

Checklist of Reef Fishes from Taiping Island (Itu Aba Island), Spratly Islands, South China Sea¹

JENG-PING CHEN,² RONG-QUEN JAN,² AND KWANG-TSAO SHAO^{2,3}

ABSTRACT: A total of 49 families and 399 species of fishes was recorded from the reef area around Taiping Island (Itu Aba Island) in the Spratlys (Nansha Islands), located at 114° 21'–114° 23' E, 10° 22'–10° 23' N. Data were collected by underwater observation, specimen identification, and photography during our survey of 19–23 April 1994. A checklist, including previous records, of 50 families and 421 species was compiled. If all midwater pelagic species are taken into account, the number of fish species occurring at Taiping Island is well over 450, a figure below that anticipated for a reef island located close to the equator and Indo-Australian diversity center. Limited reef area and recent reef degradation may be the principal causes of the disparity. Czekanowski similarities for eight regions around Taiwan and in the South China Sea show that the reef fish fauna of Taiping Island most closely resembles that of Green Island, then Orchid Island, Tungsha (Pratas Island), Hsiao-liu-chiu, southern Taiwan, Penghu, and northern Taiwan in that order. The fish fauna of the western coast of Taiwan, which has a predominantly sandy environment, is most different from that of Taiping. The results suggest that the fish fauna of Taiping Island originated by larval dispersal from the Kuroshio Current as is probably the case for southern Taiwan and its adjacent islets. However, 42 species found in this survey, of which 11 are probably undescribed, are not known from the waters around Taiwan. Most of the fish species (95.7%) at Taiping Island are widely distributed, particularly in the Indo-Pacific Region. Fewer than 20 species are restricted in their distribution.

TAIPIPING ISLAND (Itu Aba Island), located at 114° 21'–114° 23' E, 10° 22'–10° 23' N, is one of the southernmost islands in the South China Sea and is the largest reef island among the 104 islands, reefs, cays, and banks commonly called the Spratly Islands or Nansha Islands, which stretch 810 km from north to south and 900 km from east to west. Land area of Taiping Island, 1,500 km away from Taiwan, is about 489,600 m². Because of the remote location, its marine resources have not previously been fully investigated, explored, or conserved. In recent years, however, scientific investigations have been encouraged and the Ministry of Interior, National Science Council, Council of Agriculture, and Kaohsiung City Council of Taiwan, Republic of China, have initiated several ecolog-

ical surveys in the South China Sea particularly in the areas of Tungsha (Pratas Island) and the Spratlys. In this report, our survey of the fishes at Taiping Island, which formed part of a joint ecological research project sponsored by the Council of Agriculture to Lee-Shing Fang, Director of the National Marine Biology Museum/Aquarium, is presented and serves primarily as an attempt to enhance the understanding of the biological resources in this marine region. The results may also contribute to increasing the distributional data base for fishes of the Indo-Pacific.

Information on the fishes in this region is scarce: 45 species of demersal reef fishes collected by handline were reported by Liu (1975); three reports (Wu 1981, Hsieh and Hong 1982, Chi 1989) stemming from marine environmental and biological surveys between 1980 and 1988 by the Taiwan Fishery Research Institute include checklists of primarily pelagic or economically

¹ Manuscript accepted 15 May 1996.

² Institute of Zoology, Academia Sinica, Taipei 115, Republic of China.

³ To whom reprint requests may be sent.

important deepwater fishes, although Wu's (1981) report included a few reef fishes. The more extensive surveys of Chang et al. (1981, 1982) reported 33 families and 173 species of reef fishes from their 1-week survey.

The validity of the fish species previously reported needs scrutiny. Some of the names listed by Chang et al. (1981) are synonyms, 13 species are unidentified, three species are dubious, and one is duplicated (Table 1), for a total of 156 valid species. Examination of the photographs illustrating Chang et al.'s (1982) book of the Spratlys fishes suggests several name changes: *Epinephelus* sp. and *Dampiera* sp. should read *E. spilotoceps* and *Pseudochromis fuscus*, respectively; the damselfish *Glyphidodontops* sp. may be an undescribed species; and the fishes identified as *Myripristis murdjan* and *Glyphidodontops biocellatus* appear to be *M. kuntzei* and *Hemiglyphidodon plagiometopton*, respectively. These changes bring the total number of valid species to 161.

Apart from the records from mainland China, there are very few records of the fishery resources in this area, and most of the fishes listed are offshore and commercial species. J. R. Chen and Wei (1987), for example, listed 64 families and 137 species of larval or juvenile fishes; Yang (1987) reported 30 families and 53 species; Hwang et al. (1991a) recorded 57 families and 108 species from a cruise in 1988; Li et al. (1991) listed 85 families and 174 species from the southwestern area of the Spratly Islands Shelf using a bottom trawler in 1990; and Z. Chen and Chen (1991) reported 97 families and 214 species in their zoogeographical studies based on information collected on the same trip. Hwang et al. (1991b) reviewed the marine fishes reported from previous studies of parts of mainland China, but among the 138 families and 558 species listed, only about 40 species are from shallow reef areas.

The Spratly Islands fall into the region of the highest diversity of reef-building corals in the world (Veron 1986), as well as the diversity center of fishes in the Indo-Australian Region. Thus the coral-reef fish fauna should be relatively large compared with the faunas north of Taiping Island.

MATERIALS AND METHODS

The study was made possible by a 15-day cruise, 19–23 April 1994, of the fishing training ship *Yu Shiun No. 2* of the Fishery Training Center, Council of Agriculture, Republic of China. Eleven stations with various physiographic features around the island were surveyed (Table 2, Figure 1). Seven subtidal stations were examined with scuba gear, and four intertidal or shallow-water stations by snorkel. Most fishes were identified by underwater observation supplemented with underwater photographs. Specimens of cryptic and/or other ambiguous species were collected by rotenone poisoning. They were deposited in the Museum of the Institute of Zoology, Academia Sinica (ASIZP).

The checklist (Appendix) includes our survey results along with earlier records. In addition to listing family and species names, literature citations, diving records, hand lining, comparative faunal records, guild types, and distributional records are noted. In the records of literature cited, only Chang et al. (1981) is listed because it is the only paper published in a scientific journal; Liu (1975) and Wu (1981) are excluded because their reports lack specific data on time and source, respectively. Specimens caught by hand line are specifically noted. Faunal records include references to species in Taiwan (Shen et al. 1990, Shao et al. 1993b) and adjacent islands, Penghu (Shao et al. 1993a), and Hsiao-liu-chiu (J. P. Chen et al. 1992) and Tungsha (J. P. Chen et al. 1994). Other records (for northern Taiwan, Lanyu, and Green Island) stem from unpublished data. Guild types include ecological characteristics from diurnal activity to spatial distribution, following Shen et al. (1990), J. P. Chen et al. (1992), and Shao et al. (1993a,b). Abbreviations for geographical distribution follow Myers (1991) and Shao et al. (1993a), except for reference to Indonesia or the South China Sea, which is denoted by "SC."

RESULTS AND DISCUSSION

A total of 49 families and 399 species was collected or observed during our survey at Taiping Island (Appendix). Number of species varied between stations: 157 species were found at

TABLE 1

UNIDENTIFIED SPECIES, DOUBTFUL SPECIES, AND SYNONYMS OF TAIPING ISLAND FISHES CITED IN CHANG ET AL. (1981)

FAMILY	NAME IN QUESTION	SUGGESTED CORRECTION
Acanthuridae	<i>Acanthurus sandviscens</i>	<i>Acanthurus triostegus</i>
Apogonidae	<i>Apogon robustus</i>	<i>Apogon cookii</i>
Blenniidae	<i>Cirripectes</i> sp.	?
	<i>Istiblennius</i> sp. A	?
	<i>Istiblennius</i> sp. B	?
	<i>Plagiotrimus townsendi</i>	?
Caesionidae	<i>Caesio xanthonotus</i>	<i>Caesio teres</i>
	<i>C. tile</i>	<i>Paracaesio tile</i>
	<i>C. diagramma</i>	<i>P. diagramma</i>
Cirrhitidae	<i>Cirrhitichthys serratus</i>	<i>Cirrhitichthys oxycephalus</i>
Holocentridae	<i>Adioryx spinosissimus</i>	<i>Sargocentron spinosissimus</i>
	<i>A. spinifer</i>	<i>S. spiniferum</i>
	<i>A. caudomaculatus</i>	<i>S. caudomaculatum</i>
	<i>A. lacteoguttatus</i>	<i>S. punctatissimum</i>
	<i>Flammeo sammara</i>	<i>Neoniphon sammara</i>
	<i>Myripristis murdjan</i>	<i>Myripristis kuntee</i>
	<i>Halichoeres centiquadrus</i>	<i>Halichoeres hortulanus</i>
	<i>H. kallochroma</i>	?
Labridae	<i>Hemipteronotus</i> sp.	?
	<i>Chelinus rhodochronus</i>	<i>Chelinus unifasciatus</i>
	<i>Parapercis polyophthalma</i>	<i>Parapercis hexophthalma</i>
Mugiloidae	<i>Parupeneus pleurospilus</i>	<i>Parupeneus heptacanthus</i>
Mullidae	<i>P. trifasciatus</i>	<i>P. multifasciatus</i>
	<i>Gymnothorax</i> sp.	?
Muraenidae	<i>Scolopsis cancellatus</i>	<i>Scolopsis lineatus</i>
Nemipteridae	<i>Ophichthus</i> sp.	?
Ophichthidae	<i>Dischistodus notoptthalmus</i>	<i>Dischistodus melanotus</i>
	<i>Glyphidodontops</i> sp.	<i>Chrysipterus</i> sp.
	<i>G. rex</i>	<i>C. rex</i>
	<i>G. cyaneus</i>	<i>C. cyaneus</i>
	<i>G. glaucus</i>	<i>C. glaucus</i>
	<i>G. leucopomus</i>	<i>C. leucopomus</i>
	<i>G. biocellatus</i>	<i>C. biocellatus</i>
	<i>Paraglyphidodon melas</i>	<i>Neoglyphidodon melas</i>
	<i>P. melanopus</i>	<i>N. nigroris</i>
	<i>P. behni</i>	<i>N. nigrosus</i>
	<i>Eupomacentrus nigricans</i>	<i>Stegastes nigricans</i>
	<i>Dampiera</i> sp.	<i>Pseudochromis fuscus</i>
	Pseudochromidae	<i>Scarus</i> sp. A
<i>Scarus</i> sp. B		?
<i>Scarus</i> sp. C		?
Scorpaenidae	<i>Scorpaena albobrunea</i>	<i>Sebastapistes cyanostigma</i>
	<i>Scorpaena</i> sp.	?
Serranidae	<i>Epinephelus megachir</i>	<i>Epinephelus quoyanus</i>
	<i>E. fario</i>	?
	<i>E. cometae</i>	<i>Epinephelus morrhua</i>
Tetraodontidae	<i>Epinephelus</i> sp.	<i>E. spilotoceps</i>
	<i>Tetraodon nigropunctatus</i>	<i>Arothron nigropunctatus</i>

station 67, an eastern subtidal station closely linked to the reef flat, and the most speciose station; 78 species were recorded at station 1 at the anchor area, the least speciose station. Species numbers seem to be related to station depth:

more species occurred at subtidal stations (78–157 at stations 1–7) than at intertidal stations (57–112 at stations 8–11). Comparison of species numbers at two stations located in the same area but at different depths seems to indicate

TABLE 2
SUBSTRATUM AND TOPOGRAPHY OF THE SURVEY STATIONS

STATION NO.	LOCATION	SURVEY DATA (1994)	DEPTH (m)	HABITAT
1	East of anchor ground	19 April PM	15–18	Reef flat with coral-pebbled pavement of sandy channels; algae growth everywhere
2	Southeastern side	20 April AM	2–23	Reef front to outer reef slope, slope 50–60° at depth 15–18 m then lessening to sandy bottom
3	Southwestern side	20 April PM	2–12	Reef flat with some raised ridges or boulders; surge channels larger in shallow area but smaller in deeper waters
4	Western side	21 April AM	6–35	Reef front (6–9 m) to almost vertical outer slope (32 m); some sand and rubble talus or patch reefs on the slope of more than 60°; at 42–45 m the bottom is flat
5	Northeastern side	22 April AM	9–42	Similar to station 4
6	Eastern side	22 April PM	6–35	Reef front (6 m) to outer slope, 70° and 25–32 m in depth, the depth shallower on south slope but deeper on north slope; consolidated limestone on lower part of slope to flat sandy bottom
7	Southeastern east side	23 April AM	6–42	Similar to stations 4 and 5 but a giant 12-m-wide channel on the reef flat; the depth at reef front can reach 12 m; dropoff from 12 m down to 38 m; small patch reefs in front of cliff
8	Old pier at southwestern side	19 April AM	0–15	From shallow reef flat on western side of a southward bridge (depth <2.5 m) to outer terrace 15 m deep
9	Western side	20 April AM	0–15	Shallow reef flat 400 m wide mixed with coral patches, pebbles, sea grasses, and <i>Acropora</i> thickets, from 2 to 15 m of terrace
10	Southeastern side	21 April AM	0–15	Shallow reef flat (<2.5-m depth) around the old bridge, down to 15 m of terrace
11	Northern side	22 April AM	0–10	Shallow reef flat from high-tide level to outer reef face; many large trenches on reef flat

higher diversity at deeper stations (for example, subtidal stations 4, 9, and 2 and intertidal station 10), but there was no difference in diversity at subtidal station 5 and intertidal station 11 located north of the island (Appendix).

The Checklist

Our observations, with those of Chang et al. (1981, 1982), enable us to record 50 families of fishes and 421 species at Taiping Island (Appendix), excluding nonreef fishes such as flying fishes (Exocoetidae) and needlefishes (Belontiidae). If pelagic fishes are included, the list would comprise more than 450 species. Of the fishes reported here, 42 species have not been recorded from the waters around Taiwan (Table 3): 11 are

probably undescribed species, 13 species were identified only by observation, and 18 species were identified by specimen examination. The undescribed species (Figures 2–12) include *Marorubra* sp., *Chrysiptera* sp. (also found from Tungsha Island and southern Taiwan by K.T.S.), *Amblyeleotris* sp. (also occurs in Indonesia), *Fusigobius* sp. (known from Japan and Indonesia), *Opistognathus* sp. (distributed in the Indo-Pacific), *Pseudoplesiops* sp., two species of *Xenisthmus*, *Pseudochromis* sp., and two species of *Trimma*. The remaining 31 identified species not reported from Taiwan include the following: 13 species identifications based on underwater observation, and five identified from photographs; four (*Hyperoglyphe japonica*, *Parupeneus heptacanthus*, *Dischistodus melanotus*, and

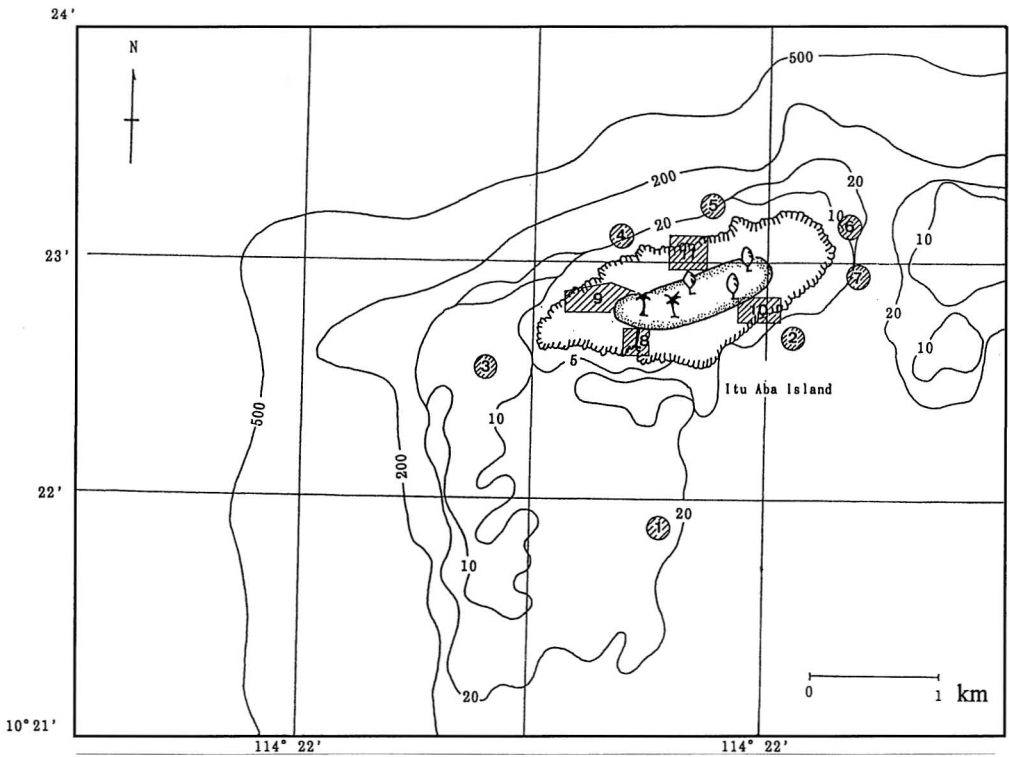
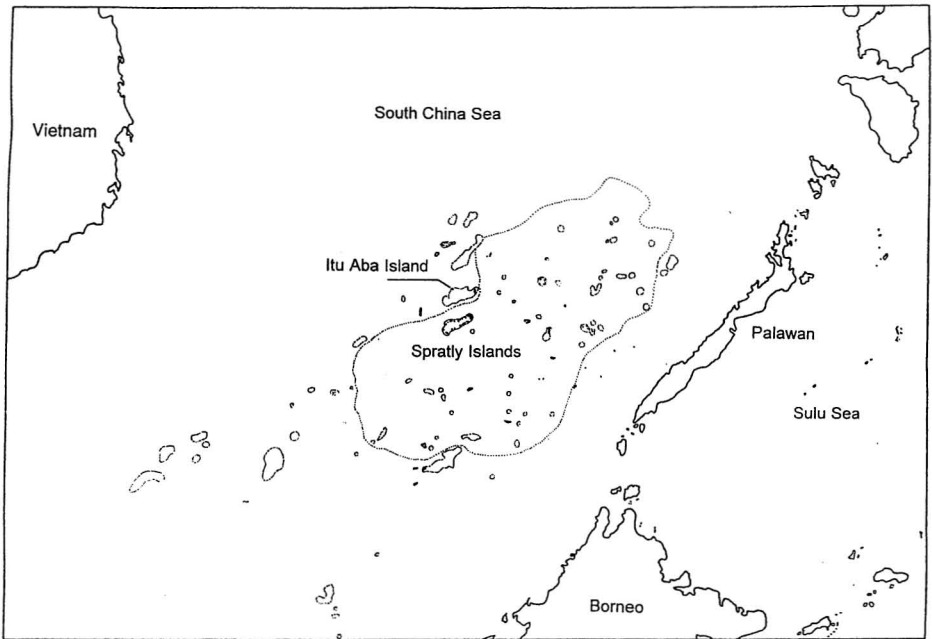


FIGURE 1 (Top) South China Sea, showing location of Taiping Island (Itu Aba Island) in the Spratly Islands. (Bottom) Taiping Island, showing the 11 diving investigation stations. Stations with circles were investigated by scuba diving, and those with squares (stations 8–11) by snorkeling.

TABLE 3
REEF FISHES FROM TAIPING ISLAND NOT RECORDED
FROM TAIWAN AND METHODS OF RECORD

FAMILY	SPECIES	RECORDS ^a
Blenniidae	<i>Ecsenius bathi</i>	F
	<i>Ecsenius melarchus</i>	S
	<i>Ecsenius stictus</i>	S
Bothidae	<i>Asterorhombus fijiensis</i>	F
Caesionidae	<i>Pterocaesio pisang</i>	P
	<i>Pterocaesio randalli</i>	P
Centrolophidae	<i>Hyperoglyphe japonica</i>	S*
Gobiidae	<i>Amblyeleotris randalli</i>	F
	<i>Amblyeleotris</i> sp.	F
	<i>Calumia godeffroyi</i>	F
	<i>Ctenogobiops tangaroai</i>	F
	<i>Eviota pellucida</i>	F
	<i>Eviota prasites</i>	F
	<i>Eviota cometa</i>	F
	<i>Fusigobius</i> sp.	F
	<i>Istigobius rigilius</i>	F
	<i>Trimma emeryi</i>	F
	<i>Trimma</i> sp. 1	F
	<i>Trimma</i> sp. 2	F
	<i>Valenciennea longipinnis</i>	S
Labridae	<i>Labropsis xanthonota</i>	F
	<i>Labroides pectoralis</i>	F
Lethrinidae	<i>Lethrinus atkinsoni</i>	S
Malacanthidae	<i>Hoplolatilus starcki</i>	F
Mullidae	<i>Parupeneus heptacanthus</i>	S
Opistognathidae	<i>Opistognathus</i> sp.	F
Pomacanthidae	<i>Centropyge shepardi</i>	S
Pomacentridae	<i>Amphiprion sandaracinos</i>	P
	<i>Chromis alpha</i>	S
	<i>Chrysiptera</i> sp.	F
	<i>Dischistodus melanotus</i>	P*
	<i>Hemiglyphidodon plagiometopon</i>	P*
Pseudochromidae	<i>Pseudochromis diadema</i>	F
	<i>Pseudochromis marshallensis</i>	F
	<i>Pseudoplesiops</i> sp. 1	F
	<i>Pseudoplesiops</i> sp. 2	F
Serranidae	<i>Epinephelus spilotoceps</i>	F
Syngnathidae	<i>Marorubra</i> sp.	F
	<i>Halicampus spinirostris</i>	F
Xenisthmidae	<i>Xenisthmus polyzonatus</i>	F
	<i>Xenisthmus</i> sp. 1	F
	<i>Xenisthmus</i> sp. 2	F

^a F, specimen collected; P, photo only; S, observation only; *, species cited in Chang et al. (1981).

Hemiglyphidodon plagiometopon) also reported by Chang et al. (1981); nine species that are fast swimmers and are difficult to catch (*Pterocaesio randalli*, *P. pisang*, *Chromis alpha*, and *Lethrinus atkinsoni*); rare species (*Ecsenius stictus*, *E. melarchus*, and *Valenciennea longipinnis*); and

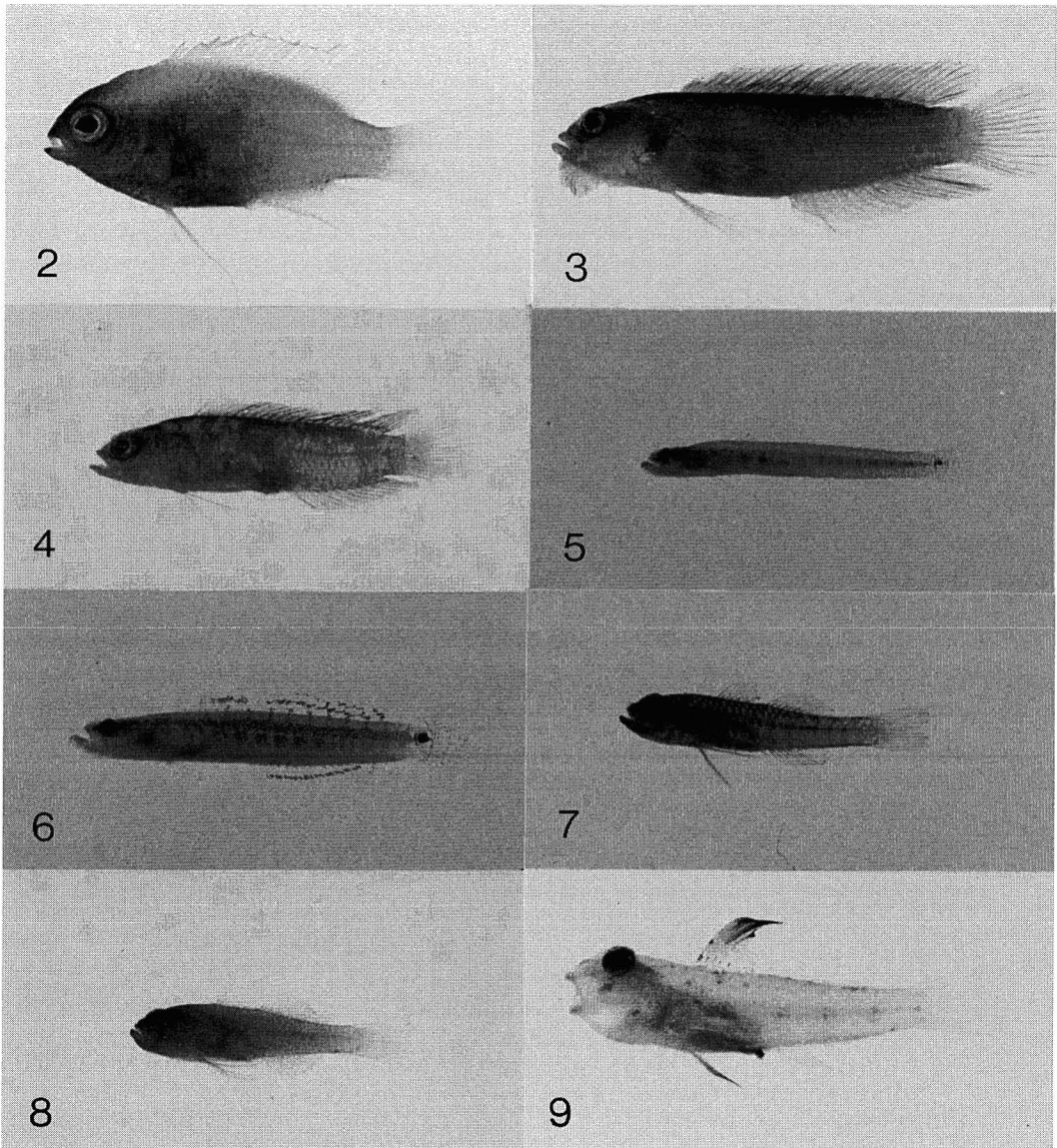
fishes such as *Centropyge shepardi* and *Amphiprion sandaracinos*, which, although apparently occurring in Taiwan, lack appropriate published records.

Among the 18 species identified by specimen examination, *Ecsenius bathi* is rare, previously recorded only from Indonesia; others may be widely distributed and may be found in Taiwan in the future, except for such species as *Callumia godeffroyi*, *Halicampus spinirostris*, *Epinephelus spilotoceps*, *Pseudochromis diadema*, and *Hoplolatilus starcki*, which are not known from either Japan or Taiwan. The specimen of *Asterorhombus fijiensis* collected from Taiping Island is only the fifth specimen known (Lin et al. 1995).

Zoogeographical Distribution

As many as 95.7% of the fishes at Taiping Island are widely distributed, circumtropical, or found throughout the Indo-pacific, Indo-west Pacific, West central Pacific, or West Pacific (Table 4). Fewer than 20 species are restricted in distribution, among them 11 unidentified (probably undescribed) species with no distributional records. The few species known to be restricted in distribution include *Ecsenius bathi*, *Amblyeleotris* sp., and *Choerodon azurio*, which have been recorded from Indonesia. *Choerodon azurio* also occurs from Japan to the South China Sea as does *Psettina tosana*. Both the cryptic *Limnichthys* sp., probably an undescribed species, and the nocturnal *Sargocentron spinosissimus* are known from Japan to Taiwan, although the latter species was not recorded, probably because we did not conduct night fieldwork.

The 10 most speciose fish families are, in decreasing order: Labridae, Pomacentridae, Gobiidae, Chaetodontidae, Acanthuridae, Serranidae, Scaridae, Apogonidae, Blenniidae, and Balistidae. Major faunistic differences among Taiping Island and eight other regions are shown in Table 5. Despite some inconsistencies in rank order in families such as the Balistidae, Apogonidae, and Blenniidae, the dominant families at Taiping Island most closely resemble those from Green Island, where fringing reefs are also well developed. Reef-fish assemblages from Orchid Island, Tungsha Island, Hsiao-liu-chiu, southern Taiwan, Penghu, and northern Taiwan follow

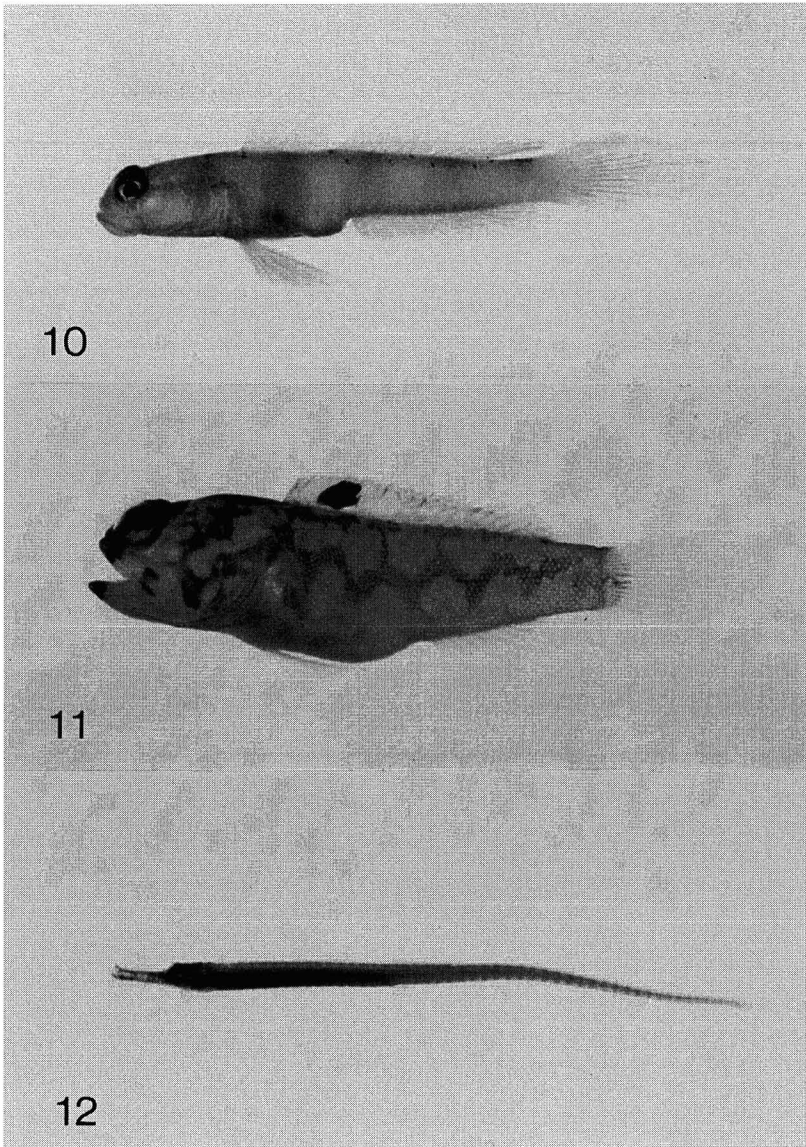


FIGURES 2–9 (2) *Chrysiptera* sp., ASIZP, 057118, 21.72 mm SL. (3) *Pseudoplesiops* sp., ASIZP, 057016, 24.20 mm SL. (4) *Pseudochromis* sp., ASIZP, 057009, 20.46 mm SL. (5) *Xenisthmus* sp. 1, ASIZP, 057011, 17.26 mm SL. (6) *Xenisthmus* sp. 2, ASIZP, 057012, 19.52 mm SL. (7) *Trimma* sp. 1, ASIZP, 057116, 14.78 mm SL. (8) *Trimma* sp. 2, ASIZP, 057117, 13.84 mm SL. (9) *Fusigobius* sp., ASIZP, 056996, 27.16 mm SL.

in decreasing order. Family dominance is most different from that found in western Taiwan, where a sandy environment predominates. With 351 species co-occurring in Taiping Island and southern Taiwan, these two areas share the largest number of fishes. Green Island with 316

co-occurring species is second, although it holds top rank in similarity (61.78%). Generally, rank order of species similarity between regions matches the results from the analysis of the 10 most speciose families.

From these results, we infer that reef fishes



FIGURES 10–12 (10) *Amblyeleotris* sp., ASIZP, 057113, 43.43 mm SL. (11) *Opistognathus* sp., ASZIP, 056990, 42.60 mm SL. (12) *Maroubra* sp., ASIZP, 057123, 40.38 mm SL.

at Taiping Island originate by larval dispersal from the Kuroshio Current, as do the the fishes of southern Taiwan and adjacent Green Island, Orchid Island, and Hsiao-liu-chiu.

Total number of reef fish species at Taiping

Island was less than at Orchid Island (561) and Green Island (602) in Taiwan. Limited reef area, short survey time, more monotonous topography and substratum, which lower habitat diversity, and recent serious but puzzling reef degradation

TABLE 4

NUMBERS OF REEF FISH SPECIES AT TAIPING ISLAND AND EIGHT LOCATIONS NEAR TAIWAN AND IN THE SOUTH CHINA SEA AND CZEKANOWSKI SIMILARITY INDICES

GEOGRAPHICAL REGIONS ^a	REGION								
	Nansha I.	Green I.	Orchid I.	Tungsha I.	Hsiao- liu-chiu	Southern Taiwan	Penghu	Northern Taiwan	Western Taiwan
IP	229	188	181	156	181	211	112	115	63
WP	72	45	40	25	36	50	26	19	10
IwP	56	42	29	24	31	45	18	15	11
WcP	33	25	23	17	16	27	10	12	4
IpP	12	11	11	8	10	11	6	7	5
C	4	4	3	1	4	4	2	3	2
SC	2	—	—	—	—	—	—	—	—
JsC	2	—	—	—	1	1	1	1	1
JT	2	1	1	2	1	2	1	1	—
JC	1	—	—	—	1	—	—	1	—
?	8	—	—	1	—	—	—	—	—
Total	421	316	288	234	281	351	176	174	96
Similarities		61.87%	58.65%	58.65%	54.62%	46.92%	32.92%	31.72%	17.69%

^a For explanation of symbols, see Appendix.

TABLE 5

THE 10 MOST SPECIOSE FAMILIES OF REEF FISHES AT TAIPING ISLAND AND COMPARISONS WITH THOSE FOUND IN OTHER REGIONS OF TAIWAN

FAMILIES	REGION								
	TAIPING I.	TUNGSHA I.	GREEN I.	ORCHID I.	PENGHU	SOUTHERN TAIWAN	NORTHERN TAIWAN	WESTERN TAIWAN	HSIAO- LIU- CHIU
Labridae	73(1)	54(1)	93(1)	85(1)	69(1)	49(1)	98(1)	44(1)	80(1)
Pomacentridae	51(2)	36(2)	60(2)	51(2)	28(5)	29(4)	61(3)	*	55(2)
Gobiidae	32(3)	34(3)	31(3)	31(3)	37(2)	35(2)	80(2)	23(4)	42(3)
Chaetodontidae	21(4)	26(4)	29(4)	29(4)	29(4)	23(8)	30(8)	*	26(7)
Acanthuridae	18(5)	16(7)	29(4)	29(4)	*	*	28(10)	*	26(5)
Serranidae	16(6)	12(9)	23(6)	21(7)	36(3)	24(7)	53(5)	35(2)	*
Scaridae	15(7)	20(5)	23(6)	20(8)	*	*	28(10)	*	*
Apogonidae	15(7)	19(6)	18(10)	19(9)	29(4)	27(6)	55(4)	22(5)	32(4)
Blenniidae	14(9)	*	23(6)	28(6)	16(9)	29(4)	37(6)	*	24(8)
Balistidae	13(10)	*	*	*	*	*	*	*	*
Lutjanidae	*	12(9)	20(9)	*	20(8)	19(9)	36(7)	18(8)	*
Muraenidae	*	*	*	18(10)	*	*	*	*	22(8)

NOTE: Number in parentheses indicates original rank in the region. An asterisk (*) means the family was not included in the list of the top 10 in the region.

may also play important roles in occurrence and distribution. Thus, although Taiping Island is closer to the equator and the diversity center of the Indo-Australian Region, the number of fish species is less than we expected.

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APPENDIX

CONTINUED

FAMILY	SPECIES	RECORDED BY CHANG ET AL. (1981)	STATION ^d											HAND LINE ^{a,b}	REGIONAL OCCURRENCE ^c							GUILD	GEOGRAPHIC DISTRIBUTION ^d		
			1	2	3	4	5	6	7	8	9	10	11		T	W	P	H	S	N	L			G	
	<i>Pterocaesio pisang</i>					A	C	A																1,4	IP
	<i>Pterocaesio randalli</i>					C	C	C																1,4	WP
	<i>Pterocaesio tile</i>	×						A					C		×	×		×	×			×		1,4	IP
Callionymidae	<i>Neosynchiropus ocellatus</i>				R											×		×	×			×		5,13	IwP
Carangidae	<i>Carangichthys melampyngus</i>		R	R			R	R		O	R	O										×	×	4,5	IpP
	<i>Caranx ignobilis</i>	×							R					R	×	×			×	×	×	×	×	4,5	IP
	<i>Elagatis bipinnulata</i>				R	R							R			×	×	×	×	×	×	×	×	1	C
	<i>Trachinotus baillonii</i>	×														×								1,4,5	IwP
Centrolophidae	<i>Hyperoglyphe japonica</i>	×																						1.5	WP
Chaetodontidae	<i>Chaetodon auriga</i>	×			R			R	R	O	O	O	C		×	×	×	×	×	×	×	×	×	4	IP
	<i>Chaetodon baronessa</i>	×											R		×		×		×		×	×	×	4	WP
	<i>Chaetodon citrinellus</i>	×		R	R	R	R	R		R	O	R			×	×	×	×	×	×	×	×	×	4	IP
	<i>Chaetodon kleinii</i>	×				R	R								×	×	×	×	×	×	×	×	×	4	IP
	<i>Chaetodon lunula</i>	×			R			R		R	R				×	×	×	×	×	×	×	×	×	4	IP
	<i>Chaetodon melannotus</i>	×		R	R					O	R	O			×		×	×	×	×	×	×	×	4,7	IP
	<i>Chaetodon ornatissimus</i>	×		R	O	R		R	R		R	O	R		×		×	×	×	×	×	×	×	4,7	IP
	<i>Chaetodon punctatofasciatus</i>	×					R	R							×	×		×	×	×	×	×	×	4	WcP
	<i>Chaetodon rafflesi</i>											R	R		×				×					4	IP
	<i>Chaetodon trifascialis</i>	×		R		R	R	R		O	R	O			×		×	×	×	×	×	×	×	4,7	IP
	<i>Chaetodon trifasciatus</i>											O	O		×		×	×	×	×	×	×	×	4,7	IP
	<i>Chaetodon unimaculatus</i>												R		×		×	×	×	×	×	×	×	4,7	IP
	<i>Chaetodon vagabundus</i>	×													×	×	×	×	×	×	×	×	×	4	IP
	<i>Chaetodon xanthurus</i>	×		R			R	R							×		×	×	×	×	×	×	×	4	WP
	<i>Coradion altivelis</i>				O	O											×				×			4	WP
	<i>Forcipiger flavissimus</i>		R	R			R	R		R								×	×			×	×	4	IpP
	<i>Hemitaurichthys polylepis</i>	×						R							×	×	×	×	×	×	×	×	×	3,4	WP
	<i>Heniochus acuminatus</i>						R								×	×	×	×	×	×	×	×	×	4,11	IP
	<i>Heniochus chrysostomus</i>	×			O	R	R				R				×		×	×	×	×	×	×	×	4,11	WP
	<i>Heniochus monoceros</i>											R			×		×	×	×	×	×	×	×	4,11	IP
	<i>Heniochus varius</i>				R		R				R				×		×	×	×	×	×	×	×	4,11	WcP
Cirrhitidae	<i>Amblycirrhitus bimacula</i>					R												×						6	IP
	<i>Cirrhitichthys aprinus</i>						R											×		×		×		6	IwP
	<i>Cirrhitichthys falco</i>		R	R	R		R	R								×	×	×	×		×			6,7	WP
	<i>Cirrhitichthys oxycephalus</i>	×													×		×	×	×		×			6	IpP

	<i>Cirrhitus pinnulatus</i>		R	O		R		O	R	O	×	×	×	×	×	×	6,13	IP
	<i>Paracirrhites arcatus</i>	×	O	R	O	R	R		R	R	×		×	×	×	×	6,7	IP
	<i>Paracirrhites forsteri</i>	×	R	O	O	R					×	×	×	×	×	×	6	IP
Congridae	<i>Conger cinereus</i>	×									×	×	×	×	×	×	5,13	IP
	<i>Heteroconger hassi</i>		C										×				5	IwP
Creedidae	<i>Limnichthys</i> sp.			R							×	×	×				5	JT
Dasyatidae	<i>Dasyatis kuhlii</i>		R										×	×	×	×	5	IwP
	<i>Taeniura melanospila</i>			R							×	×					5	IP
Diodontidae	<i>Diodon holocanthus</i>			R								×	×	×	×	×	6,10	C
Gobiesocidae	<i>Discotrema crinophila</i>					R							×	×			14	IP
Gobiidae	<i>Amblyeleotris guttata</i>		O		O	C	C	C					×	×	×	×	5	WP
	<i>Amblyeleotris randalli</i>					R	R										5	IwP
	<i>Amblyeleotris</i> sp.																	SC
	<i>Amblyeleotris steinitzi</i>			A				O					×	×		×	5	IwP
	<i>Amblyeleotris wheeleri</i>		O	O	R			R					×	×	×	×	5	WP
	<i>Amblygobius phalaena</i>								O		×	×	×	×	×		5	IP
	<i>Amblygobius rainfordi</i>							R						×			5	WP
	<i>Bryaninops yongei</i>							O									7	IP
	<i>Calumia godeffroyi</i>		R														5	IP
	<i>Callogobius sclateri</i>		R	R							×		×	×		×	5	IP
	<i>Ctenogobiops feroculus</i>			C							×		×				5	IwP
	<i>Ctenogobiops tangaroae</i>		A			R	O	O									5	WP
	<i>Eviota cometa</i>																6	WcP
	<i>Eviota pellucida</i>							O									4	WcP
	<i>Eviota prasites</i>		C	C		C					×						6	WP
	<i>Fusigobius duospilus</i>		O	O	O	O	O	O	O		×		×	×	×		5	WP
	<i>Fusigobius longispinus</i>						R					×	×	×	×	×	5	IwP
	<i>Fusigobius neophytus</i>							R			×		×	×		×	5	IwP
	<i>Fusigobius signipirris</i>			R												×	5	WP
	<i>Fusigobius</i> sp.			C		O	O	O	O								5	WP
	<i>Gnatholepis</i>		A	C	A		A	R			×	×	×	×	×	×	5,10,13	WP
	<i>scapulostigma</i>																	
	<i>Gobiodon citrinus</i>	×									×	×	×	×		×	7	IP
	<i>Istigobius rigilius</i>		O	O	O	O					×						5	IP
	<i>Lotilia graciliosa</i>			R				R					×	×	×		5	IP

APPENDIX

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FAMILY	SPECIES	RECORDED BY CHANG ET AL. (1981)	STATION ^d											HAND LINE ^{a,b}	REGIONAL OCCURRENCE ^c							GUILD	GEOGRAPHIC DISTRIBUTION ^d			
			1	2	3	4	5	6	7	8	9	10	11		T	W	P	H	S	N	L			G		
Grammistidae	<i>Trimma emeryi</i>				R		R		R													6	WP			
	<i>Trimma okinawae</i>						R	R	R									×	×	×	×	×	×	6	WP	
	<i>Trimma</i> sp. 1 (orange spot)		C	C																			5	?		
	<i>Trimma</i> sp. 2 (ring-eyed)		C	C																			5	?		
	<i>Valenciennesa longipinnis</i>											R											5	IwP		
	<i>Valenciennesa puellaris</i>				R		R		R													×	×	×	5	IP
	<i>Valenciennesa sexguttata</i>				O				R		O											×	×	5	IP	
	<i>Valenciennesa strigata</i>	×		R	C						O	C		O	O							×	×	5	IP	
	<i>Grammistes sexlineatus</i>			R										R								×	×	5,11	IP	
	<i>Plectorhinchus chaetodonoides</i>												R									×	×	5	WP	
	Holocentridae	<i>Plectorhinchus orientalis</i>				R			R													×	×	11	WP	
<i>Myripristis berndti</i>					C	C	A		O													×	×	11	IwP	
<i>Myripristis kuntee</i>		×		R																		×	×	11	IP	
<i>Myripristis murdjan</i>		×				R					O	O		R								×	×	11,13	IP	
<i>Myripristis vittata</i>						O	O		R													×	×	11	IP	
<i>Neoniphon sammara</i>		×		R																		×	×	11,13	IP	
<i>Sargocentron caudimaculatum</i>		×		R				R	R			O	O									×	×	10,11	IP	
<i>Sargocentron diadema</i>						O									R							×	×	11,13	IP	
<i>Sargocentron punctatissimum</i>		×			O																	×	×	10,11	IP	
<i>Sargocentron spiniferum</i>		×					R															×	×	10,11	IP	
Kyphosidae		<i>Sargocentron spinosissimum</i>	×																				×	×	10,11	JT
	<i>Kyphosus cinerascens</i>									C		O										×	×	4	IP	
	<i>Anampses caeruleopunctatus</i>				R	R		R	R			R										×	×	4,5,6	IP	
	<i>Anampses geographicus</i>							R														×	×	4,5,6	IwP	
	<i>Anampses melanurus</i>					R		R	R													×	×	4,5,6	IP	
	<i>Anampses meleagrides</i>	×		R	R	R		R	R													×	×	4,5,6	IP	
	<i>Anampses twistii</i>	×		R	R	R																×	×	4,5,6	IP	
	<i>Bodianus anthioides</i>						R															×	×	4	IP	
	<i>Bodianus axillaris</i>	×		R								R										×	×	4,11	IP	
	<i>Bodianus bilunulatus</i>	×		R																		×	×	6	IP	
	<i>Bodianus diana</i>	×				R	R	R														×	×	6	IP	
<i>Bodianus loxozonus</i>	×							R													×	×	4	WP		

<i>Bodianus mesothorax</i>	×	R							×	×	×	×	×	×	4,11	WP
<i>Cheilinus chlorourus</i>		R	R	O	R				×	×	×	×	×	×	6	IP
<i>Cheilinus fasciatus</i>						R			×	×	×	×	×	×	6	IP
<i>Cheilinus oxycephalus</i>		R	R	R	R		R		×	×	×	×	×	×	6	IP
<i>Cheilinus trilobatus</i>			R					O	O	×	×	×	×	×	6	IP
<i>Cheilinus undulatus</i>			R		R				R	×		×	×	×	6	IP
<i>Cheilio inermis</i>			R			R				×	×	×	×	×	4	IP
<i>Choerodon azurio</i>	×									×	×	×	×	×	4	JsC
<i>Choerodon jordani</i>						R				×	×	×	×	×	5	WP
<i>Cirrhilabrus</i>																
<i>cyanopleurus</i>	×	A	A	C				O		×	×	×	×	×	6	WP
<i>Cirrhilabrus exquisitus</i>	×										×	×	×	×	6	IwP
<i>Cirrhilabrus melanomarginatus</i>		C	A	A	A	C	R	O			×	×	×	×	6	WP
<i>Cirrhilabrus rubrimarginatus</i>					A						×	×	×	×	6	WP
<i>Coris aygula</i>	×			R							×	×	×	×	5	IP
<i>Coris schroederi</i>	×		R	R	R							×			5,6	IP
<i>Coris dorsomacula</i>				O	R	R	R				×	×	×	×	5	IP
<i>Coris gaimard</i>	×	R				R	R	R	O	O	R	×	×	×	5,6	IP
<i>Epibulus insidiator</i>						R						×	×	×	6,11	IP
<i>Gomphosus varius</i>	×	R	O	O	R	R	R	R	R	O	O	O	×	×	6	IwP
<i>Halichoeres biocellatus</i>		O	R	O		R	R	O				×	×	×	5,6	WP
<i>Halichoeres chrysus</i>			O	R				O				×	×	×	5	WP
<i>Halichoeres hartzfeldii</i>			C									×	×	×	5	IwP
<i>Halichoeres hortulanus</i>	×	R	R	O	R			O	O	O	O	×	×	×	5	IP
<i>Halichoeres margaritaceus</i>	×			C				C	C	C	A	×	×	×	5,6	WcP
<i>Halichoeres marginatus</i>	×			C				C	C	O		×	×	×	5,6	IP
<i>Halichoeres nebulosus</i>		C	O	R				C	C	C	A		×	×	5,6	IwP
<i>Halichoeres ornatissimus</i>						R	R					×	×	×	5	WP
<i>Halichoeres prosopion</i>			R		R	R	O	O				×	×		6	WP
<i>Halichoeres scapularis</i>								C	C	C	C	×	×	×	5,6	IwP
<i>Halichoeres timorensis</i>	×														4	IwP
<i>Halichoeres trimaculatus</i>	×		O	R	R			A	O	C	A	×	×	×	5	IwP
<i>Hemigymnus fasciatus</i>	×	R	R	R	R	R			R	O	O	×	×	×	6	IP
<i>Hemigymnus melapterus</i>	×		R									×	×	×	5,6	IP

	<i>Lethrinus erythracanthus</i>	×							×						5	IP			
	<i>Lethrinus harak</i>									R		×	×	×	×	5	IP		
	<i>Lethrinus lentjan</i>					O								×	×	5	IP		
	<i>Lethrinus reticulatus</i>	×							R					×		5	IwP		
Lutjanidae	<i>Monotaxis grandoculis</i>	×	R	R	C	O	C		O	O	O	O	O	×	×	×	×	5	IP
	<i>Aphareus furca</i>		R				R							×	×	×	×	5	IpP
	<i>Aphareus rutilans</i>				R	R								×	×	×	×	5	IP
	<i>Aprion virescens</i>	×											O	×	×	×	×	5	IP
	<i>Lutjanus bohar</i>					R		R						×	×	×	×	2,5	IP
	<i>Lutjanus decussatus</i>														×	×	×	5,13	IwP
	<i>Lutjanus gibbus</i>						R			R				×	×	×	×	2,5	IP
	<i>Lutjanus kasmira</i>	×	C		C		C						R	×	×	×	×	2,5	IP
	<i>Lutjanus monostigma</i>										R			×	×	×	×	5,13	IP
	<i>Lutjanus russelli</i>										R			×	×	×	×	5,13	IP
	<i>Macolor macularis</i>							R									×	6	IwP
	<i>Macolor niger</i>	×											R	×		×	×	6	IwP
Malacanthidae	<i>Hoplolatilus starcki</i>					R	O									×	×	6	WP
	<i>Malacanthus brevivirostris</i>		R					R						×		×	×	5	IpP
Microdesmidae	<i>Malacanthus latovittatus</i>	×		R				O						×	×	×	×	5	IwP
	<i>Nemateleotris magnifica</i>		O	C	C	C	C	C						×	×	×	×	4	IP
	<i>Ptereleotris evides</i>	×	O		O	R	C	C				O			×	×	×	6	IP
	<i>Ptereleotris heteroptera</i>						R	R							×	×	×	5	IP
Monacanthidae	<i>Ptereleotris zebra</i>		O												×	×	×	6	IP
	<i>Cantherhines pardalis</i>			R	R	R				R					×	×	×	6	IP
	<i>Paraluteres prionurus</i>						R								×	×	×	6	IP
Mullidae	<i>Pervagor janthinosoma</i>			R	R										×	×	×	6	IP
	<i>Mulloides flavolineatus</i>							C			O			×	×	×	×	5	IP
	<i>Parupeneus barberinus</i>	×		R					O	O	O			×	×	×	×	5	IP
	<i>Parupeneus bifasciatus</i>	×	O	O			R		O	O	O	O		×	×	×	×	5	IP
	<i>Parupeneus ciliatus</i>						R	R						×	×	×	×	5	IP
	<i>Parupeneus cyclostomus</i>						R	R		O				×	×	×	×	5	IP
	<i>Parupeneus heptacanthus</i>	×		R	R													5	IP
	<i>Parupeneus multifasciatus</i>	×		C			R		O		O	O	O	×	×	×	×	5	WcP
	<i>Parupeneus pleurostigma</i>		O	C	R			R						×	×	×	×	5	IP
	Muraenidae	<i>Echidna nebulosa</i>	×												×	×	×	×	10,13
<i>Echidna polyzona</i>							R							×	×	×	×	10,13	IP
<i>Gymnothorax eurostus</i>								R							×	×	×	10	IP
<i>Gymnothorax fimbriatus</i>								R						×	×	×	×	10	IP
<i>Gymnothorax javanicus</i>								R						×	×	×	×	10	IP
<i>Gymnothorax meleagris</i>							R							×	×	×	×	10,13	IP
<i>Gymnothorax pseudothyrsoides</i>			R												×	×	×	10,13	WP
<i>Gymnothorax zonipectis</i>				R			R									×		10	IP

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FAMILY	SPECIES	RECORDED BY CHANG ET AL. (1981)	STATION ^a											HAND LINE ^{a,b}	REGIONAL OCCURRENCE ^c							GUILD	GEOGRAPHIC DISTRIBUTION ^d				
			1	2	3	4	5	6	7	8	9	10	11		T	W	P	H	S	N	L			G			
Nemipteridae	<i>Uropterygius macrocephalus</i>						R												×	×				5		WcP	
	<i>Pentapodus caninus</i>		R											O		×					×				5		WcP
	<i>Scolopsis bilineatus</i>	×	R	R	R	R		R	R	O		O	O		×	×	×	×	×	×	×	×	×	×	5		WP
	<i>Scolopsis lineatus</i>	×			R		R		R	O	R	O			×	×		×	×		×	×		5		IP	
	<i>Scolopsis margaritifera</i>				R																×			5		WP	
Opistognathidae	<i>Scolopsis xenochrous</i>						R													×		×	×	5		WP	
	<i>Opistognathus</i> sp.					R																		5		?	
Ostraciidae	<i>Ostracion cubicus</i>				R										×		×	×	×	×	×	×	×	6		IP	
	<i>Ostracion meleagris</i>						R			R						×		×	×	×	×	×	×	6		IpP	
Pinguipedidae	<i>Parapercis clathrata</i>	×			R		R	O		R				O						×	×	×	×	5		IP	
	<i>Parapercis cylindrica</i>								O	R					×		×	×		×	×		5		IP		
	<i>Parapercis hexophthalma</i>	×	R	R										R	×		×	×	×		×		5		IP		
	<i>Parapercis millepunctata</i>			R	C	C						O			×		×	×		×	×		5		IP		
Plesiopidae	<i>Plesiops coeruleolineatus</i>	×					R								×		×	×		×	×		5,10,13		IP		
Pomacanthidae	<i>Apolemichthys trimaculatus</i>				R		R	R	R		R									×	×	×	×	10		IwP	
	<i>Centropyge bispinosus</i>						O	O	R	R					×		×	×	×	×	×	×		4,10		IP	
	<i>Centropyge heraldi</i>		O	O	R	R	O	O			R									×	×	×		4,10		WcP	
	<i>Centropyge multifasciatus</i>	×				R																×		2		WP	
	<i>Centropyge shepardii</i>		R																					4,10		WP	
	<i>Centropyge vroliki</i>	×	R			R	O				O	O			×		×	×	×	×	×	×		4,10		IP	
	<i>Genicanthus melanospilos</i>					O	C	O	C													×	×		6		WcP
	<i>Pomacanthus imperator</i>	×				R	R		R		R				×		×	×	×	×	×	×		2,10,11		IP	
	<i>Pomacanthus semicirculatus</i>				R											×	×	×	×	×	×	×	×	2,10,11		IwP	
	Pomacentridae	<i>Pygoplites diacanthus</i>	×				R				R					×		×	×	×	×	×	×		2,10,11		IP
		<i>Abudefduf sordidus</i>									R					×	×	×	×	×	×	×	×		6,13		IP
		<i>Abudefduf vaigiensis</i>	×			C	O		O		O	C	C	A		×		×	×	×	×	×			3,13		IP
		<i>Amblyglyphidodon aureus</i>				C		O	C		O										×	×	×		2		IwP
		<i>Amblyglyphidodon leucogaster</i>		O	R		O		R						R								×	×	7		IwP
		<i>Amphiprion clarkii</i>	×	O					R				O			×		×	×	×	×	×	×		9		IwP
<i>Amphiprion frenatus</i>		×		R		O						O			×		×	×		×	×	×		9		WP	
<i>Amphiprion ocellaris</i>		×				R			R	O		O											×		9		IwP
<i>Amphiprion perideraion</i>							R	R							×			×				×		9		WcP	

<i>Amphiprion sandaracinos</i>	×	R			R							9	IwP		
<i>Chromis alpha</i>				R	O	O	O					6	IP		
<i>Chromis atripes</i>	×			R	O	O	O		×	×	×	×	6	WcP	
<i>Chromis chrysurus</i>		R	R	R		R	R		×		×	×	4	WP	
<i>Chromis lepidolepis</i>		A		A	R		O			×	×	×	3,4	IP	
<i>Chromis margaritifer</i>	×	A	C	O	O		O	C	×	×	×	×	6	WcP	
<i>Chromis notata</i>	×									×	×		6	JC	
<i>Chromis ovatiformes</i>				O	C	O					×	×	2,6	WP	
<i>Chromis vanderbilti</i>	×	A	A	A	A	A	C	A	C	C		×	×	6	WcP
<i>Chromis viridis</i>	×								×	×	×	×	7	IP	
<i>Chromis weberi</i>	×	R	C	R	C	O	R	O		O	O		3	IP	
<i>Chromis xanthura</i>				O	C	O	O		R		×	×	4,6	WcP	
<i>Chrysiptera biocellata</i>	×							A	A	A		×	6	WcP	
<i>Chrysiptera cyanea</i>	×	C						C	A	C	A	×	6	WP	
<i>Chrysiptera glauca</i>	×							C	A	C	A	×	6,13	IP	
<i>Chrysiptera leucopoma</i>	×		C		C			A	A	C	A	×	6	IP	
<i>Chrysiptera rex</i>	×											×	2,11	WP	
<i>Chrysiptera sp.</i>	×	A	C	O	O		R	O	O	O		×	6	?	
<i>Chrysiptera unimaculata</i>								O	C	C	C	×	5	WP	
<i>Dascyllus aruanus</i>	×											×	7	IP	
<i>Dascyllus reticulatus</i>	×	O	C				O					×	7	IP	
<i>Dascyllus trimaculatus</i>	×	C	C		O	O	C		O	C	C	×	7	IP	
<i>Dischistodus melanotus</i>	×												6	WP	
<i>Hemiglyphidodon plagiometopon</i>	×											×	6	IwP	
<i>Neoglyphidodon melas</i>	×						R	R				×	2,7	IwP	
<i>Neoglyphidodon nigroris</i>	×	R										×	2,6	WP	
<i>Plectroglyphidodon dickii</i>	×	O	R	R			C	C	C			×	7	IP	
<i>Plectroglyphidodon imparipennis</i>					R	O	O	O				×	7	IP	
<i>Plectroglyphidodon lacrymatus</i>	×	A	R	C	R	R	R	R	O	O		×	6	IP	
<i>Plectroglyphidodon leucozonus</i>	×	O			O		C	C	O	A		×	6,13	IP	
<i>Pomacentrus amboinensis</i>	×	R	C		C							×	7	WcP	
<i>Pomacentrus bankanensis</i>	×	O	C	C	C	C	O	C	C	C		×	6	WP	
<i>Pomacentrus chrysurus</i>					R							×	5	IwP	
<i>Pomacentrus coelestis</i>		O	C	C	O			C	C			×	6	WcP	
<i>Pomacentrus lepidogenys</i>	×	C			R	C						×	6	IwP	
<i>Pomacentrus moluccensis</i>						R						×	7	WP	
<i>Pomacentrus nagasakiensis</i>		R										×	6	WP	
<i>Pomacentrus nigromarginatus</i>		R	C	C	C	C						×	2,6	IwP	

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FAMILY	SPECIES	RECORDED BY CHANG ET AL. (1981)	STATION ^a											HAND LINE ^{a,b}	REGIONAL OCCURRENCE ^c							GUILD	GEOGRAPHIC DISTRIBUTION ^d		
			1	2	3	4	5	6	7	8	9	10	11		T	W	P	H	S	N	L			G	
Pseudochromidae	<i>Pomacentrus philippinus</i>	×	O	A	O	A	O	O	O	O	O	O	O	O	×			×	×	×	×	×	2	IwP	
	<i>Pomacentrus vaiuli</i>	×	C			R		R											×	×	×	×	6	IwP	
	<i>Pomachromis richardsoni</i>				O			C												×	×	×	7	IwP	
	<i>Stegastes fasciolatus</i>			R	O						C	C				×	×	×	×	×	×	×	6	IP	
	<i>Stegastes nigricans</i>	×		O											×		×	×		×	×	×	6	IP	
	<i>Pseudochromis diadema</i>			R																		×	5,10	WP	
	<i>Pseudochromis fuscus</i>	×		R											×						×		5,10	IwP	
	<i>Pseudochromis marshallensis</i>										R													10	WcP
	<i>Pseudoplesiops</i> sp. 1							C	O	O														5	IwP
	<i>Pseudochromis</i> sp. 1																							5	?
Pseudogrammidae	<i>Pseudogramma polyacantha</i>			R		O	O								×			×	×			×	5,13	IwP	
Scaridae	<i>Cetoscarus bicolor</i>	×													×	×		×	×		×	×	4	IP	
	<i>Scarus bowersi</i>								R						×			×	×		×	×	4	WP	
	<i>Scarus festivus</i>											O	O					×	×		×	×	6	IP	
	<i>Scarus forsteni</i>		O	O	O	O	A	A	O			O	C	O		×	×	×	×	×	×	×	4	WcP	
	<i>Scarus frenatus</i>			O											×	×	×	×	×	×	×	×	4	IP	
	<i>Scarus gibbus</i>			O				O	O						×		×	×	×	×	×	×	4	IP	
	<i>Scarus globiceps</i>				R										×		×	×	×	×	×	×	4	IP	
	<i>Scarus longiceps</i>								R						×	×	×						4	WcP	
	<i>Scarus niger</i>		R	O					R						×	×	×	×		×	×	×	4	IP	
	<i>Scarus oviceps</i>	×													×	×		×	×	×	×	×	4	WcP	
	<i>Scarus psittacus</i>		R		R										×			×	×	×	×	×	4	IP	
	<i>Scarus pyrrhurus</i>								R									×					4	WP	
	<i>Scarus rubroviolaceus</i>			O		C	A	O	O				O		×	×	×	×	×	×	×	×	4	IpP	
	<i>Scarus schlegeli</i>							O	R				O		×	×	×	×		×	×	×	4	WcP	
	<i>Scarus sordidus</i>		C	O	O	O	R	R	O					O	×	×	×	×	×		×	×	4	IP	
	Scombridae	<i>Gymnosarda unicolor</i>	×				R																	1	IP
	Scorpaenidae	<i>Thunnus albacares</i>						R								×		×	×	×		×		1	C
<i>Dendrochirus biocellatus</i>							R										×	×		×	×	×	3,5,6	IP	
<i>Dendrochirus zebra</i>		×													×	×	×	×	×	×	×	×	5,6,3	IP	
<i>Parascorpaena mcadamsi</i>							R								×	×	×	×		×	×		10	IP	
<i>Pterois antennata</i>			R						R						×	×	×	×		×			5,6	IP	
<i>Pterois lunulata</i>									R								×	×	×				5,6	IP	

	<i>Pterois volitans</i>	×		R					R		×	×	×	×	×	×	×	×	5,6,3	WcP
	<i>Scorpaenodes guamensis</i>	×									×	×	×	×	×	×	×	×	10	IP
	<i>Scorpaenodes parvipinnis</i>			R										×					10	IP
	<i>Scorpaenopsis diabolus</i>			R		R					×	×	×	×	×	×	×	×	5	IP
	<i>Sebastapistes cyanostigma</i>	×		O							×	×	×	×	×		×		7	IwP
Serranidae	<i>Aethaloperca rogaa</i>					R					×	×	×	×	×		×		10,11	IP
	<i>Cephalopholis argus</i>							R	R			×	×	×	×	×	×	×	10,11,13	IP
	<i>Cephalopholis leopardus</i>			R		O	O	O			C			×	×	×	×		10,11	IP
	<i>Cephalopholis urodeta</i>	×		C	R	O	O	O	O		C	C	A	×	×	×	×	×	10,11	IP
	<i>Epinephelus spilotoceps</i>	×						R											10,11	IP
	<i>Epinephelus fasciatus</i>	×		C				R	R				C		×		×	×	10,11	IP
	<i>Epinephelus hexagonatus</i>	×			R	C	R		O	C	O	C	C	O	×		×	×	10,11	IP
	<i>Epinephelus merra</i>	×		O	R	A	O	R	O	O	O	O	C	C	×		×	×	10,11,13	IP
	<i>Epinephelus morrhua</i>	×															×		10,11	IP
	<i>Epinephelus polyphemadion</i>								R								×		10,11	WP
	<i>Epinephelus quoyanus</i>	×												×	×	×	×	×	10,11	IP
	<i>Mikrolabrichthys pascalus</i>					R	O		R								×		2	WP
	<i>Plectropomus leopardus</i>						O	R					R				×		5	WP
	<i>Pseudanthias pleurotaenia</i>						O	C	C								×	×	2	WcP
	<i>Variola albimarginata</i>					R								×	×	×	×	×	4	IwP
	<i>Variola louti</i>			R		R							R		×	×	×	×	4	IP
Siganidae	<i>Siganus argenteus</i>								R					×		×	×	×	6	IP
	<i>Siganus spinus</i>	×								O	O	C			×	×	×	×	6	IP
	<i>Siganus vulpinus</i>			R												×			4,6	WP
Syngnathidae	<i>Corythoichthys flavofasciatus</i>							R						×				×	5	IP
	<i>Halicampus spinirostris</i>							R									×		5	IP
	<i>Marorubra</i> sp.																		5	?
Synodontidae	<i>Saurida gracilis</i>							R			R			×	×	×	×	×	5	IP
	<i>Synodus variegatus</i>	×			R	O	C		R					×	×	×	×	×	5	IP

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FAMILY	SPECIES	RECORDED BY CHANG ET AL. (1981)	STATION ^a											HAND LINE ^{a,b}	REGIONAL OCCURRENCE ^c								GUILD	GEOGRAPHIC DISTRIBUTION ^d		
			1	2	3	4	5	6	7	8	9	10	11		T	W	P	H	S	N	L	G				
Tetraodontidae	<i>Arothron hispidus</i>												O		×	×	×	×	×	×	×	×	×	×	6	IpP
	<i>Arothron nigropunctatus</i>	×		R			R	R		R	O	R			×	×		×	×	×	×	×	×	6	IP	
	<i>Arothron stellatus</i>			R												×	×	×	×	×	×	×	×	6	IP	
	<i>Canthigaster bennetti</i>	×								R							×	×	×	×	×	×	×	6	IP	
	<i>Canthigaster coronata</i>			R				R									×	×		×	×	×	×	6	IP	
	<i>Canthigaster janthinoptera</i>							R							×			×	×		×	×	×	6	IP	
	<i>Canthigaster valentini</i>							R							×	×	×	×	×	×	×	×	×	6	IP	
Tripterygiidae	<i>Enneapterygius</i> sp. 1			R	C	C											×	×				×		10	IwP	
	<i>Helcogramma striata</i>									R					×		×	×	×	×	×			10	WP	
Xenisthmidae	<i>Xenisthmus polyzonatus</i>									R					×									5	IP	
	<i>Xenisthmus</i> sp. 1					R																		5	?	
	<i>Xenisthmus</i> sp. 2				R																			5	?	
Zanclidae	<i>Zanclus cornutus</i>	×		O	R		R	R	C	R		O	O	R		×	×	×	×	×	×	×	×	6	IpP	
Total no. species	421	161	78	148	136	145	106	157	142	57	79	112	90	32	234	96	176	281	351	174	288	316				

^a Abundance data: R, rare (1–3 individuals of a species observed during one survey); O, occasional (4–15 individuals); C, common (16–63 individuals); A, abundant (>64 individuals).

^b Specimens caught from research vessel.

^c T, Tungsha Island; W, western Taiwan; P, Penghu; H, Hsiao-liu-chiu; S, southern Taiwan; N, northern Taiwan; L, Lanyu; G, Green Island.

^d Abbreviations follow Myers (1991) and Shao et al. (1993a), except sc.