

New Records of Six Species of the Tetraodontidae (Pisces: Tetraodontiformes) from Korea

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Six species of the family Tetraodontidae collected from coastal waters of Korea were described with photographs, all of which are unreported previously from Korea. They are *Lagocephalus inermis* (Temminck et Schlegel), *Takifugu alboplumbeus* (Richardson), *T. pseudommus* (Chu), *T. reticularis* (Tien, Cheng et Wang), *Arothron hispidus* (Linnaeus) and *A. nigropunctatus* (Bloch et Schneider).

Introduction

A total of 20 species and 6 genera of the Korean Tetraodontidae have been reported by previous authors (Mori, 1952; Abe, 1949; Chyung, 1977; Kim and Kim, 1985; Kim and Lee, 1989; 1990). Recently, Kim and Lee (1990) reviewed of the suborder Tetraodontoidei including 24 species as some synonym and their taxonomic position.

In the course of studying the Korean fish fauna, many specimens of the tetraodontid fishes were collected from 1990 to 1993. Among them, six species were recognized as new records from Korea. In this paper the author redescrbe them and provide their geographical distribution in Korea.

Materials and Methods

The majority of specimens were collected by fisherman with trawl net and hook or from local fish markets in the several sites of the south and west coast of Korea (Fig. 1). The methods of counts and measurement followed Lee (1993). Radiographs by soft x-ray (Hitax 80-A, Japan) were used in counting the number of vertebrae, pterygiophores and fin ray.

The specimens used in this study are deposited at the Department of Biology, Chonbuk National University, Chonju, Korea (CNUC).

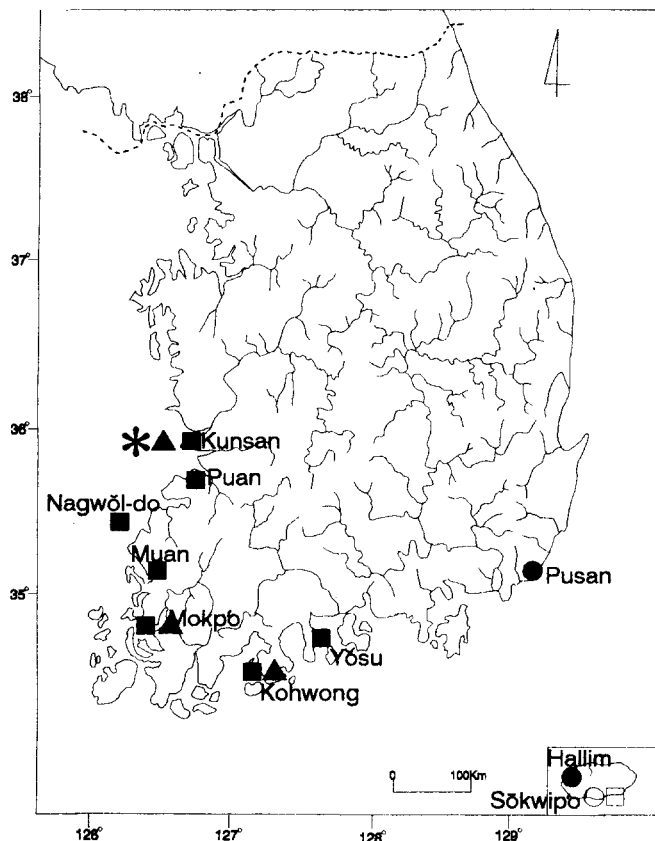


Fig. 1. Map showing the collection sites of the tetraodontid fishes from Korea.
Lagocephalus inermis (●); *Takifugu alboplumbeus* (■); *Takifugu pseudommus* (▲);
Takifugu reticularis (*); *Arothron hispidus* (○); *Arothron nigropunctatus* (□).

Results

Genus *Lagocephalus* Swainson, 1839

Lagocephalus inermis (Temminck et Schlegel), 1850

New Korean name : Minmilbok

Tetraodon inermis Temminck et Schlegel, 1850, p. 278 (type locality: Shimahara bay, Japan).

Lagocephalus inermis: Matsuura in Masuda *et al.*, 1984, p. 364.

Material examined: CNUC 15135, 1 specimen, 216.0 mm SL, Hallim - up, Pukcheju - gun, Cheju - do, Korea, 14 January, 1990; CNUC 18034 - 18035, 2 specimens, 150.0 - 243.0 mm SL, Nampo - dong, Chung - gu, Pusan - shi, 7 October, 1991.

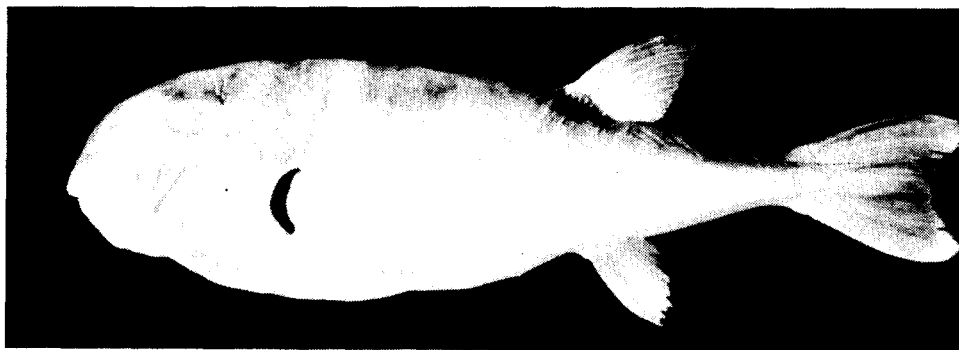


Fig. 2. *Lagocephalus inermis*. 243.0 mm SL.

Description: Dorsal fin rays 13-14; anal fin rays 11-12; pectoral fin rays 17; vertebrae 18; dorsal pterygiophores formula 7*12231; dorsal pterygiophores 9; anal pterygiophores 6. Measurement for 3 specimens (259.8-295.0 mm SL) in percent of standard length: body depth 30.2-34.4; body width 19.4-23.1; head length 33.3-33.6; snout length 18.5-19.9; eye diameter 7.4-7.5; interorbital width 14.6-15.6; predorsal length 67.1-69.4; preanal length 69.7-76.4; length of dorsal fin 18.6-18.7; length of anal fin 12.9-15.7; length of pectoral fin 15.1-16.5; length of caudal fin 20.7-22.2; length of dorsal fin base 7.5-8.8; length of anal fin base 7.0-7.4; caudal peduncle length 21.4-23.5; caudal peduncle depth 6.4-8.1. Tilly bones on vertebrae present with 2. Body rather elongate, the lateral fold ridges distinct; whole back and belly smooth; fins rather falcate. Caudal fin slightly round forked lunate. Color when fresh brown or olive-green on back and golden yellow or silver white on lateral side. Gill opening and anus black. Dorsal fin black with white or brown color at base. Anal fin nearly colorless. Pectoral fin grey.

Distribution: Cheju Island(Hallim) and South Sea(Pusan) of Korea, Japan, Taiwan, South China and East China Sea, Indo-Pacific Ocean (Jordan and Snyder, 1902; Chen *et al.*, 1986).

Notes on biology: This species was found in both pelagic and inshore habitats; sometimes it was found with *Lagocephalus gloveri*. This species attains at least 1000mm in total length. Food habits are poorly known; however, present study material (CNUC 18034, 245.5 mm SL) included some unidentified crustaceans and fishes segments in the stomach

Remark: This species resembles *Lagocephalus lunaris*, but differ in having black gill opening, back and belly without prickles, and slightly round forked caudal fin. But Jordan and Snyder (1902) reported in the belly with prickles. This species is reported for the first time from Korea.

Genus *Takifugu* Abe, 1949
Takifugu alboplumbeus (Richardson), 1844
New Korean name; Hwanghaehinjombok

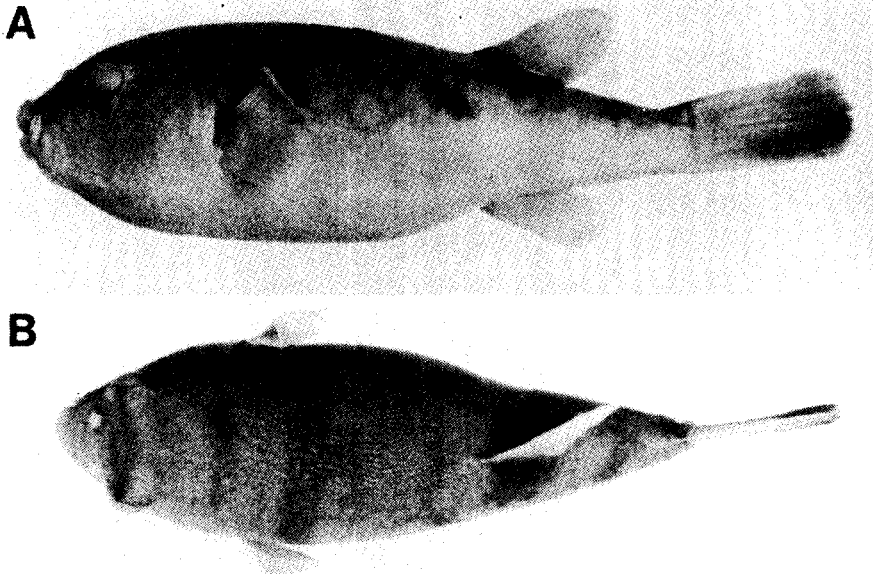


Fig. 3. *Takifugu alboplumbeus*, 130.0 mm SL.
A: Lateral view. B: Dorsal view.

Tetraodon alboplumbeus Richardson, 1844, p. 121, pl. 58, fig. 6-7 (type locality: Canton, China).

Fugu alboplumbeus: Cheng *et al.*, 1975, p. 374-375, pl. 2, fig. 6.

Takifugu: Matsuura, 1990, pp. 15-20.

Material examined: CNUC 17167-17179, 14 specimens, 110.4-171.5 mm SL, Todae-ri, Ch'onggye-myon, Muan-gun, Chollanam-do, Korea, 30 July, 1988; CNUC 17180-17185, 6 specimens, 80.0-89.0 mm SL, Nagwol-do, Nagwol-myon, Younggwang-gun, Chollanam-do, 28 October, 1991.

Description: Dorsal fin rays 12-13(13); anal fin rays 10-11(11); pectoral fin rays 14-17(16); vertebrae 21; dorsal pterygiophores formula 7*1122232 or 7*1112232; dorsal pterygiophores 12-13; anal pterygiophores 7-8(8). Measurement for 20 specimens (80.0-171.5 mm SL) in percent of standard length: body depth 27.6-35.5; body width 28.6-32.7; head length 30.2-32.8; snout length 13.3-16.1; eye diameter 5.9-7.9; interorbital width 15.9-19.5; predorsal length 65.3-72.9; preanal length 66.1-71.2; length of dorsal fin 18.4-21.9; length of anal fin 17.1-21.1; length of pectoral fin 13.5-15.4; length of caudal fin 20.2-26.5; length of dorsal fin base 9.9-12.2; length of anal fin base 7.8-10.2; caudal peduncle length 23.5-27.1; caudal peduncle depth 8.5-9.4. Body rather elongate, the dorsal little elevated; caudal peduncle not compressed. Interorbital space broad, flat.

Lateral fold ridges prominent. Skin of back and belly covered with prickles; the two areas confluent both before and behind pectorals. Color when fresh whitish brown above with numerous round, pale spots which are larger, more confluent, and more irregular on sides, none of them sharply defined or stellate, most of them broader than the inter-spaces; a indistinct dark blotch behind pectoral; caudal yellowish dusky toward tip; other fins more or less yellow.

Distribution: Western parts of South Sea (Yosu, Kohwong) and southern parts of Yellow Sea (Kunsan, Puan, Younggwang, Muan, Mokpo) in Korea, South China and East China Sea, Eastern Indian Archipelago.

Notes on biology: *Takifugu alboplumbeus* was found in both pelagic and inshore sandy and muddy bottom habitats with *Takifugu niphobles* and young specimens of *T. rubripes*. This species is a small size puffer. The largest specimen examined was approximately 172mm in SL. Sexual maturity is attained between 90 and 120 mm SL. Food habits are poorly known; however, stomach contents of present study materials(CNUC 17177-17179, 114.3-115.3 mm SL; CNUC 17184-17185, 85.0-87.0 mm SL) included small crustaceans, especially crabs and shrimps, mollusca (gastopods), echinoderms, and small fishes. This species contained the potent poison tetrodotoxin, which was especially concentrated in the gonads, skin and muscles.

Remark: This species resembles *Takifugu poecilonotus*, but differ in having 12-13 (13) dorsal fin rays (*T. poecilonotus*, 11-13(12)), 10-11 (11) anal fin rays (*T. poecilonotus*, 10-11(10)), 12-13 dorsal pterygiophores (*T. poecilonotus*, 11-12), distinct 7 longitudinal band, and whitish color in base of prickles. This species is reported for the first time from Korea.

***Takifugu pseudommus* (Chu), 1935**

New Korean name: Hinjomchambok

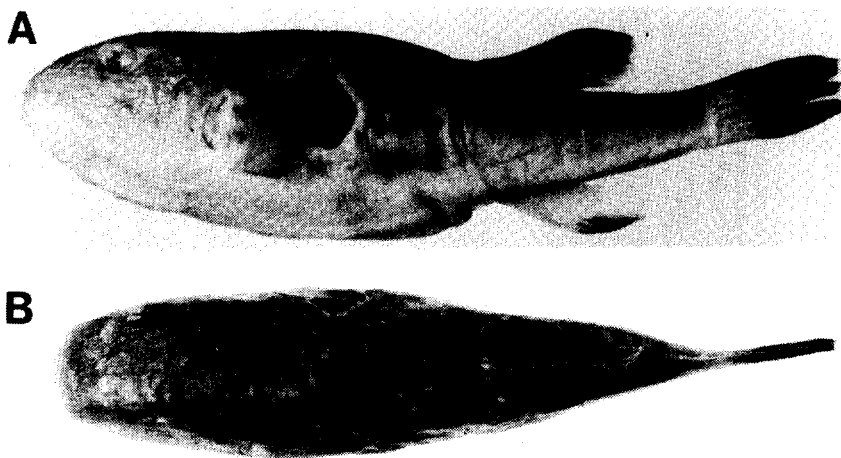


Fig. 4. *Takifugu pseudommus*, 150.0 mm SL.

A: Lateral view, B: Dorsal view.

Lagocephalus pseudommus Chu, 1935, p. 87, fig. 1 (type locality: Chusan, Soochow, China).

Spherooides pseudommus: Abe, 1949, p. 108-110, pl. 2, fig. 3-4.

Fugu pseudommus: Cheng *et al.*, 1975, p. 370, pl. 2, fig. 1-3.

Takifugu: Matsuura, 1990, pp. 15-20.

Material examined: CNUC 17230-17231, 2 specimens, 127.3-133.5 mm SL, Hae-mang-dong, Kunsan-shi, Chollabuk-do, Korea, 7 November, 1989; noncatalog, 1 specimen, 145.0 mm SL, Doyang-up, Kohung-gun, Chollanam-do, 17 May, 1990; noncatalog, 1 specimen, 160.0 mm SL, Doyang-up, Kohung-gun, Chollanam-do, 24 September, 1990; noncatalog, 1 specimen, 150.0 mm SL, Yonghae-dong, Mokpo-shi, Chollanam-do, 30 March, 1986.

Description: Dorsal fin rays 17-18; anal fin rays 14-15; pectoral fin rays 18; vertebrae 22; dorsal pterygiophores formula 7*112222222; dorsal pterygiophores 15-16; anal pterygiophores 10. Measurement for 5 specimens (127.3-160.0 mm SL) in percent of standard length: body depth 30.9-33.4; body width 23.9-24.1; head length 32.6-33.2; snout length 14.8-15.5; eye diameter 5.0-5.1; interorbital width 17.7-19.6; predorsal length 67.4-68.7; preanal length 68.2-70.7; length of dorsal fin 23.3-23.6; length of anal fin 21.3-22.1; length of pectoral fin 13.7-13.8; length of caudal fin 21.3-22.9; length of dorsal fin base 10.7-10.8; length of anal fin base 10.7-10.8; caudal peduncle length 21.3-22.5; caudal peduncle depth 8.5-8.8. Body rather elongate, heavier in front, tapering behind. Nasal area low, each with two nostrils. Top of head, back and belly with small prickles; snout, cheek and tail naked; two areas separate. Lateral fold ridges distinct, but confined to the posterior part of the body. Dorsal and anal somewhat falcate, of about equal height and size. Dorsal and upper lateral surfaces dark greyish brown, with numerous spots of white, narrower than interspaces. Two distinct dark blotch behind and above the bases of pectorals, the blotch being edged with a white ring. A similar prominent blotch at the base of dorsal, being also encircled by white. Tip of caudal blackish; tip of anal, dorsal and pectoral blackish gray.

Distribution: Yellow Sea (Kunsan, Mokpo) and South Sea (Kohung) of Korea, northern of East China Sea.

Notes on biology: *Takifugu pseudommus* was found in pelagic habitats with *Takifugu vermicularis* and *T. rubripes*. This puffer fishes appears to be medium in size, as the largest specimen examined was approximately 170mm in SL. Food habits are poorly known; however, stomach contents of present study materials (CNUC 17230-17231, 124.60-133.5 mm SL) included cephalopods (squid), and small fishes (*Zoarces gilli* cut in about 12 mm segment of body).

Remark: The present species is distinguishable from *Takifugu chinensis* by the presence of numerous white spots on the head and body, and body color of yellowish brown. This species is reported for the first time from Korea.

***Takifugu reticularis* (Tien, Cheng and Wang), 1975**

New Korean name: Mangbok

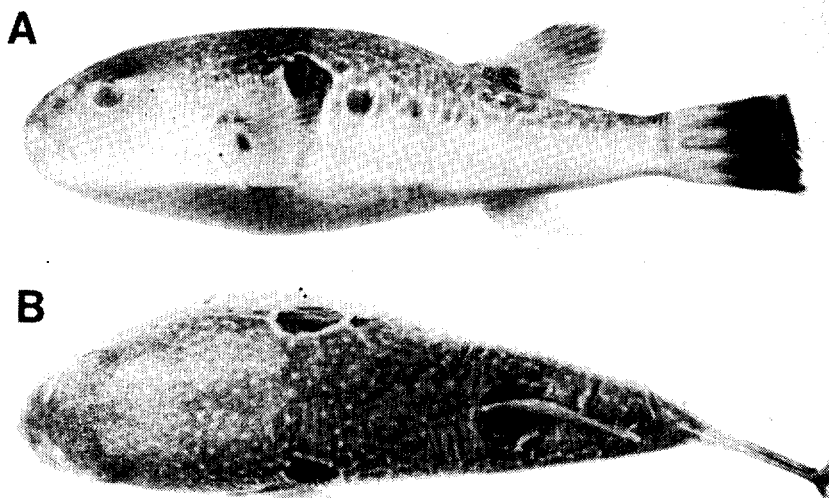


Fig. 5. *Takifugu reticularis*, 171.0 mm SL.
A: Lateral view, B: Dorsal view.

Fugu reticularis Tien, Cheng and Wang in Cheng *et al.*, 1975, pp. 369–370, 377–378
(type locality: Shandong, China).

Takifugu: Matsuura, 1990, pp. 15–20.

Material examined: CNUC 17233, 1 specimen, 171.0 mm SL, Haemang-dong, Kunsan-shi, Chollabuk-do, 3 January, 1987; CNUC 17234, 1 specimen, 161.2 mm SL, Haemang-dong, Kunsan-shi, Chollabuk-do, 2 March, 1986.

Description: Dorsal fin rays 17; anal fin rays 14; pectoral fin rays 17; vertebrae 22; dorsal pterygiophores formula 7*111222223; dorsal pterygiophores 15–16; anal pterygiophores 10–11. Measurement for 2 specimens (161.2–171.0 mm SL) in percent of standard length: body depth 26.7–31.4; body width 23.3–28.3; head length 31.1–34.8; snout length 15.0–16.7; eye diameter 4.9–5.0; interorbital width 15.2–18.6; predorsal length 67.9–74.4; preanal length 66.2–72.6; length of dorsal fin 21.4–21.6; length of anal fin 20.0–20.7; length of pectoral fin 12.8–16.3; length of caudal fin 22.2; length of dorsal fin base 12.2–14.5; length of anal fin base 10.4–10.7; caudal peduncle length 22.0–22.5; caudal peduncle depth 8.3–9.1. Body rather elongate, heavier in front, tapering behind. Nasal area low, each with two nostrils. Top of head, back and belly with very small prickles (dermal spine); snout, cheek and tail naked; two areas separate. Lateral ridges distinct. Dorsal and anal somewhat falcate, of about equal height and size. The ground color of the back greenish brown, with irregular whitish spots in the smaller speci-

mens. and with a blackish network in the larger specimens. A large black blotch on the side at about the end of the pectoral fin. Tip of caudal and dorsal blackish; anal and pectoral yellowish brown.

Distribution: Yellow Sea (Kunsan) of Korea, East China Sea and Yellow Sea of China (Cheng *et al.*, 1975).

Notes on biology: *Takifugu reticularis* was found in pelagic habitats with *Takifugu chinensis* and *T. xanthopterus*. This species appears to be a moderate size puffer, as the largest specimen examined was approximately 171 mm SL. Food habits are poorly known; however, stomach contents of present study material (CNUC 17234, 159.2 mm SL) included small segments of unidentified fish (about 5 mm size).

Remark: The present species is closely related to *T. basilevskianus*, but differs from the latter in having a blackish network color on the back in adult specimens. This species is reported for the first time from Korea.

Genus *Arothron* Müller, 1843

***Arothron hispidus*(Linnaeus), 1758**

New Korean name; Hinjomkkokkulbok



Fig. 6. *Arothron hispidus*, 257.6 mm SL.

Tetraodon hispidus Linnaeus (cited from Jordan and Snyder, 1902), 1758. p. 333 (type locality: China).

Arothron hispidus; Fraser - Brunner, 1943. p. 15.

Material examined: CNUC 18848, 1 specimen, 257.6 mm SL, Chungmun - dong, Sogwipo - shi, Cheju - do, Korea, 17 August, 1991.

Description: Dorsal fin rays 11; anal fin rays 11; pectoral fin rays 17; vertebrae 8+10=18; dorsal pterygiophores formula 7*1231; dorsal pterygiophores 7; anal pterygiophores 5. Meas-

urement for one specimen (257.6 mm SL) in percent of standard length: body depth 36.7; body width 34.4; head length 42.7; snout length 20.8; eye diameter 5.4; interorbital width 17.1; predorsal length 85.5; preanal length 80.2; length of dorsal fin 21.9; length of anal fin 22.0; length of pectoral fin 17.7; length of caudal fin 31.7; length of dorsal fin base 8.8; length of anal fin base 8.6; length of pectoral fin base 11.3; caudal peduncle length 21.0; caudal peduncle depth 15.5. Body elongate and rounded havy forward, tapering to the laterally compressed caudal in present study specimens; head blunt; lips thin and fleshy; mouth small and terminal; eye large and far back; nostrils with two forked tentacle, connected at its base. Fins small, their edges rounded; body everywhere except anterior part of head, bases of fins and caudal peduncle covered with small prickles or bristles. Body color variable, blackish gray, the upper parts with oblong or round pale spots about as large as pupil; interspaces wider than spots; a large black blotch surrounded by a white ring around base of pectoral and gill opening; chin dusky; belly whitish, with parallel stripes of black, which fade and grow narrower on the median part; caudal with small white spots; other fins pale or with a little dusky.

Distribution: Cheju Island (Sogwipo) of Korea, southern parts of Japan, Taiwan, South China Sea, Hawaii, Australia, Indo - Pacific Ocean.

Notes on biology: *Arothron hispidus* is found in inshore habitats with rocky and coral reef bottoms. This species has morderate body size with approximately 258mm SL. Nothing is known of its food habits. This species contain the potent poison tetradotoxin, which is especially concentrated in the gonads, skin and muscle.

Remark: This species was similar to *Arothron stellatus*, but differ in having the white spots on head, back and sides, and belly with many longitudinal narrow dark stripes. This species is reported for the first time from Korea.

***Arothron nigropunctatus* (Bloch et Schneider), 1801**

New Korean name: Hukjomkkokkulbok



Fig. 7. *Arothron nigropunctatus*, 136.3 mm SL.

Tetraodon nigropuctatus Bloch et Schneider, (cited from Abe, 1949) 1801, p. 507 (type locality: Tranquebar, Madras, India).

Arothron nigropuctatus: Fraser - Brunner, 1943, p. 15.

Materials examined: CNUC 18031, 1 specimen, 136.3 mm SL, Chungmun - dong, Sogwipo - shi, Cheju - do, Korea, 17 August, 1991.

Description: Dorsal fin rays 10; anal fin rays 11; pectoral fin rays 18; vertebrae 8+10=18; dorsal pterygiophores formula 7*1223; dorsal pterygiophores 8; anal pterygiophores 5. Measurement for one specimen (136.3 mm SL) in percent of standard length: body depth 35.6; body width 31.2; head length 41.1; snout length 19.2; eye diameter 7.3; interorbital width 16.4; predorsal length 77.4; preanal length 75.6; length of dorsal fin 18.9; length of anal fin 17.2; length of pectoral fin 12.8; length of caudal fin 26.0; length of dorsal fin base 8.7; length of anal fin base 8.5; length of pectoral fin base 10.9; caudal peduncle length 16.4; caudal peduncle depth 13.4. Body oblong, and rounded havy forward, tapering to the laterally compressed caudal peduncle; dorsal smoothly rounded; ventral with great inflation in belly; lips thin and fleshy; mouth small and terminal; eye large and far back; nostrils with two forked tentacle, connected at its base. Fins of dorsal and anal small, their edges rounded; anal fin originates just behind dorsal; pectoral fin and caudal fin rounded; skin rough, body covered thickly with pale bristles except lips and posterior part of caudal peduncle. Body color variable, brown or light brownish to blackish above, becoming lighter on sides and paler beneath; some black spots of varying size scattered over body, more numerous on belly; snout and gill opening usually black; anus in a black blotch; dorsal and anal mostly dark brown or blackish, pale on terminal margins; bases of pectorals dark and usually dusky or pale on fins; caudal brown or dark blackish, but pale on its margin.

Distribution: Cheju Island (Sogwipo) of Korea, southern parts of Japan, Taiwan, South China Sea, Hawaii, Australia and Indo - Pacific Ocean.

Notes on biology: *Arothron nigropuctatus* was found in inshore habitats with rocky and coral reef bottoms. This species appears to have small body size among the genus *Arothron*. The specimen examined was approximately 137 mm SL. Nothing is known of its food habits.

Remark: *Arothron nigropuctatus* was reported only from tropical Indo - Pacific Ocean, but in the present study this species was collected from the coast of Sogwipo, Cheju Island, Korea for the first time.

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New Records of Six Species of the Tetraodontidae(Pisces: Tetraodontiformes) from Korea

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한국산 참복과 (복어목) 어류 6 미기록종

이 완 옥
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한국의 연안에서 1990년 부터 1993년 까지 채집된 참복과 (복어목) 어류 가운데 다음 6 종의 어류는 지금까지 한번도 채집되어 기록된 적이 없는 한국 미기록종이었다. 이들 6 종의 새로운 국명과 학명은 민밀복 *Lagocephalus inermis* (Temminck et Schlegel), 황해흰점복 *Takifugu alboplumbeus* (Richardson), 흰점참복 *T. pseudommus* (Chu), 망복 *T. reticularis* (Tien, Cheng et Wang), 흰점꺼끌복 *Arothron hispidus* (Linnaeus), 흑점꺼끌복 *A. nigropunctatus* (Bloch et Schneider) 이었으며, 위의 종들의 특징과 분포에 관하여 논의 하였다.