata</i>	5
イシサンゴ目 Scleractinia		
キサンゴ科 Dendrophylliidae		
ムツサンゴ	<i>Rhizopsammia minuta mutsuensis</i>	1
イボヤギ	<i>Tubastraea aurea</i>	6
オオイボヤギ	<i>T. coccinea</i>	1
ハマサンゴ科 Poritidae		
ハナガササンゴ	<i>Goniopora planulata</i>	3
キクメイシ科 Faviidae		
オオバナサンゴ	<i>Trachyphyllia geoffroyi</i>	10

軟体動物 Mollusca

腹足綱 Gastropoda		
中腹足目 Mesogastropoda		
フジツガイ科 Cymatiidae		
カコボラ	<i>Monoplex parthenopeum</i>	4
オオゾウガイ	<i>Renularia pyra</i>	3
ボウシュウボラ	<i>Charonia sauliae sauliae</i>	4
オキニシ科 Bursidae		

コナルトボラ	<i>Tritonoranella ranelloides</i>	1
新腹足目 Neogastropoda		
アキガイ科 Muricidae		
アカニシ	<i>Rapana venosa</i>	6
レイシガイ	<i>Tharis bronni</i>	20
エゾバイ科 Buccinidae		
ミガキボラ	<i>Kelletia lischkei</i>	2
テングニシ科 Melongenidae		
テングニシ	<i>Hemifusus tuba</i>	1
イトマキボラ科 Fasciolaridae		
イトマキボラ	<i>Pleuroploca trapezium</i>	1
ツノマタナガニシ	<i>Fusinus tuberosus</i>	1
アメフラシ目 Aplysiacea		
アメフラシ科 Aplysiidae		
トゲアメフラシ	<i>Eursatella leachi</i>	2
ドーリス目 Doridacea		
ドーリス科 Dorididae		
コモンウミウシ	<i>Chromodoris aureopurpurea</i>	1
クロシタナシウミウシ科 Dendrodorididae		
クロシタナシウミウシ	<i>Dendrodoris nigra</i>	2
ミヤコウミウシ	<i>D. denisoni</i>	2
頭足綱 Cephalopoda		
オウムガイ目 Nautiloidea		
オウムガイ科 Nautilidae		
オウムガイ	<i>Nautilus pompilius</i>	10
バラオオウムガイ	<i>N. belauensis</i>	1
十腕目 Decembranchiata		
コウイカ科 Sepiidae		
コウイカ	<i>Sepia esculenta</i>	20
環形動物 Annelida		
定在目 Sedentaria		
ケヤリ科 Sabellidae		
ケヤリ	<i>Sabellastarte indica</i>	2

節足動物 Arthropoda

剣尾目 Xiphosura

カブトガニ科 Limulidae

カブトガニ

Tachypleus tridentatus

25

十脚目 Decapoda

長尾亜目 Macrura

ザリガニ科 Astacidae

アメリカンロブスター

Homarus americanus

7

セミエビ科 Scyllaridae

セミエビ

Scyllarides squamosus

1

コブセミエビ

S. haani

4

ヒメセミエビ

Scyllarus cultrifer

5

ゾウリエビ

Parribacus antarcticus

6

モエビ科 Hippolytidae

アカシマシラヒゲエビ

Lysmata amboinensis

5

タラバエビ科 Pandalidae

ボタンエビ

Pandalus nipponensis

50

イセエビ科 Palinuridae

イセエビ

Panulirus japonicus

27

カノコイセエビ

P. longipes

1

ケブカイセエビ

P. homarus

1

異尾亜目 Anomura

タラバガニ科 Lithodidae

タラバガニ

Paralithodes camtschatica

1

ハナサキガニ

P. brevipes

3

ホンヤドカリ科 Paguridae

ホンヤドカリ

Pagurus samuelis

2

ベニホンヤドカリ

P. similis

21

オホーツクホンヤドカリ

P. ochotensis

1

ヤドカリ科 Diogenidae

イボアシヤドカリ

Dardanus impressus

1

ソメンヤドカリ

D. pedunculatus

15

イシダタミヤドカリ

D. crassimanus

31

ヨコスジヤドカリ

D. arrosor

47

サメハダヤドカリ

D. gemmatus

1

トゲツノヤドカリ

Diogenes edwardsi

1

ケブカヒメヨコバサミ

Paguristes barbatus

17

オニヤドカリ

Aniculus aniculus

11

短尾亜目 Brachyura		
ホモラ科 Homolidae		
トウヨウホモラ	<i>Homola orientalis</i>	2
カイカムリ科 Dromiidae		
カイカムリ	<i>Dromia dehaani</i>	1
アカゲカムリ	<i>D. intermedia</i>	1
コブシガニ科 Leucosiidae		
テナガコブシ	<i>Myra fugax</i>	2
ツノナガコブシ	<i>Leucosia anatum</i>	1
ジュウイチトゲコブシ	<i>Arcania undecimspinosa</i>	1
カラッパ科 Calappidae		
トラフカラッパ	<i>Calappa lophos</i>	1
メガネカラッパ	<i>C. philargius</i>	1
クモガニ科 Majidae		
エダツノガニ	<i>Naxioides mammillata</i>	21
ツノガニ	<i>Hyastenus diacanthus</i>	3
ケアシガニ	<i>Maja spinigera</i>	25
ノコギリガニ	<i>Schizophrys aspera</i>	1
モクズシヨイ	<i>Camposcia retusa</i>	1
カイメンガニ	<i>Chlorinoides longispinus</i>	2
コワタクズガニ	<i>Micippa philyra</i>	2
タカアシガニ	<i>Macrocheira kaempferi</i>	4
ヒシガニ科 Parthenopidae		
ヒシガニ	<i>Parthenope validus forma validus</i>	2
ホソウデヒシガニ	<i>P. validus forma laciniatus</i>	11
イチョウガニ科 Cancridae		
イチョウガニ	<i>Cancer japonicus</i>	2
イボイチョウガニ	<i>C. gibbosulus</i>	3
ワタリガニ科 Portunidae		
ノコギリガザミ	<i>Scylla serrata</i>	3
イシガニ	<i>Charybdis japonica</i>	2
ベニイシガニ	<i>C. acuta</i>	1
フタバベニツケガニ	<i>Thalamita sima</i>	2
カルバガザミ	<i>Curupa tenuipes</i>	1
シワガザミ	<i>Macropipus corrugatus</i>	2
オウギガニ科 Xanthidae		
アカマンジュウガニ	<i>Atergatis subdentatus</i>	5
ヘリトリマンジュウガニ	<i>A. reticulatus</i>	6
スベスベマンジュウガニ	<i>A. floridus</i>	1
イワガニ科 Grapsidae		
シウジンガニ	<i>Plagusia dentipes</i>	1

棘皮動物 Echinodermata

ヒトデ綱 Asteroidea		
顕帯目 Phanerozonia		
ヒトデ科 Asteriidae		
ヒトデ	<i>Asterias amurensis</i>	5
有棘目 Spinulosa		
アステリナ科 Asterinidae		
イトマキヒトデ	<i>Asterina pectinifera</i>	5
オフィディアステル科 Ophidiasteridae		
アカヒトデ	<i>Certonardoa semiregularis</i>	1
ウニ綱 Echinocidea		
ガンガゼ目 Diadematoidea		
ガンガゼ科 Diadematidae		
ガンガゼ	<i>Diadema setosum</i>	10
サンショウウニ目 Temnopleurida		
サンショウウニ科 Temnopleuridae		
サンショウウニ	<i>Temnopleurus toreumaticus</i>	1
キタサンショウウニ	<i>T. hardwicki</i>	4
ラッパウニ科 Toxopneustidae		
ラッパウニ	<i>Toxopneustes pileolus</i>	4
シラヒゲウニ	<i>Tripleneustes gratilla</i>	1
オオバフンウニ科 Strongylocentrotidae		
バフンウニ	<i>Hemicentrotus pulcherrimus</i>	20
ナマコ綱 Holothuroidea		
楯手目 Aspidochirotida		
マナマコ科 Stichopodidae		
マナマコ	<i>Stichopus japonicus</i>	6
クロナマコ科 Holothuriidae		
ニセクロナマコ	<i>Holothuria leucospilota</i>	14

オタリア新生児における鉤虫感染症について

鳥羽水族館

長谷川一宏・石川 創・沢村栄一

川口直樹・中村修一

On the Infection of the Hookworm in a Pup of the South American Sea Lion *Otaria byronia*

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ABSTRACT

A female pup of the south American sea lion *Otaria byronia* was born in Toba Aquarium on 14, July, 1988. Her parents had been brought to Toba in 1973.

The pup excreted bloody mucous feces at 12 days old. She was suffered from anemia, and excreted eggs of the hookworm at 16 days old. Adult hookworms, which the pup excreted later, were concluded to belong to genus *Uncinaria*, and suspected as *Uncinaria hamiltoni* by National Science Museum and Daito College of Medical Technolgy.

We administered Parabendazole or Pyrantel pamoate to this pup. It was suggested that Parabendazole was not able to kill all worms, but it temporally improved the condition of the pup, and prevented decrease in her body weight.

Whereas after we had administered Pyrantel pamoate to the pup at 41 days old, we could not find the eggs of the hookworm in her feces, and her health recovered. But it was possible that the pup of the south American sea lion might naturally recover from the infection of the hookworm after about 40 days old.

As for the route of the infection, we thought that the hookworms invaded the pup from the milk of her mother. Olsen and Lyons reported (1965) that adult northern fur seals *Callorhinus ursinus* were not infected with adult hookworms *Uncinaria lucasi*, and the parasitic third-stage larvae of the hookworm kept living in the blubber of fur seals of all age groups. Similarly it was suggested that in this case the mother of our pup has been infected with the parasitic third-stage larvae in the wild before she was taken to Toba Aquarium. And the larvae were thought to keep living more than 10 years in the blubber of this mother.

鳥羽水族館では1988年7月14日に1頭のオタリア *Otaria byronia* が出生したが、新生児は16日齢で鉤虫卵と思われる虫卵を排泄した。これに対し、パーベンダゾール、パモ酸ピランテルを用いて駆虫を試みた。また処置中に回収した虫体を国立科学博物館

ならびに大東医学技術専門学校で検索していただいた結果、*Uncinaria hamiltoni* であろうと考えられた。

オタリアにおける鉤虫感染症は国内でも(三上・志村, 1981) 海外でも(BAYLIS, 1933, BOTTO and MAÑÉ-GARZÓN, 1975) 報告されており、致命的

な疾病になる危険性があるとして恐れられている。また鰓脚類の鉤虫感染症に対する治療は BIGG and LYONS (1981) や BROWN et al. (1974), LYONS et al. (1978, 1980) らによって報告されているが、使用されている薬剤は限られている。

本稿では鳥羽水族館で見られたオタリア新生児の *Uncinaria* 感染症の臨床経過を報告するとともに、その感染経路を考察する。

発症個体と飼育状況

個体は1988年7月14日に出生したメスで、母親は国内登録番号006のボンキチ、父親は005のクロである。両親は共に1973年8月6日に入館した。

母親は当該個体を出産する前は、 $2 \times 2 \times 1 \text{ m}^3$ のプールが付属した $6 \times 3 \text{ m}^2$ の飼育場で当該個体の父親とともに飼育されていたが、出産26日前に縦 2 m ・横 2.5 m ・高さ 2 m のケージ内に $1.3 \times 1.05 \times 0.75 \text{ m}^3$ のタンクを置いた飼育舎に移動した。両飼育施設はともに屋外に位置し、飼育水は開放式自然海水であった。

当該個体は161日齢で初めて冷凍アジを摂餌したが、それまで母乳のみを摂取した。その期間に母獣は $0.7\text{--}9.0 \text{ kg/day}$ の範囲で平均 7.3 kg/day の冷凍アジを摂取した。

Table 1. Measurements of adult hookworms suspected as *Uncinaria hamiltoni*, which we found in feces of the pup of south American sea lion. They were measured by Daito College of Medical Technology.

Parasite	No. 1	No. 2	No. 3
Sex	♂	♀	♀
Measurements (mm)			
Length of body	8.3	11.7	12.4
Maximum width of body	0.30	0.31	0.30
Length of esophagus	1.13	1.28	1.16
Cervical papillae from anterior extremity	0.67	—	0.86
Length of spicules	0.96, 0.97	—	—
Length of gubernaculum	0.11	—	—
Vulva from anterior extremity	—	7.4	7.5
Length of tail	—	0.20	0.22

寄生虫

駆虫薬投与後に回収した成虫虫体(♂1, ♀2)を国立科学博物館ならびに大東医学技術専門学校で計測および検索していただいた。

計測値は Table 1 に示した。虫体は頭端が背側に反り、口の開口部には1対のよく発達した板状構造(cutting plate)が見られた。口腔はよく発達していたが、頸部乳頭は口腔付近ではなく食道のレベルにあり、顕著ではなかった。♂(Fig. 1)の交接囊はよく発達した1対の側葉と背肋を含む小さな背葉から成っていた。



Fig. 1 An adult male hookworm. It belongs to the genus *Uncinaria*.

また新生児の糞便中に見られた虫卵(Fig. 2)は長径約 $130 \mu\text{m}$ 、短径約 $80 \mu\text{m}$ で、複数の細胞から成る内容物を有していた。

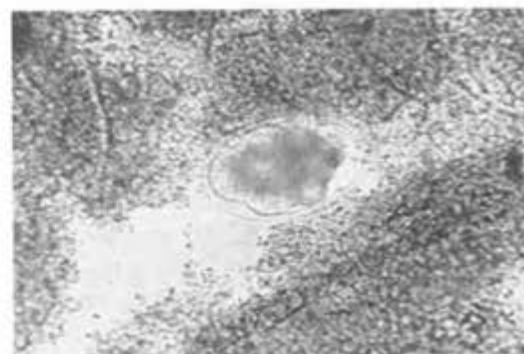


Fig. 2 *Uncinaria* egg in feces. It measured about $130 \mu\text{m}$ by $80 \mu\text{m}$, and contained several cells.

以上の計測結果と特徴から本種は *Uncinaria* 属の鉤虫と同定された。しかし種については *Uncinaria hamiltoni* であろうと考えられたが、虫体数が少な

Table 2. Correlation of anthelmintic administration with the condition of feces, the degree of anemia, the number of eggs of the hookworm and the appearance of adult worms in feces of the pup.

●: Parbendazole. ○: Pyrantele pamoate. M: Bloody mucous feces. S: Severe bloody feces. P: Solid pink feces. B: Solid brown feces. Y: Solid yellow feces.

Age (days)	12	16	17	20	24	25	26	27	32	40	41	42	44	47	79
Anthelmintic		●	●		●	●					○				
Number of eggs of hookworm in feces		+		±	+	+	±		+	±	-	-			-
Appearance of adult worms in feces						+									
Condition of feces	M	M		P	M	M		P	M	S	M	B	Y		
Degree of anemia		###				##			+		##				-

く、またいたんでいたため断定はできなかった。

臨床経過

新生児は16日齢で初めて虫卵を排泄したので、同日と翌日にパーベンダゾール約28mg/kgを経口投与した。その後排泄される虫卵数は一時的に減少したが、24日齢で増加したので同日から2日間パーベンダゾール約23mg/kgを投与した。排泄虫卵数は26日齢では減少したが32日齢で再び増加し、40日齢で鮮血便を排泄したので、翌日パモ酸ピランテル約7.4mg/kgを投与した。以後糞便中に虫卵は確認されなかった (Table 2)。

なお本例では糞便の回収が困難であったため、パーベンダゾール投与直後の25日齢以外では虫体は採取できなかった (Table 2)。

新生児は12日齢から粘血便を排泄したが、2日連続のパーベンダゾールの投与の後一時的に固型便を排泄した。また便の状態はパーベンダゾールの投与後日数が経過すると悪化したが、41日齢のパモ酸ピランテルの投与後は著しく回復した (Table 2)。

新生児の貧血は2度の2日連続のパーベンダゾールの投与を経て徐々に回復したが、41日齢でやや悪化した。しかし同日のパモ酸ピランテルの投与を経て、79日齢では貧血は認められなかった (Table 2)。なお貧血の程度は口腔粘膜の色調によって判断した。

さらに新生児の体重は2度の2日連続のパーベンダゾールの投与を経て順調に増加した (Fig. 3)。個体は321日齢現在順調に成育している。

上述した駆虫薬の投与は注射筒に連結した内径4

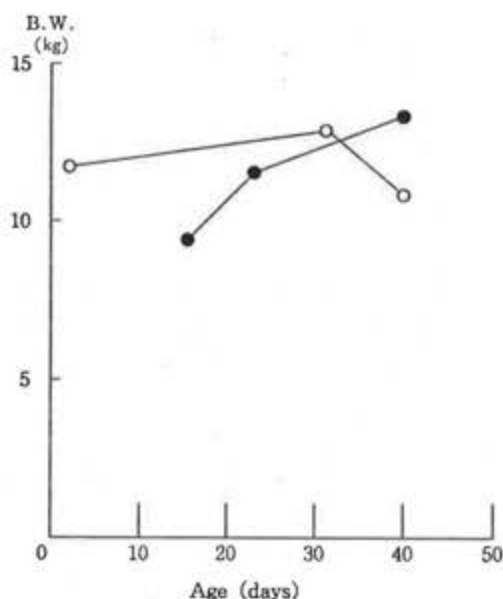


Fig. 3 Body weight of two female pups of the south American sea lion. Both two pups were infected with adult hookworms. ○: The pup, which Mikami and Shimura reported in 1981, did not receive any anthelmintic.

●: The pup, which we report in this paper, were administered with Parbendazole at 16, 17, 24 and 25 days old, and with Pyrantele pamoate at 41 days old.

mm, 外径6mmのビニールホースを食道に入れ、約100mlの温湯に溶かした薬剤を強制的に押し込む方法で行った。

考 察

三上と志村は1981年に、事故死したメスのオタリア新生児の小腸から鉤虫に類似した線虫を検出した。その個体は生存中に駆虫処置を行わなかったが、本例の個体とは対照的に31日齢から体重が減少した (Fig. 3)。また本例では2日連続のパーベンダゾールの投与の後、一時的に排泄虫卵数が減少し便の状態が回復した。これらのことからパーベンダゾールは全ての寄生鉤虫を殺すことはできないが、寄生虫数を減らし一時的に症状を改善させること、そして体重の減少をくい止めることが示唆された。

さらにパモ酸ビランテルの投与後は虫卵も検出されなくなり、症状も著しく改善した。このことはパモ酸ビランテルが優れた駆虫効果を持つ可能性を示唆する。しかし鉤虫 *Uncinaria lucasi* の感染を受けたオットセイ *Callorhinus ursinus* は8月中旬から耐過することが報告されており (OLSEN and LYONS, 1965), 本例の40日齢以後が自然に耐過する時期に一致した可能性もある。

U. lucasi では成虫の感染を受けたオットセイの幼獣の糞便中に虫卵が排泄され、第3期子虫が孵化する。これが主に経皮的に成獣に感染し、第3期感染子虫となって皮下脂肪、乳腺などで短くても1年間はとどまる。そして次の繁殖季節に母乳を介して新生児の消化管に入り、第4期子虫から成虫になる。以上のような生活環が報告されている (OLSEN and LYONS, 1965) が、本例でも母獣の糞便検査では虫卵は検出されておらず、おそらく同様の生活環を

持つと思われる。つまり成虫は母乳から経口的に新生児だけに感染すると考えられる。ただし本例では種も同定されておらず、生活環を解明するためには同一の母親が今後出産した際に母獣および新生児の便を詳細に検査するとともに、数多くのオタリアについての情報を収集しなければならないであろう。

以上の生活環から考えて本例の母獣が飼育下で感染を受けたとすれば、同居個体が出産し、その新生児が数日間生存していたことが前提となるが、それに該当するケースはなく、母獣は野生で感染したものと思われる。また本例の母獣が出産し新生児が数日間生存しなければ、寄生虫は世代を更新することができない。ところがこの母親は飼育10年目まで生産例がなく、15年目の本例で新生児に鉤虫感染が認められた (Fig. 4)。すなわち第3期感染子虫が母獣の体内で短くとも10年間は生存していたと考えられる。また *U. lucasi* の第3期感染子虫が4年間 (LYONS, 1983) と6年間 (LYONS and KEYES, 1984), オットセイ成獣の体内で生きていたという報告もあり (Fig. 4), これらの子虫対策が今後の課題となるであろう。近年イベルメクチン等の注射用駆虫薬が普及してきており、鉤虫子虫に対する応用例を期待したい。

稿を終るにあたり寄生虫の計測と検索をしていた国立科学博物館の町田昌昭先生ならびに大東医学技術専門学校校の荒木潤先生に厚く御礼申し上げる。また本症例の治療にあたって協力していただいた鳥羽水族館飼育研究部の皆様にも心から感謝する。

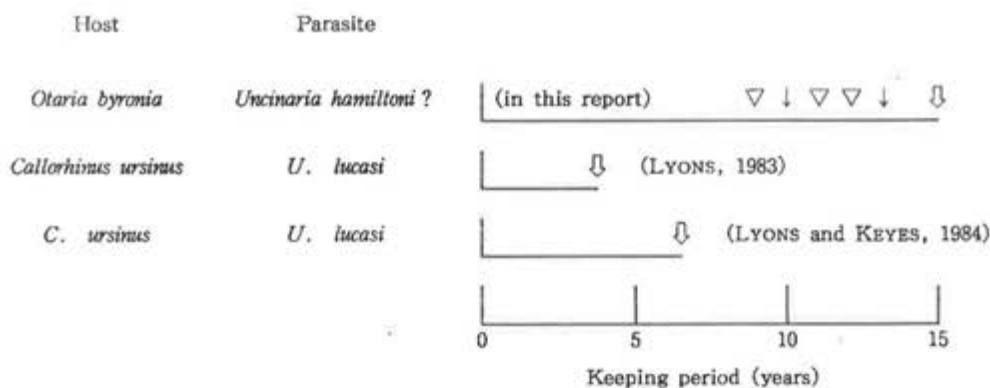


Fig. 4 Intervals between the time of start to keep female pinnipeds and the time that their pups excreted eggs of the hookworms. ▽: Post-mortem delivery. ↓: Normal delivery. Ⓡ: Normal delivery and infection of the pup with adult hookworms.

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鳥羽近海で得られた水母類とその飼育について

鳥羽水族館

堀田拓史

On the rearing of some medusae collected in the neighboring
waters around Toba Aquarium.

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Toba Aquarium

Abstract

Jellyfishes are strange and marvelous marine organisms, therefore, they have attracted people's attention for a long time. Recently, many aquaria are making attempts to display living medusae and bring up polyps to medusae, we also have tried to do that since 1987.

The present author collected 13 species of medusae, but not including small and minute medusae, from the neighboring waters around Toba Aquarium. Both polyps and juvenile medusae were obtained from 7 species such as *Cladonema pacifica*, *Aequorea coerulescens*, a species of Cubomedusa, *Dactylometra pacifica*, *Sanderia malayensis*, *Aurelia aurita* and *Mastigigas papua*. Mature and nearly mature medusae were obtained through rearing of 4 species, i.e., *C. pacifica*, *A. coerulescens*, *D. pacifica* and *A. aurita*. Contrary to expectation, it seems to be very difficult to rear and bring up Ctenophores, comb-jellies, such as *Balinopsis mikado*, *Ocyropsis fusca* and *Beroe cucumis* because they do not live on brine-shrimp nauplii or mysids. Most of the medusae except Ctenophores eat brine-shrimp nauplii though *Aequorea coerulescens* prefers comb-jelly, *Beroe cucumis* for food.

はじめに

水母(クラゲ)は腔腸動物のヒドロ虫綱と鉢水母綱(近年では鉢水母綱から新綱として独立が唱えられた立方水母綱を含む)及び有櫛動物と一部の軟体動物の総称であり、その奇妙な姿は古くから人々の興味を引いてきた。

水族館における水母類の飼育展示は古くから行われてきたが、最近になって再び種々の水母の飼育展示が行われるようになり、鳥羽水族館においても1987年からミズクラゲをはじめ鳥羽近海で採集される水

母類の飼育を試みてきたので、その採集と飼育について報告する。

材料と方法

主な採集地は鳥羽湾沿岸及び坂手島周辺、志摩郡阿児町立神の英麩湾奥部であり、得られた水母は流水または止水にて飼育しポリプなどは主に底面経過水槽にて飼育した。餌料として多くの場合アルテミア幼生を用いたが、一部これらを摂餌しないものについてはニホンアミ(*Neomysis japonica*)をもちいた。

結 果

得られた水母は6目13種（不明種1種を含む）で下記に示す。

腔腸動物門 Coelenterata

ヒドロ虫綱 Hydrozoa

ヒドロ虫目 Hydroida

花水母亜目 Anthomedusae

- 1) エダアシクラゲ
Cladonema pacifica
- 2) カミクラゲ
Spirocodon saltarix

軟水母亜目 Leptomedusae

- 3) オワンクラゲ
Aequorea coerulescens

淡水水母亜目 Limnomedusae

- 4) カギノテクラゲ
Gonionemus vertens

鉢水母綱 Scyphozoa

立方水母目 Cubomedusae

- 5) 不明種

旗口水母目 Semaestomae

- 6) アカクラゲ
Dactylometra pacifica
- 7) ユレイクラゲ
Cyanea nozakii
- 8) アマクサクラゲ
Sanderia malayensis
- 9) ミズクラゲ *Aurelia aurita*

根口水母目 Rhizostomae

- 10) タコクラゲ *Mastigias papua*

有櫛動物門 Ctenophora

有触手綱 Tentaculata

カブトクラゲ目 Lobatae

- 11) カブトクラゲ
Balinopsis mikado
- 12) チョウクラゲ *Ocyropsis fusca*

無触手綱 Atentaculata

ウリクラゲ目 Beroidea

- 13) ウリクラゲ *Beroe cucumis*

1) エダアシクラゲ *Cladonema pacifica* (Fig. 1)

1989年2月18日に三重県志摩郡阿見町立神の英褒湾奥部にてカミクラゲを採集しそのブラヌラを得たが、ブラヌラを入れた底面汚過水槽にエダアシクラゲのポリプが出現し、3月11日から水母を遊離し始めた。遊離直後の水母はアルテミア幼生を活発に摂餌し、一週間ほどで傘高約4mmに成長したが、水温が18℃ほどに上昇すると摂餌不良となり死滅した。ポリプは4本の有頭触手を持つのみで糸状の反口触手がなく、英褒湾や菅島で採集記録のある、*C. pacifica* と考えた。

2) カミクラゲ *Spirocodon saltarix* (Fig. 2)

立神にて1989年2月15日に1個体、18日に3個体を採集し、後者3個体を4時間ほど暗闇に放置したところ受精卵を得た。受精卵は直径約65 μ の球形で、内田(1951)の報告と同様の放射分割が観察された。受精卵は水温15℃で約24時間でフ化しブラヌラ幼生(64 μ ×51 μ の楕円型)になって泳ぎ回った。得られたブラヌラは、シャーレ(径9cm)に収容してポリプの出現をまったが、収容後4日経ったブラヌラのなかにはその体軀が伸長したものが観察されたものの、やはり今までに報告された通りシャーレ内ではポリプの出現を確認する事はできなかった。また、得られたブラヌラを水族館内のあらゆる水槽に混入させてポリプの出現を待ったが、現時点ではそのポリプは観察されていない。一方、ブラヌラを混入させた小型水槽(底面汚過)には2種のポリプが出現したが、1種はエダアシクラゲのものであり、他方は触手間に膜のあるCampanulina型のポリプで、軟水母の一種のポリプと考えられた。

成体水母は小型水槽(60×45×45cm)で自然海水を流して飼育し、低水温下でニホンアミを活発に捕食したが水温の上昇と共に摂餌不良となり死亡した。鳥羽近海においても、1月から2月にかけてこの水母はよく目撃されるが、5月以降に殆ど観察されなくなる。飼育水槽にはヒトエクラゲに似たポリプが出現したが、これがカミクラゲのポリプかどうかは現時点では分らない。

3) オワンクラゲ *Aequorea coerulescens* (Fig. 3)

1989年に鳥羽湾では1～2月にかけて多数のオワンクラゲの出現が観察され、それらを採集し飼育し

た。餌料としてアルテミア幼生やニホンアミを与えたが摂餌するものの成長せず、ウリクラゲを与えたところ活発に摂餌し成長にも好結果を得た。3月23日飼育水槽全面にポリブが出現しているのを確認し、さらに遊離直後の水母も得られた。ポリブは群体性で、触手間に膜のある *campanulina* 型で個虫は小型である。遊離した水母は傘高1.05mm、傘径1.30mmで触手数は最初2本であるが、徐々にその数を増し、16日目には傘径3.0~10.8mm、触手数4~18本に成長した。

4) カギノテクラゲ *Gonionemus vertens* (Fig. 4)

立神にて1989年4月22日に2個体、5月4日に3個体を採集した。傘径は約15~30mmで、水槽壁やカキ殻などに附着しながらニホンアミを活発に捕食した。大型の固体では生殖腺が発達しており検鏡すると卵粒が観察された。卵粒を確認した個体を小型容器に収容したところ、翌日に放出された卵を得たが未受精であった。

5) 立方水母の一種 (Fig. 5)

1988年10月に立神にてタコクラゲを採集し、当館に持ち帰って飼育したが、この飼育水槽に立方水母の一種のポリブが出現した。このポリブは長さ約1.7~2mmほどで、先端に大型の刺胞を1個備えた有頭触手を普通13~20本を持つ(最多触手数は26本)。ポリブは体軀中央付近より1~4個の出芽胞を出し、これらはのちに6~8本の触手を持つ細長い worm 状のポリブ(長さ1.8~2.5mm)となって母体を抜出して匍匐し始め、水温27℃では約2日間匍匐した後再び固着ポリブとなった。その1日後には再び buds を生じて増殖をつづけ、早いものは固着後17日目で稚水母となって遊離した。

ポリブは鉢水母類のように Strobilation を行わず、1個のポリブが1個体の稚水母となって自由に遊泳する。遊離直後の稚水母は、傘径0.90~1.65mmで4本の触手を持ち、個体によっては傘頂部にポリブ時代の足盤痕を残す。口柄は傘部の約3分の2まで達し、4唇を持つ。4個の感覚器を持ち、各感覚器は3対の黒色素で囲まれた眼点を有し、中央の2個は大型である。稚水母はアルテミア幼生を活発に捕食し、成長の早い個体では遊離後1週間で傘高

3mmに達したが、アルテミア幼生のみでの単一投餌では傘高3~4mm以上には成長せず、ニホンアミの肉片を強制的に給餌する事によって傘高6mmまで育成する事ができたものの、それ以上の成長は認められなかった。傘高6mmに達した個体では、葉状体は傘部から張り出し、間軸柱が隆起した。

稚水母の傘表面にみられる刺胞塊列を、遊離後間もない稚水母の報告がある他の立方水母6種、すなわち、アンドンクラゲ *Carybdea rastonii*, *C. siuichisi*, *C. marsupiaris*, *C. alata*, *Tripedalia cystophora*, *Chironex fleckeri* の稚水母と比較したところ、その配列は *Chironex fleckeri* と最も類似しており、他の5種とは明らかに一致しなかった。しかしながら、*C. fleckeri* のポリブの最多触手数は45本とされており、今回得た立方水母は *Chirodropus*, *Chironex*, *Chiropsalmus* 属を含むネットタイアンドンクラゲ (*Chirodropidae*) の一種と考えられた。

6) アカクラゲ *Dactylometra pacifica* (Fig. 6)

当館では自然海水の流水にてアマクサクラゲのポリブを飼育していた水槽にアカクラゲのポリブが発生し、海水中にこのクラゲの卵あるいは幼生が混入していたと考えられた。1988年10月30日にそのエフィラを得たが、水温は17.7℃であった。

エフィラをシャーレ内と100%パンライト水槽でアルテミア幼生を餌料として与えて飼育した。傘径10mmに達するまでの成長速度は遅く1ヶ月ほどかかったが、その後は著しい成長をみせ、2ヶ月後には傘径6cmに達した。自然海水を流水にした水槽では水温の上昇と共に摂餌の不良が観察されたが、水温12~14℃で展示飼育したものは摂餌及び傘の収縮運動も活発で、飼育水槽には多数のポリブが出現した。

7) アマクサクラゲ *Sanderia malayensis* (Fig. 7)

鳥羽湾付近ではこのクラゲの成体を目撃した事はないが、館内では1987年11月20日に自然海水を流した水槽にこの種のポリブの付着がみられ、また、1988年2月21日に鳥羽湾の海水を用いて水替えを行ったオウムガイの飼育水槽内に多数のポリブが付着しているのを発見した。この事から、鳥羽湾付近の海水中にアマクサクラゲの受精卵か幼生が混入していたと考えられる。

自然海水を流して飼育したポリブは春季と秋季にエフィラ遊離したが、傘径9mm以上に育成する事はできなかった。遊離直後にエフィラの直径は2.8~3.0mmで花ピラ (lippet) の数は普通16枚であるが、13~15枚のものも数多くみられた。1個のポリブから1個のエフィラを生ずる monodisc タイプである。

8) ユウレイクラゲ *Cyanea nozakii*

1987年5月8日に鳥羽湾にてユウレイクラゲ2個体を採集した。傘径は50~60cmで容量1トンの水槽に収容したが、数日後に死亡した。

9) ミズクラゲ *Aurelia aurita* (Fig. 8)

ミズクラゲは鳥羽湾付近では冬季から夏季にかけて普通にみることができる。立神では11月から多数のエフィラを観察でき、2~3月にかけて種々の大きさのクラゲを、また、4月には多数の大型クラゲを観察できる。

館内では、1987年5月8日に鳥羽湾で採集したミズクラゲから多数のプラヌラ幼生を得、水槽に付着させたあとに自然海水を流して飼育したところ、11月23日から(水温17.8℃)エフィラを遊離した。得られたエフィラは止水で飼育し、餌料としてアルテミア幼生を充分与える事によって約3ヶ月で傘径15~20cmに成長した。成長したクラゲは1988年1月3日から水温13~15℃で展示飼育し、水槽内で産卵がみられ多数のポリブが出現した。1989年2月16日にアカクラゲを収容したところ、ミズクラゲはアカクラゲの触手に付着し死亡する事が観察された。

10) タコクラゲ *Mastigias papua* (Fig. 9)

鳥羽周辺では英彦湾や五ヶ所湾などで夏季から秋季にかけて多数のタコクラゲを目撃することができる。

1987年10月に立神にて採集したタコクラゲの口腕に付着したプラヌラ幼生を多数採取しシャーレ内で飼育した。水温22℃では4日間遊泳した後固着してポリブ化した。水温18℃ではポリブ化しなかった。プラヌラは楕円形で0.183×0.104mmであった。

1988年10月に採集飼育した例では水温23.8℃において、採集後3日目より水槽にポリブの出現が観察された。ポリブは柄の長いワイングラス型で長さ約

2mm、幅約0.8mmに成長し、ミズクラゲのポリブなどと比較すると可憐である。触手数には16本でベル基底部より1~2個の出芽胞 (buds) を出す。遊離した buds は長径0.50mm、短径0.47mmの楕円形で、受精卵から直接フ化したプラヌラ幼生と比較するとかなり大型である事が観察された。水温24℃でポリブは buds を頻繁に放出し増殖したが、他種のポリブが増殖すると駆逐された。水温24℃から一旦28℃で飼育したのち、21~22℃で飼育するとポリブは4日後にストロピラに変態し、10日後にエフィラを遊離した。一方、同じ水温24℃の条件においても他の水槽に移動して数日後にやはりエフィラの遊離が観察された。

タコクラゲと共生生物としてタコクラゲモエビ (*Latreutes macronatus*) の雌雄とシマイシガニ (*Charybdis feriata*) の稚ガニが観察された。

11) カブトクラゲ *Balinopsis mikado* (Fig. 10, A)

12) チョウクラゲ *Ocyropsis fusca* (Fig. 10, B)

13) ウリクラゲ *Beroe cucumis* (Fig. 10, C)

鳥羽湾では、秋季から冬季にかけて多数のウリクラゲやカブトクラゲがみられ、1989年1月4日にはチョウクラゲが採集された。しかしながら、これらのクラゲ類については長期飼育する事はできなかった。

考 察

今回鳥羽周辺で得られた水母類は6目13種であったが、これらは比較的目にとまり易い大型の水母であり、今後、プランクトンネットなどを用いた採集によって得られる種類数はかなり増えるものと思われる。

13種の水母のうち飼育によってポリブと稚水母の両方が得られたものは、エダアシクラゲ、オワンクラゲ、立方水母の一種、アカクラゲ、アマクサクラゲ、ミズクラゲ、タコクラゲの7種で、そのうち稚水母から成体またはそれに近くまで育成できたものはエダアシクラゲ、オワンクラゲ、アカクラゲ及びミズクラゲの4種であり、他の3種においては稚水母から殆ど成長させる事はできなかった。立方水母については他の園館においても長期飼育した例はなく、稚水母の育成についても餌料や飼育水槽などこ

れからの課題が多く残されている。しかしながら、アマクサクラゲとタコクラゲの育成についてはそれぞれ読売ランドと江ノ島水族館で成功しており、前種については最近になって碧南水族館でも育成に成功したらしい(増田私信)。

水母類の飼育技術は年々向上しており、ミズクラゲなどを周年展示している水族館も少なくない。水母の飼育に関する注意点は、遊泳力の弱い水母をいかにして排水口に吸引されずに飼育するかと云う点である。当館では、容量1トンの六角型の水槽を用いてミズクラゲとアカクラゲの飼育展示を行った。水槽内の海水は一旦、底面の砂層を通った後オーバー排水され汚過層へ流れるようにし、循環水は1日に約1ターンほどの量とした。この水槽でミズクラゲやアカクラゲは底面に吸引される事もなく、また強すぎる水流によって水槽内をグルグルと回る事もなくごく自然な遊泳を行い、また、傘の破損も殆ど観察されずミズクラゲでは同一個体を周年展示する事ができた。一方、アカクラゲでは産卵後に摂餌不良となって縮小し、周年飼育する事はできなかったが、これはアカクラゲの寿命が比較的短く、産卵後は死亡するのではないかと考えられた。カミクラゲ、オワンクラゲ、タコクラゲにおいても同様の事が考えられ、これらの水母の同一個体における長期飼育は困難と考えられる。

水母類の飼育における水槽の形状については、方型では水槽の隅に水母が長時間滞留し傘が変形する事が観察され、遊泳する水母の飼育については円筒型が最も優れていると考えられた。また、アカクラゲやユウレイクラゲなどの触手を長く延ばす水母についてはかなりの水深が必要で、ユウレイクラゲの大型個体を飼育する為にはかなり大型の水槽を用意する必要があると思われる。

謝 辞

江ノ島水族館志村和子氏には水母類の飼育に関して有益な助言と情報を戴いた。また、立方水母類に関する文献と有益な情報を戴いた独協大学教授杉浦靖夫氏、北海道大学講師久保田信氏および琉球大学教授山口正士氏に心から感謝の意を表す。更に、成体水母の写真撮影を心よく引き受けられた鳥羽水族館企画室村上光男君に深く感謝する。

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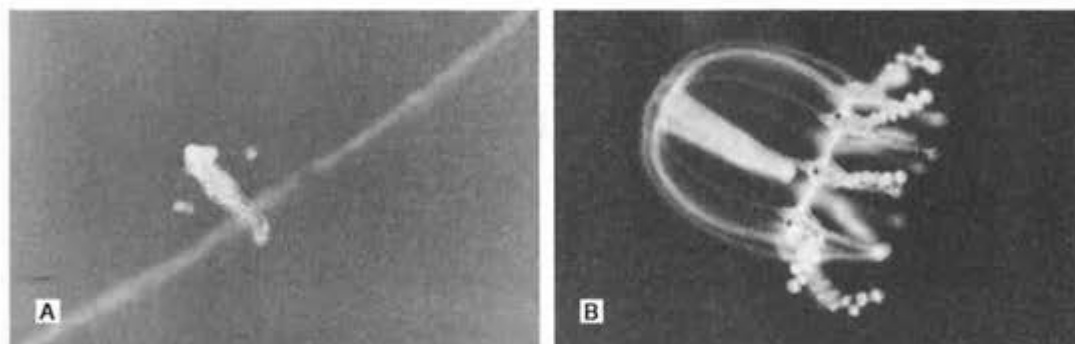


Fig. 1 Polyp and medusa of *Cladonema pacifica*.
A: polyp, B: medusa just after liberation.



Fig. 2 Mature medusa of *Spirocodon saltarix*.

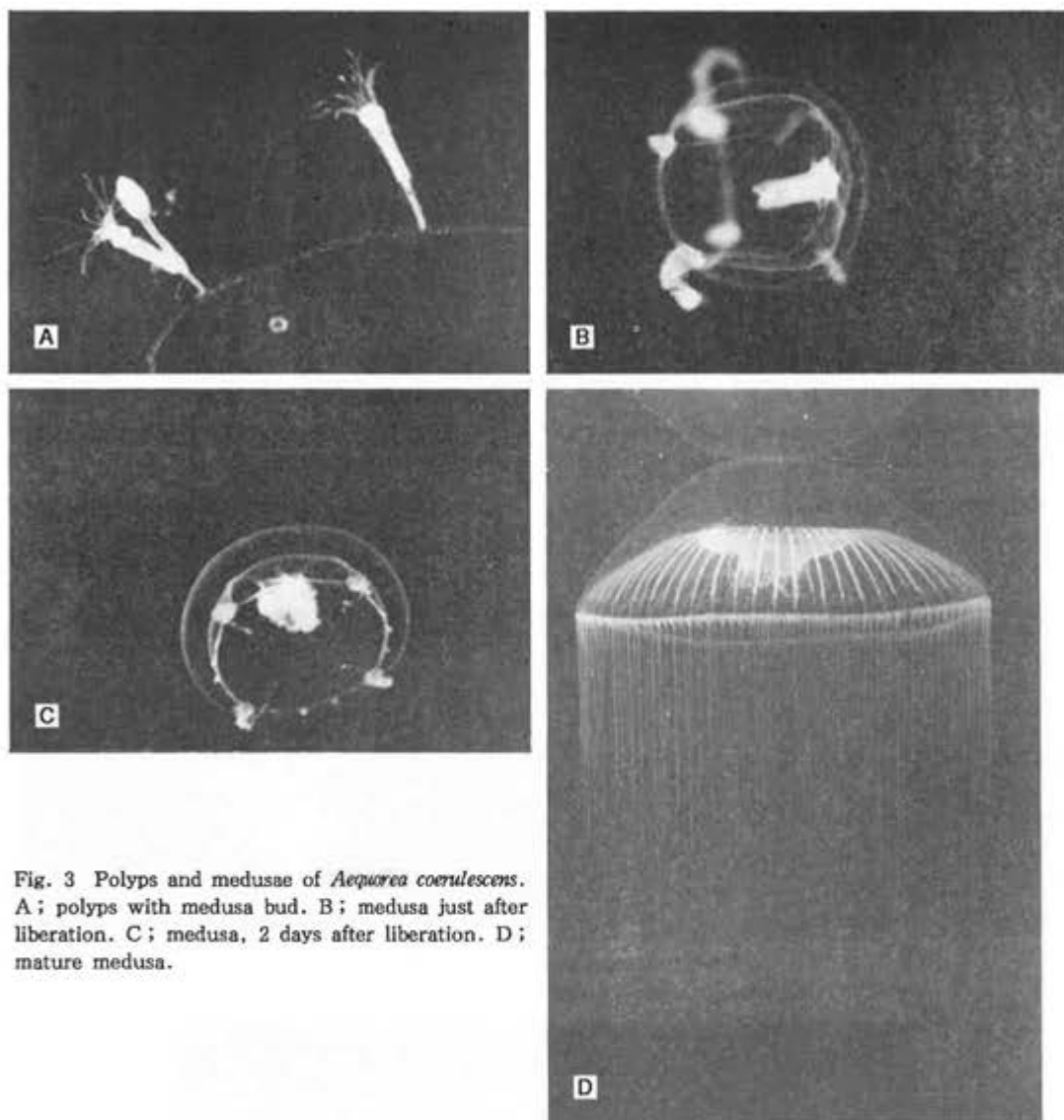


Fig. 3 Polyps and medusae of *Aequorea coerulescens*.
A; polyps with medusa bud. B; medusa just after liberation. C; medusa, 2 days after liberation. D; mature medusa.



Fig. 4 mature medusa of *Gonionemus vertens*.

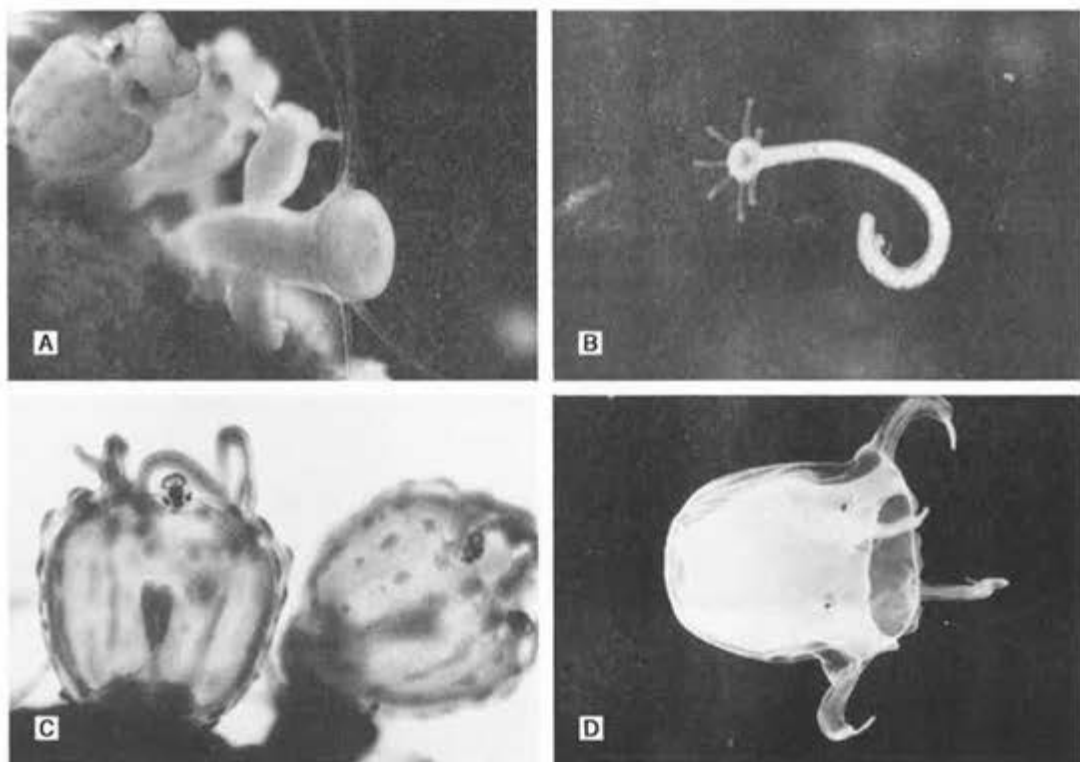


Fig. 5 Polyp and medusa of a species of *Cobomedusa*.
 A ; polyp with two buds. B ; crawling bud. C ; juvenile medusae, just before liberation. D ; reared medusa, 6 mm in bell height.

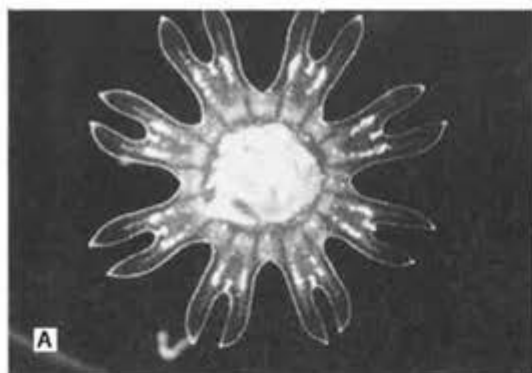


Fig. 6 Ephyra and medusa of *Doctylometra pacifica*.
A; ephyra, just after liberation. B; young medusa.

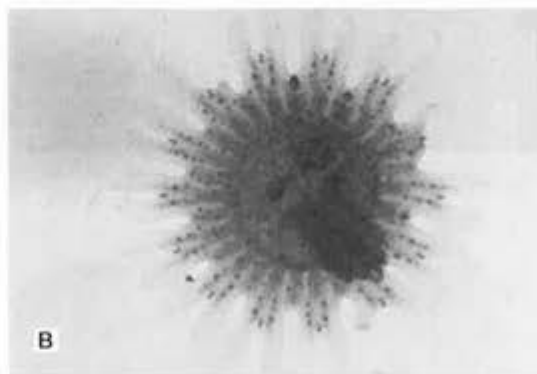
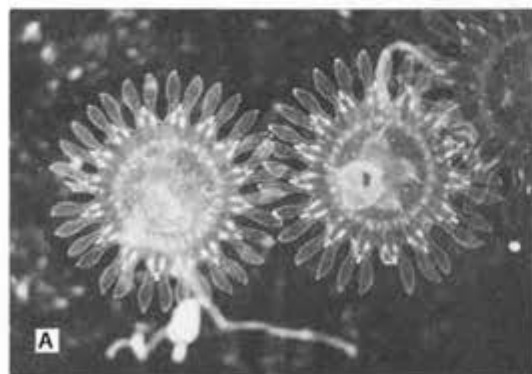


Fig. 7 Ephyra of *Sanderia malayensis*.
A; ephyra, just after liberation. B; ditto, 7 days after liberation.

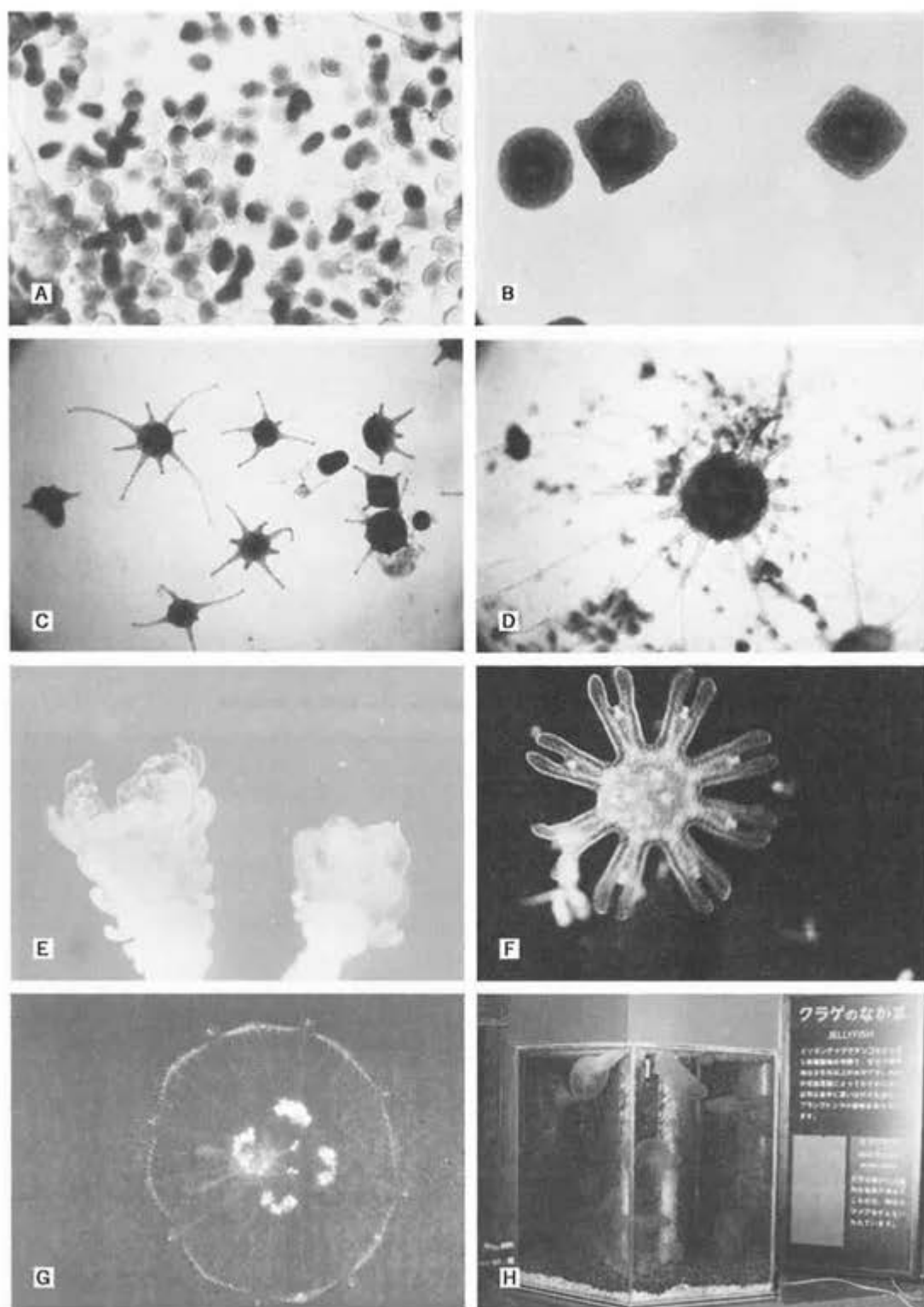


Fig. 8 A growth process of *Aurelia aurita*.

A; eggs and planula larvae. B; polyps with 4 tentacles. C; ditto, with 4-8 tentacles. D; ditto, with 16 tentacles. E; strobila. F; ephyra. G; metaphyra. H; mature medusae in displaying tank.

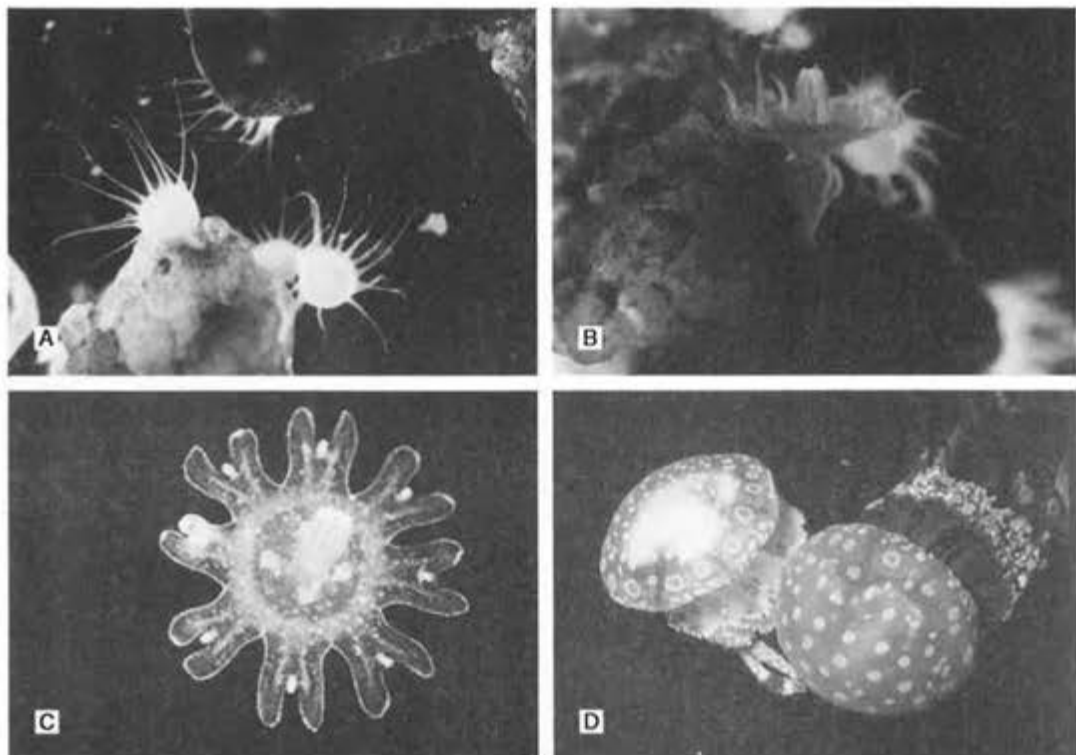


Fig. 9 Polyps and ephyra of *Mastigias papua*.
 A; polyps with 16 tentacles. B; strobila. C; ephyra. D; mature medusae.

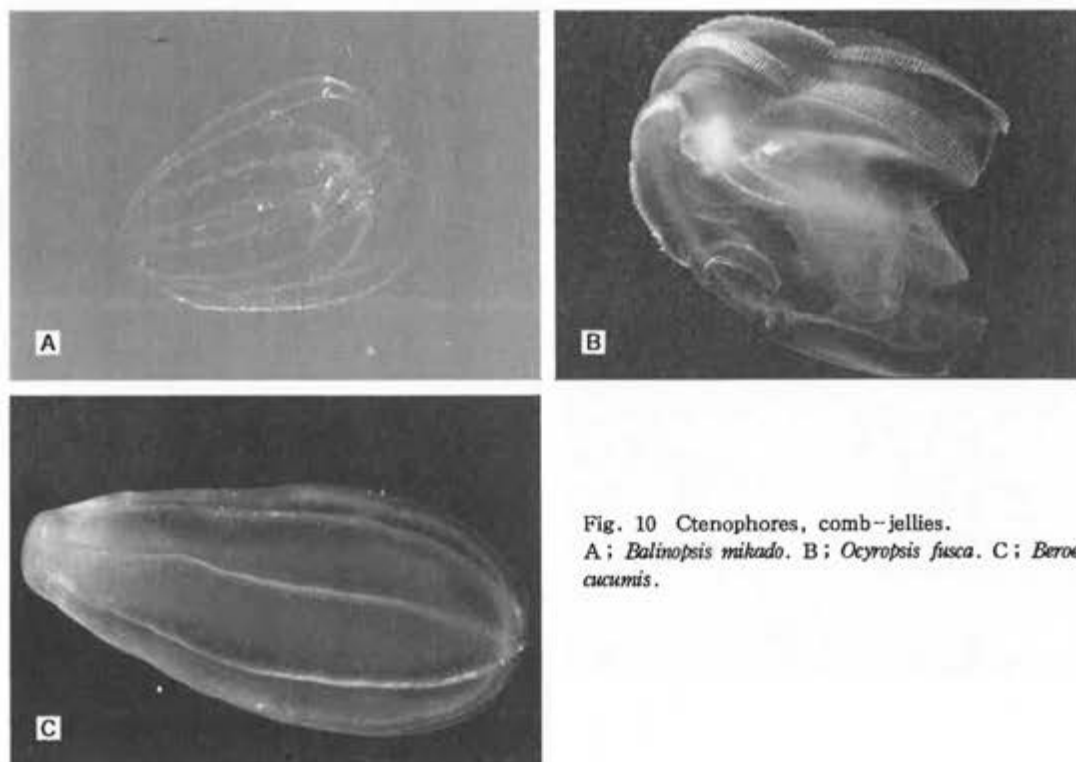


Fig. 10 Ctenophores, comb-jellies.
 A; *Balinopsis mikado*. B; *Ocyropsis fusca*. C; *Beroe cucumis*.

A Bibliography on Methods of Aging of Fishes (1926-1988)

KIYOSHI SUZUKI* and SEISHI KIMURA**

The age determination of animals is one of the most important and fundamental problem for the studies on their ecology or population dynamics. On fishes, therefore, many workers have contributed to this field since the beginning of this century, and a large amount of information has been accumulated.

In this paper, we listed up 416 fishes (4 petromyzontiforms, 1 chimaeriform, 23 elasmobranchs, 3 acipenseriforms and 385 teleosts) for which the age determination had been done and the methods or materials used in aging, in order to provide facilities for fishery biologists, from examining the literature mainly housed in the Library of the Faculty of Bioresources, Mie University. Scientific, Japanese, and English common names in this paper follow Masuda *et al.* (1988) and Robins *et al.* (1980) in general rule.

Result and Discussion

Scientific and common names of the fishes age-determined, and the methods or materials used in aging were shown in Table 1. The age of fishes was determined from the ring marks imprinted on some hard tissues, the size compositions, or the marking method. Those kinds of hard tissues were the scale, sagittal otolith, vertebral centrum, fin ray or spine, opercle, supraoccipital crest, dentary, urohyal, cleithrum,

coracoid, radial, pterygiophore, *etc.* Of these, the scale and otolith were used most commonly. The former was used in 228 teleosts and the latter in 2 petromyzontiforms and 137 teleosts. The other hard tissues were somewhat rarely used as the aging character. For example, the centrum and the fin ray or spine were used in 40 and 21 species, respectively (including elasmobranchs and acipenseriforms).

The scale is the most useful for many fishes because it is very easy to pick up from the body and to prepare for reading, and because even the scale decalcified by the unbuffered formalin is available. The scale is, however, unusable in the fishes with hard and thick scales or many regenerated ones, or in the fishes easily scaled off at landing. The annual ring mark on the scale generally forms just after seasonal growth rate has changed. In some fishes, the scales show "spawning mark" as the result of reduction or interruption of feeding and/or calcium consumption from scales during the spawning season.

The sagittal otolith is used frequently in aging of the fishes without scale or in which the ring mark on the scale can not be read consistently. Thin otolith can be read directly, but thick one needs grinding or sectioning procedure. Burning method also has been used for the unreadable otolith (Christensen, 1964). Although

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the otoliths decalcified by unbuffered formalin or gastric juice are unusable for aging as well as the other hard tissues except for scales, those from the specimens preserved in buffered formalin for several months or less are available (McMahon and Tash, 1979). Zonation of the otolith is composed by hyaline and opaque zones, and the annual ring mark is usually regarded as inner or outer margin of either zone. In spite of many exceptions, it has been generally accepted that the hyaline and opaque zones form during the periods of slow and rapid growths of body, respectively. There is, however, no explanation which is applicable to all fishes about the formation of the zones on otoliths even in the present. In recent years, the age estimation using the daily growth rings on the otolith was carried out (Ralston, 1976; Ralston and Miyamoto, 1983; Uchiyama *et al.*, 1986; Uchiyama and Struhsaker, 1981; *etc.*). This method is very useful for the subtropical and tropical teleosts whose annual rings on the otoliths or scales are usually indistinct.

The vertebral centrum is often used for elasmobranchs and large teleosts such as tunas. This bone is necessary to make a longitudinal section for reading. Although the fin ray or spine is easily taken off from the body, it is necessary to prepare a cross section for reading. This tissue is used mainly for squalid sharks, sturgeons, a part of salmonids, and catfishes. The opercle was used for some cyprinids, catostomids, amberjack (*Seriola quinqueradiata*), *etc.*

The other hard tissues were rarely used in the following fishes; supraoccipital crest: poorcod (*Gadus minutus*) and *Leiognathus dussumieri*; dentary: paddlefish (*Polyodon spathula*); urohyal: Japanese horse mackerel (*Trachurus japonicus*); cleithrum: muskellunge (*Esox masquinogy*), northern pike (*E. lucius*), and *Leiognathus dussumieri*; radial: bluespotted mud hopper

(*Bleopthalmus pectinirostris*); coracoid: Pacific cod (*Gadus macrocephalus*); pterygiophore: silver carp (*Hypophthalmichthys molitrix*).

The hard tissues used in determining the age of fish must preliminarily satisfy the following 3 conditions: (1) ring marks on the tissue are clearly distinguishable; (2) ring marks form periodically; (3) ring marks in each individual form simultaneously in a population. Besides, the better tissues are required to satisfy the following 2 conditions: (4) false rings, multiple rings, and lacked rings are few; (5) picking up from body and preparation for reading are easy. Moreover, in the case of the growth estimation, the tissues are required to satisfy next 2 conditions: (6) the origin of tissue's growth (focus or core) is recognizable; (7) strong correlation is observed between radius of the tissue and body length of fish. In the conditions of (1), (2), (3), and (7), each species has its own most suitable tissue. In the condition of (5), scales are the best for many teleosts. In the condition of (6), the focus or core of the tissue is clearly recognized in the scale, otolith, centrum, and fin ray or spine; whereas it is rather obscure in the other tissues.

Age of fishes without usable hard tissue is often estimated from the composition of body length. Recently, this method becomes easier because of popularization of the personal computer (Akamine, 1982; 1984). It is also possible to estimate the age of fish from its growth calculated by Allen's (1966) method using monthly change of body length.

Although numerous studies have been done on the age determination of fishes, the data for the fishes inhabiting the tropical and subtropical regions are very few. Accordingly, the studies on the age determination of those fishes will be necessary. And, in the course of those studies, analyses of the daily rings on the otolith and the length composition may be very useful methods.

Table 1. A list of the fishes age-determined and the methods of aging used. SC, scale; OT, otolith, CE, vertebral centrum; FR, fin ray or spine; OP, opercle; RA, radial; SO, supraoccipital; UR, urohyal; CL, cleithrum; DE, dentary; CO, coracoid; PT, pterygiophore; VO, vomerine dental plate; CS, clasper; LC, length composition; TG, tagging. Figures in parentheses indicate the author reference number.

Scientific name	Japanese and/or English name(s)	Method of aging
PETROMYZONTIFORMES		
Petromyzontidae		
<i>Ichthyomyzon gagei</i>	Southern brook lamprey	LC (25)
<i>Ichthyomyzon greeleyi</i>	Mountain brook lamprey	LC (24)
<i>Lampetra appendix</i>	American brook lamprey	OT (25), LC (25,453)
<i>Petromyzon marinus</i>	Sea lamprey	OT (25), LC (25)
CHIMAERIFORMES		
Chimaeridae		
<i>Hydrolagus coliei</i>	Spotted ratfish	VO (195)
HEXANCHIFORMES		
Hexanchidae		
<i>Hexanchus griseus</i>	Kagura-zame, sixgill shark	CE (88)
LAMNIFORMES		
Carcharhinidae		
<i>Carcharhinus acronotus</i>	Blacknose shark	CE (449)
<i>Carcharhinus brevipinna</i>	Hana-zame, spinner shark	CE (47)
<i>Carcharhinus falciiformis</i>	Kuro-togazame, silky shark	CE (48)
<i>Carcharhinus limbatus</i>	Blacktip shark	CE (47,48)
<i>Carcharhinus obscurus</i>	Dota-buka, dusky shark	CE (450)
<i>Carcharhinus plumbeus</i>	Mejiro-zame, sandbar shark	CE (55), LC (55) TG (55)
<i>Galeocerdo cuvieri</i>	Itachi-zame, tiger shark	CE (48,49)
<i>Negaprion brevirostris</i>	Lemon shark	CE (52)
<i>Prionace glauca</i>	Yoshikiri-zame, blue shark	CE (511)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark	CE (46,48,400), LC (400)
Triakididae		
<i>Mustelus manazo</i>	Hoshi-zame	CE (500,502), CS (571)
Sphyrnidae		
<i>Sphyrna lewini</i>	Aka-shumokuzame, scalloped hammerhead	CE (450)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
SQUALIFORMES		
Squalidae		
<i>Squalus acanthias</i>	Abura-tsunozame, spiny dogfish	CE (199), FR (225)
Squatinae		
<i>Squatina japonica</i>	Kasu-zame	CS (571)
RAJIFORMES		
Rhinobatidae		
<i>Rhinobatos schlegelii</i>	Sakata-zame	CS (571)
Rajidae		
<i>Raja boesemani</i>	Isago-gangiei	CE (183)
<i>Raja clavata</i>	Roker	CE (153,433), LC (45)
<i>Raja fusca</i>	Kuro-kasube	CE (182)
<i>Raja microcellata</i>	Painted ray	CE (433)
<i>Raja montagu</i>	Spotted ray	CE (433)
Dasyatidae		
<i>Dasyatis akajei</i>	Aka-ei	CS (571)
Myliobatidae		
<i>Myliobatis californica</i>	Bat ray	CE (295)
ACIPENSERIFORMES		
Acipenseridae		
<i>Acipenser fulvescens</i>	Lake sturgeon	FR (75,430,431)
<i>Acipenser transmontanus</i>	White sturgeon	FR (454)
Polyodontidae		
<i>Polyodon spathula</i>	Paddlefish	DE (279)
OSTEOGLOSSIFORMES		
Hiodontidae		
<i>Hiodon tergisus</i>	Mooneye	SC (106,107)
ANGUILLIFORMES		
Anguillidae		
<i>Anguilla anguilla</i>		SC (190,510)
<i>Anguilla australis</i>		OT (512)
<i>Anguilla dieffenbachii</i>		OT (512)
<i>Anguilla rostrata</i>	American eel	OT (92,126,146,147)
Congridae		
<i>Conger myriaster</i>	Ma-anago	LC (173)
Muraenesocidae		
<i>Muraenesex bagio</i>	Suzu-hamo	OT (391)
<i>Muraenesex cinereus</i>	Hamo	OT (328,389,390), CE (504)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
CLUPEIFORMES		
Clupeidae		
<i>Alosa sapidissima</i>	American shad	SC (366)
<i>Brevoortia patronus</i>	Gulf menhaden	SC (367)
<i>Brevoortia tyrannus</i>	Atlantic menhaden	SC (87)
<i>Clupea harengus</i>	Atlantic herring	SC (94, 169, 315, 387), OT (163, 343)
<i>Clupea pallasii</i>	Nishin, Pacific herring	SC (580), LC (239)
<i>Dorosoma cepedianum</i>	Gizzard shad	SC (39)
<i>Etrumeus teres</i>	Urume-iwashi, round herring	OT (67)
<i>Harengula jaguana</i>	Scaled sardine	LC (160)
<i>Herklotsichthys quadrimaculatus</i>	Gold spot herring	OT (543)
<i>Hilsa ilisha</i>	Ilish	OT (417)
<i>Konosirus punctatus</i>	Konoshiro	SC (260, 272, 575)
<i>Sardinella jussieu</i>		SC (364)
<i>Sardinops melanostictus</i>	Ma-iwashi	SC (10, 185, 337, 506, 508, 563, 559, 569), OT (442), FR (301)
<i>Sprattus sprattus</i>	Sprat	SC (424)
<i>Stolothrissa tanganicae</i>		SC (57)
Engraulididae		
<i>Engraulis japonicus</i>	Katakuchi-iwashi	SC (139)
<i>Engraulis mordax</i>	Northern anchovy	OT (286, 399)
CYPRINIFORMES		
Cyprinidae		
<i>Aspius vorax</i>		SC (455)
<i>Carassius buergeri subsp.</i>	Ô-kinbuna	SC (488)
<i>Carassius auratus</i>	Gengoro-buna	SC (356, 488, 536)
<i>Carassius langsdorffii</i>	Gin-buna	SC (488)
<i>Ctenopharyngodon idellus</i>	Sôgyo	SC (81)
<i>Cyprinus carpio</i>	Koi, common carp	SC (81)
<i>Erythroculter mongolicus</i>		SC (81)
<i>Erythroculter oxycephaloides</i>		SC (81)
<i>Gila bicolor</i>	Tui chub	OP (451)
<i>Gila coerulea</i>	Blue chub	OP (451)
<i>Hemibarbus barbus</i>	Nigoi	SC (252)
<i>Hypophthalmichthys molitrix</i>	Hakuren	PT (415)
<i>Leuciscus brandti</i>		SC (76)
<i>Leuciscus leuciscus</i>	Dace	LC (287)
<i>Notropis niveus</i>	Whitefin shiner	SC (68)
<i>Notropis nubilis</i>	Ozark minnow	LC (105)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
<i>Ospariichthys microstris</i>	Hasu	SC (499)
<i>Parabramis pekinensis</i>		SC (81)
<i>Phoxinus neogaeus</i>	Finescale dace	SC (478)
<i>Phoxinus phoxinus</i>	Minnow	OT (318)
<i>Plagiognathops microlepis</i>		SC (81)
<i>Ptychocheilus grandis</i>	Sacramento squawfish	OP (451)
<i>Ptychocheilus lucius</i>	Colorado squawfish	OP (451)
<i>Rhinichthys cataractae</i>	Longnose dace	SC (50)
<i>Rhinogobio cylindricus</i>		SC (81)
<i>Rhinogobio typus</i>		SC (81)
<i>Rhodeus ocellatus ocellatus</i>	Tairiku-baratanago	OT (473)
<i>Scardinius erythrophthalmus</i>	Rudd	SC (288)
<i>Squaliobarbus curriculus</i>		SC (81)
<i>Tor putitora</i>		SC (501)
<i>Zacco platypus</i>	Oikawa	SC (359)
Catostomidae		
<i>Catostomus catostomus</i>	Longnose sucker	SC (16,129)
<i>Catostomus commersoni</i>	White sucker	FR (26,27,31)
<i>Catostomus discobolus</i>	Bluehead sucker	OP (451)
<i>Catostomus latipinnis</i>	Flannelmouth sucker	OP (451)
<i>Catostomus luxatus</i>	Lost River sucker	OP (451)
<i>Catostomus macrocheilus</i>	Largescale sucker	OP (451)
<i>Catostomus occidentalis</i>	Sacramento sucker	OP (451)
<i>Catostomus rimiculus</i>	Klamath smallscale sucker	OP (451)
<i>Catostomus snyderi</i>	Klamath largescale sucker	OP (451)
<i>Catostomus tahoensis</i>	Tahoe sucker	OP (451)
<i>Chasmistes brevirostris</i>	Shortnose sucker	OP (451)
<i>Chasmistes cujus</i>	Cui-ui	OP (451)
<i>Chasmistes liorus</i>	June sucker	OP (451)
SILURIFORMES		
Ictaluridae		
<i>Ictiobus cyprinellus</i>	Bigmouth buffalo	SC (198)
<i>Ictalurus platycephalus</i>	Flat bullhead	FR (385)
<i>Ictalurus punctatus</i>	Channel catfish	FR (472)
Pangasiidae		
<i>Pangasius pangasius</i>	Pangas	FR (397)
Ariidae		
<i>Arius platysstomus</i>		CE (314), OP (314), LC (314)
<i>Osteogeneiosus militalis</i>		FR (398)
Plotosidae		
<i>Plotosus lineatus</i>	Gonzui	OT (205)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
SALMONIFORMES		
Esocidae		
<i>Esox lucius</i>	Northern pike	SC (234,547), CL (83)
<i>Esox maspinogy</i>	Muskellunge	SC (74,130,131,156,476), CL (130,131)
Argentinidae		
<i>Glossanodon semifasciatus</i>	Nigisu	OT (127,327,465)
Bathylagidae		
<i>Lewroglossus schmidti</i>	Togari-ichimonjiwashi	OT (299)
Osmeridae		
<i>Hypomesus niphonensis</i>	Wakasagi	SC (120,121,528)
<i>Hypomesus pretiosus japonicus</i>	Chika	SC (122)
<i>Mallotus villosus</i>	Karafuto-shishamo, capelin	SC (18,407,544), OT (17)
<i>Osmerus mordax dentex</i>	Kyūriuo	OT (117)
<i>Osmerus mordax mordax</i>	Rainbow smelt	SC (311)
Salmonidae		
<i>Coregonus artedii</i>	Cisco	SC (86,217)
<i>Coregonus clupeaformis</i>	Lake whitefish	SC (85,110,145,152, 218,220,347,413)
<i>Coregonus hoyi</i>	Bloater	SC (152)
<i>Coregonus hiyi</i>	Kiyi	SC (152)
<i>Coregonus laurettae</i>	Berling cisco	SC (8,9)
<i>Coregonus nasus</i>	Broad whitefish	SC (354)
<i>Coregonus nigripinnis</i>	Blackfin cisco	SC (217)
<i>Coregonus zenithicus</i>	Shorjaw cisco	SC (217)
<i>Hucho perryi</i>	Itō	SC (555)
<i>Oncorhynchus gorbusha</i>	Karafuto-masu, pink salmon	SC (211,404)
<i>Oncorhynchus keta</i>	Sake, chum salmon	SC (22,23,38,264), OT (36), FR (37)
<i>Oncorhynchus kisutch</i>	Gin-zake, coho salmon	SC (38,84)
<i>Oncorhynchus masou macrostomus</i>	Satsuki-masu (amago)	SC (210,358,360)
<i>Oncorhynchus masou masou</i>	Sakura-masu	SC (212,213,376)
<i>Oncorhynchus nerka</i>	Beni-zake (hime-masu) sockeye salmon	SC (38,179,253,373,513), OT (36), FR (37)
<i>Oncorhynchus tshawytscha</i>	Masunosuke, chinook salmon	SC (35,65), FR (65), TG (148)
<i>Prosopium coulteri</i>	Pygmy whitefish	SC (309)
<i>Prosopium cylindraceum</i>	Round whitefish	SC (15,192,282), OT (191)
<i>Prosopium williamsoni</i>	Mountain whitefish	SC (110)
<i>Salmo clarki</i>	Cutthroat trout	SC (71)
<i>Salmo gairdneri</i>	Niji-masu, steelhead trout (rainbow trout)	SC (261,363,384)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
<i>Salmo mykiss</i>		SC (384)
<i>Salmo salar</i>	Atlantic salmon	SC (56, 189, 222), TG (7)
<i>Salmo trutta</i>	Brown trout	SC (72, 204)
<i>Salvelinus alpinus</i>	Arctic char	OT (11, 111, 202, 427), FR (111)
<i>Salvelinus fontinalis</i>	Kawa-masu, brook trout	SC (446)
<i>Salvelinus malma malma</i>	Oshorokoma, Dolly Varden	OT (13)
<i>Salvelinus malma miyabei</i>	Miyabe-iwana	OT (285)
<i>Salvelinus namaycush</i>	Lake trout	SC (219, 283)
<i>Stenodus leucichthys</i>	Inconnu	SC (8)
<i>Thymallus arcticus</i>	Arctic grayling	SC (73), OT (73)
STOMIIFORMES		
Gonostomatidae		
<i>Cyclothone pseudopallida</i>	Haiiro-onihadaka	LC (338)
<i>Maurollicus muelleri</i>	Kyûrieso	OT (581)
AULOPIFORMES		
Aulopidae		
<i>Aulopus japonicus</i>	Hime	SC (572)
Chlorophthalmidae		
<i>Chlorophthalmus albatrossis</i>	Aome-eso	SC (572), OT (486)
Synodontidae		
<i>Saurida elongata</i>	Tokage-eso	SC (495, 572, 573)
<i>Saurida tumbil</i>		LC (422)
<i>Saurida undosquamis</i>	Ma-eso	SC (503, 505, 572, 573), LC (422)
<i>Saurida unimeso</i>	Wani-eso	SC (383, 572, 573)
<i>Trachinocephalus myops</i>	Oki-eso	SC (572)
MYCTOPHIFORMES		
Myctophidae		
<i>Benthosema glaciale</i>	Glacier lanternfish	OT (119), LC (214)
<i>Diaphus suborbitallis</i>	Sen-hadaka	OT (108, 109)
<i>Lampanyctus macdonaldi</i>		LC (214)
<i>Myctophum nitidulum</i>	Susuki-hadaka	OT (374)
<i>Protomyctophum arcticum</i>		LC (214)
<i>Stenobrachius leucopsarus</i>	Kohire-hadaka, northern lampfish	OT (471)
PERCOPSIFORMES		
Percopsidae		
<i>Percopsis omiscomaycus</i>	Trout-perch	SC (157)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
Aphredoderidae		
<i>Aphredoderus sayanus</i>	Pirate perch	SC (457)
GADIFORMES		
Gadidae		
<i>Eleginus gracilis</i>	Komai, saffron cod	SC (116), OT (116)
<i>Gadus macrocephalus</i>	Ma-dara, Pacific cod	SC (221, 265, 305), OT (265), FR (29, 265), CO (265), LC (224), TG (223)
<i>Gadus minutus</i>	Poor-cod	SO (313)
<i>Gadus morhua</i>	Atlantic cod	OT (95, 242, 402)
<i>Lota lota</i>	Burbot	OT (149, 267, 268)
<i>Melanogrammus aeglefinus</i>	Haddock	OT (240, 241, 509)
<i>Merlangius merlangus</i>	Whiting	OT (102)
<i>Theragra chalcogramma</i>	Suketō-dara, walleye pollack	SC (175, 375, 552, 558), OT (162, 175, 558), CE (526, 527, 558), FR (29)
Merlucciidae		
<i>Macruronus novaezelandidae</i>	Hoki	OT (257, 258)
<i>Merluccius albidus</i>	Offshore hake	LC (426)
<i>Merluccius gayi</i>	Peruvian hake	OT (331)
<i>Merluccius productus</i>	Pacific hake	OT (28, 77)
CYPRINODONTIFORMES		
Exocoetidae		
<i>Cypselurus heterurus doederleini</i>	Tsukushi-tobiuo	OT (379)
<i>Cypselurus hiraii</i>	Hoso-tobiuo	OT (379)
<i>Praexocoetus mento mento</i>	Bashō-tobiuo	SC (515)
Hemiramphidae		
<i>Hemiramphus sajori</i>	Sayori	SC (137, 255)
Scomberesocidae		
<i>Cololabis saira</i>	Sanma, Pacific saury	SC (161, 254, 523, 525, 565), OT (370)
ATHERINIFORMES		
Atherinidae		
<i>Basilichthys australis</i>		SC (529)
<i>Hypoatherina tserugae</i>	Gin-isoiwashi	SC (345)
<i>Odontesthes bonariensis</i>	Peherai, pejerrey	SC (53, 238)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
BERYCIFORMES		
Berycidae		
<i>Beryx splendens</i>	Kinmedai	SC (458,459), OT (167), TG (168)
Polymixiidae		
<i>Polymixia japonica</i>	Ginmedai	SC (572)
SCORPAENIFORMES		
Scorpaenidae		
<i>Apistus carinatus</i>	Hachi	SC (572)
<i>Neosebastes entaxis</i>	Hirenaga - kasago	SC (572)
<i>Sebastes alutus</i>	Arasuka - menuke, Pacific ocean perch	SC (59,60,61,62,63,64), OT (114,115,540)
<i>Sebastes crameri</i>	Darkbotched rockfish	SC (406)
<i>Sebastes diploproa</i>	Splintnose rockfish	SC (406), OT (40)
<i>Sebastes entomelas</i>	Widow rockfish	SC (406)
<i>Sebastes flavidus</i>	Yellowtail rockfish	SC (406), OT (230, 270,466)
<i>Sebastes goodei</i>	Chilipepper	SC (406)
<i>Sebastes inermis</i>	Mebaru	SC (320), OT (133,320)
<i>Sebastes jordani</i>	Shortbelly rockfish	SC (406)
<i>Sebastes marinus</i>	Ocean perch	OT (479)
<i>Sebastes melanops</i>	Black rockfish	OT (466)
<i>Sebastes mentella</i>	Deepwater redfish	OT (200)
<i>Sebastes miniatus</i>	Vermilion rockfish	SC (406)
<i>Sebastes paucispinis</i>	Bocaccio	SC (406)
<i>Sebastes pinniger</i>	Canary rockfish	SC (406), OT (40,466)
<i>Sebastes polystipis</i>	Kitano - menuke, northern rockfish	OT (541)
<i>Sebastes serranoides</i>	Olive rockfish	OT (279)
<i>Sebastes thompsoni</i>	Usu - mebaru	OT (493,532)
<i>Sebastiscus marmoratus</i>	Kasago	OT (321,340)
<i>Sebastolobus macrochir</i>	Kichiji	SC (136)
<i>Setarches guentheri</i>	Aka - kasago	SC (572)
Triglidae		
<i>Chelidonichthys spinosus</i>	Hōbō	SC (362), CE (579)
Platycephalidae		
<i>Suggroidus meerdervoorti</i>	Me - gochi	SC (572)
Anoplopomatidae		
<i>Anoplopoma fimbria</i>	Gin - dara, sable fish	SC (439), OT (101)
Hexagrammidae		
<i>Hexagrammos agrammus</i>	Kujime	SC (236)
<i>Ophiodon elongatus</i>	Lingcod	SC (30), FR (30)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
<i>Pleurogrammus azonus</i>	Hokke	SC (263,496), LC (262)
Cottidae		
<i>Myoxocephalus scorpius</i>	Shorthorn sculpin	OT (90)
<i>Oligocottus snyderi</i>	Fluffy sculpin	LC (97)
Agonidae		
<i>Agonus acipenserinus</i>	Sturgeon poacher	OT (524)
<i>Ocella dodecaedron</i>	Bering poacher	OT (524)
Liparidae		
<i>Liparis pulchellus</i>	Showy snailfish	OT (197)
<i>Liparis tanakai</i>	Kusauo	LC (215)
PERCIFORMES		
PERCOIDEI		
Percichthyidae		
<i>Lates calcarifer</i>		SC (78)
<i>Doederleinia berycoides</i>	Aka-mutsu	SC (226,244,560)
<i>Lateolabrax japonicus</i>	Suzuki	SC (134,247,408)
<i>Malakichthys griseus</i>	Ôme-hata	SC (572)
<i>Malakichthys wakiyae</i>	Wakiya-hata	SC (572)
<i>Morone americana</i>	White perch	SC (21)
<i>Morone saxatilis</i>	Striped bass	SC (112)
<i>Siniperca kneri</i>		SC (570)
Serranidae		
<i>Centropristis striata</i>	Black sea bass	OT (539)
<i>Chelidoperca hirundinacea</i>	Himekodai	SC (572)
<i>Epinephelus drummondhayi</i>	Speckled hind	OT (304)
<i>Epinephelus niveatus</i>	Snowy grouper	OT (304)
<i>Mycteroperca microlepis</i>	Gag	OT (70,291)
<i>Plectranthias japonicus</i>	Kasumi-sakuradai	SC (572)
Callanthiidae		
<i>Callanthias japonicus</i>	Shikishima-hanadai	SC (572)
Centrarchidae		
<i>Ambloplites rupestris</i>	Rock bass	SC (432)
<i>Lepomis auritus</i>	Redbreast sunfish	SC (273)
<i>Lepomis cyanellus</i>	Green sunfish	SC (273)
<i>Lepomis gibbosus</i>	Pumpkinseed	SC (273)
<i>Lepomis gulosus</i>	Warmouth	SC (273)
<i>Lepomis macrochirus</i>	Bluegill	SC (104,273)
<i>Micropterus coosae</i>	Redeye bass	SC (20)
<i>Micropterus dolomieu</i>	Kokuchi-basu, smallmouth bass	SC (69,517)
<i>Micropterus punctulatus</i>	Spotted bass	SC (386)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
<i>Micropterus salmoides</i>	Ôkuchi-basu, largemouth bass	SC (273,368,369), OT (158,174,507)
<i>Pomoxis annularis</i>	White crappie	SC (273)
Percidae		
<i>Etheostoma blennioides</i>	Blenny darter	SC (54)
<i>Etheostoma juliae</i>	Yoke darter	SC (187)
<i>Etheostoma perlongum</i>	Waccamaw darter	SC (464)
<i>Perca flavescens</i>	Perch	OP (188)
<i>Stizostedion vitreum</i>	Walleye	SC (51)
Apogonidae		
<i>Apogon carinatus</i>	Mato-ishimochi	SC (572)
<i>Apogon cyanosoma</i>	Kinsen-ishimochi	SC (483)
<i>Apogon lineatus</i>	Tenjikudai	LC (388)
<i>Apogon notatus</i>	Kurohoshi-ishimochi	SC (522)
<i>Apogon semilineatus</i>	Nenbutsudai	SC (484,572)
Sillaginidae		
<i>Sillago japonica</i>	Shiro-gisu	SC (206,572), OT (323)
Malacanthidae		
<i>Caulolatilus mirops</i>	Blueline tilefish	OT (429)
<i>Lopholatilus chamaeleonticeps</i>	Tilefish	OT (518), FR (128)
Branchiostegidae		
<i>Branchiostegus albus</i>	Shiro-amadai	SC (572)
<i>Branchiostegus auratus</i>	Ki-amadai	SC (567)
<i>Branchiostegus japonicus</i>	Aka-amadai	SC (567), OT (141, 142,143,228,274)
Labracoglossidae		
<i>Labracoglossa argentipectus</i>	Takabe	SC (12)
Scombroptidae		
<i>Scombroptus boops</i>	Mutsu	SC (480,558), OT (342,558), CE (558)
<i>Scombroptus gilberti</i>	Kuro-mutsu	OT (342)
Carangidae		
<i>Decapterus dayi</i>		LC (477)
<i>Decapterus maruadji</i>	Maru-aji	SC (492)
<i>Decapterus punctatus</i>	Round scad	OT (118)
<i>Seriola lalandi</i>	Hiramasa	CE (2)
<i>Seriola quinqueradiata</i>	Buri	SC (154,332), CE (2,333, 349), OP (334,336)
<i>Trachurus japonicus</i>	Ma-aji	SC (332,335,351,491), OT (14,316,361), CE (2), UR (229)
<i>Trachurus symmetricus</i>	Jack mackerel	OT (286)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
Coryphaenidae		
<i>Coryphaena equiselis</i>	Ebisu-shiira, Pompano dolphin	OT (519)
<i>Coryphaena hippurus</i>	Shiira, dolphin	SC (32), OT (396, 519)
Leiognathidae		
<i>Leiognathus dussumieri</i>		SO (186), CL (186)
Lutjanidae		
<i>Lutjanus campechanus</i>	Red snapper	SC (365), OT (365)
<i>Lutjanus griseus</i>	Gray snapper	SC (294), OT (294)
<i>Lutjanus synagris</i>	Lane snapper	SC (293), OT (293)
<i>Ocyurus chrysurus</i>	Yellowtail snapper	OT (193)
<i>Pristipomoides filamentosus</i>	Hawaiian snapper	OT (421)
<i>Rhomboplites aurorubens</i>	Vermilion snapper	SC (113), OT (113)
Haemulidae		
<i>Haemulon aurolineatum</i>	Tomtate	SC (290), OT (290)
<i>Haemulon plumieri</i>	White grunt	SC (289)
<i>Parapristipoma trilineatum</i>	Isaki	SC (232, 302, 303, 441, 481, 490), OT (231, 232)
Sparidae		
<i>Acanthopagrus schlegelii</i>	Kuro-dai	SC (159, 377, 440), LC (554)
<i>Dentex tumifrons</i>	Ki-dai	SC (460, 564, 572, 573)
<i>Eviomis japonica</i>	Chi-dai	SC (319, 572, 573)
<i>Lagodon rhomboides</i>	Pinfish	SC (125)
<i>Pagrus auratus</i>		OT (403)
<i>Pagrus major</i>	Ma-dai	SC (5, 89, 184, 216, 256, 322, 350, 382, 436, 437, 447, 572, 573, 599), LC (447), TG (381)
<i>Pagrus pagrus</i>	Red porgy	SC (292)
<i>Stenotomus caprinus</i>	Longspine porgy	LC (103)
Nemipteridae		
<i>Nemipterus mesoprion</i>		LC (352)
<i>Nemipterus virgatus</i>	Itoyori-dai	SC (324, 572, 573), LC (353, 530)
<i>Scolopsis inermis</i>	Tamagashira	SC (572)
Sciaenidae		
<i>Argyrosomus argentatus</i>	Shiro-guchi	SC (140, 208, 243, 562, 568, 572, 573)
<i>Atrubucca nibe</i>	Kuro-guchi	SC (227, 306, 443, 444, 553)
<i>Cynoscion arenarius</i>	Sand seatrout	SC (461)
<i>Cynoscion nebulosus</i>	Spotted seatrout	OT (281)
<i>Cynoscion nothus</i>	Silver seatrout	SC (79)
<i>Cynoscion regalis</i>	Weakfish	SC (456)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
<i>Genyonemus lineatus</i>	White croaker	OT (278)
<i>Leiostomus xanthurus</i>	Spot	OT (34)
<i>Menticirrhus americanus</i>	Southern kingfish	SC (468)
<i>Menticirrhus undulatus</i>	California corbina	SC (203)
<i>Microgogonias undulatus</i>	Atlantic croaker	SC (125,542), OT (19)
<i>Miichthys miiuy</i>	Hon-nibe	SC (124)
<i>Nibea albiflora</i>	Koichi	SC (209), LC (497)
<i>Nibea mitsukurii</i>	Nibe	SC (561)
<i>Pseudosciaena polyactis</i>	Ki-guchi	SC (165,328,572), OT (328)
<i>Pseudotolithus elongatus</i>		LC (276)
<i>Pseudotolithus senegalensis</i>		LC (276)
<i>Pseudotolithus typus</i>		LC (276)
<i>Roncador stearnsi</i>	Spotfin croaker	SC (203)
Mullidae		
<i>Upeneus bensasi</i>	Himeji	SC (572), LC (176)
<i>Upeneus tragula</i>	Yome-himeji	SC (572)
Girellidae		
<i>Girella punctata</i>	Mejina	SC (341)
Chaetodontidae		
<i>Chaetodon miliaris</i>	Millet-seed butterflyfish	OT (420)
Cichlidae		
<i>Haplochromis quadrimaculatus</i>		LC (170)
<i>Haplochromis varginalis</i>		LC (170)
Embiotocidae		
<i>Ditrema temmincki</i>	Umi-tanago	SC (138)
<i>Ditrema viridis</i>	Ao-tanago	SC (138)
<i>Neoditrema ransonneti</i>	Oki-tanago	SC (138)
Pomacentridae		
<i>Pomacentrus coelestis</i>	Sora-suzumedai	SC (482)
Latrididae		
<i>Latridopsis ciliaris</i>	Moki	OT (96)
POLYNEMOIDEI		
Polynemidae		
<i>Galeoides decadactylus</i>		LC (277)
LABROIDEI		
Labridae		
<i>Choerodon azurio</i>	Ira	SC (572)
<i>Pseudolabrus celidotus</i>		SC (201)
<i>Semicossyphus pulcher</i>	California sheephead	FR (535)
ZOARCOIDEI		
Pholididae		
<i>Pholis gunnellus</i>	Rock gunnel	OT (414,448)
<i>Pholis nebulosa</i>	Ginpo	LC (233)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
NOTOTHENIOIDEI		
Nototheniidae		
<i>Trematomus bernachii</i>		SC (546)
TRACHINOIDEI		
Trichodontidae		
<i>Arcoscoptes japonicus</i>	Hatahata, sailfin sandfish	OT (326)
Uranoscopidae		
<i>Gnathagnus elongatus</i>	Ao-mishima	OT (325)
Mugiloididae		
<i>Parapercis sexfasciata</i>	Kurakake-toragisu	SC (572)
AMMODYTOIDEI		
Ammodytidae		
<i>Ammodytes dubius</i>	Northern sand lance	OT (452,545)
<i>Ammodytes personatus</i>	Ikanago	SC (172,357,378), OT (237)
<i>Ammodytes tobianus</i>		OT (423)
GOBIOIDEI		
Gobiidae		
<i>Acanthogobius flavimanus</i>	Ma-haze	SC (339)
<i>Boleophthalmus pectinirostris</i>	Mutsugoro	RA (516)
<i>Chaenogobius isaza</i>	Isaza	SC (494)
SCOMBROIDEI		
Trichiuridae		
<i>Trichiurus lepturus</i>	Tachiuo, cutlassfish	OT (123,144,249,328, 329,330,348,434, 435,489), CE (349)
Scombridae		
<i>Katsuwonus pelamis</i>	Katsuo, skipjack tuna	OT (520), CE (1), LC (534,557)
<i>Rastrelliger kanagurta</i>	Gurukuma	LC (521)
<i>Scomber australasicus</i>	Goma-saba	SC (574), CE (380)
<i>Scomber japonicus</i>	Ma-saba, chub mackerel	SC (164,245,246 380,393,394), OT (246,286,380), CE (246,380), FR (301)
<i>Scomberomorus cavalla</i>	King mackerel	OT (194)
<i>Scomberomorus commerson</i>	Yokoshima-sawara	OT (82), LC (82)
<i>Scomberomorus guttatus</i>	Taiwan-sawara	OT (82), LC (82)
<i>Scomberomorus lineolatus</i>		OT (82), LC (82)
<i>Scomberomorus maculatus</i>	Spanish mackerel	OT (91)
<i>Scomberomorus niphonius</i>	Sawara	SC (235), OT (275,582)
<i>Thunnus alalunga</i>	Bin'naga, albacore	SC (550), CE (1,401,524), FR (29), TG (266)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
<i>Thunnus albacares</i>	Kihada, yellowfin tuna	SC (551,556), OT (520), CE (1,498), LC (269,534,548,549)
<i>Thunnus maccoyii</i>	Minami-maguro	SC (576)
<i>Thunnus obesus</i>	Mebachi, bigeye tuna	SC (577)
<i>Thunnus thynnus</i>	Kuro-maguro, bluefin tuna	SC (578), OT (418), CE (1)
Istiophoridae		
<i>Istiophorus platypterus</i>	Bashō-kajiki, sailfish	OT (419)
<i>Makaira indica</i>	Shiro-kajiki, black marlin	LC (467)
<i>Tetraodon audax</i>	Ma-kajiki, striped marlin	LC (467)
STROMATEOIDEI		
Centrolophidae		
<i>Hyperoglyphe japonica</i>	Medai	SC (514)
<i>Psenopsis anomala</i>	Ibodai	SC (438)
PLEURONECTIFORMES		
Paralichthyidae		
<i>Paralichthys dentatus</i>	Summer flounder	OT (410,470)
<i>Paralichthys olivaceus</i>	Hirame	SC (284,572,573), OT (445), LC (346)
<i>Pseudorhombus cirriamomeus</i>	Ganzō-birame	OT (308,573)
Pleuronectidae		
<i>Clidoderma asperinum</i>	Same-garei	OT (178)
<i>Dexistes rikuzenius</i>	Migi-garei	OT (180)
<i>Eopsetta grigorjevi</i>	Mushi-garei	OT (171,179,395,462)
<i>Eopsetta jordani</i>	Petrale sole	TG (405)
<i>Glyptocephalus cynoglossus</i>	Witch flounder	OT (41,43)
<i>Glyptocephalus stelleri</i>	Hireguro	OT (177)
<i>Glyptocephalus zachirus</i>	Rex sole	OT (155)
<i>Hippoglossoides pinetorum</i>	Sōhachi	SC (392), OT (180,537)
<i>Hippoglossoides platessoides</i>	American plaice	OT (408,411)
<i>Hippoglossoides robustus</i>	Doro-garei, Berling flounder	OT (412)
<i>Hippoglossus stenolepis</i>	Ohyō, Pacific halibut	OT (475), TG (310)
<i>Kareius bicoloratus</i>	Ishi-garei	OT (98,99,100,135,151, 298,344,463,485), CE (259)
<i>Microstomus achne</i>	Baba-garei	SC (181)
<i>Microstomus pacificus</i>	Dover sole	SC (80)
<i>Platichthys flesus</i>	Flounder	OT (33)
<i>Platichthys stellatus</i>	Numa-garei, starry flounder	OT (248)
<i>Pleuronectes americanus</i>	Winter flounder	OT (280)
<i>Pleuronectes asper</i>	Kogane-garei, yellowfin sole	OT (132,538)

(To be continued)

Table 1. Continued.

Scientific name	Japanese and/or English name(s)	Method of aging
<i>Pleuronectes bilineatus</i>	Shumushu-garei, Rock sole	OT (93,538)
<i>Pleuronectes ferrugineus</i>	Yellowtail flounder	OT (409)
<i>Pleuronectes herzensteini</i>	Ma-garei	OT (371,531)
<i>Pleuronectes platessa</i>	Plaice	OT (44)
<i>Pleuronectes quadrituberculatus</i>	Alaska plaice	OT (538)
<i>Pleuronectes yokohamae</i>	Mako-garei	OT (98,99,100,297, 474,487)
<i>Pleuronichthys cornutus</i>	Meita-garei	OT (58,296)
<i>Reinhardtius hippoglossoides</i>	Karasugarei, Greenland halibut	OT (42,271), CE (317)
Cynoglossidae		
<i>Cynoglossus bilineatus</i>	Ô-shitabirame	SC (372)
<i>Cynoglossus interruptus</i>	Genko	SC (372)
<i>Cynoglossus itinus</i>	Minami-akashitabirame	SC (372)
<i>Cynoglossus joyneri</i>	Aka-shitabirame	SC (372)
<i>Cynoglossus nigropinnatus</i>	Hireguro-genko	SC (372)
<i>Cynoglossus robustus</i>	Inunoshita	SC (372)
<i>Cynoglossus trigrammus</i>	Murasaki-shitabirame	SC (372)
<i>Paraplagusia blochi</i>	Nan'yô-ushinoshita	SC (372)
<i>Paraplagusia japonica</i>	Kuro-ushinoshita	SC (372)
<i>Symphrus orientalis</i>	Azuma-garei	SC (372)
<i>Symphrus strictus</i>	Himo-ushinoshita	SC (372)
Soleidae		
<i>Aesopia cornuta</i>	Tsuno-ushinoshita	SC (372)
<i>Aseraggodes kaianus</i>	Moyô-ushinoshita	SC (372)
<i>Aseraggodes kobensis</i>	Tobi-sasaushinoshita	SC (372)
<i>Heteromycteris japonica</i>	Sasa-ushinoshita	SC (372)
<i>Pardachirus pavoninus</i>	Minami-ushinoshita	SC (372)
<i>Pseudaesopia japonica</i>	Seto-ushinoshita	SC (372)
<i>Trinectes maculatus</i>	Hog choker	SC (250)
<i>Zebrias fasciatus</i>	Obi-ushinoshita	SC (372)
<i>Zebrias zebra</i>	Shima-ushinoshita	SC (372)
TETRAODONTIFORMES		
Balistidae		
<i>Balistes capriscus</i>	Gray triggerfish	FR (196)
Monacanthidae		
<i>Thamnaconus modestus</i>	Umazura-hagi	LC (150,207,166)
<i>Thamnaconus septentrionalis</i>	Nankai-umazurahagi	CE (416)
Tetraodontidae		
<i>Takifugu rubripes</i>	Tora-fugu	CE (251)
<i>Takifugu vermicularis</i>	Shôsai-fugu	CE (307)

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魚類の年齢査定に関する文献集
(1926~1988年)

鈴木 清*・木村 清志**

野性動物の年齢を明らかにすることは、その動物について個体群生態学的研究を進める上で重要な基本的事項の一つとなっている。

魚類については、今世紀に入って多くの研究者により年齢査定に関する研究がなされ、数多くの知見が得られている。

本文献集は1926~1988年に公表された魚類の年齢査定に関する論文581編を集録したもので、年齢査定がなされた416種を表示するとともに、査定に使用された形質・方法を付記した。

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