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Taxonomic Studies on the Puffers from Japan and Adjacent Regions — Corrigenda and Addenda. Part II

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In October, 1959, a serious case of intoxication caused by eating the flesh of a puffer of the genus *Lagocephalus* taken off Vietnam occurred in Kokura City, Fukuoka Prefecture, Kyushu, Japan. The present writer has been asked by Dr. Iwao TANI (Laboratory of Criminal Sciences, Fukuoka Prefectural Police Department) to identify the fish, and several frozen specimens and skeletons of the fish from the same water have been received for study through the courtesy of Dr. TANI, Mr. Takeo KAWAKAMI (Research Laboratory, Taiyō Gyogyō Co., Shimonoseki) and Dr. Toshiharu KAWABATA (Dept. of Food Control, National Institute of Health, Tokyo). The last-named biochemist and Mr. Kōichi KAN-NA (Tokai Regional Fisheries Research Laboratory) have kindly revealed the presence of an unusually strong toxicity in the viscera, flesh and skin of the fish specimens dissected by the present writer. This fish resembles a Japanese form of *Lagocephalus* called "saba-fugu", which is well known as non-toxic in Japan, and some fishermen shipped the former fish caught during the 2nd and 3rd of September, 1959, to Kyushu believing that it was, like the Japanese "saba-fugu", not poisonous to eat. Some 340 kg of the flesh (with vertebral columns and caudal fins) were sold by auction on the 16th of October, 1959, in Kokura City, and four persons died on the next day by eating the flesh in spite of the fishermen's effort to buy back the flesh from the purchasers; some of them working at a big restaurant ate tentatively a small quantity of the flesh in the evening of the 16th of October as they usually did, and in the next morning informed the retailer who sold the flesh of the puffer to the restaurant that it might be poisonous.

In the previous papers (ABE, 1942-1954), the present writer, with some doubt, disposed of *Tetrodon spadiceus* RICHARDSON as a synonym of *Lagocephalus lunaris* (BLOCH & SCHNEIDER). Examination of the frozen and skeletonized specimens of the poisonous puffer from off Vietnam mentioned above has led him to believe that it differs, morphologically as well, from the non-toxic congener from the Japanese waters which has hitherto been recorded either as *Lagocephalus lunaris* or as *L. spadiceus*.

Although he is still doubtful of the identity of the latter fish with *spadiceus* described by RICHARDSON, it is thought advisable to give a new Japanese name for the poisonous puffer from Vietnam mentioned above and to discriminate between it and *Lagocephalus lunaris spadiceus* from the Japanese waters. The poisonous puffer from Vietnam is believed to be *Lagocephalus lunaris lunaris* (BLOCH & SCHNEIDER). In the following pages the writer wishes to give a new Japanese name for it along with additional records of *Lagocephalus lunaris lunaris* and *L. lunaris spadiceus*, and finally present a key to these puffers. He takes pleasure in expressing here his thanks to the scientists who have co-operated with him.

Lagocephalus lunaris lunaris (BLOCH & SCHNEIDER)

"Doku*-sabafugu**", new Japanese name

Tetraodon lunaris CUVIER, 1817, p. 359, foot-note. After RUSSELL, 1803.
Lagocephalus lunaris ABE, all the papers published during 1942-1954, in many places; in part. Borneo.
Gastrophysus lunaris FRASER-BRUNNER, 1943, p. 10.——SMITH, 1939 (second impression in 1950), p. 418, pl. 93. South Africa.

Lagocephalus lunaris spadiceus (RICHARDSON)

"Sabafugu"

Tetrodon lunaris var. *δ spadiceus* (BLKR) GÜNTHER, p. 274; in part. Japan.
Lagocephalus lunaris ABE, all the papers published during 1942-1954; in part. Japan; Chusan Is., China.——? KURONUMA, 1943, p. 126, pl. 7, fig. 13. Japan.——? CLARK & GOHAR, 1953, p. 57, text-fig. 17, Suez; Al Ghardaqa, Red Sea.
? *Tetraodon lunaris* BOESEMAN, 1947, p. 198.
? *Gastrophysus spadiceus* FRASER-BRUNNER, 1943, p. 10.——SMITH, 1949 (second impre4sion in 1950), p. 418, pl. 93. South Africa.

Key to the two forms of *Lagocephalus* hitherto lumped together as *lunaris*

I. Spinulose area on back reaches dorsal origin or farther back, not thinning off posteriorly. Length of head is larger than distance from upper corner of gill opening to dorsal orign. Total number of vertebrae is 17 (=8+9). Prefrontal (=lateral ethmoid), preopeculum and lower limb of postclavicle are remarkably thickened and white (figs. 1 & 2). Prefrontal is protruded anteriorly. Tips of caudal fin are acutely pointed, and not white. Flesh is extremely toxic. Ranges north to the Philippines ..... *L. lunaris lunaris.*

II. Spinulose area on back does not reach dosal origin, or, thins off posteriorly extending rearwards as a very narrow band along mid-dorsal line. Length of head

* Doku means poison or poisonous.
** Saba means mackerel; fugu is puffer.

is smaller than distance from upper corner of gill-opening to dorsal origin. Total number of vetebrae is 19 (=8+11) or 20 (=8+12). No bones of the head region and pectoral girdle are thickened (figs. 3 & 4). Prefrontal is short. Upper and lower tips of caudal fin are not acutely pointed, and white. All the parts of body are non-toxic ..... *L. lunaris spadiceus.*

The shape of the lateral line below the eye on either side of the head is angular in *lunaris*; in *spadiceus* it is often rounded, but the bilateral asymmetry in the shape of the line just mentioned is not infrequently met with.

Some of the neural or haemal spines of the vertebrae behind the last interneural or interhaemal are thickened (figs. 6 & 7) in *lunaris* and *spadiceus*. If the thickening of some of the bones of the head region and pectoral girdle, and the prolongation and thickening of the prefrontal in *lunaris* is an abnormal growth in large sized individual, the key given above may be changed, and if the difference in the total number of vertebrae is due to differences in the environment, the key will become a simpler one. Further, if the toxicity of the flesh and the other parts of the body in *lunaris* from Vietnam is similiar to what often observed of ordinary food fishes becoming poisonous in certain places alone, the key will relate only to the length of head, extent of the spinulose area on back and the shape and color of the caudal tips.

References

ABE, T. 1954. Taxonomic studies on the puffers from Japan and adjacent regions—Corrigenda and addenda. Part I. Jap. Journ. Ichth., iii, nos. 3/4/5, pp. 121-128, pl. 1. For earlier papers by ABE, please see "References" at the end of the paper.

BOESEMAN, M. 1947. Revision of the fishes collected by BURGER & VON SIEBOLD in Japan. vii+242 pp., 3 pls. E. J. BRILL, Leiden.

CLARK, E. & GOHAR, H. A. F. 1953. The fishes of the Red Sea: Order Plectognathi. Publications of the Marine Biological Station, Al Ghardaqa (Red Sea), no. 8, 80+33 pp., 5 pls., 3 maps.

CUVIER, G. L. C. F. D. Le règne animal....., ii, 532 pp. Paris.

FRASER-BRUNNER, 1943. Notes on the plectognath fishes.—VIII. The classification of the suborder *Tetraodontoidea*, with a synopsis of the genera. Ann. Mag. Nat. Hist., Ser. 11, vol. x, pp. 1-18.

FUKUOKAKEN EISEIBU KŌSYŪ-HOKENKA (Dept. of Public. Health., Hygienic Sect., Fukuoka Prefecture). 1960. Reitō Fugu-niku Shoku-chūdoku Jiken Roku, 30 pp. Mimeograph. Fukuoka.

HALSTEAD, W. W. 1959. Dangerous marine animals. xiv+146 pp. Cornell Maritime Press, U.S.A.

HOTTA, H. 1958. Abnormal development of the cranical bones of "Jack-Mackerel" *Trachurus japonicus* TEMMINCK & SCHLEGEL with the growth. Jap. J. Ichth., vii, nos. 2/3/4, pp. 115-117. In Japanese.

KORSCHELT, E. Über Besonderheiten im Auflau des Knochenfischskelets. Zeitschr. wiss. Zool., cliii, pp. 507-546.

KURONUMA, K. 1943. Osteological study on Japanese fish (I) Comparative osteology, especially of cranial characteristics in tetraodontid genera *Liosaccus*, *Lagocephalus* and *Sphoeroides*. Journ. Shigenkagaku Kenkyujo, i, no. 2, pp. 119-130, pl. 7.

SMITH, J. L. B. 1949 (second impression in 1950). The sea fishes of southern Africa. xvi+550 pp., 102 pls. (Later 14 pp. and 2 pls. have been added). Central News Agency, South Africa.

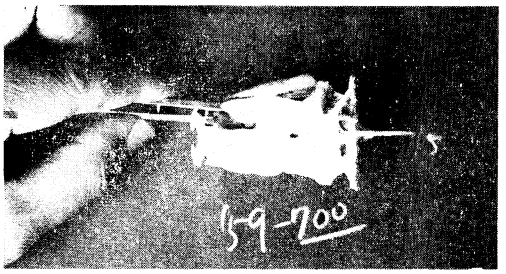

Fig. 1. Dorsal view of the cranium of *Lagocephalus lunaris lunaris*. (Cat. No. ABE '59-700) from off Vietnam.

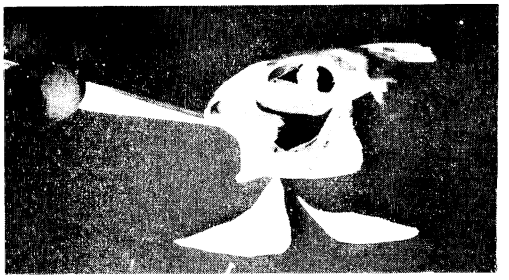

Fig. 2. Lateral view of some of the head bones and lower limb of post-clavicle of *Legocephalus lunaris lunaris* (Cat. No. ABE '59-700).

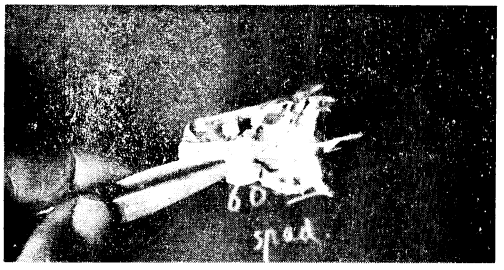

Fig. 3. Dorsal view of the cranium of *Legocephalus lunaris spadiceus* (Cat. No. ABE '60-20) from Japan.

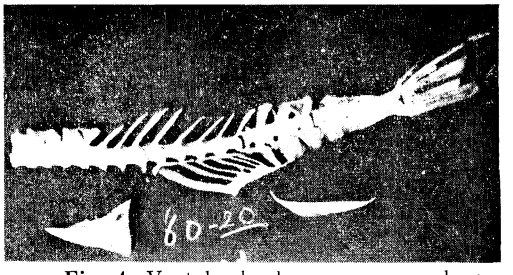

Fig. 4. Vertebral column, preoperculum and lower limb of postclavicle of *Legocephalus lunaris spadieeus* (Cat. No. ABE '60-20).

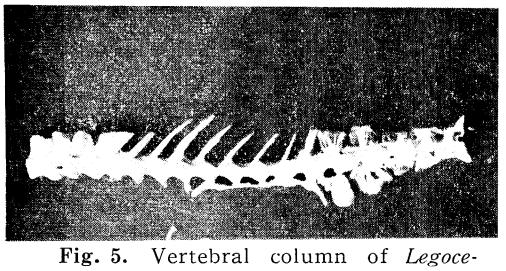

Fig. 5. Vertebral column of *Legocephalus lunaris lunaris* (Cat. No. ABE '59-700).

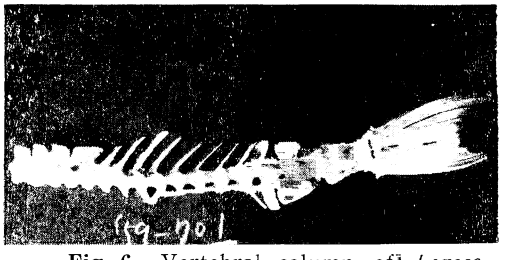

Fig. 6. Vertebral column of *Legocephalus lunaris lunaris* (Cat. No. ABE '59-701) from off Vietnam.

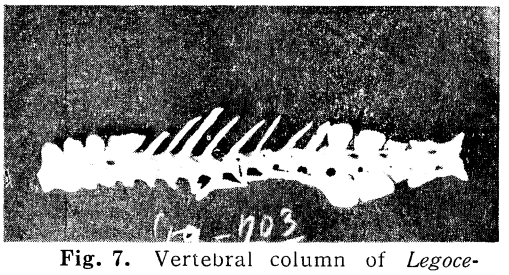

Fig. 7. Vertebral column of *Legocephalus lunaris lunaris* (Cat. No. ABE '59-703) from off Vietnam.