Zoological Studies **38**(4): 391-404 (1999)

Zoological Studies

Species Composition of Fish in the Coastal Zones of the Tsengwen Estuary, with Descriptions of Five New Records from Taiwan

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(Accepted May 12, 1999)

Shih-Rong Kuo and Kwang-Tsao Shao (1999) Species composition of fish in the coastal zones of the Tsengwen estuary, with descriptions of five new records from Taiwan. *Zoological Studies* **38**(4): 391-404. Fishes in the estuary of the Tsengwen River and nearby coastal zone were collected using different gear between October 1994 and July 1997. A checklist of all fish species is given in the present paper together with their life-cycle category, life habits, and world zoogeographical distribution. Totally 80 families and 244 species of inshore fishes were recorded from 5 estuarine zones along the coast near the Tsengwen River mouth. Among these families, Gobiidae had the most species (34 species, 13.9%); Carangidae the 2nd (15 species, 6.1%); and then Apogonidae and Clupeidae (11 species, 4.5%). Nearly half of these species, including 10 families and 111 species, were not previously recorded from the entire western coast of Taiwan, and include 5 new records for Taiwan. They are *Ambassis miops, A. interruptus*, and *A. commersoni* of the Ambassidae; *Epinephelus lanceolatus* of the Serranidae; and *Zenarchopterus dunkeri* of the Hemiramphidae. Diagnostic characters and specimen photographs of these 5 species are provided. The fishes collected throughout the estuarine areas comprised 208 marine species, of which 124 were marine stragglers and 84 were marine estuarine-opportunists, together with 29 estuarine species, 6 freshwater species, and 1 catadromous species. Comparison of the faunistic similarities and the dendrogram among the 5 estuarine zones near Tsengwen, the estuarine zones of Tainan (Yenshui and Erhjen), of the Kaoping River in southern Taiwan, and the Tanshui River in northern Taiwan indicate that the species composition of the 5 Tsengwen estuarine zones are in 1 cluster, and they group with the southern estuaries of both Tainan and Kaoshiung rather than with the northern fish fauna at Tanshui. This result is consistent with previous studies on coral reef and mangrove fishes whose results indicate that community structures between northern and southern Taiwan are quite different.

Key words: Fish fauna, Species composition, Life cycle, Checklist, Tsengwen River estuary.

Estuarine and coastal zones are among the most productive areas in the ocean. They comprise only 8% of ocean surface but account for about 14% of ocean production (IGBP 1994). Almost 60% of the world's fish catch is taken from coastal ecosystems (Lie 1983). A number of marine teleosts congregate in this zone for reproduction, feeding, and shelter. However, these areas are also subject to great human impacts through exploitation of coastal resources and economic and social developments. The estuary of the Tsengwen River and nearby estuarine zones are located in southwestern Taiwan (23°01'-23°11'N and 120°01'-120°04'E) and are one of the most important fishing grounds in Taiwan. Drift gill net, shrimp otter trawler, mullet gill net, hand-lining, long-lining, and set net are important fishing gear used by fishermen in this area. However, the southwestern coastal environments have changed remarkably during recent decades, resulting mainly from intensive exploitation of coastal resources and anthropogenic pollution, in addition to problems of overfishing and illegal fishing. Thus, basic faunistic surveys, inventory work, and database establishment should be urgently carried out to satisfy the de-

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mands for information on sustainable utilization and conservation of these important natural resources.

There are numerous technical or research reports, published earlier, which contain information on fishes of the west coast of Taiwan, such as Yang (1983) and Chen et al. (1987) in the southwestern part; Chen et al. (1989), Shao et al. (1990), and Shao and Kao (1992) along the northwest; and Yang (1985), Su et al. (1988), Hong et al. (1989), and Shao (1989-1993) in waters off the central west coast. However, most of these only list common economic species, using group names, or even have misidentified some species. Shao et al. (1993) first compiled a fish checklist of 664 species along the entire western coast including non-economic inshore species. As to the fish fauna in the estuaries of the western coast, the following publications were found: Lee (1992) in the estuary of the Tanshui River (TS) in northern Taiwan; Han and Fang (1997) in estuaries of the Yenshui and Erhjen Rivers (TN) in southern Taiwan; and Fang et al. (1996) in the estuary of the Kaoping River (KP) in southern Taiwan. No information is available from the estuary of the Tsengwen River and nearby estuaries of the southwestern coast of Taiwan. The purposes of this study are therefore to initially investigate the species composition in this region to fill this gap, then compare the estuarine fish assemblages in this region with those in southern and northern Taiwan to understand spatial distributional patterns of inshore fishes and their possible causes along the western coast of Taiwan. Studying the community structure of fish in this region is also the 1st step in conducting another joint project of Land-Ocean Interactions in the Coastal Zone (LOICZ) in the Tsengwen estuary for establishing a trophic model using ECOPATH (Lin et al 1999).

MATERIALS AND METHODS

Study area

The Tsengwen River is the 2nd largest river in southwestern Taiwan. The river drains through Tainan and Chiayi Counties with a total catchment area of 1177 km^2 and a total length of 138.5 km (Water Resources Planing Commission 1995). The seawater intrusion zone, which is defined as estuarine, ranges from approximately 10 to 25 km from the river mouth depending upon flow conditions of freshwater. There are 5 stations situated along the estuarine zone of the Tsengwen River including Shiliao (SL) and Chiku (CK), located inside the lagoon on the northern side of the Tsengwen River; the estuaries of the Tsengwen River (TW); and Ruerhmen (RM) and Shihtsao (ST) on the southern side of the Tsengwen River (Fig. 1). Water temperatures ranged from 16.2 °C in January to 32.8 °C in June (25.2 ± 0.54 °C); salinities were relatively stable during the study, ranging from 24.9 to 33.4 p.s.u. (30.6 ± 3.26 p.s.u.). The substratum profiles at the estuaries of 5 stations were similar and characterized by fine muddy silt. Mean tidal range in the estuaries varies from 0.8 to 2.2 m depending upon the estuary location.

Sampling method and data analysis

Fishes were caught monthly from October 1994 to July 1997 with various fishing gear. The major fishing methods included bottom trawler, gill net, cast net, and fyke net. Fishes were then brought back to the laboratory for identification, using Masuda et al. (1984) and Shen et al. (1993) mostly. Each species was categorized as either marine straggler (MS), marine estuarine-opportunist (O), estuarine (E), catadromous (C), or freshwater (F) based on the criteria in Lenanton and Potter (1987). Marine straggler refers to those species that only occasionally occur in estuaries and are usually restricted to their lower reaches, whereas marine estuarine-opportunist refers to species that enter estuaries regularly, often in large numbers, and also frequently penetrate some distance into these systems. Although the estuarine category refers to species that complete their life cycles in estuaries, catadromous species are those species which spend much of their life cycle in rivers, but migrate into the lower regions of estuaries to breed, while freshwater species are those whose life cycle is typically confined to freshwater. Life habitats were divided into 4 categories as either surface (S), pelagic (P), benthopelagic (BP), or benthic (B) (Lenanton and Potter 1987). The world zoogeographical distribution range of each species was sought and categorized as follows: circumtropical (C), Indo-Pacific (IP), Indo-pan Pacific (IpP), Indo-West Pacific (IwP), from Japan to the East China Sea (JeC), from Japan to the South China Sea (JsC), from Japan to the China Sea (JC), from Japan to Taiwan (JT), North Pacific (NP), Pacific (P), endemic to Taiwan (T), from Taiwan to the China Sea (TC), from Taiwan to the South China Sea (TsC), West-central Pacific (WcP), and West Pacific (WP) (Shao et al. 1993). The abundance of each species at each locality was noted as A (abundant), C (common), O (occasional), or R (rare) based on the occurrence ratio of that species in the entire study period, i.e., $75\% < A \leq 100\%$, $50\% \leq C < 75\%$, $25\% \leq$

O < 50%, 0% < R < 25%.

Jaccard's coefficient (*Jc*) of similarity (Sneath and Sokal 1973) was used to express the association between fauna found in every 2 study sites. When the dissimilarity index is expressed as 1-*Jc*, a dendrogram is derived from the clustering of the matrix of the index for every 2 localities by using the UPGMA (unweighted pair-group method using arithmetic averages) in NTSYS/PC (Rohlf 1993).

RESULTS AND DISCUSSION

Table 1 lists all 80 families and 244 species of fish collected by bottom trawler, cast net, or fyke net from the estuary of the Tsengwen River and 4 nearby estuarine zones between October 1994 and July 1997. Numbers of species varied among estuaries: 176 species were found in the estuary of the Shiliao River, followed by Ruerhmen (124 species), Tsengwen River (93 species), Chiku (90 species), and Shihtsao (85 species). Gobiidae was by far the dominant family, contributing 13.9% (34 species) to the total number of species, followed by Carangidae 6.1% (15 species), Apogonidae 4.5% (11 species), and Clupeidae 4.5% (11 species). The remaining speciose families in order are: Leiognathidae, Lutjanidae, Bothidae, Haemulidae, Mugilidae,

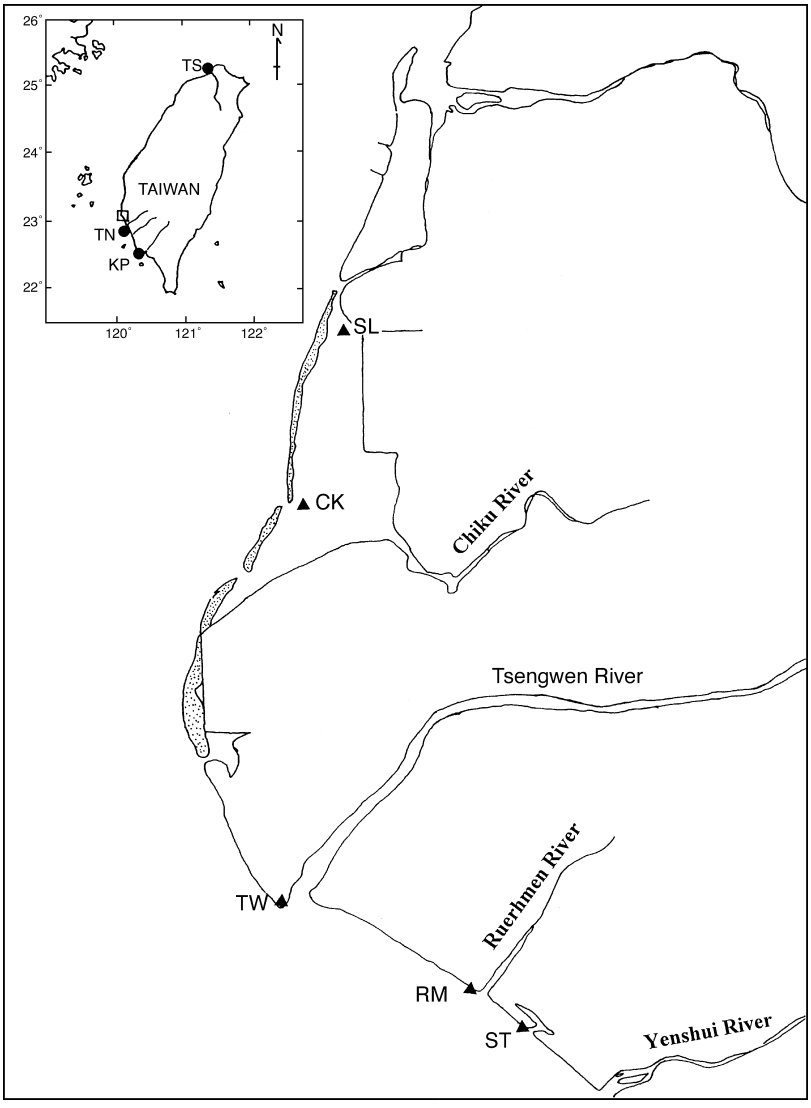

Fig. 1. Map showing the positions of the 5 sampling sites (▲) in the estuary of Tsengwen River and nearby estuaries on the west coast of Taiwan. TS, estuary of Tanshui River; TN, estuaries of Yenshui and Erhjen Rivers; KP, estuary of Kaoping River.

Table 1. List of frequency occurrence, life-cycle (LC) categories, life habitats (LH) and zoogeographical distribution of fishes (G) in different estuaries along the west coast of Taiwan

Family	Species	SL	CK	TW	RM	ST	PS	TS	TN	KP	LC	LH	G
Acanthuridae	*Acanthurus mata*[♦,a]	R			R		+				MS	BP	IwP
	A. xanthopterus[d]	R					+				MS	BP	IP
Albulidae	*Albula glossodonta*[b]								+	+	MS	BP	IwP
Ambassidae	*Ambassis commersoni*[♦,d]				R	R	+				E	BP	IwP
	A. interruptus[♦,d]			C	R	R	+				E	BP	IwP
	A. miops[♦,d]				R	R	+		+	+	E	BP	IwP
	A. urotaenia[c,d]	A	C	A	A	A	+		+	+	E	BP	IP
	A. gymnocephalus[c,d]					R	+	+	+	+	E	BP	IP
Antennariidae	*Antennarius striatus*[a,d]	R			R		+		+		MS	B	IwP
	Histrio histrio[♦,a,d]	R		R			+				MS	B	IP
Anabantidae[♦]	*Trichogaster trichopterus*[♦,d]			R		R	+		+		F	BP	IP
Anguillidae	*Anguilla japonica*[d]			O	O		+		+	+	C	BP	JeC
	A. marmorata[d]								+	+	C	BP	JsC
Apogoniade	*Apogon doederleini*[a,d]	R					+				O	BP	IP
	A. ellioti[a]	R					+				O	BP	IP
	A. fraenatus[♦,a]				R		+		+	+	O	BP	IP
	A. hyalosoma[♦,a]				R	R	+				O	BP	IP
	A. kiensis[a]	C	C	C	C	C	+				O	BP	IP
	A. lineatus[♦,d]			R			+				O	BP	WP
	A. psendotaeniatus[♦,a,d]	R					+				O	BP	WP
	A. trimaculatus[♦,a,d]	R					+				O	BP	WP
	Archamia lineolata[a,d]	R	R				+		+		O	BP	IwP
	Fowleria variegata[♦,d]	R					+				O	BP	IP
	Rhabadamia gracilis[♦,d]	R					+				O	BP	IwP
Ariidae	*Arius maculatus*[b,d]	O		O			+	+	+	+	O	P	IwP
Atherinidae[♦]	*Atherinomorus lacunosus*[♦,d]	R					+				MS	BP	IwP
	Hypoatherina woodwardi[♦,d]	R					+	+			MS	BP	IwP
	H. valencienni[b]								+		MS	BP	IwP
Balistidae	*Aluterus monoceros*[a]							+			MS	BP	IwP
	Canthidermis maculatus[♦,d]			R	R		+				MS	BP	C
Belonidae	*Platybelone argalus platyura*[♦,d]	R					+				MS	S	IP
Blenniidae	*Omobranchus fasciolaticeps*[♦,d]				R		+		+		MS	BP	JC
	Plagiotremus tapeinosoma[d]	R					+				MS	BP	IwP
Bothidae	*Pseudorhombus arsius*[a,d]	R		R			+	+	+	+	MS	B	IwP
	P. cinnamomeus[a,d]		R	R			+				MS	B	JsC
	P. dupliciocellatus[d]	C	C	O	O	R	+				MS	B	WP
	P. elevatus[♦,d]	R	R	R	R		+				MS	B	JsC
	P. levisquamis[♦,a,d]	R	R	R			+				MS	B	JsC
	P. oligodon[d]	R					+				MS	B	JsC
Callionymidae	*Callionymus planus*[a]	R					+				MS	B	IwP
	C. virgis[a]								+		MS	B	IwP
Carangidae	*Alectis cilliaris*[b,d]								+		MS	P	C
	Alectis indicus[b,d]	R					+		+		MS	P	C
	Alepes djedaba[b,d]	R			R		+	+	+		MS	P	IwP
	A. para[♦,d]	R					+				MS	P	IP
	A. vari[♦,d]	R					+				MS	P	IP
	Carangoides armatus[b]								+		MS	P	IP
	C. dinema[♦,d]	R					+				MS	P	IwP
	C. equula[b]								+		MS	P	IwP
	Caranx ignobilis[b,d]	C	R	O	O	O	+				O	P	IP
	C. melampygus[♦,d]				R		+				O	P	IP
	C. papuensis[♦,d]	R			R	R	+				O	P	IP
	C. sexfasciatus[b,d]	C		O	O	R	+		+		O	P	IpP
	C. tille[b]							+			O	P	IpP
	Decapterus maruadsi[b]							+			MS	P	IpP
	Megalaspis cordyla[b,d]			R	R			+		+	MS	P	IP
	Scomberoides commersornianus[♦,b]				R		+		+		MS	P	IP
	S. lysan[b]								+		MS	P	IP
	S. tol[b,d]	A	O	O	C	C	+	+	+	+	MS	P	IwP

Table 1. (Cont.)

Family	Species	SL	CK	TW	RM	ST	PS	TS	TN	KP	LC	LH	G
	Seriolina nigrofasciata[b,d]	R		R			+				MS	P	C
	Trachurus japonicus[d]	O					+				MS	P	JeC
	Trachinotus baillonii[♦,d]	R					+				MS	P	IwP
Centropomidae[♦]	*Lates calcarif!er*[♦,d]				O	O	+				MS	BP	IP
Chaetodonidae	*Chaetodon auriga*[d]	R					+				MS	BP	IP
	C. ephippium[d]		R				+				MS	BP	WcP
	C. vagabundus[d]	R					+				MS	BP	IP
	Heniochus acuminatus[d]	R					+				MS	BP	IP
Channidae[♦]	*Channa asiatica*[♦,d]					R	+				F	BP	IP
Chanidae	*Chanos chanos*[b,d]	C	O	C	C	O	+	+	+	+	E	S	IP
Cichlidae[♦]	*Tilapia mossambica*[♦,d]	C	C	C	A	A	+		+	+	F	BP	IP
	T. niloticus[♦,d]		O				+			+	F	BP	IP
	T. zillii[♦,d]			O			+		+	+	F	BP	IP
Clupeidae	*Clupanodon punctatus*[♦,b,d]	R			R		+				O	S	JsC
	C. thrissa[d]	R			R	R	+				O	S	TsC
	Sardinella zunasis[d]	R					+				O	S	JeC
	Nematalosa come[♦,d]	A	C	C	C	A	+		+	+	O	S	IP
	N. japonica[d]	C	O	O	O	C	+		+		O	S	IP
	Sardinella fimbriata[♦,d]	R			R		+	+			MS	S	IwP
	S. hualiensis[♦,d]	O	O		O		+		+		MS	S	IwP
	S. lemuru[d]	R	R				+				MS	S	IwP
	S. melanura[d]	O		C	C	O	+				MS	S	JeC
	S. sindensis[♦,d]	O	O				+				MS	S	JeC
	S. zunasi[b]	R					+	+			O	S	JsC
Congridae	*Conger japonicus*[♦,d]			R			+				O	B	JeC
Cynoglossidae	*Cynoglossus arel*[a,d]									+	MS	B	JsC
	C. puncticeps[♦,a,d]				R		+		+		MS	B	JsC
Dactylopteridae	*Dactyloptena orientalis*[♦,d]	R					+				MS	B	IwP
Dasyatidae	*Dasyatis akajei*[a,d]		R				+	+			MS	BP	IwP
	D. bennetti[d]								+		MS	BP	IwP
Diodontidae	*Diodon liturosus*[d]							+			O	BP	C
Echeneidae[♦]	*Echensis naucrates*[♦,d]	R			O	O	+				MS	BP	C
Elopidae	*Elops machnata*[b,d]	C	O	O	C	C	+		+		MS	P	IP
Engraulidae	*Engraulis japonicus*[d]	C	C		C	C	+				MS	S	JeC
	Stolephorus indicus[d]	R			R		+		+		MS	S	IP
	S. insularis[♦,d]			R	R	R	+				MS	S	IP
	Thryssa chefuensis[d]							+			MS	S	IP
	T. hamiltonii[d]	C	O	C	C	C	+		+	+	MS	S	IwP
Ephippidae	*Drepane longimana*[d]	R	R				+	+			MS	BP	IwP
	D. punctata[d]	O	R	O	O		+	+	+		MS	BP	WP
	Platax pinnatus[♦,d]	R					+				MS	BP	IwP
	P. teria[♦,d]	R				R	+				MS	BP	IwP
Exocoetidae	*Cypselurus cyanopterus*[♦,d]			R			+				MS	S	IP
Gerredidae	*Gerres abbreviatus*[♦,b,d]	A	C	A	C		+		+	+	O	B	IwP
	G. filamentosus[b,d]	A	C	A	C	O	+	+	+	+	O	B	IwP
	G. japonicus[b,d]	R	R	R			+		+		O	B	WP
	G. oynea[d]	O			O	O	+	+	+		O	B	IwP
Gobiidae	*Acentrogobius janthinopterus*[♦,d]		R	R		R	+				O	B	IwP
	A. viganensis[d]	R		R		R	+		+	+	O	B	WP
	A. viridipunctatus[♦,d]	C	R	O	O	C	+		+		O	B	IwP
	Awaous melanocephalus[a]									+	O	B	IwP
	Bathygobius cyclopterus[d]		R	R	R		+				O	B	IwP
	Boleophthalmus pectinirostris[♦,d]				O	O	+	+	+		E	B	TC
	Bostrichthys sinensis[♦,d]				O		+				E	B	TC
	Brachyamblyopus anotus[♦,d]									+	O	B	IwP
	Butis amboinensis[♦,d]	R			R	R	+		+		E	B	IwP
	B. melanostigma[d]		R		C	C	+		+	+	E	B	IwP
	Cryptocentrus filifer[d]	O					+		+		O	B	JC
	C. yatsui[♦,d]					R	+		+		O	B	JsC
	Eleotris fusca[♦,d]	O			O	O	+			+	E	B	JsC

Table 1. (Cont.)

Family	Species	SL	CK	TW	RM	ST	PS	TS	TN	KP	LC	LH	G
	E. melanosoma[♦,d]	C	R	C	C	C	+	+		+	E	B	lwP
	Exyrias puntang[♦,d]	R		R	R		+			+	O	B	lwP
	Favonigobius reichei[♦,d]	R		R	R		+	+		+	O	B	lwP
	F. gymnauchen[d]								+		O	B	lwP
	Glossogobius aureus[♦,d]	C	R	O	O	C	+		+	+	E	B	IP
	G. bicirrhosus[d]									+	E	B	lwP
	G. biocellatus[d]	C	O	C		C	+	+		+	E	B	IP
	G. celebius[♦,d]			R	R		+				E	B	lwP
	G. giuris[d]									+	E	B	lwP
	G. olivaceus[♦,d]	C	C	C	C	C	+	+	+		E	B	TC
	Hazeus otakii[♦,d]	R			R		+				O	B	JT
	Istigobius campelli[d]	R					+				O	B	JT
	Luciogobius saikaiensis[a,d]							+			O	B	lwP
	Mugilogobius abei[a,d]							+	+		O	B	lwP
	M. parvus[♦,a,d]	R				R	+		+	+	O	B	JT
	Oligolepis acutipinnis[a,d]					R	+	+	+	+	O	B	IP
	O. stomia[a]									+	O	B	lwP
	Ophiocara porocephala[♦,d]			R	R		+				E	B	lwP
	Oxyurichthys ophthalmonema[d]	A	C	C	A	A	+	+		+	E	B	IP
	O. papuensis[♦,d]	O		C	O	C	+		+	+	E	B	IP
	Parachaeturichthys polynema[d]	R			R		+				O	B	lwP
	Periophthalmus cantonensis[a,d]					R	+	+	+	+	E	B	lwP
	Prionobutis koilomatodon[a]								+		O	B	lwP
	Rhinogobius maculafasciatus[d]								+	+	E	B	lwP
	Scartelaos gigas[♦,d]	R					+				O	B	TC
	S. viridis[♦,d]					R	+	+			O	B	IP
	Sciyopterus japonicus[a]									+	O	B	lwP
	Taenioides cirratus[♦,a,d]	O	R	R		R	+	+	+	+	E	B	IP
	Tridentiger nudicervicus[d]								+		E	B	lwP
	Trypauchen microcephalus[♦,d]	R	R	R			+				E	B	lwP
	T. vagina[d]	C	O	C	C		+				E	B	lwP
	Yongeichthys caninus[a,d]	A	C	C	A	A	+	+	+		E	B	WP
	Y. criniger[a,d]	C		C	O	A	+	+	+	+	E	B	IP
Grammistidae	*Grammistes sexlineatus*[d]	R	R				+		+		MS	BP	IP
Haemulidae	*Plectorhinchus cinctus*[b,d]	R			R		+	+	+		MS	BP	JsC
	P. diagrammus[♦,d]	R					+				MS	BP	JsC
	P. lineatus[♦,d]	R	R				+				MS	BP	JsC
	P. nigrus[♦,d]			R			+				MS	BP	JsC
	P. pictus[d]	R			R		+				MS	BP	IP
	Pomadasys hasta[b]							+	+		MS	BP	JsC
	P. kakaan[b,d]	O	O	O	O	O	+	+		+	MS	BP	IP
	P. maculatus[b,d]			R	R		+			+	MS	BP	IP
Hemiramphidae	*Hyporhamphus dussumieri*[d]	R			R		+		+		MS	S	IP
	H. gernaerti[d]								+		MS	S	IP
	H. intermedius[♦,d]		O			O	+				MS	S	JC
	Zenarchopterus dunckeri[♦,d]					C	+				O	S	IP
Holocentridae	*Myripristis randalli*[♦,d]				R		+				MS	BP	lwP
	Sargocentron praslin[♦,d]	R			R		+				MS	BP	lwP
Kuhliidae[♦]	*Kuhlia mugil*[d]								+		O	BP	lwP
Kyphosidae	*Kyphosus biggibus*[♦,d]	R		R			+				MS	P	IP
	K. cinerascens[b]								+		MS	P	IP
	Microcanthus strigatus[♦,d]	R		R			+				MS	P	IP
Labridae	*Cheilinus chlorurus*[♦,d]	R					+				MS	BP	lwP
	Halichoeres argus[d]	C					+		+		MS	BP	WP
	H. dussumieri[♦,d]	R			R		+				MS	BP	WP
	H. leparensis[♦,d]	R					+				MS	BP	WP
Leiognathidae	*Gazza achlamys*[d]				R		+				O	BP	lwP
	G. minuta[d]	R	R				+		+		O	BP	IP
	Leiognathus berbis[a,d]	O			O	R	+	+	+		O	BP	JsC
	L. brevirostris[a,d]	A	C	C	C	O	+		+	+	O	BP	WP

Table 1. (Cont.)

Family	Species	SL	CK	TW	RM	ST	PS	TS	TN	KP	LC	LH	G
	L. equulus[a,d]	A	C	A	A	C	+		+	+	O	BP	IwP
	L. lineolatus[♦,a,d]			R			+	+	+		O	BP	IwP
	L. nuchalis[a,d]							+			O	BP	IwP
	L. splendens[a,d]	A	A	A	A	A	+		+	+	O	BP	IwP
	Secutor insidiator[a,d]			R			+				O	BP	IwP
	S. ruconius[a,d]	O	O	C	C	C	+		+	+	O	BP	IwP
Lethrinidae	*Lethrinus lentjan*[♦,d]		R				+				MS	BP	IwP
	L. miniatus[♦,d]		R				+				MS	BP	IwP
	L. nebulosus[d]	R					+				MS	BP	IwP
Lobotidae	*Lobotes surinamensis*[d]	R		R		R	+				MS	BP	C
Lutjanidae	*Lutjanus argentimaculatus*[a,d]	O	O	R	O	O	+	+	+	+	MS	BP	IwP
	L. erythropterus[d]				R		+				MS	BP	IwP
	L. fulviflamma[d]	R	R				+		+	+	MS	BP	IwP
	L. fulvus[d]	R	R		R		+				MS	BP	IwP
	L. monostigma[d]	R					+				MS	BP	IwP
	L. notatus[♦,d]				R		+				MS	BP	IwP
	L. rivulatus[d]	R			R		+				MS	BP	IwP
	L. russelli[d]	C	O	O	O		+	+		+	MS	BP	IwP
Megalopidae	*Megalops cyprinoides*[b,d]	C	C		C	C	+	+		+	MS	P	IP
Menidae	*Mene maculata*[a,d]		R				+				MS	BP	IwP
Monacanthidae[♦]	*Aluterus scriptus*[♦,d]	R		R			+				MS	BP	C
	Chaetodermis penicilligerus[♦,d]	R					+				MS	BP	IwP
	Monacanthus chinensis[♦,d]	R					+				MS	BP	IwP
Monodactylidae	*Monodactylus argenteus*[d]	O			O	O	+		+		O	BP	IwP
Mugilidae	*Liza affinis*[♦,d,d]	O		O	O	O	+	+	+	+	O	B	IwP
	L. macrolepis[c,d]	A	A	A	A	A	+	+	+	+	E	B	IwP
	L. subviridis[♦,d]	R				R	+		+	+	E	B	IwP
	Mugil cephalus[b,d]	O	O	C	C	O	+	+	+	+	E	B	C
	Valamugil cunnesius[♦,c,d]	C	O	O	C	O	+		+	+	E	B	IwP
Mullidae	*Parupeneus multifasciatus*[d]	R					+				MS	BP	IP
	Upeneus tragula[a,d]	O	R		O		+		+		MS	BP	IP
	U. sulphureus[a,d]								+		MS	BP	IP
	U. vittatus[a,d]	O			O		+				MS	BP	IwP
Muraenesocidae	*Muraenesox bagio*[d]			O			+		+	+	MS	P	IP
	M. cinereus[d]	R	R	R	R		+				MS	P	IP
	M. mcropterus[d]								+		O	B	IP
Muraenidae	*Gymnothorax favagineus*[a]								+		MS	B	IP
	Gymnothorax fimbriatus[♦,d]				R		+				MS	B	IP
	G. hepaticus[♦,d]	R			R		+				MS	B	IP
	G. pseudothyrsoideus[a]								+		MS	B	IP
	Strophidon sathete[a]								+		MS	B	IP
Nemipteridae	*Nemipterus peronii*[d]	R	R				+				MS	BP	IwP
	Scolopsis vosmeri[d]	R					+				MS	BP	IP
Nomeidae[♦]	*Cubiceps squamiceps*[♦,d]					R	+				MS	BP	IP
Ophichthidae	*Ophichthus apicalis*[♦,d]				R		+			+	O	B	IP
	Pisodonphis cancrivorus[d]								+		O	B	IP
Pempheridae	*Pempheris oualensis*[d]	R	R				+				MS	BP	IP
Percichthyidae	*Lateolabrax japonicus*[d]		R		R		+	+	+		O	P	JsC
Percophidae	*Bembrops caudimacula*[♦,d]					R	+				MS	BP	JsC
Platycephalidae	*Cociella crocodila*[a,d]	R			O	O	+				MS	B	IwP
	Grammoplites scaber[a,d]	O				O	+		+		MS	B	IwP
	Inegocia japonica[a,d]	O	O		C	C	+				MS	B	JC
	Platycephalus indicus[a,d]	A	C	C	A	A	+		+	+	MS	B	IP
	Suggrundus meerdervoorti[a,d]								+		MS	B	IP
Plotosidae	*Plotosus lineatus*[a,d]	O	R		R		+	+	+		O	P	IwP
Poeciliidae[♦]	*Gambusia affinis*[♦,c,d]								+	+	F	BP	IP
	Poecilia velifera[♦,c,d]		O	O	C	A	+		+	+	F	BP	IP
Polynemidae	*Eleutheronema tetradactylum*[b]		R	R			+	+			S	S	WP
	Polydactylus sextarius[b]							+			S	S	WP
Pomacanthidae	*Pomacanthus semicirculatus*[b]	R					+				S	P	IwP

Table 1. (Cont.)

Family	Species	SL	CK	TW	RM	ST	PS	TS	TN	KP	LC	LH	G
	P. sexstriatus♦,d	R					+				S	P	lwP
Pomacentridae	*Abudefduf bengalensis*d	O			R		+	+			MS	BP	lwP
	*A. sordidus*d	O		R			+				MS	BP	IP
	*A. sexfasciatus*d		R				+				MS	BP	lwP
	*A. vaigiensis*d	O	O	R	R		+		+		MS	BP	IP
	*Stegastes fasciolatus*d								+		MS	BP	IP
	S. insularis♦,d	R					+				MS	BP	IP
Rachycentridae	*Rachycentron canadus*d		R				+				MS	BP	C
Scaridae	*Leptoscarus vaigiensis*♦,d	R					+				MS	BP	IP
	*Scarus ghobban*d	O					+				MS	BP	IpP
Scatophagidae	*Scatophagus argus*d	C	C	C	C	C	+	+	+		E	BP	IP
Sciaenidae	*Argyrosomus japonicus*a							+			O	BP	lwP
	*Johnius belengerii*a,d	R			R		+		+		O	BP	lwP
	J. sina♦,a,d				R		+	+	+	+	O	BP	lwP
	*Nibea albiflora*a							+			O	BP	lwP
	*N. semifasciata*d	R					+				O	BP	JC
	*Otolithes ruber*a								+		O	BP	lwP
	Pennahia argentata♦,d					R	+				O	BP	JC
Scombridae	*Scomber japonicus*b	R					+				MS	S	C
Scorpaenidae	*Dendrochirus zebra*d	R					+				MS	B	IP
	Parascorpaena picta♦,d	R					+				MS	B	IP
	Pterois antennata♦,d	R					+				MS	B	IP
	*Scorpaena diabolis*d	R					+				MS	B	IP
	*S. neglecta*a,d	R					+				MS	B	JT
Serranidae	*Epinephelus coiodes*d								+	+	O	BP	lwP
	E. lanceolatus♦,d				R		+				O	BP	lwP
	*E. tauvina*d	O	O	O	O		+				O	BP	lwP
Siganidae	*Siganus fuscescens*b,d	O	O				+		+		MS	BP	lwP
	*S. guttatus*b,d	C	O	C	C	O	+				MS	BP	IP
Sillaginidae	*Sillago asiatica*d							+			O	BP	IP
	*S. sihama*d	A	A	A	A	A	+	+	+	+	O	BP	lpP
Soleidae	*Solea ovata*d	R	R				+		+		MS	B	WP
Sparidae	*Acanthopagrus australis*♦,b,d	R					+		+		O	BP	lwP
	*A. berda*b,d	O	O		O		+		+	+	O	BP	IP
	*A. latus*b,d	O	R	O	O		+	+	+	+	O	BP	lwP
	*A. schlegeli*b,d	C	C	C	C	C	+	+	+		O	BP	JeC
	*Sparus sarba*b,d				R		+		+		O	BP	lwP
Sphyraenidae	*Sphyraena barracuda*d	R					+				O	P	C
	*S. jello*d	O	R	R	O	O	+				O	P	lwP
	*S. putnamiae*d								+		O	P	lwP
Syngnathidae	*Hippichthys cyanospilus*♦,d			R			+				O	BP	lwP
	H. spicifer♦,d					R	+	+			O	BP	lwP
	*Microphis manadensis*a									+	O	BP	lwP
Synodontidae	*Saurida elongatus*d			R			+	+			MS	BP	JC
	*S. gracilis*d	R	R		R		+				MS	BP	IP
	*S. nebulosa*d									+	MS	BP	IP
Tetraodontidae	*Arothron hispidus*d	C		O	C	C	+		+	+	O	BP	IpP
	A. immaculatus♦,d				R		+				O	BP	lwP
	*A. manilensis*d	R		R	R		+		+	+	O	BP	lwP
	*Chelondon patoca*d	C	O	C	C	C	+			+	O	BP	lwP
	*Takifugu niphobles*d	C	R		O		+	+	+		O	BP	JT
	*T. poecilonotus*d								+		O	BP	JT
Teraponidae	*Pelatus quadrilineatus*b,d	C	C	O	C	O	+	+	+	+	E	BP	lwP
	*Terapon jarbua*b,d	A	C	A	C	C	+	+	+	+	E	BP	lwP
Trichiuridae	*Trichiurus lepturus*b,d		R				+		+		MS	B	C
Triacanthidae	*Triacanthus biaculeatus*d	R	R				+		+		MS	BP	lwP
Zanclidae	*Zanclus cornutus*d	R					+				MS	BP	lpP
	Total no. of species	176	90	93	124	85	244	63	123	74			

For abbreviations of localities see text; the frequency occurrences are denoted as: A, abundant; C, common; O, occassional; R, rare. Fishing gear: a, bottom trawler; b, gill net; c, cast net; d, fyke net. +, present investigation; ♦, not recorded by Shao et al. (1993); MS, marine straggler; O, marine estuarine opportunist; E, estuarine; C, catadromous; F, freshwater; S, surface; P, pelagic; B, benthic; BP, bentho-pelagic.

Scorpaenidae, Ephippidae, Gerredidae, Labridae, Platycephalidae, Pomacentridae, Sparidae, and Tetraodontidae. Table 2 lists the 5 most dominant families and their ranks, and compares them with those of estuaries in the northern (TS) and southern (TN, KP) parts of Taiwan. Except for the top family of Gobiidae which has the same rank in all areas, the rank orders of the other dominant families are very different, especially for those pelagic or soft bottom-associated families like the Carangidae, Clupeidae, Apogonidae, Bothidae, Mugilidae, and Platycephalidae.

The most abundant species in the southwestern estuaries are the estuarine species: *Ambassis urotaenia, Glossogobius olivaceus, Oxyurichthys opthalmonema, Yongeichthys caninus, Liza macrolepis*, and *Scatophagus argus*; the marine estuarine-opportunists: *Nematalosa come, Gerres filamentosus, Leiognathus brevirostris, L. equulus, L. splendens, Sillago sihama, Acanthopagrus schlegeli*, and *Terapon jarbua*, as well as the marine straggler species: *Scomberoides tol* and *Platycephalus indicus*.

Among the total number of 244 species obtained during the present study, 10 families and 111 species were newly added to the fish fauna of the west coast of Taiwan. Of these, 5 are new records for Taiwan: *Ambassis commersoni, A. interruptus*, and *A. miops* of Ambassidae, *Zenarchopterus dunckeri* of Hemiramphidae, and *Epinephelus lanceolatus* of Serranidae (Figs. 3-7). These results render the fish fauna and geographical distributional database in Taiwan more complete.

With regard to life cycles, fishes collected throughout the estuarine areas comprised 208 marine species, of which 124 were marine stragglers (50.8%), 84 were marine estuarine-opportunists (34.4%), 29 estuarine species (12.3%), 6 freshwater species (2.4%), and 1 catadromous species (Table 1). Within each region of the estuary, the marine stragglers were the most speciose group in the estuaries SL (55.7%) and CK (49%), but were replaced by estuarine opportunists at TW (27%) and ST (26%). Both types are about equal at RM (53%). In this investigation, we also recorded a number of economic species which were mostly in young stages, such as *Acanthopagrus schlegeli, Sillago sihama, Caranx sexfasciatus*, and *C. ignobilis*, etc. (Table 3). This result suggests that these estuaries are utilized by marine species and estuarine opportunists for nursery, feeding, and sheltering and by euryhaline coastal and estuarine species for residence. Ansari et al. (1995) reached a similar conclusion.

Marine teleosts are typically the most abundant group of fishes reported from estuaries and bays (Day et al. 1981, Haedrich 1983). Although those species which regularly enter estuaries in relatively large numbers have often been included in a category termed 'estuarine-dependent' (Claridge et al. 1986), Loneragan et al. (1989) observed that these species are also frequently abundant in Australian estuaries suggesting that they are more appropriately called 'estuarine opportunists'. There are also transient species which stay in these estuaries for a short time. Table 4 lists the number of species of each life habit category at 8 different estuaries along the west coast of Taiwan. Within each region of the estuary, the bentho-pelagic species were the most speciose category, then the benthic was the next in all estuarine areas. This result may reflect the impor-

Table 2. The most speciose families of fishes occurring in 8 estuaries along the western coast of Taiwan. Only the top 5 families in each estuary were taken into account and ranked in parenthesis. For abbreviations of localities see text. The dash - indicates that a family was not caught

Family	SL	CK	TW	RM	ST	TN	KP	TS
Gobiidae	23 (1)	13 (1)	19 (1)	21 (1)	21 (1)	21 (1)	22 (1)	14 (1)
Carangidae	12 (2)	2 (9)	5 (3)	8 (2)	4 (4)	9 (2)	2 (6)	4 (2)
Clupeidae	11 (3)	5 (2)	3 (6)	7 (3)	4 (4)	3 (7)	1	2 (6)
Apogoniade	8 (4)	2 (9)	2	3	2 (7)	2	1	–
Leiognathidae	6 (5)	5 (2)	6 (2)	6 (4)	5 (2)	7 (3)	4 (3)	3 (3)
Lutjanidae	6 (6)	4 (4)	2	6 (5)	1	2	3 (4)	2 (6)
Bothidae	5 (7)	4 (4)	5 (3)	2	1	1	1	1
Haemulidae	5 (8)	2 (9)	3 (6)	4 (7)	1	2	2 (6)	3 (3)
Mugilidae	5 (9)	3 (6)	4 (5)	4 (7)	5 (2)	5 (4)	5 (2)	3 (3)
Platycephalidae	4	2 (9)	1	3	4 (4)	2	1	–
Sparidae	4	3 (6)	2	4 (7)	1	5 (4)	2 (6)	2 (6)
Tetraodontidae	4	2 (9)	3 (6)	5 (6)	2	4 (6)	3 (4)	1

tance of sediments in addition to the salinity factor. Nevertheless, the result may be simply because there are more benthic than pelagic species in the marine environment. According to the data of zoogeographical distribution in table 1, in general, most fish species in estuarine areas were widely distributed, including 207 species of IwP, IP, WP, C, and IpP which comprise 84.2% of the total fish species. Only 27 species or 10.9% had a narrow distribution of JeC, JsC, and JT. These figures are similar to those of Shao et al. (1993) since the geographical location of these 5 estuaries are within the range of the previous study region.

Figure 2 is an UPGMA dendrogram of the 8 estuaries along the western coast. The 5 estuaries near the Tsengwen River are grouped together first, then they group with more southerly estuaries at Tainan and Kaoshiung. The Tanshui estuary in northern Taiwan joins last. This result is not only quite consistent with the geographical distances among these sites, but also agrees with the results of bipartite fish communities between northern and southern Taiwan obtained earlier by analyzing fish faunistic data from 6 mangrove areas along the western coast (Kuo et al. 1999), and from coral reef fish species (Shao et al. 1999).

Changes of fish community structure in different estuaries occur in response to spatial and temporal variations of abiotic environmental factors, such as salinity gradients, current velocity differences, water temperature fluctuations, and pollution (Thiel et al. 1995). Our results show that temperature determined by the current distributional pattern is the most important factor, because the low temperature of the China continental coastal current will influence the extreme northwestern part of Taiwan in the winter, and a branch of the warm Kuroshio current can only penetrate up to Chiayi, approximately 40 km to the north of Tsengwen estuary, through the Penghu trench (Wang and Chern 1989). Thus, the limiting factor of water temperature inhibits the migration of southern fish species to northern waters.

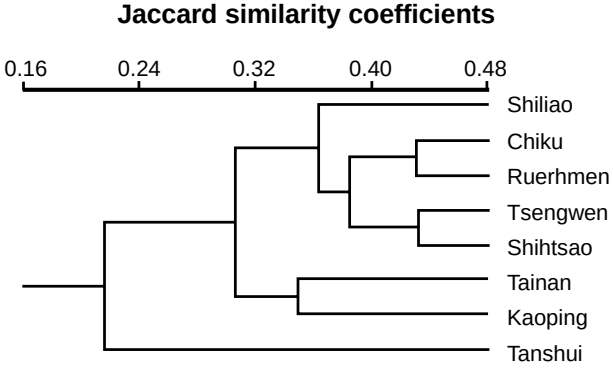

Fig. 2. UPGMA phenogram for comparing fish assemblages among 8 estuarine zones along the west coast of Taiwan.

Table 3. Number of species (*n*) and percentage contributions (%) of life-cycle categories in 8 estuaries along the western coast of Taiwan. For abbreviation of estuaries, see text

	SL		CK		TW		RM		ST		TN		KP		TS	
Life-cycle category	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Marine straggler	99	56	44	49	33	27	49	53	22	26	44	36	16	21	19	30
Estuarine opportunist	54	31	25	28	33	27	46	49	27	32	52	42	30	40	29	46
Estuarine	22	12	18	20	22	18	26	28	32	38	20	16	21	28	15	24
Catadromous					1	0.8	1	1.1			2	1.6	2	2.7		
Freshwater	1	0.6	3	3.3	4	3.2	2	2.2	4	4.7	5	4.1	5	6.7		
Total	176		90		93		124		85		123		74		63	

Table 4. Number of species (*n*) and percentage contributions (%) of their life habitat categories in 8 estuaries along the western coast of Taiwan. For abbreviation of estuaries, see text

	SL		CK		TW		RM		ST		TN		KP		TS	
Life habitat category	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Pelagic	23	13.1	8	8.9	12	12.9	14	11	7	8.1	16	13	5	6.7	8	12.7
Surface	17	9.7	10	11.1	9	9.7	13	10	10	12	8	6.5	3	4.1	6	9.5
Bentho-pelagic	84	47.7	45	50	38	40.9	59	48	35	40.7	55	44.7	33	44.6	29	46
Benthic	52	29.5	27	30	34	36.6	38	31	34	39.5	44	35.8	33	44.6	20	31.8
Total	176		90		93		124		86		123		74		63	

The diagnostic characteristics of the 5 species of new record are described below.

Family Ambassidae
Ambassis miops Günther, 1871
(Fig. 3)

Ambassis miops Günther, 1871: 655 (Rarotonga, Cook Is.); Munro 1967: 262; Masuda et al. 1984: 123.
Ambassis lafa Jordan and Seale, 1905: 341.

Material: One specimen ASIZP 057562, 58.0 mm SL., 24 Apr. 1995, Shiliao.

Diagnosis: Dorsal rays VII-1,9; anal rays III,9; tubed lateral line scales 30; gill rakers 36. Body depth 2.67; head length 3.2; 2nd dorsal length 4.36 in SL. Snout length 4.29; orbit diameter 3.35; interorbit width 3.75; caudal peduncle depth 3.00; pectoral fin length 1.50; pelvic fin length 2.04 in head length. Supraorbital ridge ending posteriorly to 1st spine, suborbital margin serrated, preorbital margin serrated. Preopercular margin serrated below, entire behind and ridge similar with enlarged serrate angle. Interoperculum ends in 1 sharp serrate cheek scale in 2 rows. Lateral line continuous or interrupted by 1-2 scales on one or both sides. Color when fresh, body generally brownish-yellow with silvery mid-lateral band. Snout and chin with dusky mark. Membrane between 2nd and 3rd spines of dorsal blackish. Dark streak along caudal lobes.

Remarks: Resembles *A. urotaenia*, but differs in having a large eye, and gently rounded snout. Eye diameter over 30% and interorbital width over 20% of head length.

Ambassis interruptus Bleeker, 1852
(Fig. 4)

Ambassis interruptus Bleeker, 1852: 696 (Wahai, Ceram; Batavia, Java); Fowler and Bean 1930: 155; Munro 1967: 262; Masuda et al. 1984: 123.
Ambassis macracanthus Day, 1870: 681.
Priopis interruptus Jordan and Seale, 1907: 18.

Material: One specimen; ASIZP 057561, 43 mm SL., 30 Mar. 1995, Shihtsao.

Diagnosis: Dorsal rays VII-1,9; anal rays III,9; tubed lateral line scales 26; gill rakers 31. Body depth 2.32; head length 3.40; 2nd dorsal length 4.43 in SL. Snout length 3.75; orbit diameter 2.73; interorbital width 3.75; caudal peduncle depth 2.14; pectoral fin length 1.2; pelvic fin length 1.67 in head length. The maxilla reaching below front edge of orbit; teeth villiform and small, in narrow bands in jaws, on vomer and palatines and narrow medium row or band on tongue; interorbital very slightly convex; single postero-supraorbital spine, none below; preorbital edge with 6 or 7 spines, ridge with a few weaker serrae; lower edge and ridge of preopercle serrate, upper ridge and edge entire, also slightly enlarged spine at angle of ridge. The 2nd spine of 1st dorsal fin strong and very long. Lateral line interrupted. Ground color on body sides and lower surface with bright silvery white tint when fresh. Median diffuse silvery-white band from eye to caudal. Fins all pale or with grayish dusting terminally on verticals. Membrane between 2nd and 3rd dorsal spines dusky to blackish.

Ambassis commersoni Cuvier and Valenciennes, 1828
(Fig. 5)

Ambassis commersoni Cuvier and Valenciennes, 1828: 176 (Mahe, Java); Day 1878: 52; Weber and de Beaufort 1929: 23; Munro 1967: 263; Masuda et al. 1984: 123; Smith and Heemstra 1986: 507.
Ambassis batjanensis Bleeker, 1855: 196; Fowler and Bean 1930: 161.
Ambassis safgha Fowler, 1927: 136.

Materials: Three specimens; ASIZP 057560, 057568, 56.8-65.2 mm SL, 24 Apr. 1995, Tsengwen R. estuary; ASIZP 057569, 59.5 mm SL, 7 Oct. 1995, Ruerhmen R. estuary.

Diagnosis: Dorsal rays VII-1,9-10; anal rays III, 9; tubed lateral line scales 27-29; gill rakers 28-31, Body depth 2.81-3.10; head length 3.51-3.80; 2nd dorsal length 4.47-4.82 in SL; snout length 4.67-4. 92; orbit diameter 2.84-2.92; interorbital width 2.33-2.46; caudal peduncle depth 2.00-2.26; pectoral fin length 1.41-1.65; pelvic fin length 1.75-1.85 in head length. Dorsal and anal profiles about equally convex. The maxilla reaching below the first 1/3 of orbit. Preorbital margin serrated. Preorbital ridge with a few weak serrae posteriorly. Preopercular ridge serrated below with larger serrae at angle, entire behind. Interoperculum ends in 1 large serrae. Third anal spine slightly longer than 2nd. Lateral line often with slight interruption below end of spinous dorsal base. Membrane between 2nd and 3rd spines of dorsal blackish. A dark stripe along caudal lobes. Yellowish with silver reflections and a burnished silver mid-lateral band when fresh.

Family Serranidae
Epinephelus lanceolatus (Bloch, 1790)
(Fig. 6)

Holocentrus lanceolatus Bloch, 1790: 92 (East Indies) (not seen).
Promicrops lanceolatus Fowler and Bean, 1930: 297-299.
Epinephelus lanceolatus Randall and Heemstra, 1991: 174-176; Heemstra and Randall 1993: 174-175.

Material: One specimen; ASIZP 058331; 134.4

Fig. 3. *Ambassis miops*, SL = 58 mm.

Fig. 4. *Ambassis interruptus*, SL = 43 mm.

Fig. 5. *Ambassis commersoni*, SL = 59.0 mm.

mm SL, 7 Oct. 1995, Ruerhmen R. estuary.

Diagnosis: D. XI,15; A. III,8; P. 19; LL. 57; GR. 9+16; body depth 2.8 in SL. This specimen is a juvenile. Body color yellow with a broad black bar in pectoral region extending into most of spinous portion of dorsal fin and anteriorly in a band at midside to large irregular black areas on head; a 2nd black bar extending from soft portion of dorsal fin across body onto anal fin, and a 3rd black bar posteriorly on caudal peduncle. It is commonly seen in caves on coral reefs and around wrecks; and adults as well as juveniles are found in estuaries.

Fig. 6. *Epinephelus lanceolatus*, SL = 134.4 mm.

Fig. 7. *Zenarchopterus dunckeri*, SL = 79.0 mm.

Family Hemiramphidae
Zenarchopterus dunckeri Mohr, 1926
(Fig. 7)

Zenarchopterus dunckeri Mohr, 1926: 255 (not seen).
Zenarchopterus dunckeri: Fowler 1928; Munro, 1967: 113; Masuda et al. 1984: 80.

Materials: Three specimens; ASIZP 057296; 71.3-94 mm SL, 26 Dec. 1994, Shihtsao mangrove swamp.

Diagnosis: D. 10-12; A. 11-12; P. 9-10; LL. 37-38; upper jaws as broad as long, caudal fin truncate or rounded. Adult males with 4th dorsal ray filamentous and 6th anal ray enlarged. Dark brown above, paler below. A broad band of dark dots below stripe. Small species, inhabiting brackish waters.

Acknowledgments: We are grateful to the National Science Council of the Republic of China (Grant NSC 85-2621-P-001-001), for funding a research project in the estuary of the Tsengwen River. We are also grateful for much assistance from the Fish Ecology and Evolution Laboratory, Institute of Zoology, Academia Sinica for help in identifying some fishes and Mr. Chi-Liang Su, Shun-Ching Yang, and Ms. N. J. Chen for their help with field work. Thanks are extended to Wen-Hsien Hsu for assistance with the map.

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曾文溪河口附近沿岸河口域之魚種組成 兼記五種臺灣新記錄魚種

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本文報導自 1994 年 10 月至 1997 年 7 月期間，在臺灣曾文溪與其附近共五處河口地區以不同漁具所調查到之魚類。文中除列出其魚種學名外，並包括各種魚類的生活史，習性和世界地理分布。研究期間，共採獲 80 科 244 種沿岸魚類，其中以鰕虎魚科 (Gobiidae) 的種數最多 (34 種， 13.9%)；其次為鰺科 (Carangidae)(15 種， 6.1%)，天竺鯛科 (Apogonidae) 及鯡科 (Clupeidae) (11 種， 4.5%) 次之。在所有魚種中，有將近半數，即 10 科、 111 種在過去西海岸的魚種組成文獻中並未記錄到，其中包括五種係臺灣尚未記錄過的種類，這五種分別是雙邊魚科的少棘雙邊魚 (*Ambassis miops*)、斷線雙邊魚 (*A. interruptus*)、康氏雙邊魚 (*A. commersonii*) 及鮨科之鞍帶石斑魚 (*Epinephelus lanceolatus*)、及鰨科的董氏異鰨鰨 (*Zenarchopterus dunckeri*)。文中亦附有此五種之標本照片。在生活史方面，共有 208 種海水性的魚種在此河口地區出現過，其中 124 種為純海水性種；84 種為海水－河口性種， 29 種為河口性種， 6 種為淡水性種， 1 種為降海性種。比較本地區與臺灣北部、南部主要河口地區魚相之間相似性的結果時，發現臺灣西海岸的河口魚相也有南北不同的差異，且隨地理位置及距離，依次排列。即曾文溪附近五處河口自成一群，與更南部之高屏溪口、鹽水及二仁溪口相近，而與北部淡水河口之魚相最遠。

關鍵詞：魚相，地理分布，生活史，名錄，曾文溪河口。

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