

## Depth Distribution of the Percophid *Matsubaraea fusiforme* in Fukiagehama Beach, Kyushu

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**Abstract** Collections with a small beam trawl and push-net at Fukiagehama beach, Kyushu, revealed that individuals of the percophid, *Matsubaraea fusiforme*, usually inhabit water not exceeding 5 m deep along sandy beaches during warm seasons. They are especially abundant along the low water line of spring tide regardless of the tidal phase. They may over winter in the deeper waters. Their length composition suggests protandry in the species.

Individuals of the percophid, *Matsubaraea fusiforme* (Fowler), are commonly caught in wading depths along Fukiagehama beach mainly in summer months. As their body form suggests, they spend most of the time buried in the sand. While it is known that they are seldom collected in water over 15 m deep, it is not known at what depth they are most abundant (Senta et al., 1989; Noichi et al., 1990).

In the present paper we report that they usually inhabit water not exceeding 5 m deep, with the highest density being along the spring tide low water line, regardless of tidal phase. The possibility of protandry in this species is suggested.

### Study site and methods

The collections were made at Irikihama beach located at the center of Fukiagehama, which extends north and south for about 40 km along the western coast of the Satsuma Peninsula, Kyushu (Fig. 1). The tidal range during spring tide reaches about 280 cm. A sandy flat 150 m wide and a sand bar are exposed at low water spring tide, with a trough 70–120 cm deep and 30–50 m wide remaining between them. The bottom of the lower half of the intertidal zone and the subtidal zone consists of medium to fine sand (Md  $\phi$  1.5–2.3).

We used an R-H push-net (1.5 m in beam width; Amarullah and Senta, 1989), a slightly modified Riley push-net, or a small beam trawl of the same dimension. The net was pushed or towed for a distance of 100 m parallel to the beach line at a speed of 33 m/min. The operation was usually repeated

four or five times at the same place. In July 1989 we determined the distribution of *M. fusiforme* close to the beach line by using the push-net in wading depths. In July 1990 we towed the beam trawl from an anchored boat in water between 3.5 and 15 m deep, and two people pulled the net in wading depths, to study the distribution of the fish from the beach line to further off shore.

We followed Matsuura (1991) in synonymizing *Matsubaraea setouchiensis* Taki, 1953 with *M. fusiforme* (Fowler, 1943).

### Results

**Distribution adjacent to low water line.** Twenty-nine operations were made in wading depths at low tide and about two hours preceding and following low tide on July 2–3 (May 29–June 1 in lunar calendar), 1989. The transects along which the push-net was operated were progressively shifted seawards or landwards according to the tidal phases.

Some 130 individuals of *M. fusiforme* were collected in depths between 15 and 100 cm (Table 1). In terms of sea floor elevation, however, they occurred along lines between +50 and –100 cm from standard sea level, with peak numbers at the low water line of spring tide (Fig. 2A).

**Distribution from the beach to 15 m depth.** Operations with the 1.5-m beam trawl were repeated four or five times each at four depths between 3.5 and 15 m, off Irikihama on July 9 (May 17 in lunar calendar), 1990. At around low tide the following day, 21 operations were made by two people pulling the same net in wading depths.

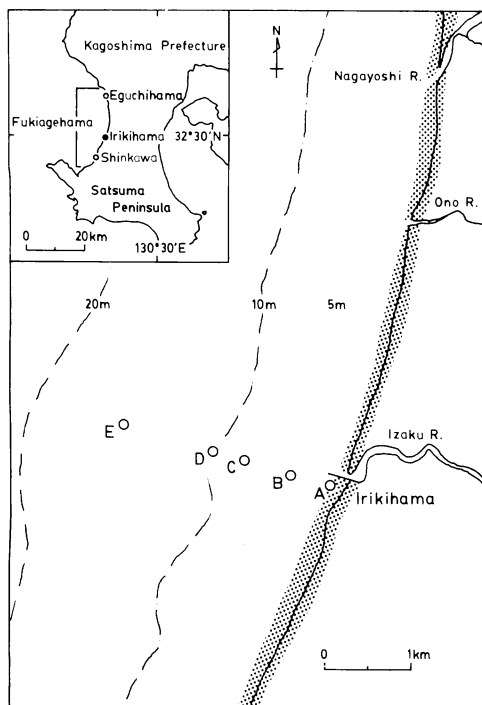


Fig. 1. A map of Irikiham, the site of the present study. The sampling gear was operated either by two people wading (at A) or from an anchored boat (at B-E). A general survey of the demersal components of the surf zone ichthyofauna has been continued by us at Irikiham and two other beaches, Eguchiham and Shinkawa, since November 1987.

We caught 70 *M. fusiforme* from wading depths. On the other hand, only two were caught at 3.5 m depth and none from 7, 10 and 15 m (Fig. 2B).

Besides two individuals of *M. fusiforme*, a total of 240 fish belonging to about 20 species, including the painted lizardfish, *Trachinocephalus myops* (Bloch et Schneider) (32.8–58.1 mm SL), flatheads, *Platycephalidae* spp. (9.8–50.5 mm SL), and hook-mouth sole, *Heteromycteris japonicus* (Temminck et Schlegel) (13.5–112.0 mm SL), were caught at 3.5–15 m. This shows that the gear worked properly at these depths.

**Size of fish collected.** Fig. 3 illustrates the length-frequency distribution of the fish collected. In both years, two separate size groups were obvious. The smaller group consisted of males, and the larger one females.

#### Discussion and conclusion

The finding that *M. fusiforme* was most abundant around the low water line spring tide confirmed our previous observations (Senta et al., 1989; Noichi et al., 1990). In the Gulf of Thailand the species also occurred at 30 to 45 cm depths along a sandy beach (Iwamoto, 1980; Senta et al., 1989).

Mysids comprise the main food of *M. fusiforme* (Senta et al., 1989). In shallow waters such as wading depths, swarms of mysids may be denser than in deeper waters, and access to such food may be easier.

Marked shore normal movements related to tidal phase have been reported for juveniles of the plaice, *Pleuronectes platessa* Linnaeus, and some other flat-

Table 1. Records of collection of *M. fusiforme* at low tide and about two hours on either side, at Irikiham, July 2–3 (May 29–June 1 in lunar calendar), 1989. Each catch represents a single operation, except where asterisked which is from two operations. Dashes denote that no operation was made.

Date	Time	Tide		No. of fish by depths			
		Phase	Level (cm)	15 cm	50 cm	100 cm	130 cm
July 2	1030	Ebb		0	15	5	0
	1230	Low	9	23	7*	1	—
	1430	Flood		0	26	1	—
	2300	Ebb		0	0	0	—
July 3	0100	Low	125	0	0	5	—
	0300	Flood		0	0	0	—
	1130	Ebb		1	13	1	—
	1300	Low	10	10	0	0	—
	1500	Flood		4	17	0	—
Total				38	78	13	0

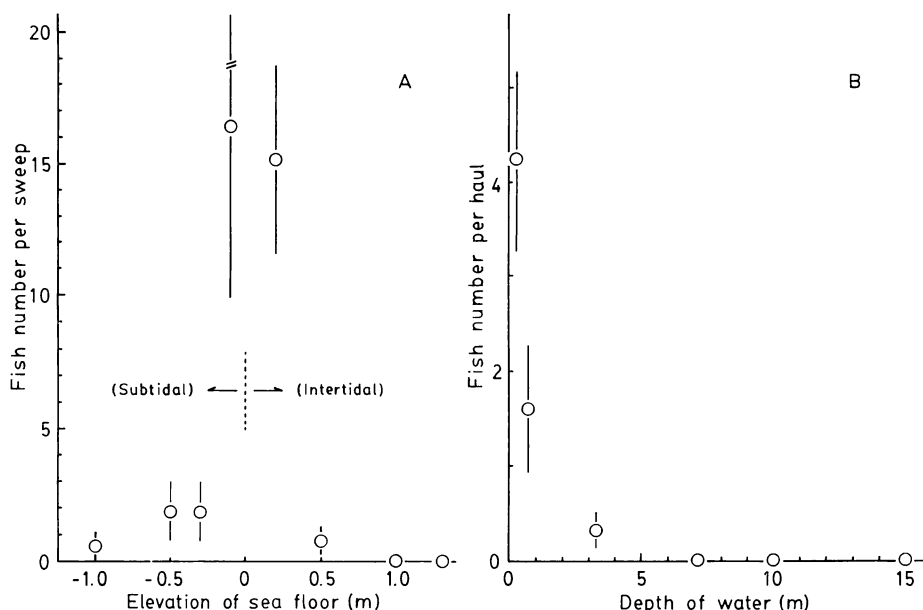


Fig. 2. Catches of *M. fusiforme* with a 1.5-m push-net/beam trawl at Irikiham; in relation to elevation of the sea floor at around low tide, July 2–3 (May 29–June 1 in lunar calendar), 1989 (A); along five transects at different depths, July 9–10 (May 17–18 in lunar calendar), 1990 (B). Open dots and bars represent means and standard errors of the catch per operation, respectively.

fishes (Gibson, 1973; Kuipers, 1973). Also, we have often observed juveniles of fishes such as the mullets, *Mugil cephalus* Linnaeus and *Liza carinata* (Valenciennes), therapons, *Terapon jarbua* (Forsskal) and *T. oxyrhynchus* Temminck et Schlegel, and many kinds of gobies, swimming or feeding, either solitarily or in an assemblage, close to the edge of the beach in response to tidal movements. Unlike these fishes, *M. fusiforme* exhibited little response to tidal movements. On windy days, however, they must retire to deeper waters, because the waves strongly agitate the sediment of their usual habitat in Fukiagehama which is a high energy beach.

We have also made seasonal collections with the R-H push-net along the beach at three different locations of Fukiagehama (Fig. 1) since November 1987, but no *M. fusiforme* have been obtained in the months from December to April. The habitat of the fish in the cold season is unknown to us. It may over winter in deeper waters.

The members of the families Trichonotidae and Creediidae are warmwater fishes, which resemble *M. fusiforme* in body form; small-sized and slender, with a pointed snout, and eyes placed on the top of the head. A single specimen of *Trichonotus filamentosus*

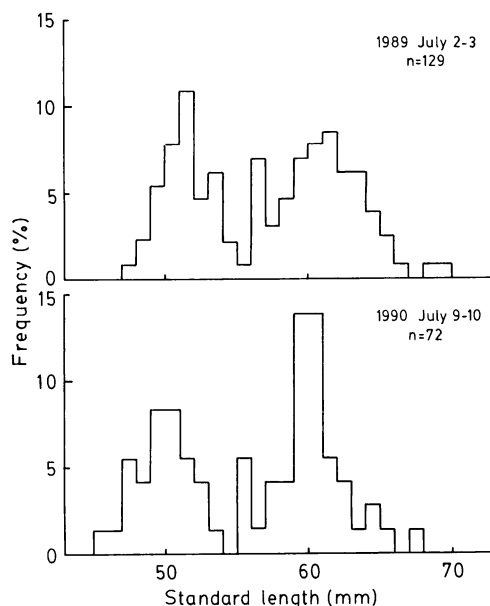


Fig. 3. Length-frequency distribution of *M. fusiforme* caught at Irikiham in July of 1989 and 1990. The smaller group consisted of males, and the larger one females.

(Steindachner), 71.1 mm SL, was collected at 15 m depth during the present study. Another trichonotid, *T. elegans* Shimada et Yoshino is “usually found hovering above sandy slopes in 10 to 30 m depths” (Shimada and Yoshino, 1984; Yoshino and Shimada, 1984). Habitat segregation is assumed between *M. fusiforme* and trichonotids, with the former occupying the innermost part of the surf zone and the latter inhabiting outside the zone.

According to Yoshino and Shimada (1984), the creediid, *Limnichthys fasciatus* Waite, is “commonly found in sand and gravel substrates in intertidal and infralittoral zones” of “northward to Chiba Prefecture in Japan”. Mr. S. Tasaki of our laboratory collected two juveniles of the fish, 12.4 and 15.8 mm TL, with a 1-m push-net in depths 10–60 cm at Oogiura beach of Chichijima, the Ogasawara Islands, in July 1990 (unpublished). However, this fish did not occur in our samples from Fukiagehama. The reason may be either that the beach is not under the direct influence of the Kuroshio Current or that there is no gravel bottom near the beach.

Yoshino and Shimada (1984) considered trichonotids to be protogynous hermaphrodites. This was fully verified with *Trichonotus filamentosus* by Kusen et al. (1990). The length frequency distribution of *M. fusiforme*, on the contrary, suggests protandry in this species. A detailed study of this topic is now under study by us.

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#### 吹上浜におけるマツバラトラギスの水深別分布

乃一哲久・神原利和・スビヤント・千田哲資

薩摩半島の西岸をなす吹上浜のほぼ中央に位置する入来浜において、1989年の7月に汀線付近において網口の巾1.5mの小型押し網を用い、また翌年の7月には汀線から水深15mの範囲でおなじ大きさの桁曳き網を用いて、採集をおこなった。合計201個体のマツバラトラギスが採集されたが、うち199個体は徒歩可能な深さから、残りの2個体を水深3.5mから得たのみであった。分布密度がもっとも高いのは潮時に関係なく常に大潮干潮線付近で、潮の干満に伴う沖または岸側への移動はほとんどおこなわぬと思われた。現在までのところ本種は12–4月の間には吹上浜の汀線付近から採集されていず、冬季はより沖合に移動すると考えられる。体長組成は55 mm SLを境にはっきり2つの山に分かれ、小さい方は雄、大きい方は雌より成っていた。これは本種における雄性先熟の可能性を示唆し、一般に雄が大きく雌性先熟が想定されているペラギンボ科の魚類と対照的であった。

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