

# **An Annotated Checklist of Philippine Flatfish: Ecological Implications<sup>a)</sup>**

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## **Abstract**

An annotated list of the flatfish of the Philippines was assembled, covering 108 species (*vs.* 74 in the entire North Atlantic), and thus highlighting this country's feature of being at the center of the world's marine biodiversity. More than 80 recent references relating to Philippine flatfish are assembled. Various biological inferences are drawn from the small sizes typical of Philippine (and tropical) flatfish, and pertinent to the "systems dynamics of flatfish". This was facilitated by the FishBase CD-ROM, which documents all data presented here, and which was used to generate the graphs supporting these biological inferences.

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## Introduction

Taxonomy, in its widest sense, is at the root of every scientific discipline, which must first define the objects it studies. Then, the attributes of these objects can be used for various classificatory and/or interpretive schemes; for example, the table of elements in chemistry or evolutionary trees in biology. Fisheries science is no different; here the object of study is a fishery, the interaction between species and certain gears, deployed at certain times in certain places. This interaction determines some of the characteristics of the resource (e.g., recruitment to the exploited stock), and generates catches.

For conventional fisheries research to work, however, the underlying taxonomy must have been done: the species caught must be known, and catch statistics must be available, at least at species level. Without these, state-of-the art methods of fisheries research cannot be used, and emphasis must then be given, to various indirect methods and to inferences by analogy. This, indeed, is the reason for the renaissance of comparative methods in fishery research (Bakun 1985).

Flatfish (Order Pleuronectiformes) support substantial single-species fisheries in the North Atlantic and North Pacific, besides forming a sizeable bycatch in various medium latitude trawl fisheries. On the other hand, the many species of flatfish occurring in the intertropical belt do not support directed fishery, nor do they contribute much to the bycatch of the multispecies (trawl) fisheries common in tropical shelves (Pauly 1994). Thus, studying the fishery biology of tropical flatfish cannot proceed as does the study of flatfish resource species in temperate waters, and comparative approaches must make use of the facts that are known about the distribution and occurrence, the morphology and

other features of the fish under study, in an attempt to compensate as far as possible for the unavailability of abundance data and of catch time series.

Relational databases are ideal for assembling, recombining and analyzing such facts, and this report relies heavily on the FishBase 96 CD-ROM (Froese and Pauly 1996), and its current (August 1996) update which anticipates the release of FishBase 97. The usefulness of FishBase for the comparative study of flatfish in general (and by extension, of any other fish group) was highlighted in Froese and Pauly (1994), and by Pauly et al. (this symposium). Hence this contribution focuses on the narrower issue of its use for generating inferences on "Systems Dynamics of Flatfish", the topic of this symposium, from data-sparse, but species-rich tropical areas, here represented by the waters within the Philippine EEZ.

### **Material and Methods**

The first task was to complete the FishBase coverage of Philippine flatfish; this was achieved by (1) scanning the national (Evermann and Seale 1907; Fowler 1934; Herre 1953) and regional taxonomic literature (e.g., Weber and de Beaufort 1929; Menon and Monkolprasit 1974; Amaoka and Hensley, in press A, B), and (2) interacting with taxonomists, notably at the FAO/ICLARM/MSI workshop held on 1 - 10 October 1995 for the production of an FAO Identification Guide to Living Marine Resources of the Western Central Pacific, and at the Smithsonian Institution, Washington, D.C.

The pleuronectids in Herre (1953) were checked against Menon's (1977) revision of the Cynoglossidae and revisions of *Engyprosopon* (Amaoka et al. 1993) and *Paraplagusia* (Chapleau and Renaud 1993), while Eschmeyer (1990) was consulted for

the validity of the generic names. Distribution records were taken from Herre (1953), from revisions, redescrptions (e.g., *Pseudorhombus megalops*; Hensley and Amaoka 1989), museum records, and the general scientific literature on Philippine demersal fish and fisheries.

Biological and ecological information on Philippine flatfish were gleaned mainly from the *Philippine Journal of Fisheries*, the *Philippine Journal of Science*, and the *Philippine Scientist*. Also, various bibliographies were examined for entries on flatfish (Blanco and Montalban 1951; Gomez 1980; Aprieto et al. 1986; Pauly et al. 1986), complemented by a search of the Aquatic Sciences and Fisheries Abstracts CD-ROM, and of the personal reprint collections of colleagues both at ICLARM, Manila and the Smithsonian Institution, Washington, D.C.

The second task was to create, for each species of flatfish reported from the Philippines at least one georeferenced occurrence record with sampling depth and environmental temperature. The plot of temperature vs. depth in Fig. 1 was used to infer temperature from position and depth in cases where the temperatures had been missing from an original record.

Our major source of occurrence records was a printout from the Smithsonian Institution listing all Philippine flatfish in their collection (courtesy of Dr. Leslie W. Knapp), the results of the MUSORSTOM Expedition to the Philippines (Fourmanoir 1976), and the definitions of the type locality for the species described (mainly by Fowler 1934).

Biological characteristics (catch data and derived features do not exist for Philippine flatfish) were entered into the appropriate fields of FishBase, whose CD-ROM

documents their sources. Also, the FishBase coverage of non-Philippine flatfish was boosted such as to provide sufficient contrast to Philippine species.

The various graphing and reporting routines of FishBase were then evoked, and used to generate the exhibits presented below.

## Results and Discussion

There are at least 108 species of flatfish in the Philippines, distributed in 8 families and 36 genera (Appendix I). The type locality of 22 nominal flatfish species is in the Philippines (W.N. Eschmeyer, pers. comm.). As predicted by Pauly (1994) for tropical species in general, Philippine flatfish tend to remain small, ranging from 6 to 80 cm in standard length (SL) with most species reaching 15 cm (SL) or less.

During the October 1995 FAO-ICLARM workshop for the testing of the FAO Western Central Pacific Field Guide, the fish markets of Cebu, Manila, and Bolinao were sampled by groups of taxonomists, and specimens were bought for identification and collection purposes. The relatively few flatfish found by that survey consisted of 19 flatfish species with an average maximum size of about 21 cm SL (Table 1), thus confirming the low abundance, high diversity, small size, and low economic importance of Philippine flatfish.

Table 1. List of flatfish surveyed during the October 1995 FAO-ICLARM workshop.

Family	Species	Length (cm)
Bothidae	<i>Arnoglossus aspilos</i>	15.4 SL
	<i>Arnoglossus taenio</i>	
	<i>Bothus pantherinus</i>	
	<i>Chascanopsetta micrognathus</i>	
	<i>Engyprosoyon grandisquama</i>	
Citharidae	<i>Citharoides macrolepidotus</i>	10.4 SL
Cynoglossidae	<i>Cynoglossus cynoglossus</i>	
Paralichthyidae	<i>Cynoglossus kopsii</i>	24.5 SL
	<i>Pseudorhombus arsius</i>	
	<i>Pseudorhombus arsius</i>	
Psettodidae	<i>Pseudorhombus dupliciocellatus</i>	25.2 SL
	<i>Psettodes erumei</i>	29 SL
	<i>Psettodes sp.</i>	25.5 SL
Soleidae	<i>Aseraggodes sp.</i>	21 SL
	<i>Dexillichthys muelleri</i>	
	<i>Euryglossa sp.</i>	
	<i>Pardachirus pavoninus</i>	
	<i>Synaptura orientalis</i>	
	<i>Synaptura sorsogonensis</i>	20.5 SL

Fig. 2 compares the maximum size distribution of Philippine flatfish with that of North Atlantic species (FAO areas 21 and 27). Two ecological implications of this are that Philippine flatfish are limited to smaller prey than their North Atlantic counterpart, while simultaneously being susceptible to (numerous) smaller predators. The implications of reduced size and increased temperature for population dynamics are faster turnover rates, i.e., the asymptotic size is approached rapidly due to high values of the parameter K of the von Bertalanffy growth function (Pauly 1980). This leads to reduced longevity (Fig. 3), and high natural mortality (Fig. 4).

The maximum size that can be reached by fish of various taxa is largely independent of temperature: there are small and large fish at almost all temperatures. However, within groups, the size reduction of maximum size imposed by environmental

temperature (for which Pauly 1994 suggests a mechanism) does show, and this is confirmed by Fig. 5 for the Pleuronectiformes.

Tropical demersal environments are usually characterized by high fish diversity (Aprieto and Villosio 1979; Sainsbury et al. 1985; Gloerfelt-Tarp and Kailola 1984; Dredge 1989a, 1989b; Kulbicki and Wantiez 1990; Cabanban 1991).

Several surveys of demersal fishes were conducted in the Philippines (Warfel and Manacop 1950; Ronquillo et al. 1960; Villosio and Hermosa 1982) which provided checklists of fishes and their relative abundances (Aprieto and Villosio 1979; Villosio and Aprieto 1983). Furthermore, catch rate data are available for several decades but have tended to remain underutilized (Silvestre et al. 1986b). These data allow rough assessments of the status of the demersal stocks (Silvestre et al. 1986a, 1986b) and inference on growth, mortality and recruitment patterns based on analysis of length-frequency data (Ingles and Pauly 1984), though inferences on Pleuronectiformes are few, due to their scarcity.

The flatfish of the Philippines are diverse but compose a small percentage of the total catch of demersal fisheries. To date, there is a lack of scientific investigation on the systematics, biology, population ecology, and fisheries of Philippine flatfish.

The high diversity and low abundance of flatfish in the tropics [e.g., Sunda Shelf (see contributions in Pauly and Martosubroto 1996); North Western Australia (Sainsbury et al. 1985); northern part of Australia (Rainer and Munro 1982; Rainer 1984); Cleveland Bay, Australia (Cabanban 1991)] has been highlighted by Pauly (1994).

He argued that the low biomass and recruitment rates of flatfish in the tropics are primarily based on environmental physiology (temperature-mediated difference of

metabolic rate) and diet. He also suggests that flatfish are overadapted to feeding on zoobenthic epi- and infauna such that low availability of food limits the production of biomass and recruitment.

Flatfish are considered trashfish (Saila 1983; Dredge 1989a, 1989b) in most warmwater developed countries, e.g., in Australia (Rainer 1984), but enter markets in the Philippines, often as dried packs of juveniles of various species used for snacks. As for the adults, their small sizes reduce their value, substantially, except for *Psettodes erumei*, a high "quality" fish (Aprieto and Villosa 1979).

Flatfish in Southeast Asia generally feed on benthic invertebrates (Chan and Liew 1986). In turn, these fish form part of the prey items of medium-sized (*Saurida* spp.; Cabanban 1991) and large-sized carnivores. As such they may form a significant link in those demersal ecosystems where terrigenous input of nutrients leads to high benthos biomasses (Belperio 1983).

We conclude by pointing out that there is a need to revise the systematics of the Philippine Pleuronectiformes, many species of which have not been reported since they were originally described. Also there is a need to study their spatial and temporal distribution and abundances in various habitats. Furthermore, studies on the diet, growth, reproduction, and recruitment of these fish are required if understanding of their population dynamics is to improve.

Except for taxonomic studies, dedicated work on flatfish may not be of high priority in the Philippines. However, it is hoped that Philippine Pleuronectiformes will be studied further, at least in the context of their relationships in multispecies assemblages.



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### Figure legends

- Fig. 1. Relationship between mean annual sea temperature ( in °C) and depth ( in m) for various locations in the Philippines. Source: Dalzell and Ganaden (1987) based on Selga (1931) and Labao (1980).
- Fig. 2. Frequency distribution of maximum reported lengths in Philippine and North Atlantic flatfish, highlighting small sizes of Philippine species (data from FishBase, August 1996).
- Fig. 3. Longevity is in most organisms related to size, and neither the fish nor the Pleuronectiformes are an exception (data from FishBase, August 1996).
- Fig. 4. In Pleuronectiformes as in other fishes, natural mortality ( $M$ ) is strongly related to the parameters of the von Bertalanffy growth equation,  $K$  and  $L_{\infty}$ . Plot B also shows the effect of temperature.
- Fig. 5. Within groups of similar fishes (here in the Pleuronectiformes), the maximum size reached by different species decreases with environmental temperature, although this effect is not seen when data for all orders of fish are pooled.



## Appendix. Annotated Checklist of the Flatfishes of the Philippines

### Family Achiridae

*Achirus hartzfeldii* Bleeker 1853 Max. length: 11.4 cm

Museum: R/V *Albatross* collections: Leyte, Hinunangan B., USNM 137718; Mindanao, Davao, USNM 137719; Cotabato, USNM 137720; Palawan, Verde del Sur, USNM 137721; Port Bais, eastern Negros, USNM 137722; Mantaquin Bay, Palawan, USNM 137723; Subic Bay, Olongapo, USNM 137724 (Anon. 1994). A 4.5 in (11.4 cm) specimen was collected from the country (Evermann and Seale 1907). See also Herre (1953).

### Family Bothidae

*Arnoglossus aspidos* (Bleeker 1851) Max. length: 19 cm TL

Museum: Eastern Luzon, 4.9 miles off Caringo I., in 11 fathoms (20 m), R/V *Albatross* collection, Stn. 5461, USNM 137659 (Anon. 1994). Sold in dried form called *palad*. See also Kuronuma and Abe (1996).

*Arnoglossus brunneus* (Fowler 1934) Max. length: 18.3 cm TL

Museum: R/V *Albatross* collections, as *Bothus brunneus*: east coast of Luzon, in 146 fathoms (267 m), Stn. D. 5453, USNM 93074 (holotype, 18.3 cm) (Fowler 1934); Sombrero I., Batangas, 118 fathoms (216 m), USNM 93543, and Uanivan I., Batanes, USNM 93544 (paratypes) (Anon. 1994). See also Herre (1953) and Amaoka and Hensley (in press A).

*Arnoglossus elongatus* Weber 1913 Max. length: 11 cm TL

Inhabits coral-sand bottoms from depths of 100 - 224 m (Amaoka and Hensley, in press A).

*Arnoglossus polyspilus* (Günther 1880) Max. length: 24 cm TL

Museum: East coast of Luzon, in 195 fathoms (357 m), R/V *Albatross* collection, Stn. 5475, USNM 93076 (as *Bothus tchangii*, 21 cm) (Fowler 1934). See also Amaoka and Hensley (in press A). Additional reference: Morphology in Masuda et al. (1984a).

*Arnoglossus tapeinosoma* (Bleeker 1865) Max. length: 13 cm TL

Museum: R/V *Albatross* collections: western coast of Luzon, off San Fernando Pt., 45 fathoms (82.4 m), USNM 138709; Sulu Sea, off western Mindanao I., off Panabutan Pt., USNM 138712 (Anon. 1994).

*Asterorhombus fijiensis* (Norman 1931) Max. length: 15 cm TL

Museum: Palawan, Putic I., 0 - 15 ft (0 - 4.6 m), USNM 260364. Ajong, Negros I., 0 - 8 ft (0 - 2.4 m), USNM 260365. Balicasag I., 0 - 80 ft (0 - 24.4 m), USNM 260366.

Siquijor I., 0 - 35 ft (0 - 11 m), USNM 260367 (Anon. 1994). See also Amaoka and Hensley (in press A).

*Asterorhombus intermedius* (Bleeker 1865) Max. length: 15 cm TL

Museum: Bais Bay, Negros I., 0 - 120 ft (0 - 36.6 m), USNM 260363 (Anon. 1994).

Additional reference: Morphology in Myers (1991).

*Bothus mancus* (Broussonet 1782) Max. length: 42 cm SL

Museum: Tagburos, Puerto Princesa, USNM 227085. West of Engano Point, Barrio Anqib., Santa Ana, Cagayan Prov., USNM 309422. Fuga I. (Babuyan Is.) USNM 318329. Maybag I., (Babuyan Is.), USNM 318330 (Anon. 1994). See also Herre (1953) and Randall et al. (1990). Additional references: Morphology in Myers (1991). Diet in Randall (1985).

*Bothus myriaster* (Temminck & Schlegel 1846) Max. length: 27 cm TL

A rare species found in sand and mud bottoms of continental shelves (Amaoka and Hensley, in press A). See also Conlu (1979). Additional reference: Morphology in Masuda et al. (1984a).

*Bothus pantherinus* (Rüppell 1830) Max. length: 30 cm TL

Reported from southern to western Luzon to Cagayan Prov., Palawan, the Visayas (Panay, Negros, Cebu, Bohol), and northern Mindanao. Museum: ANSP 63543, 63483; LACM 347416, 42485-7; USNM 260373, 260471. Two specimens, 5.2 and 6 in (13 and 15 cm), were collected from Bacon, Sorsogon (Evermann and Seale 1907). See also Herre (1953), Randall et al. (1990), Myers (1991), and Anon. (1994). Additional reference: Morphology in Myers (1991).

*Chascanopsetta lugubris* Alcock 1894 Max. length: 38 cm SL

Museum: Balayan Bay, Luzon, USNM 138016. Gulf of Davao, Dumalag I. USNM 138017. Northern Mindanao, USNM 138018. Luzon coast, USNM 138019-20 (Anon. 1994). See also Masuda et al. (1984a, 1984b). Additional reference: Morphology in Masuda et al. (1984a).

*Chascanopsetta micrognathus* Amaoka & Yamamoto 1984 Max. length: 27.4 cm

Reported by Kunio Amaoka (pers. comm.) using samples collected by him during the WCP Workshop 1995.

*Crossorhombus valderostratus* (Alcock 1890) Max. length: 14 cm TL

Museum: China Sea, vicinity s. Luzon, Malavatuan I., 80 fathoms (146 m), R/V *Albatross* collection, Stn. 5277, USNM 137391 (Anon. 1994).

*Engyprosopon grandisquama* (Temminck & Schlegel 1846) Max. length: 15 cm TL

Reported from Sulu archipelago to Corregidor I., Manila Bay. Museum: USNM 137924-41 (Anon. 1994). Sold in the market in dried form called *palad*. See also Herre (1953). Additional reference: Morphology in Masuda et al. (1984a).

*Engyprosopon latifrons* (Regan 1908) Max. length: 8 cm SL

Inhabits sandy bottoms at depths of 37 - 68 m (Amaoka and Hensley, in press A).

*Engyprosopon macrolepis* (Regan 1908) Max. length: 5.9 cm SL  
Inhabits sandy and muddy bottoms (Amaoka and Hensley, in press A).  
Museum: BPBM 26860; USNM 260378; CAS-SU 33678. Species redescribed by  
Hensley and Randall (1990). Additional reference: Morphology in Hensley and Randall  
1990.

*Engyprosopon maldivensis* (Regan 1908) Max. length: 12.7 cm SL  
Museum: R/V *Albatross* collections, as *Arnoglossus maculipinnis*: vicinity of Jolo, in 20  
to 76 fathoms (37 - 139 m), Stn. D. 5140, USNM 93098 (10.1 cm) (Fowler 1934);  
between Samar and Leyte, vicinity of Surigao Strait, Tabuc Pt., (Leyte), 62 fathoms  
(113.5 m), Stn. 5480, USNM 93570 (Anon. 1994). See also Amaoka et al. (1993) and  
Amaoka and Hensley (in press A). Additional reference: Morphology in Masuda et al.  
(1984a).

*Engyprosopon mogkii* (Bleeker 1854) Max. length: 11 cm SL  
Known from Mindanao, southern Negros, Palawan, to southern Luzon. Museum: USNM  
137960-81, 260468 (Anon. 1994). Based on records, this species occurs in estuarines,  
reef sand flats, and embayments.

*Engyprosopon obliquiocularum* (Fowler 1934) Max. length: 7.6 cm  
Museum: collected most likely from deep water, R/V *Albatross* collection, as *Bothus*  
*obliquiocularus*, USNM 93077 (holotype, 7.6 cm); USNM 93078 (4 paratypes) (Anon.  
1994).

*Grammatobothus polyophthalmus* (Bleeker 1865) Max. length: 21 cm TL  
Reported from southern Negros to Masbate Is. and off entrance to Manila Bay (Herre  
1953). Museum: USNM 260448, 160480-1 (Anon. 1994). See also Weber and de  
Beaufort (1929).

*Kamoharaia megastoma* (Kamohara 1936) Max. length: 22.5 cm TL  
Inhabits sandy and muddy bottoms (Amaoka and Hensley, in press A). Additional  
reference: Morphology in Masuda et al. (1984a).

*Laeops darns* Fowler 1934 Max. length: 15.5 cm TL  
Museum: R/V *Albatross* collections: between Cebu and Bohol, in 162 fathoms (296.5 m),  
Stn. D. 5412, USNM 93083 (holotype, 15.5 cm) (Fowler 1934); east coast of Luzon, San  
Bernadino Strait to San Miguel Bay; Atulayan I., 0 - 560 fathoms (1025 m), USNM  
93560 (paratype) (Anon. 1994). See also Herre (1953) and Amaoka and Hensley (in press  
A).

*Laeops cypho* Fowler 1934 Max. length: 14.9 cm  
Museum: R/V *Albatross* collections: off northern Mindanao, in 182 fathoms (333 m),  
Stn. D. 5519, USNM 93085 (holotype, 14.9 cm) (Fowler 1934); Sombrero I., Batangas,  
118 fathoms (216 m), USNM 93567 (paratype) (Anon. 1994). Type locality identified as  
off Point Tagolo, Zamboanga (Herre 1953).

*Laeops gracilis* Fowler 1934 Max. length: 16.5 cm TL  
Museum: East of Masbate, in 108 fathoms (197 m), R/V *Albatross* collection, Stn. D. 5212, USNM 93084 (holotype, 16.5 cm) (Fowler 1934). See also Herre (1953) and Amaoka and Hensley (in press A).

*Laeops guentheri* Alcock 1890 Max. length: 14 cm TL  
Museum: West coast of Luzon, from Manila Bay to Lingayen Gulf, S. Fernando Pt., in 45 fathoms (82.4 m), R/V *Albatross* collection, Stn. 5442, USNM 137394 (Anon. 1994).

*Laeops parviceps* Günther 1880 Max. length: 14 cm TL  
Museum: R/V *Albatross* collections: east coast of Luzon, San Bernardino Strait to San Miguel Bay, Legaspi, 146 fathoms (267 m), Stn. 5453, USNM 137395; west coast of Luzon, Manila Bay to Lingayen Gulf, San Fernando Pt., 45 fathoms (82.4 m), Stn. 5442, USNM 137396; Visayan Sea between northern Negros and Masbate Is., se. Tanguingui I., 0 - 69.5 m, USNM 260451 (Anon. 1994).

*Neolaeops microphthalmus* (von Bonde 1922) Max. length: 21 cm SL  
Inhabits sandy and muddy bottoms (Amaoka and Hensley, in press A). Additional reference: Morphology in Masuda et al. (1984a).

*Psettina brevirictis* (Alcock 1890) Max. length: 8 cm SL  
Museum: R/V *Albatross* collections: western Samar, Taratara I., 20 fathoms (37 m), Stn. D.5209, USNM 137389; off eastern Panay, Antonia I., 24 fathoms (44 m), Stn. 5182, USNM 137390 (Anon. 1994).

*Psettina gigantea* Amaoka 1963 Max. length: 13 cm SL  
Museum: Visayan Sea between northern Negros and Masbate Is. northwest Guintacan I., 0 - 80.5 m, USNM 260446; southwest of Caduruan Point, 0 - 78.7 m, USNM 260482 (Anon. 1994). Additional reference: Morphology in Masuda et al. (1984a).

*Psettina variegata* (Fowler 1934) Max. length: 9.2 cm SL  
Museum: between Samar and Leyte Islands in 61 fathoms (112 m), R/V *Albatross* collection Stn. D. 5481, USNM 93091 (as *Bothus variegatus*, holotype, 9.2 cm) (Fowler 1934; Herre 1953). See also Amaoka and Hensley (in press A).

*Taeniopsetta ocellata* (Günther 1880) Max. length: 11.4 cm  
Specimens 6.9 to 11.4 cm were trawled from Stn. 16, at depth of 150 to 164 m during the R/V *Vauban* expedition (Fourmanoir 1976). Additional reference: Morphology in Masuda et al. (1984a).

#### Family Citharidae

*Brachypleuranovaezeelandiae* Günther 1862 Max. length: 14 cm TL  
Museum: Marinduque and vicinity, USNM 137708. Off Luzon, Sueste Pt., USNM 137709-10. Manila Bay, Corregidor Lt., USNM 137711. S. Mindanao, eastern Illana Bay, USNM 137712. E. Mindanao, Nagubat I., USNM 137714. Visayan Sea, between northern Negros and Masbate I., USNM 261361, 261363-4, 261526. Carigara Bay, Samar

Sea, USNM 228536-9 (Anon. 1994). See also Herre (1953) and Kuronuma and Abe (1986). Additional reference: Morphology in Hensley (in press A).

*Citharoides axillaris* (Fowler 1934) Max. length: 19.5 cm

Museum: *Albatross* collections. as *Brachypleurops axillaris*: Balayan Bay and Verde Island Passage, in 118 fathoms (216 m), R/V, Stn. D. 5117, USNM 93080 (holotype, 19.5 cm) (Fowler 1934, Herre 1953); China Sea, vicinity of southern Luzon, Malavatuan I., USNM 93545; Balabac Strait, Cape Melville, USNM 93547 (Anon. 1994).

*Citharoides macrolepidotus* Hubbs 1915 Max. length: 29 cm TL

A rare species found at depths of 121 - 240 m (Hensley, in press A).

*Lepidoblepharon ophthalmolepis* Weber 1913 Max. length: 36 cm TL

Museum: Balanja Pt., Mindoro Is., in 234 fathoms (428 m), R/V *Albatross* collection, Stn. 5260, USNM 137408 (Anon. 1994).

### Family Cynoglossidae

*Cynoglossus arel* (Bloch & Schneider 1801) Max. length: 40 cm TL

Inhabits muddy and sandy bottoms of the continental shelf down to 125 m (Munroe, in press A). Additional references: Growth in Pauly (1980). Food, Diet, Reproduction, and Spawning in Rajaguru (1992).

*Cynoglossus bilineatus* (Bloch 1787) Max. length: 44 cm SL

Museum: R/V *Albatross* collections: Cavite Mkt., USNM 137616; Manila Mkt., USNM 137617, 137652; Palawan, Verde del Sur, reef sand flat, USNM 137618; Manila Bay, USNM 137620; Limbones Cove, USNM 286919 (removed from 113179 and recatalogued) (Anon. 1994). See also Herre (1953) and Menon (1977). Additional reference: Food in Blaber (1980).

*Cynoglossus Cynoglossus* (Hamilton 1822) Max. length: 20 cm TL

Museum: ANSP 49038 - 9; NHV 43826. See also Herre (1953) and Menon (1977).

*Cynoglossus kopsii* (Bleeker 1851) Max. length: 17.7 cm SL

Museum: Iloilo, U.S.N. Eclipse Expedition USNM 112872 - 4. collections: Pt. Tagalo, 102 fathoms (187 m), Stn. 5520, USNM 113186; Lingayen Gulf, e. of Pt. Guecet, Stn. 5442, USNM 113187; Marinduque and vicinity, Tayabas, Stn. 5371, USNM 113188; Tawi Tawi, 34 fathoms (62.6 m), Stn. D.5152, USNM 137653; Cotabato, USNM 137656; Off San Fernando, 45 fathoms (82 m), Stn. D.5442, USNM 137657; Corregidor, 12 fathoms (22 m), Stn. 5360, USNM 137658; Panay, Iloilo, USNM 148586 (Anon. 1994). See also Herre (1953) and Menon (1977).

*Cynoglossus lida* (Bleeker 1851) Max. length: 21.3 cm SL

Museum: R/V *Albatross* collections: Davao, USNM 137952; Abuyog, Leyte, USNM 137953, 137957; Hinunangan B., USNM 137954; Iloilo Mkt., USNM 137955; off east coast of Leyte I., Tacloban Anchorage, USNM 137956; Palawan, Mantaquin B., USNM

137958; Cotabato, below river mouth, USNM 137959 (Anon. 1994). BMNH 1872.4.6.96 (Menon 1977). See also Herre (1953) and Heemstra (1986a). Additional references: Growth, Food, Diet, Reproduction, and Spawning in Rajaguru (1992).

*Cynoglossus lingua* Hamilton 1822 Max. length: 45 cm TL

Museum: China Sea, off s. Luzon, 17.5 miles from Malavatuan I., 525 fathoms (961m), Stn. D.5274, USNM 137410 (Anon. 1994).

*Cynoglossus monopus* (Bleeker 1849) Max. length: 18.8 cm SL

Found on muddy substrates from 13 - 18.3 m (Menon 1977). Museum: AMNH 19645.

*Cynoglossus puncticeps* (Richardson 1846) Max. length: 18 cm TL

Specimens were collected during the U.S.N. Eclipse Expedition and R/V *Albatross* from Cotabato, Mindanao, central and eastern Visayas to southern Philippines (Anon. 1994). Museum: ANSP 63524, 82548; LACM 42475 - 47. See also Herre (1953) and Menon and Monkolprasit (1974). Additional references: Morphology in Fischer and Whitehead (1974). Growth in Pauly (1994).

*Cynoglossus suyeni* Fowler 1934 Max. length: 27.5 cm SL

Museum: R/V *Albatross* collections: off southern Luzon, China Sea (Verde I. Passage, off Escarceo Light, Mindoro), in 173 fathoms (317 m), Stn. D. 5291, USNM 93086 (holotype, 15.5 cm) (Fowler 1934); USNM 113189 - 113194, 137941-8; 137950 (Anon. 1994). See also Herre (1953) and Menon (1977).

*Paraplagusia bilineata* (Bloch 1787) Max. length: 60 cm TL

Museum: R/V *Albatross* collections: Iloilo Mkt., USNM 138070, 138071; Manila Mkt., USNM 138072; Chase Head Endeavor St., Palawan, USNM 138073; Paluan Bay, Mindoro, USNM 138074; Mansalay Bay, southeastern Mindoro, USNM 138075; Lingayen Gulf, USNM 138076; Siquijor I., Santa Maria, USNM 138077; Abuyog, Leyte, USNM 138079; Subig Bay, USNM 138080; Port San Pio Quinto, Camiguin I., 1 - 6 m, USNM 138082; Panabutan Bay, Mindanao, USNM 138083; Cotabato, USNM 138084; Davao, USNM 138085; Balayan Bay, Luzon, Taal Anchorage, USNM 138086; Bolinao lagoon, Pangasinan, USNM 228535; northeastern side of Siquijor, tidal lagoon, USNM 273773; USNM 138081 (Anon. 1994). See also Herre (1953) and Heemstra (1986a). Additional references: Growth in Pauly (1978) and Erzini (1991). Food in Livingston (1993).

*Paraplagusia blochii* (Bleeker 1851) Max. length: 20 cm SL

Museum: R/V *Albatross* collections: Philippine Sea, off Daet, Luzon, 15 June 1909, USNM 138087 (7:11.6-22 cm) (Chapleau and Renaud 1993); Limbones Cove, USNM 113179. Iloilo, U.S.N. Eclipse Expedition, USNM 112870 (Anon. 1994). ANSP 77427. Also known from Dumaguete, Negros Oriental (Herre 1953). See also Winterbottom (1993) and Randall (1995).

*Symphurus gilesii* (Alcock 1889) Max. length: 14 cm

Two specimens collected between 70 to 215 m during the R/V *Vauban* expedition (Fourmanoir 1976).

*Symphurus marmoratus* Fowler 1934 Max. length: 9.8 cm  
Museum: Jolo I. and vicinity, in 10 fathoms (18.3 m), R/V *Albatross* collection, Stn. D. 5561, USNM 93092 (holotype, 9.8 cm) (Fowler 1934).

*Symphurus regani* Weber & Beaufort 1929 Max. length: 12 cm  
Museum: Between Siquijor and Bohol Is., Balicasag I., 805 fathoms (1473 m), R/V *Albatross* collection, Stn. 5526, USNM 138045 (Anon. 1994).

*Symphurus septemstriatus* (Alcock 1891) Max. length: 10 cm TL  
Museum: R/V *Albatross* collections: Verde I. Passage and Batangas Bay, Matocot Pt., 135 fathoms (247 m), Stn. 5265, USNM 138023 and in 170 fathoms (311 m), Stn. 5268, USNM 163654; between Burias and Luzon, Anima Sola I., 215 fathoms (393 m), Stn. 5216, USNM 138026; China Sea, vicinity s. Luzon, Matocot Pt., 140 fathoms (256 m), Stn. 5298, USNM 138028; between Samar and Masbate, Tubig Pt., Destacado I., 118 fathoms (216 m), Stn. 5391 and in 135 fathoms (247 m), Stn. 5392, USNM 138032; between Cebu and Bohol, Lauis Pt., 145 fathoms (265 m), Stn. 5411, USNM 138037; off n. Luzon, Hermanos I., 230 fathoms (421 m), Stn. 5326, USNM 138040; between Burias and Luzon, Bagatao I., 226 fathoms (414 m), Stn. 5388, USNM 138041 and in 209 fathoms (382 m), Stn. 5387, USNM 138042; Camp Overton Lt., Iligan Bay, Stn. 5508, USNM 163655; Dupon Bay (Leyte) and vicinity, Ponson I., 262 fathoms (479 m), Stn. 5405, USNM 163657 (Anon. 1994).

*Symphurus strictus* Gilbert 1905 Max. length: 14 cm  
Museum: R/V *Albatross* collections: Verde I. Passage and Batangas Bay, Matocot Pt., 220 fathoms (402 m), Stn. 5269, USNM 138024; China Sea, vicinity s. Luzon, Matocot, 214 fathoms (392 m), Stn. 5290, USNM 138027 and, Escarceo, 244 fathoms (446 m), Stn. 5294, USNM 138030 (Anon. 1994).

*Symphurus woodmasoni* (Alcock 1889)  
Known in the Visayan and Mindanao area, R/V *Albatross* collections (Anon. 1994).

#### Family Paralichthyidae

*Paralichthys olivaceus* (Temminck & Schlegel 1846) Max. length: 80 cm SL  
Inhabits muddy and sandy bottoms of shallow waters (Amaoka and Hensley, in press B)  
Additional reference: Diet in Dou (1992).

*Pseudorhombus argus* Weber 1913 Max. length: 25 cm SL  
Museum: Buton Strait, Kalono Pt., in 39 fathoms (71.4 m), R/V *Albatross* collection, Stn. 5641, USNM 137393 (Anon. 1994). Additional reference: Morphology Amaoka and Hensley (in press B).

*Pseudorhombus arsius* (Hamilton 1822) Max. length: 45 cm TL  
Known from northwestern Mindanao to southern and western Luzon, R/V *Albatross* collections. Museum: Davao, USNM 137985. Malabang, USNM 137986. Cavite Mkt.,

USNM 137987. Manila Mkt., USNM 137988, 137993, 137996. North of Malampaya R., USNM 137989. Mantaquin B., Palawan, USNM 137990. Endeavor Pt., in 14 - 25 fathoms (26 - 46 m), Stn. 5342, USNM 137991. Abuyog, Leyte, USNM 137992] Outside Harbor of Manila Bay, USNM 137994. Iloilo Mkt, USNM 137995, 138000. Ragay R., tidewater, USNM 137998. Samar I., Catbalogan, USNM 137999. Cuyo Is., USNM 138001 (Anon. 1994). LACM 42475-33. See also Weber and de Beaufort (1929) and Herre (1953). Additional references: Morphology in Amaoka and Hensley (in press B). Growth in Bawazeer (1987). Food in Blaber (1980).

*Pseudorhombus cinnamoneus* (Temminck & Schlegel 1846) Max. length: 35 cm SL  
A 17.7 cm specimen was caught between 150 to 164 m during the 1976 R/V *Vauban* expedition (Fourmanoir 1976). Museum: Puerto Princesa Market, USNM 227078 (Anon. 1994). See also Herre (1953) and Masuda et al. (1984a). Additional references: Morphology in Amaoka and Hensley (in press B). Growth in Matsuura (1961).

*Pseudorhombus diplospilus* Norman 1926 Max. length: 40 cm SL  
Museum: Visayan Sea between northern Negros and Masbate Is., southwest of Caduruan Point, in 75 m, USNM 260477 (Anon. 1994). Additional reference: Morphology in Amaoka and Hensley (in press B).

*Pseudorhombus dupliciocellatus* Regan 1905 Max. length: 40 cm SL  
Museum: Visayan Sea, between northern Negros and Masbate I., southwest of Caduruan Pt., 0 - 75 m, USNM 260478; north of Tanguingui I., USNM 260479; northwest Guintacan I., USNM 260687 (Anon. 1994). One large sample collected from Bulan, Sorsogon, USNM 55898 (as *Platophryspalad*, holotype, 15.5 in (39 cm)) (Evermann and Seale 1907). Additional reference: Morphology in Amaoka and Hensley (in press B).

*Pseudorhombus javanicus* (Bleeker 1853) Max. length: 35 cm SL  
Museum: Bulan, USNM 55967. Panabutan Bay, Mindanao, USNM 138714. Buena Vista, Guimaras I. (Iloilo Strait), USNM 138715. Manila Bay, Corregidor Lt., USNM 138716. Visayan Sea between northern Negros and Masbate Is., southeast south Gigante, USNM 260447 (Anon. 1994). ANSP 49030, 49272. One specimen, 8.25 in. (21 cm), collected from Bulan, Sorsogon (Evermann and Seale 1907). See also Herre (1953) and Nielsen (1984a). Additional references: Morphology in Amaoka and Hensley (in press B). Growth in Chan and Liew (1986).

*Pseudorhombus malayanus* Bleeker 1865 Max. length: 35 cm SL  
Museum: R/V *Albatross* collections: off east coast of Leyte I., Mariquitdaquit I., 15 fathoms (27 m), Stn. 5204, USNM 137420; Manila Bay, Corregidor Lt., 12 fathoms (22m), Stn. 5361, USNM 137421; Bacoor Beach, USNM 137422; Manila Mkt., USNM 137423; Western Samar, Taratara I., 20 fathoms (37 m), Stn. D.5209, USNM 137424 (Anon. 1994). LACM 35964-9, 35957-15. Additional reference: Morphology in Amaoka and Hensley (in press B).

*Pseudorhombus megalops* Fowler 1934 Max. length: 22 cm SL



Museum: Between Samar and Masbate in 135 fathoms (247 m), R/V *Albatross* collection, Stn D.5392, USNM 93082 (holotype, 22 cm) (Fowler 1934). USNM 93548 - 51 (paratypes). Morphological information found also in Hensley and Amaoka (1989).

*Pseudorhombus micrognathus* Norman 1927

Museum: R/V *Albatross* collections: Balayan Bay, Luzon, C. Santiago Lt., 214 fathoms (392 m), Stn. 5365, USNM 137654; Sulu Archipelago, Tawi-tawi group, Tinakta I., 18 fathoms (33 m), Stn. 5157, USNM 137655 (Anon. 1994).

*Pseudorhombus neglectus* Bleeker 1865 Max. length: 25 cm SL

Museum: Bulan I., USNM 55968. Panay I., Iloilo, Naval Eclipse Expedition, USNM 102648 (Anon. 1994). Three specimens collected from San Fabian, Pangasinan, 3.5 - 6.75 in (9 - 17 cm) (Evermann and Seale 1907). Also known from Dumaguete, Negros Oriental. Additional reference: Morphology in Amaoka and Hensley (in press B).

*Pseudorhombus oligodon* (Bleeker 1854) Max. length: 30 cm SL

Inhabits muddy and sandy bottoms of continental shelves. Morphological information found also in Amaoka and Hensley (in press B). See also Weber and de Beaufort (1929).

*Pseudorhombus pentophthalmus* Gunther 1862 Max. length: 18 cm SL

Museum: Samar I., Catbalogan, USNM 137923. Visayan Sea between northern Negros and Masbate, southeast south Gigante, USNM 260384. Visayan Sea, east of Sicogon I., USNM 260385 (Anon. 1994). See also Masuda et al. (1984a, 1984b). Additional reference: Morphology in Amaoka and Hensley (in press B).

*Pseudorhombus polyspilos* (Bleeker 1853) Max. length: 27 cm

Inhabits muddy and sandy bottoms of shallow waters (Amaoka and Hensley, in press B) See also Weber and de Beaufort (1929).

*Pseudorhombus russellii* (Gray 1834) Max. length: 23 cm

Museum: ANSP 63710, 63544 (12.81 and 16.34 cm). One specimen, 23 cm, was also collected from Bulan, Sorsogon (Evermann and Seale 1907).

#### Family Pleuronectidae

*Nematops chui* Fowler 1934 Max. length: 8.2 cm TL

Museum: China Sea, off southern Luzon at 135 fathoms (247 m), R/V *Albatross* collection, D. 5110, USNM 93087 (holotype, 8.2 cm) (Fowler 1934). Type locality described as near Corregidor I. See also Herre (1953) and Hensley (in press B).

*Plagiopsetta glossa* Franz 1910 Max. length: 19 cm TL

Specimens were collected between 150 and 164 m (Fourmanoir 1976).

*Poecilopsetta colorata* Günther 1880 Max. length: 17 cm TL

Museum: Vicinity of southern Luzon, Malavatuan I., 117 fathoms (214 m), R/V *Albatross* collection, Stn. 5275, USNM 137392 (Anon. 1994).

*Poecilopsetta megalepis* Fowler 1934 Max. length: 15 cm TL  
Museum: R/V *Albatross* collections: Balayan Bay and Verde I. Passage, in 118 fathoms (216 m), Stn. D. 5117, USNM 93094 (holotype, 12.8 cm) (Fowler 1934, Herre 1953). Balabac Strait: Cape Melville, 148 fathoms (271 m), USNM 93576 (Anon. 1994).

*Poecilopsetta plinthus* (Jordan & Starks 1904) Max. length: 19 cm TL  
Fourmanoir (1976) reported two specimens (9.6 and 9.9 cm) caught between 185 and 200 m during the R/V *Vauban* expedition. See also Herre (1953).

*Poecilopsetta praelonga* Alcock 1894 Max. length: 17.5 cm TL  
Reported from Davao, Mindanao, central Visayas to the west coast of Luzon; specimens caught between 247-511 m, USNM 138004 - 138015 (Anon. 1994).

*Samaris cristatus* Gray 1831 Max. length: 22 cm TL  
Museum: R/V *Albatross* collections: Between Samar and Leyte, vicinity of Surigao Strait, Tabuc Pt., 62 fathoms (114 m), Stn. 5480, USNM 00137649; Buton Strait, Kalono Pt., 39 fathoms (71 m), Stn. 5641, USNM 137650. Samar Sea collection, Carigara Bay, USNM 228532 (Anon. 1994). A specimen, 12 cm, was caught between 70 and 76 m. See also Herre (1953) and Heemstra (1986b). Additional reference: Morphology in Hensley (in press B).

*Samariscus huysmani* Weber 1913 Max. length: 11.5 cm TL  
Museum: Samar Sea, Carigara Bay, 0 - 65 m, USNM 27534 (Anon. 1994).

*Samariscus longimanus* Norman 1927 Max. length: 12 cm TL  
Museum: R/V *Albatross* collection: Between Cebu and Bohol, Luis Pt., 145 - 162 fathoms (265 - 297 m), Stns. 5411, 5412, 5418, USNM 137384 - 6; Pt. Tagolo, 182 fathoms (333 m), Stn. 5519, USNM 137387; Balayan Bay and Verde I. Passage, Sombrero I., 118 fathoms (216 m), Stn. 5117, USNM 137388 (Anon. 1994).

*Samariscus luzonensis* Fowler 1934 Max. length: 7.6 cm TL  
Museum: West coast of Luzon, in 45 fathoms (82.4 m), R/V *Albatross* collection, Stn. D. 5442, USNM 93089 (holotype, 7.6 cm) (Fowler 1934). Type locality identified as off San Fernando, La Union, Luzon. See also Herre (1953), Anon. (1994), and Hensley (in press B).

*Samariscus macrognathus* Fowler 1934 Max. length: 5.5 cm TL  
Museum: West coast of Luzon, in 45 fathoms (82.4 m), R/V *Albatross* collection, Stn. D. 5442, USNM 93088 (holotype, 5.4 cm) (Fowler 1934). Type locality identified as San Fernando, La Union, Luzon (Anon. 1994). See also (Hensley, in press B).

*Samariscus triocellatus* Woods 1966 Max. length: 9 cm TL  
Museum: Siquijor I., 80 - 100 ft (24 - 30 m), USNM 273792. White Beach, past Mahatae, Batan I., Batanes, 50 - 70 ft (15 - 21 m), USNM 298212 (Anon. 1994). Additional reference: Morphology in Myers (1991).

## Family Psettodidae

*Psettodes erumei* (Bloch & Schneider 1801) Max. length: 64 cm

Known from Iloilo, west to Palawan, and north to western Luzon (Herre 1953). Occurs from shallow waters to over 300 m deep; most abundant between 22 to 40 m (Warfel and Manacop 1950). Museum: LACM 35957-12. Off El Nido, gill net, FRLM 11761 (Kimura 1995). Additional references: Morphology in Nielsen (1984b). Growth in Pradhan (1969), Pauly (1978), and Edwards and Shafer (1991). Food in Devadoss et al. (1977) and Cabanban (1991). Diet and Reproduction in Devadoss et al. (1977). Spawning in Devadoss et al. (1977) and Ramanathan and Natarajan (1979).

## Family Soleidae

*Aesopia cornuta* Kaup 1858 Max. length: 20 cm SL

Caught by trawl in the seagrass beds of Bolinao (McManus et al. 1992).

*Aesopia heterorhinos* (Bleeker 1856) Max. length: 11 cm SL

Museum: As *Soleichthys heterorhinos*: Bacon, USNM 55963; R/V *Albatross* collections - Cebu Mkt. USNM 137412 and Batan I., Caracaran Bay, USNM 137413; Sombrero I., Batangas, USNM 28550; west side of Solino (Selinog) I., Zamboanga del Norte, Mindanao, 0 - 15 ft (4.6 m), USNM 273795; near Tonga Pt., Siquijor I., 0 - 1.2 m, USNM 273796; tidal lagoon, northeastern side of Siquijor, 0 - 1 m, USNM 273800 (Anon. 1994). A 4.2 in (11 cm) specimen was collected from Bacon, Sorsogon (Evermann and Seale 1907). See also Weber and de Beaufort (1929). Additional reference: Morphology in Myers (1991).

*Aseraggodes cyaneus* (Alcock 1890) Max. length: 8.3 cm SL

Museum: R/V *Albatross* collections: Balayan Bay and Verde I. Passage, Sombrero I., 340 fathoms (622.2 m), Stn. 5114, USNM 137674; China Sea, vicinity of southern Luzon, Corregidor, in 114 fathoms (208.6 m), USNM 137675 and in 118 fathoms (216 m), USNM 137676; east coast of Luzon, Legaspi, USNM 137678 (Anon. 1994). LACM 42475-47.

*Aseraggodes dubius* Weber 1913 Max. length: 8.5 cm

Museum: R/V *Albatross* collections: Davao, USNM 137667; China Sea, off s. Luzon, Sueste Pt., 25 fathoms (46 m), Stn. 5105, USNM 137668; Verde I. Passage and Batangas Bay, Matocot Pt., 100 fathoms (183 m), Stn. 5266, USNM 137669; Marinduque I. and vicinity, Tayabas, 90 fathoms (165 m), Stn. 5376, USNM 137671 and in 83 fathoms (152 m), Stn. 5371, USNM 137672; Batangas River, Luzon, USNM 137673 (Anon. 1994).

*Aseraggodes filiger* Weber 1913 Max. length: 11 cm

Collected from Manila Bay, 8 miles from Corregidor Is. in 15 - 25 fathoms (27 - 46 m) (Herre 1953).

*Aseraggodes kaianus* Giinther 1880 Max. length: 11.3 cm

Forty specimens, ranging from 7.2 - 9 cm, were collected between 150 - 164 m, during the R/V *Vauban* expedition (Fourmanoir 1976).

*Dexillus muelleri* (Steindachner 1879) Max. length: 18 cm

Museum: Carigara Bay, Samar Sea, 50 - 70 m, USNM 228530. Sorsogon Mkt., USNM 286939 and 291084 (Anon. 1994).

*Euryglossa aspilos* (Bleeker 1852) Max. length: 38 cm

Museum: Ulugan Bay near mouth of Baheli River, USNM 137679; Cebu Mkt., USNM 137680 - 1; Nasugbu Bay, Luzon, USNM 137682 (Anon. 1994).

*Euryglossa orientalis* (Bloch & Schneider 1801) Max. length: 30 cm SL

Inhabits shallow sand and muddy bottoms of coastal waters (Menon and Monkolprasit 1974).

*Liachirus melanospilus* (Bleeker 1854) Max. length: 7.5 cm SL

Reported from Manila Bay (Herre 1953).

*Pardachirus pavoninus* (Lacepède 1802) Max. length: 25 cm TL

Museum: Cebu Mkt., USNM 137624 - 29. Bacon, USNM 55966. Zamboanga, USNM 84258. Jolo Mkt. USNM 137622. Bolinao Bay, USNM 137623. Pagapas Bay, Santiago R., USNM 137630. Señora Ascion, n. of Dumaguete, Negros O., USNM 273799. Tagburos, Puerto Princesa City Mkt., USNM 286974 (Anon. 1994). LACM 37398 - 9, 37397-2, 37398-9, 42471-4. Marketable in Jolo, Sulu, and Cebu. A specimen, 5.5 in (14 cm) in length, was collected from Bacon, Sorsogon (Evermann and Seale 1907). See also Herre (1953) and Randall et al. (1990). Additional references: Morphology in Myers (1991). Food in Sano et al. (1984).

*Pardachirus poropterus* (Bleeker 1851) Max. length: 6.6 cm TL

Museum: Rio Grande, Mindanao, USNM 56164 (Anon. 1994). Three specimens were caught at depths between 122 and 205 m during the 1976 R/V *Vauban* expedition (Fourmanoir 1976). See also Herre (1953) and Kottelat (1993).

*Solea humilis* Cantor 1849 Max. length: 8.9 cm

Considered a commercial fish in the country (Warfel and Manacop 1950). See also Weber and de Beaufort (1929).

*Solea ovata* Richardson 1846 Max. length: 10 cm TL

Museum: R/V *Albatross* collections: Manila Mkt. USNM 137397, 137399-404; Sorsogon Mkt., USNM 137405 (Anon. 1994). See also Munroe (in press B).

*Synaptura marginata* Boulenger 1900 Max. length: 50 cm TL

Caught in seagrass beds. Museum: Tagburos, Puerto Princesa City Mkt., USNM 226832 (Anon. 1994).

*Synaptura megalepidoura* (Fowler 1934) Max. length: 24.3 cm

Museum: R/V *Albatross* collections, as *Brachirus megalepidoura*: off east coast of Leyte, 15 fathoms (27 m), Stn. D. 5204, USNM 93081 (holotype, 24.3 cm) (Fowler 1934);

western Samar, Taratara I., 20 fathoms (37 m), Stn. D.5209, USNM 93554 (Anon. 1994).  
See also Herre (1953).

*Synapturasorsogonensis* Evermann & Seale 1907 Max. length: 23 cm  
Museum: Bacon, Sorsogon, USNM 55916 (holotype, 9 in. (23 cm)) (Evermann and Seale 1907). Cuyo Is., USNM 72194 (Anon. 1994).

*Zebrias lucapensis* Seigel & Adamson 1985 Max. length: 8.4 cm SL  
Museum: Lingayen Gulf, LACM 37436-6 (holotype); LACM 37436-8 (paratype).  
Morphological information found also in Seigel and Adamson (1985).

*Zebrias quagga* Kaup 1858 Max. length: 15 cm TL  
Inhabits shallow coastal waters (Menon 1984).

*Zebrias zebra* (Bloch & Schneider 1787) Max. length: 19 cm TL  
Museum: Tigbauan, Panay, USNM 106828 (Anon. 1994).

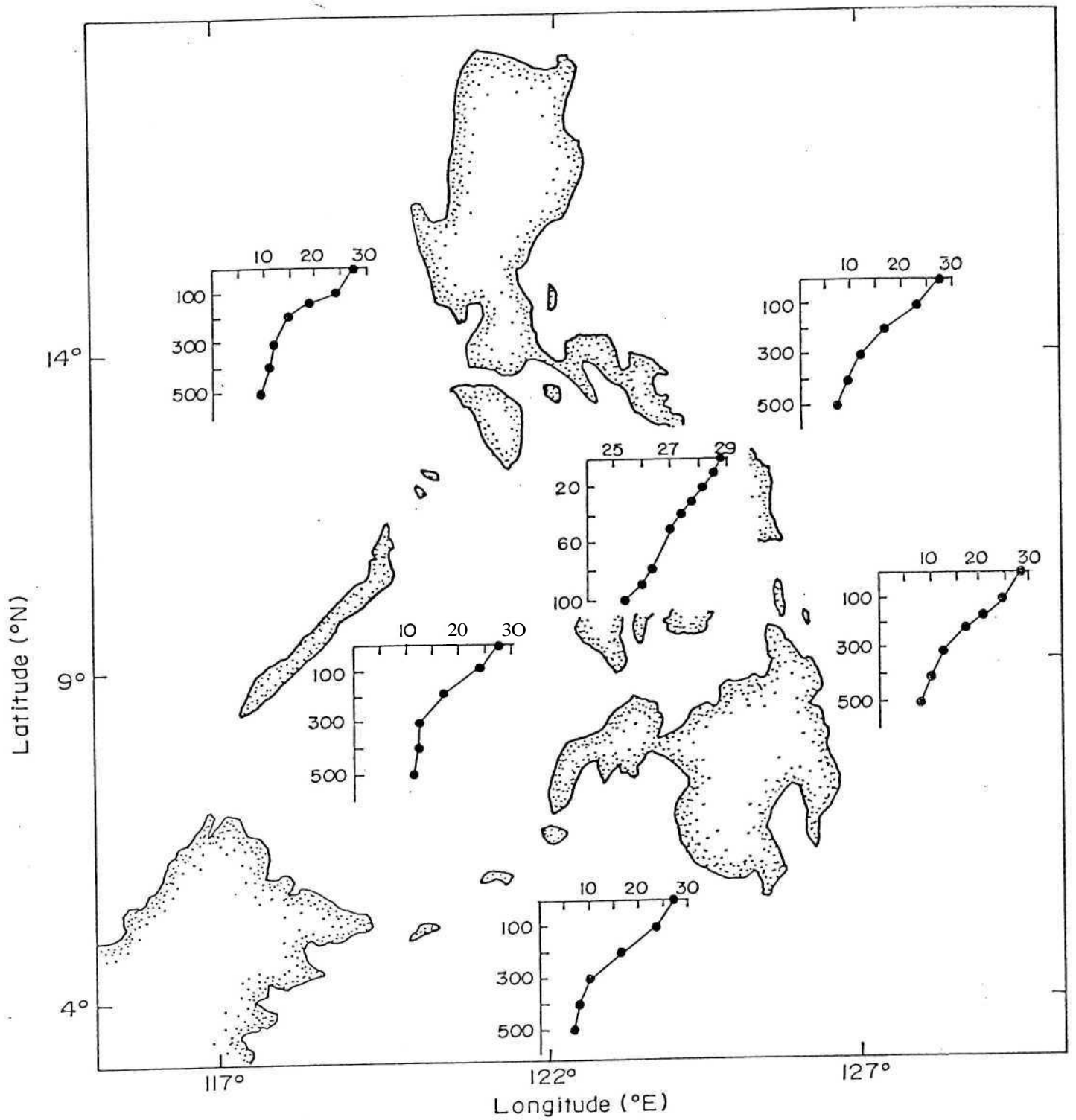


Fig. 1. Relationship between mean annual sea temperature (in °C) and depth (in m) for various locations in the Philippines. Source: Dalzell and Ganaden (1987) based on Selga (1931) and Labao (1980).

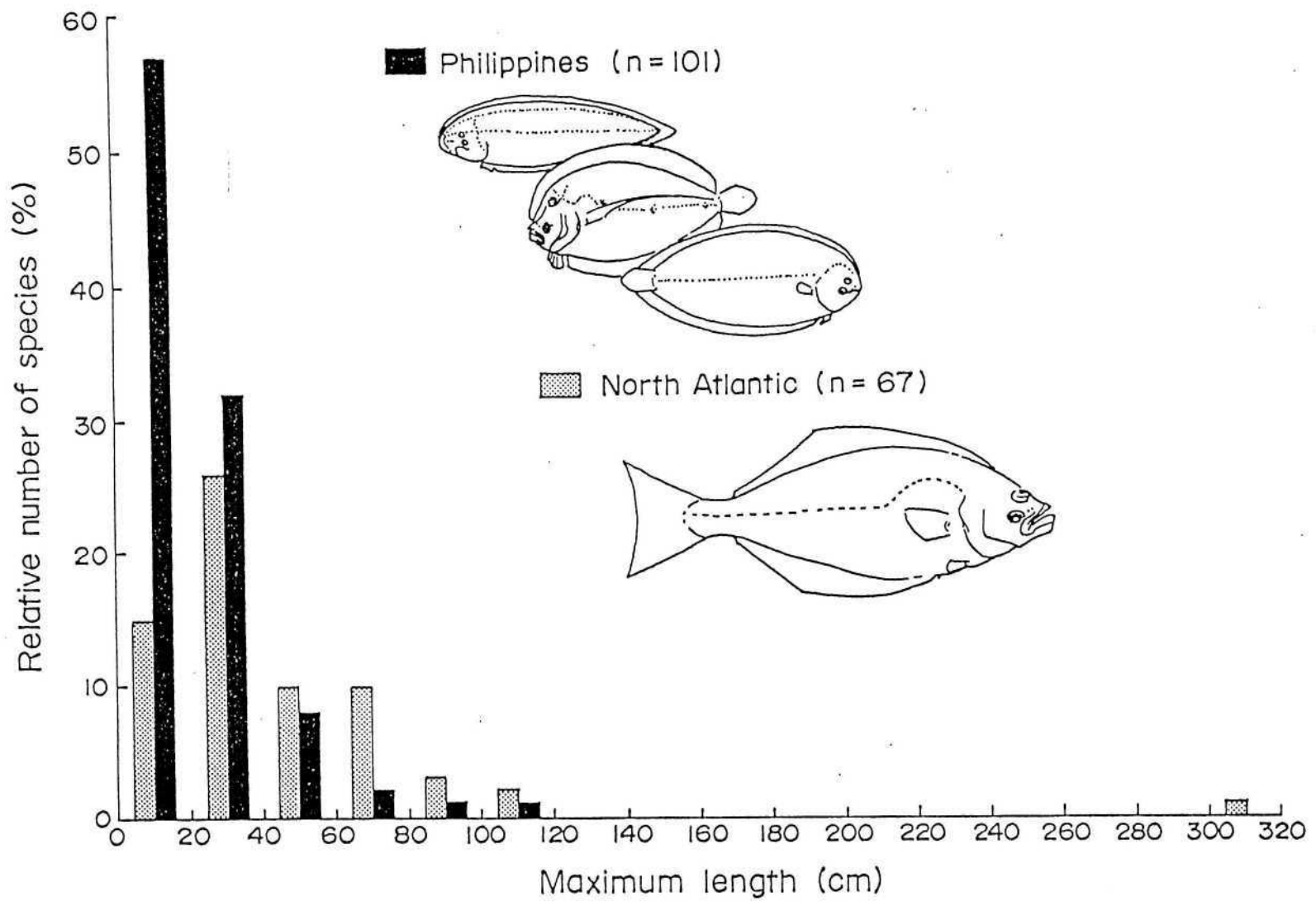
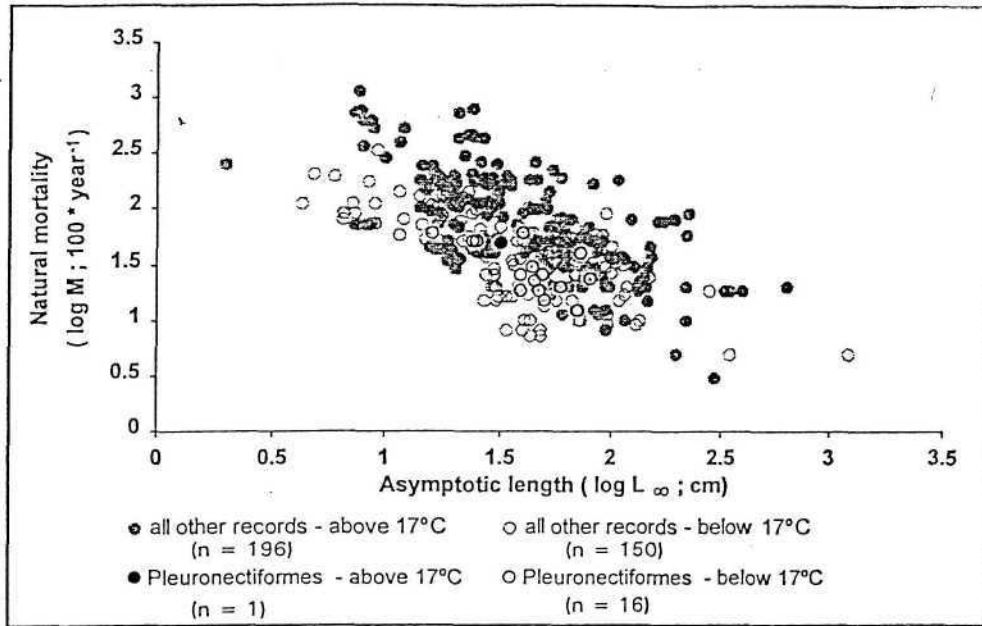


Fig. 2. Frequency distribution of maximum reported lengths in Philippine and North Atlantic flatfish, highlighting small sizes of Philippine species (data from FishBase, August 1996).

for Calamban et al. paper



M vs L(inf) of Pleuronectiformes (flatfishes)



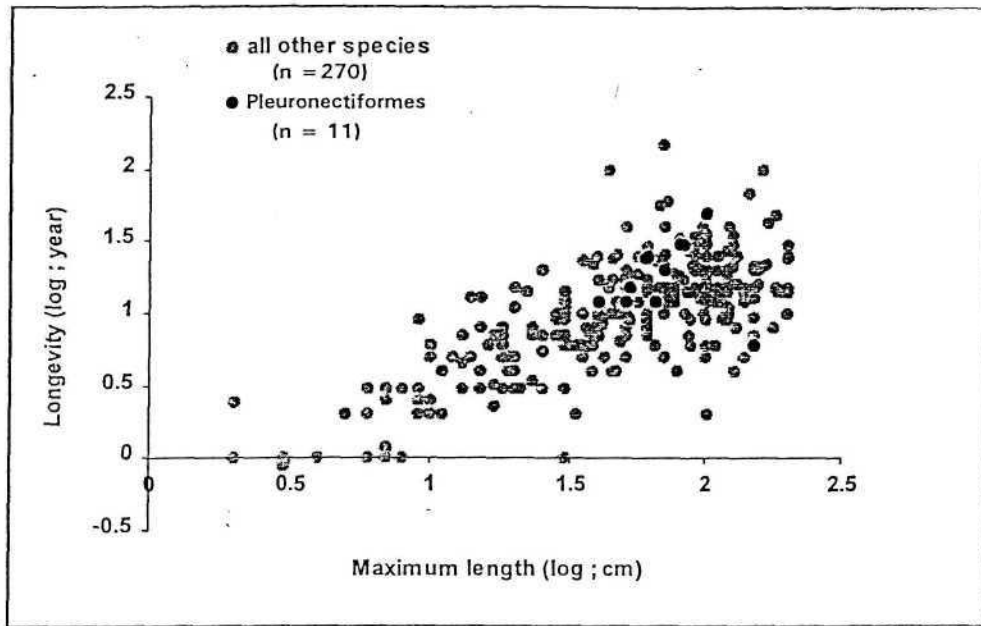


FIG. Longevity vs maximum length of Pleuronectiformes (flatfishes)

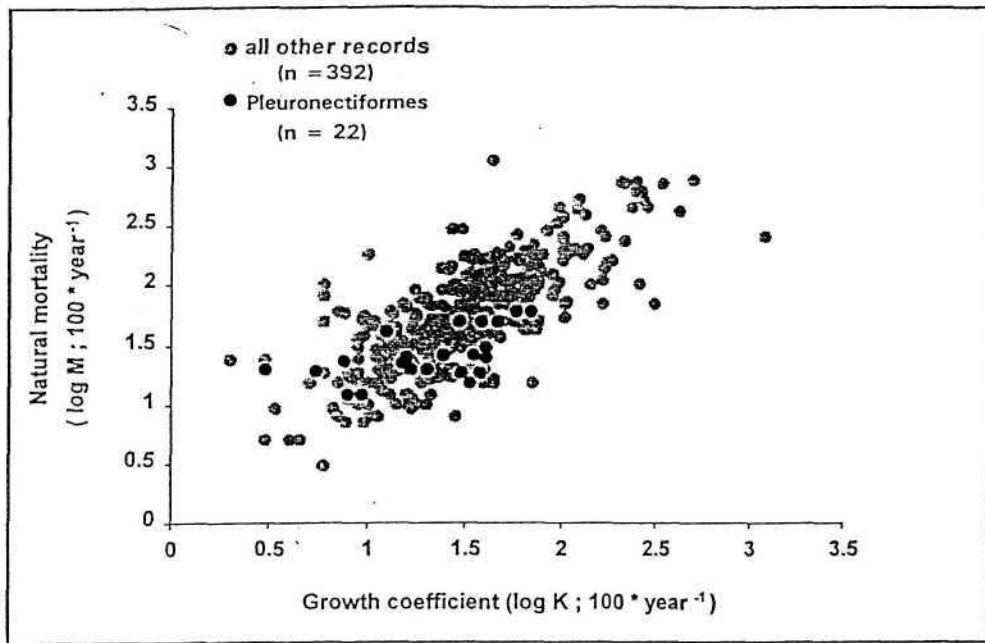


Fig. 42. M vs K of Pleuronectiformes (flatfishes)

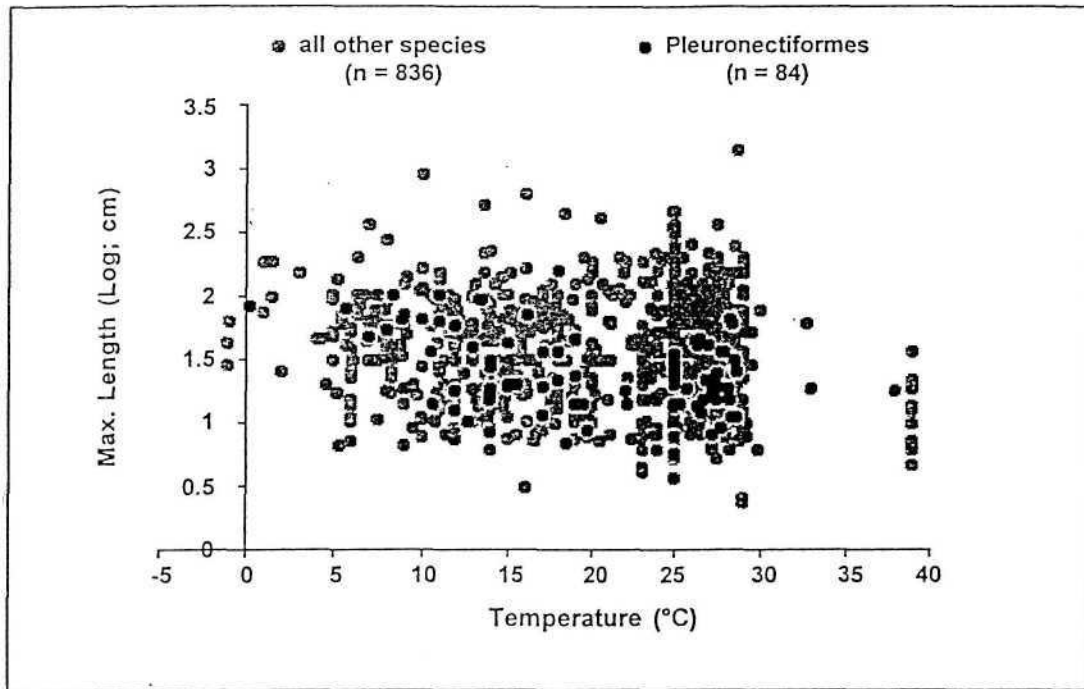


Fig. 5. Within groups of similar fishes (here in the Pleuronectiformes), the maximum size reached by different species decreases with environmental temperature, although this effect is not seen when data for all orders of fish are pooled.