

A New Moray Eel, *Gymnothorax niphostigmus*, (Anguilliformes: Muraenidae) from Northern and Eastern Taiwan

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Hong-Ming Chen, Kwang-Tsao Shao and Che-Tsung Chen (1996) A new moray eel, *Gymnothorax niphostigmus*, (Anguilliformes: Muraenidae) from northern and eastern Taiwan. *Zoological Studies* 35(1): 20-24. A new moray eel, *Gymnothorax niphostigmus*, is described here with four specimens from northern and eastern Taiwan. The new muraenid is clearly distinct from its most similar species, *Gymnothorax leucostigmus*, in the character combinations of having denser and smaller whitish snowflake-like patches over the entire body, darker brown ground coloration, anal fin with a distinct white margin, and approximately 140-142 vertebrae.

Key words: Muraenidae, Moray eel, *Gymnothorax niphostigmus* n. sp., Fish fauna, Fish taxonomy.

During recent studies on Taiwanese muraenid fishes, the senior author collected many specimens of moray eels from northern and eastern Taiwan. Among these specimens, it was noticed that there was an exceptional kind of "*Gymnothorax leucostigmus*" which had a special body color pattern. In March 1992, a live specimen of this muraenid was obtained and reared in an aquarium. Its behavior and morphological characters were then observed in more detail. It appeared that this species was undescribed. In April 1993, Miss Yu-Jane Pung of the Institute of Food Sciences, National Taiwan Ocean University, provided another specimen of this undescribed species from Hopingtao, Keelung. Finally, the senior author obtained two specimens of this *Gymnothorax* sp. from Chengkung and Changpin. After examining these specimens and comparing their morphology with that of specimens of other similar moray species, we propose and describe it here as a new species.

MATERIALS AND METHODS

The methods of measurements follow those of

Chen et al. (1994) or Hatooka and Randall (1992). The counting methods for predorsal, preanal, and total vertebrae follow those of Böhlke et al. (1989). Proportional measurements of type specimens of the new moray are expressed as percentage of the total length (TL) or the head length (HL). Lengths, proportions, and vertebral counts are given in Table 1.

The type specimens are deposited in the Museum of the Institute of Zoology, Academia Sinica (ASIZP) and the museum of Taitung Branch of Taiwan Fisheries Research Institute (TFRI-TT).

RESULTS AND DISCUSSION

Gymnothorax niphostigmus n. sp.

(Chinese name: Hsueh-hwa-ban Rou-hsun-tsung)

(English name: Snowflake-patched moray)

(Figs. 1, 2, 3; Tables 1, 2)

Holotype: ASIZP 056940, 713 mm TL, Hopingtao fish market (25°11'N, 121° 51'E), Keelung, longline at depth 100-150 m, Y. J. Pung, 23 Apr. 1993.

Paratypes: ASIZP 056941, 757 mm TL, Aoti (25°6'N, 121° 58'E), Taipei, H. M. Chen, 4 Mar. 1992; TFRI-TT 063,

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737 mm TL, Chengkung (23°1'N, 121°22'E), Taitung, H. M. Chen, 5 Jun. 1993; TFRI-TT 071, 635 mm TL, Changpin (23°18'N, 121°27'E), Taitung, longline at depth 35-40 m, H. S. Don, 23 Oct. 1993.

Diagnosis: Body length moderate (Fig. 1A). Dorsal fin moderately high, its origin starting before gill opening. Anus in front of mid-body point. Jaw teeth caniniform and almost uniserial. Body and fins darkish brown, covered with numerous whitish snowflake-like patches. The skin of pericranium area with many small whitish spots (Fig. 1B). Corner of mouth blackish. Anal fin margin white (Fig. 1C), edge of dorsal and caudal fins darkish.

Description: Data for holotype, followed in parentheses by the mean and range of data for the holotype and paratypes. The asterisk (*) indicates that data are affected by the factor of missing tail-tip. Preanus length 2.13 (2.04*; 1.87*-2.17); depth at anus 16.20 (16.71*; 14.74*-18.68); depth at gill opening 11.69 (13.51*; 10.68*-17.64); and head length 8.20 (7.38*; 5.94*-8.20), all in TL. Predorsal length 1.40 (1.39; 1.25-1.53); mouth cleft length 2.18 (2.30; 2.10-2.48); snout length 5.12 (5.37; 5.12-5.82); eye diameter 11.76 (12.66; 11.71-13.78); and interorbital width 8.88 (8.96; 8.20-9.90), all in HL. Predorsal vertebrae 5 (4.25; 4-5), preanal vertebrae 54 (54; 53-55), and total vertebrae 142 (127.5*; 108*-142). Lengths, proportions and vertebral counts of the holotype and three paratypes of *G. niphostigmus* n. sp. are showed in Table 1.

Dorsal fin moderately high, originating before gill opening and approximately above the 4th or 5th vertebra. The depth of anal fin low, its origin just behind anus and below the 53th, 54th, or 55th vertebra. Gill opening slightly below mid-body, and its length nearly equal to eye diameter.

Anterior nostril like a slender tube on each side of tip of snout, tip of anterior nostril lower. Posterior nostril over each front edge of eye with a slightly raised rim.

Head pores distinct (Fig. 2A). Supraorbital canal with three pores, one of which is situated anteroventrally to anterior nostril. Infraorbital canal with four to five pores. Mandibular canal with five to six pores. Two branchial pores situated near the mid-point between origin of dorsal fin and gill opening.

Mouth in terminal position and closing completely. Teeth in jaws uniserial, caniniform, pointed and slightly retrorse (Fig. 2B). Teeth of peripheral series of premaxillary plate 12-14 in number (these counts include shed teeth); several small teeth

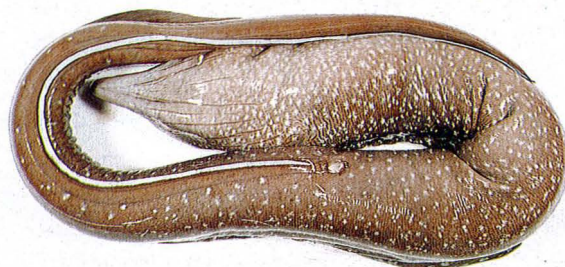
found in some spaces between lateral teeth of peripheral series of premaxillary plate. Mesial series of premaxillary plate with three teeth, the posterior larger. Prevomerine teeth small, in a straight series and 7-9 in number. Maxillary teeth in a single row, 10-14 on left and 11-15 on right side. Moreover, smaller individual has additional inner teeth anteriorly in maxilla; 1-2 teeth of the row slightly longer than the outer series of maxillary teeth. Mandibular teeth in a single series, 17-19 on left and 18-20 on right side. Anterior mandibular



A



B



C

Fig. 1. *Gymnothorax niphostigmus* n. sp. A, holotype, ASIZP 056940, 713 mm TL, Keelung; B, dorsal view of holotype; C, ventral view of holotype showing the distinct white anal fin margin.

teeth larger. As in the peripheral series of pre-maxillary teeth, several small teeth found in the space between larger teeth near symphysis.

Color in formalin or alcohol darkish brown with numerous small whitish spots over entire body and dorsal fin region. These little spots separate from each other on peri-cranium and posterior tail

region; but gather together densely to form snowflake-like patches on posterior head, trunk, anterior tail, and dorsal fin regions. The density of whitish spots varies for different individuals. No obvious whitish spots on jaw, inner mouth, chin, or anal fin. Anal fin margin distinctly white, edge of dorsal and caudal fins darkish. Corners of mouth black-

Table 1. Lengths, proportions, vertebral counts and gonadal type of the holotype and three paratypes of *Gymnothorax niphostigmus* n. sp.

	Holotype		Paratypes					
	ASIZP 056940 (mm)	(%)	ASIZP 056941 (mm)	(%)	TFRI-TT063 (mm)	(%)	TFRI-TT071 (mm)	(%)
Total length	713		757 ^a		737 ^a		635	
% of total length								
Preanus length	334	46.8	379	50.1 ^a	395	53.6 ^a	292	46.0
Trunk length	247	34.6	280	37.0 ^a	271	36.8 ^a	210	33.1
Body depth at anus	44	6.2	44	5.8 ^a	50	6.8 ^a	34	5.4
Body depth at gill opening	61	8.6	54	7.1 ^a	69	9.4 ^a	36	5.7
Head length	87	12.2	99	13.1 ^a	124	16.8 ^a	82	12.9
% of head length								
Predorsal length	62	71.3	79	79.8	81	65.3	59	72.0
Mouth cleft length	40	46.0	40	40.4	51	41.1	39	47.6
Snout length	17	19.5	17	17.2	23	18.5	16	19.5
Eye diameter	7.4	8.5	7.4	7.5	9	7.3	7	8.5
Interorbital width	9.8	11.3	10	10.1	14	11.3	10	12.2
Predorsal vertebrae	5		4		4		4	
Preanal vertebrae	54		55		53		54	
Total vertebrae	142		120 ^a		108 ^a		140	
Gonadal type	testis		ovary		testis		ovary	

^aTip of tail missing

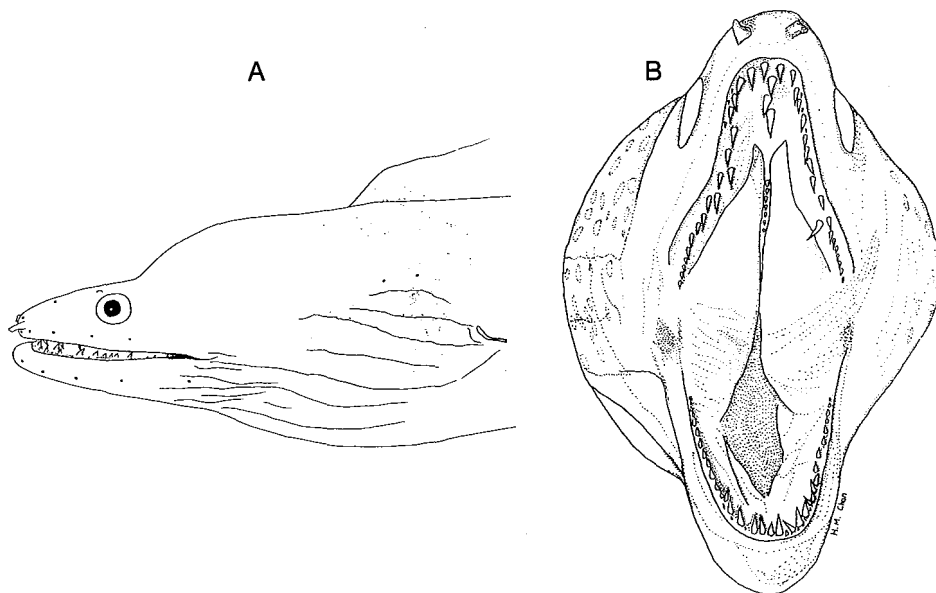


Fig. 2. *Gymnothorax niphostigmus* n. sp. A, head of holotype, ASIZP 056940, 713 mm TL, Keelung; B, dentition of holotype.

ish, thoracic creases darkish. Chin and abdomen pale. Color in life similar to that in preservative, but brown ground color darker and whitish spots brighter (Fig. 3). Iris of eye yellowish to brownish.

Distribution: From northern to eastern Taiwan, and the Pescadore Islands.

Remarks: *Gymnothorax niphostigmus* should be closely related to *G. leucostigmus* Jordan and Richardson (1909) and *G. neglectus* Tanaka (1911), since all of their bodies have a brownish ground color and whitish spots. *G. leucostigmus* has been found from southern Japan, China, Taiwan (including Keelung, Aoti, Nanfangao, Chengkung, and Kaohsiung), and the South China Sea, but *G. neglectus* has only been found from southern Japan to Taiwan (including Keelung, Nanfangao, and Chengkung).

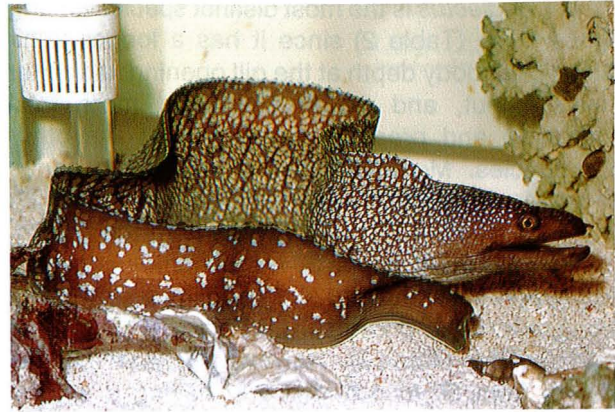


Fig. 3. *Gymnothorax niphostigmus* (paratype, ASIZP 056941, 757 mm TL, Aoti) reared in the aquarium of our laboratory showing the coloration pattern in life.

Table 2. Comparisons of proportions, counts, coloration, and other characters among *Gymnothorax niphostigmus* n. sp., *G. leucostigmus*, and *G. neglectus*^a

	<i>G. niphostigmus</i>	<i>G. leucostigmus</i>	<i>G. neglectus</i>
% of total length			
Head length	12.2-12.9 ^b	12.0-14.1	10.9-11.9
Trunk length	33.1-34.6 ^b	31.3-33.3	38.5-40.0
Body depth at gill opening	5.7-8.6 ^b	5.5-6.3	7.5-9.4
% of head length			
Snout length	17.2-19.5	18.2-20.0	13.3-13.9
Mouth cleft length	40.0-47.6	43.5-50.0	31.3-27.0
Snout shape	sharp	sharp	blunt
Counts			
Head pores			
Supraorbital canal	3	3	3
Infraorbital canal	4-5	4	4
Mandibular canal	5-6	5-6	5-6
Branchial pore	2	2	1-2
Total vertebrae	140-142 ^b	135-138	142-153
Predorsal vertebrae	4-5	4-5	4-6
Preanal vertebrae	53-55	52-54	59-60
Premaxillary teeth			
Mesial series	3	1-3	0
Peripheral series	12-14	13-15	10-12
Maxillary teeth	10-15	11-12	8-10
Mandible teeth	17-20	15-18	17-21
Prevomerine teeth	7-9	6-9	5-12
Coloration			
White anal-fin margin	Yes	No	Yes
Ground color	darkish brown	reddish brown	reddish brown
Color of iris	yellow to brown	yellow	brown to blue
Color of spots	bright whitish	obscure whitish	whitish to yellowish
Size of spots	small	large	small
Pattern of spots	snowflake-like patches	obscure round spots	dense little spots

^aSome data were taken from earlier literature, including Chen and Weng 1967, Hatooka 1984, and Chen et al. 1994.

^bData of specimens with missing tail tip have been excluded.

G. neglectus is the most distinct species among these three (Table 2) since it has a longer trunk and higher body depth at the gill opening; a shorter head, snout, and mouth cleft; and more total vertebrae and preanal vertebrae than the other two species. Moreover, the lack of a mesial series of premaxillary teeth and the bluish color of its iris make *G. neglectus* very different from the others.

On the other hand, *G. leucostigmus* is similar to the present described species in general proportions, counts of predorsal and preanal vertebrae, and dentition (Table 2). However, *G. niphostigmus* differs from *G. leucostigmus* in having a slightly longer trunk (33.1%-34.6% vs. 31.3%-33.3% of TL.), more total vertebrae (140-142 vs. 135-138), a darker ground color (darkish brown vs. reddish brown), and smaller, more numerous spots, besides its unique coloration with whitish snowflake-like patches and an unusual white margin on the anal fin.

Etymology: The new species name "*niphostigmus*" is from the Greek *nipho* (snow) and the Greek *stigma* (a spot), in reference to the whitish snowflake-like patches.

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臺灣北部及東部海域之新種鯙類：雪花斑裸胸鯙

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本新種鯙類—雪花斑裸胸鯙，與它的最相似種白斑裸胸鯙間有明顯的不同，其主要區分的特徵在於：雪花斑裸胸鯙遍佈全身的白斑點較小，數量較多且經常匯聚成雪花狀較大的斑塊；魚體底色較深；臀鰭具有明顯的白色邊緣；脊椎骨數140至142。

關鍵詞：鯙科，鯙類，雪花斑裸胸鯙，魚類相，魚類分類。

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