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Redescription of *Lophiodes infrabrunneus* Smith and Radcliffe, 1912, a senior synonym of *L. abdituspinus* Ni, Wu and Li, 1990 (Lophiiformes: Lophiidae)

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Abstract

Lophiodes infrabrunneus Smith and Radcliffe, 1912 is redescribed on the basis of all known specimens. The species is redefined as: a species of *Lophiodes* with three dorsal spines, postcephalic spines absent; illicium relatively short, 13.3–24.2% of SL; second and third dorsal spine relatively short, 12.2–21.2% and 9.1–20.6% of SL respectively, a narrow leaf–like flap, and tendrils present on second and third dorsal spine. *Lophiodes abdituspinus* is a junior synonym of *L. infrabrunneus* based on examination of type series of both species. *L. infrabrunneus* is distributed from Japan, to the Timor Sea, Salomon Is. and northwestern Australia, in eastern Indian Ocean where it occurs in depths between 208–1412 m.

Key words: Lophiidae, anglerfish, monkfish, taxonomy, synonymy

Introduction

Smith and Radcliffe (1912) described *Lophiodes infrabrunneus* based on 11 specimens collected from deep-waters off the Philippines. It was unique in the absence of postcephalic dorsal spines and a relatively short third dorsal spine, about 8.1% in total length in the holotype according to the original description. Caruso (1981) reviewed the genus and set apart *L. infrabrunneus* from his three species groups, *Lophiodes naresi*, *L. caulinaris*, and *L. mutilus*. He concluded that *L. infrabrunneus* can be distinguished from all other congeners by having a very short third dorsal spine (2.5–7.3% of SL vs. 17.1–64.0% of SL in all other *Lophiodes*), postcephalic portion without spine and combination of other characters.

Subsequently, Ni and Xu (1988) recorded a single specimen of *L. infrabrunneus* collected from the East China Sea. Ni *et al*. (1990) described a new species, *L. abdituspinus*, resembling *L. infrabrunneus*, from a single specimen collected from the South China Sea. However, its validity was uncertain. In the original description, Ni *et al*. (1990) listed only two characters to distinguish the new species from *L. infrabrunneus*: humeral spine simple and third dorsal spine short and imbedded in skin. We examined the types of both *L. infrabrunneus* (only 8 of 10 paratypes were found at the USNM) and *L. abdituspinus*, and 13 specimens without postcephalic spine obtained more recently. However, all have a relatively long third dorsal spine. This difference led us to re-examine the type series of *L. infrabrunneus* and redefine the diagnostic characters for this species. Such examinations revealed that the species are identical, with *L. infrabrunneus* being the senior synonym of *L. abdituspinus*.

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Materials and methods

Methods and definitions of the characters used in this study follow Caruso (1981). The morphometric measurements are expressed as percentage of the standard length (SL) and head length (HL). Institutional abbreviations are those provided by Leviton *et al.* (1985). Comparative data are taken from Caruso (1981) and Ni *et al.* (1990).

Lophiodes infrabrunneus Smith and Radcliffe, 1912

(Fig. 1–2)

[English names: Shortspine goosefish, shortspine monkfish]

Lophiodes infrabrunneus Smith and Radcliffe *in* Radcliffe 1912:202 (Holotype: USNM 70265; the Philippines). Herre, 1953: 852 (list, the Philippines). Caruso, 1981: 537 (review, the Philippines). Paxton *et al*. 1989:273 (catalog, NW Australia). Caruso, 1999: 2008. Hutchins, 2001: 22 (catalog, NW Australia). Su and Li, 2002:343 (description, E China Sea and S China Sea). Paxton *et al*., 2006: 605 (catalog, NW Australia).

Lophiodes abdituspinus Ni, Wu and Li 1990:341 (Holotype: SCSFRI D-2583; South China Sea). Su and Li, 2002:341 (description, E China Sea and S China Sea). Ho and Shao, 2008:372.

Lophiodes sp. (cf. *L. infrabrunneus*): Ho and Shao, 2008:372.

Material examined. ***Lophiodes infrabrunneus*: Holotype.** USNM 70265, 258 mm SL, R/V Albatross, sta. 5488, 10°00’00”N, 125°06’45”E, between Leyte and Mindanao, Philippines, 1412 m, 31 July 1909. **Paratypes.** USNM 122281, 149 mm SL, R/V Albatross, sta. 5410, 10°28’45”N, 124°05’30”E, Between Cebu and Leyte, Philippines, 18 March 1909; USNM 122282, 122 mm SL, R/V Albatross, sta. D5219, 13°21’00”N, 122°18’45°E, Between Marinduque and Luzon, Philippines, 969 m, 23 April 1908; USNM 122283, 2 specimens, 34.5– 89.8 mm SL, R/V Albatross, sta. D5373, 13°40’N, 121°31’10”E, Marinduque, Philippines, 618 m, 2 March 1909; USNM 122284, 77.4 mm SL, R/V Albatross, sta. D5508, 8°17’24”N, 124°11’42”, Northern Mindanao, Philippines, 494 m, 5 August 1909; USNM 122285, 65.1 mm SL, R/V Albatross, sta. 5407, 10°51’38”N, 124°20’54”E, Leyte, Philippines, 640 m, 17 March 1909; USNM 122286, 123 mm SL, R/V Albatross, sta. 5511, 8°15’20”N, 123°57’E, Northern Mindanao, Philippines, 750 m, 7 August 1909; USNM 150918, 87 mm SL, /V Albatross, sta. D5406, 10°49’03”N, 124°22’30”E, Leyte, Philippines, 545 m, 17 March 1909. **Non-type. Japan**: BSKU 12989, 58 mm SL, Tosa Bay, 350–450 m. **East China Sea**: BSKU 27983, 45 mm SL, 28°50’N, 127°14’E, Okinawa trough, 700–740 m; BSKU 26331, 75 mm SL, 25°37.7’N, 122°53.6’E, Okinawa trough, 560–692 m. **The Philippines**: MNHN 1978–0704, 201 mm SL, 13°40’00”N, 120°30’0”E, 757 m, Mar. 1976; ZMUC 921970, 70.1 mm, 12°12’N, 124°14’E, east of Cebu, 780 m; ZMNC P922444, 43 mm SL, 11°43’N, 121°43’E, 1170 m. **Timor Sea**: BSKU 16700, 146 mm SL, 9°27’S, 127°58.6’E, 690–850 m. **Salomon Is.**: MNHN 2005-3434, 258 mm SL, 8°45.54’S, 159°45.6’E, 708–828 m, 21 Oct. 2004; MNHN 2005-2569, 81 mm SL, 6°53.0’S, 156°23.6’E, 208–230 m, 31 Oct. 2004. **Australia**: AMS I.22814-032, 2 specimens, 84–190 mm SL, 18°29’S, 116°36’E, northwest shelf, 696–704 m; AMS I.22816-016, 2 specimens, 97–116 mm SL, 18°40’S, 116°44’E, northwest shelf, 594–612 m. ***Lophiodes abdituspinus*: Holotype.** SCSFI D–2583: now deposited in Shanghai Fishery University, 215 mm SL, 20°22’N, 115°52’E to 20°22’05”N, 115°57’05”E, South China Sea, depth 665–649 m.

Diagnosis. A species of *Lophiodes* with three dorsal spines, postcephalic spine absent; illicium relatively short, 13.3–24.2% SL; second dorsal spine relatively short, 12.2–21.2% SL; third dorsal spine relatively short, 9.1–20.6% SL; esca a leaf-like flap (Fig. 2); and tendrils present on second and third dorsal spine.

Description. Selected meristic and morphometric data are given in Table 1. Data of the holotype of *L. abdituspinus* is taken from the original description and confirmed by the first author.

Dorsal fin spines 3; dorsal fin rays 8 (7–8) ; pectoral fin rays 16 (16–20); anal fin rays 6; caudal fin rays 9; vertebrae 19.

FIGURE 1. Holotype of *Lophiodes infrabrunneus*, USNM 70265, 258 mm SL, from the Philippines. A. dorsal view; B. ventral view.

Body olive-shaped, tapering posteriorly; tendrils present along edges of head, trunk, and tail; head strongly depressed; gill opening extending in front of pectoral fin base; frontal ridge straight and smooth; mouth large, lower jaw extend beyond upper jaws anteriorly. Interorbital space flat, not forming a deep trough; eyes large, directed dorsolaterally. Teeth on premaxilla enlarged, forming three rows; those on maxilla small and in a single row; on lower jaw forming three rows, inner row largest; on vomer forming discrete groups on two outmost sides; on palatine small, forming a single row; on tongue (ceratobranchial V) forming two V-shaped patches; on pharygobranchial II and III forming small and rounded patches.

Illicium relative short (13.3–24.2.2% SL *versus* 16.7–54.9% SL in all congeners), when folded back reaching level of sphenotic spines in larger specimens, more than 190 mm SL, reaching level of posterior frontal spine in the rest specimens; esca a leaf-like transparent flap; second dorsal spine short (12.2–21.2% SL), shorter than illicium; third dorsal spine relative short (9.1–20.6% SL *versus* 17.1–64.0% SL in all congeners), when folded back reaching level of humeral spine in specimens larger than 200 mm SL, slightly beyond in the rest; fourth to sixth dorsal spine (postcephalic dorsal spines) completely absent.

Palatial spines stout and blunt; frontal ridge smooth, without any knob; posterior frontal with two or three blunt spines, anterior one directed forward, the rest directed laterally; inner frontal spine absent; inner sphenotic spines strong and sharp, not recurved; outer phenotic spines blunt; epiotic spines present, relatively strong; quadrate spines low; articular spines blunt, anterior one much reduced; hyomandibular spines strong and sharp, forming two lower knobs in some smaller specimens; opercular spines blunt, forming small knobs in specimens smaller than 70 mm SL; subopercular and interopercular spines strong and sharp; cleithral spines strong and sharp; humeral spines well developed, with 2–3 forks in specimens larger than 200 mm SL, simple to bifurcated in rest.

Coloration. Preserved specimens light to dark brown in dorsal surface, paler in ventral surface; all fins darker than body, paler distally; peritoneum black.

Size. Range of studied specimens: 43 – 258 mm SL (< 40 cm SL in Caruso, 1999).

TABLE 1. Proportionnal measurements expressed as percentage of SL and HL, and meristics of *Lophiodes infrabrunneus* specimens. Data of holotype of *L. abdituspinus* were those provided in original description.

	L. infrabrunneus	*L. abdituspinus*	*L. infrabrunneus*		
	Holotype	Holotype	Types and non-types		
Standard length (mm)	258	215	58–258 (n=20)		
Measurements in % SL			Range	X	SD
Head length (HL)	34.4	34.0	26.3–37.0	32.0	3.4
Tail length (TL)	28.5	34.9	25.0–34.4	30.3	3.2
Illicial length (IL)	21.1	17.5	13.3–24.2	17.3	1.8
2nd dorsal spine length (DS2)	21.2	14.5	12.2–21.2	14.1	1.3
3rd dorsal spine length (DS3)	9.1	6.0	9.1–20.6	15.1	2.3
Measurements in % HL					
Head width (HW)	60.0	51.6	60.0–93.9	71.0	12.8
Head depth (HD)	68.8	75.1	68.8–95.9	80.1	10.3
Snout length (SNL)	52.8	52.2	52.8–77.1	61.5	8.2
Snout width (SNW)	21.7	21.2	21.7–34.2	27.2	4.2
Distance between inner sphenotic spines (ISP)	44.9	43.3	43.7–75.6	52.5	10.5
Distance between frontal spines (IF)	38.0	20.1	30.0–52.7	38.6	7.6
Distance between pterotic and sphenotic spines (PTSP)	14.6	21.9	14.6–29.0	21.9	4.5
Distance between lower quadrate and anterior palatine spines (QPAL)	64.1	66.7	63.7–93.1	76.3	10.1
Distance between opercular and subopercular spines (OPSOP)	40.2	46.4	30.0–59.7	45.7	9.5
Meristics					
Dorsal fin spines	3	3	3		
Dorsal fin rays	8	8	7–8		
Pectoral fin rays	16	16	16–20		
Anal fin rays	6	6	6		
Caudal fin rays	9	8 (in error, 9)	9		
Vertebrae	19	–	19 (n = 6)		

Distribution. Known from off southern Japan, East China Sea, South China Sea, Salomon Islands, Timor Sea, the Philippines, and from off north–western Australia in eastern Indian Ocean (Fig. 3) at depths between 208–1412 m (494–1560 m in Caruso, 1999).

Discussion

Ni *et al*. (1990) distinguished *L. abdituspinus* from *L. infrabrunneus* with two characters: the third dorsal spine embedded under skin and the simple humeral spine. Based on our examination, the third dorsal spine of

L. infrabrunneus is usually embedded by skin in about 1/3 to 4/5 its length and the relatively short third dorsal spine in *L. abdituspinus* is considered to be a variation or damage. Moreover, the humeral spines are variable, usually simple to trifid, in *L. infrabrunneus*. So both species are herein considered synonymous: *L. infrabrunneus* being the senior synonym of *L. abdituspinus*.

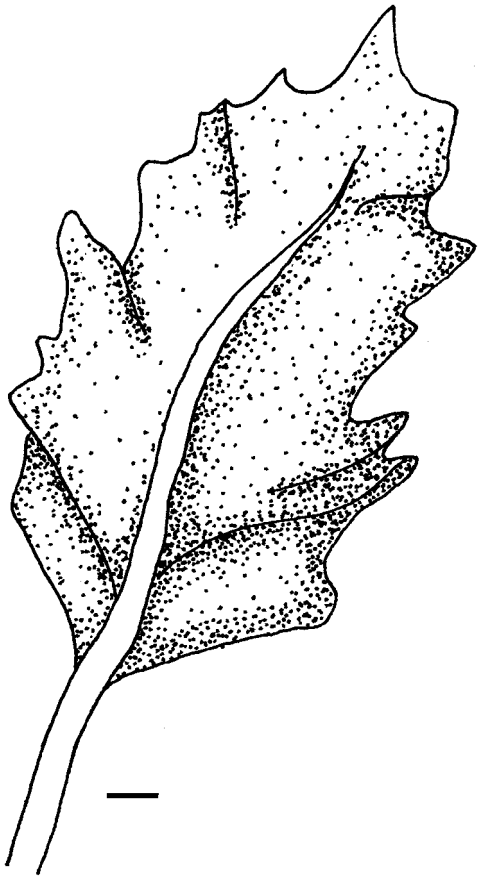

FIGURE 2. Esca of *Lophiodes infrabrunneus*, MNHN 2055–3434, 258 mm SL. Bar = 1 mm.

Proportion of third dorsal spine shows a slightly negative growth and that of illicial length shows a nearly symmetric growth (Fig. 4). The two largest specimens (USNM 70264 and MNHN 2005-3434) represent the shortest and longest examples, 9.1% SL and 20.6% SL, respectively. All specimens, except for the holotype of *L. abdituspinus*, have a longer third dorsal spine compared to the data provided in Caruso (1981, 2.5–7.3% SL). The data of shorter third dorsal spine provided by Caruso (1981) were probably caused by the different measuring technique. Sometimes the third dorsal spine is embedded under the skin and its base is not easy to determine without dissection. Here we measure the length from the connection of third dorsal spine and its pterigiophore to the tip by dissecting the skin covering the third dorsal spine.

Although Su and Li (2002) mentioned two additional specimens of *Lophiodes abdituspinus* collected from the East China Sea and South China Sea, no new information was provided additional to Ni *et al.*'s (1990) description. These two specimens could not be found in the South China Sea Fishery Institute (P.-W. Liang, personal communication, 15 Sep. 2008).

Caruso (1981) reviewed the genus *Lophiodes* and mentioned that the head, body and dorsal fin spine of *L. infrabrunneus* are devoid of tendrils. However, our examination agrees with both Smith and Radcliffe (1912) and Ni and Xu (1988) who mentioned that this species has small tendrils on head, lower jaw and caudal peduncle. Furthermore, the second and third dorsal spine has small tendrils on most specimens we examined. Moreover, Caruso (1999) mentioned that *L. infrabrunneus* has a pale peritoneum. But all specimens examined by us have a black peritoneum.

Lophiodes infrabrunneus is close to *Lophius triradiatus* Lloyd, 1909, reassigned to *Lophiodes* by Caruso (1981), which also lacks postcephalic dorsal spines. However, Caruso (1981) considered Lloyd's species as a *nomen dubium* since its validity cannot be assessed due to the very poor condition of its holotype. We agree with Caruso's opinion and have redescribed the present species rather than resurrect *L. triradiatus*.

Lophiodes sp. (cf. *L. infrabrunneus*) mentioned by Ho and Shao (2008) is now recognized as the present species.

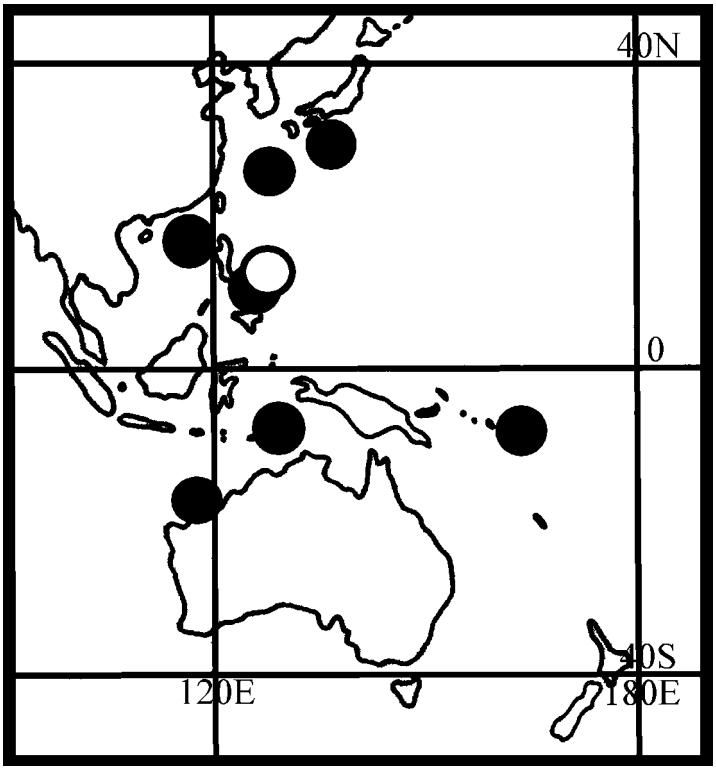

FIGURE 3. Distribution of *Lophiodes infrabrunneus*. Open dot indicates the holotype locality, one dot may represent more than one capture.

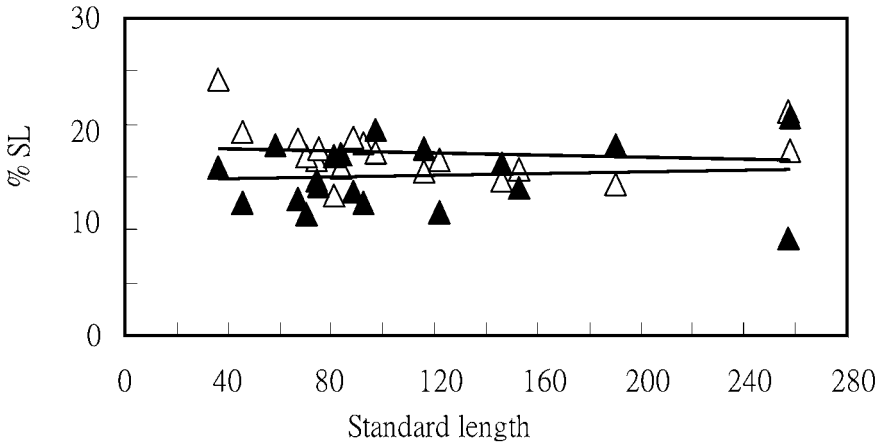

FIGURE 4. Proportion (%SL) of illicial length (solid triangles) and third dorsal fin length (open triangles) versus standard length of *Lophiodes infrabrunneus*.

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