

The red-fin *Decapterus* group (Perciformes: Carangidae) with the description of a new species, *Decapterus smithvanizi*

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Abstract The carangid genus *Decapterus* can be defined by having a single finlet behind both the second dorsal and anal fins, and lacking scutes on the anterior curved part of the lateral line. We revised taxonomically the species of *Decapterus* with red-colored caudal fins (the red-fin *Decapterus* group) and established that the group consisted of the following four species: *Decapterus akaadsi* Abe 1958, distributed in the eastern Indian Ocean and West Pacific from the Andaman Sea to Indonesia, north to central Japan; *Decapterus kurroides* Bleeker 1855, distributed in the

Indo-West Pacific from the Red Sea and eastern coast of Africa to eastern Australia, north to the Philippines; *Decapterus smithvanizi* sp. nov., occurring in the Andaman Sea, the South China Sea, and Indonesia; and *Decapterus tabl* Berry 1968, distributed circumglobally in tropical and subtropical seas. The diagnostic characters of these species are as follows: *D. akaadsi*—curved part of lateral line with 43–53 cycloid scales, straight part of lateral line with 26–29 scutes, head length 26.7–30.1 % SL, and body depth 24.0–27.9 % SL; *D. kurroides*—curved part of lateral line with 45–51 cycloid scales, straight part of lateral line with 30–32 scutes, head length 30.3–33.0 % SL, and body depth 23.4–26.4 % SL; *D. smithvanizi*—lower gill rakers 25–31, curved part of lateral line with 54–62 cycloid scales, body depth 19.4–22.5 % SL, pectoral-fin tip usually beyond the level of second dorsal-fin origin; *D. tabl*—tip of upper jaw usually hooked and opercular membrane partly serrated in larger specimens, lower gill rakers 28–33, curved part of lateral line with 61–72 cycloid scales, body depth 16.6–23.0 % SL, pectoral-fin tip not reaching to the level of second dorsal-fin origin.

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Decapterus kurroides · *Decapterus smithvanizi* sp.
nov. · *Decapterus tabl*

Introduction

The carangid genus *Decapterus* Bleeker 1851 is characterized as having a single finlet behind both the second dorsal and anal fins, no scutes along the anterior curved part of the lateral line, two low papillae on the shoulder girdle, and a well-developed adipose eyelid (Gushiken

1983; Smith-Vaniz 1999). The genus has been considered to include the following nine valid species, distributed in tropical to temperate areas of the Pacific, Indian, and Atlantic Oceans (Eschmeyer 2012): *Decapterus akaadsi* Abe 1958a from the western North Pacific, *Decapterus koheru* Hector 1875 from New Zealand [although this species lacks shoulder girdle papillae and has other characters indicating that it should be assigned to a different genus (Smith-Vaniz, personal communication)], *Decapterus kurroides* Bleeker 1855 from the Indo-West Pacific, *Decapterus macarellus* (Cuvier in Cuvier and Valenciennes 1833) distributed circumglobally in tropical and subtropical seas, *Decapterus macrosoma* Bleeker 1851 from the Indian Ocean and West and East Pacific, *Decapterus maruadsi* (Temminck and Schlegel 1843) from the West Pacific, *Decapterus muroadsi* (Temminck and Schlegel 1843) from the eastern Indian Ocean, West and East Pacific, and southeastern Atlantic Ocean, *Decapterus punctatus* (Cuvier 1829) from the western and eastern Atlantic Oceans, *Decapterus russelli* (Rüppell 1830) from the Indo-West Pacific, and *Decapterus tabl* Berry 1968 distributed circumglobally in tropical and subtropical seas. Although all species of the genus are caught as food fishes commercially, they still present taxonomical problems because of their similarity in general morphology. It is well known that the genus includes the species with red-colored caudal fins (the red-fin *Decapterus* group, defined in this study). However, this conspicuous character leads conversely to a state of taxonomic confusion. A molecular phylogeny of species of *Decapterus*, based on the specimens collected from the eastern Indian and western Pacific Oceans, using complete sequences of cytochrome *b* gene (Kuriwa and Kimura, unpublished data), had previously revealed the polyphyly of the red-fin *Decapterus* group.

Decapterus kurroides, the oldest nominal species of the red-fin *Decapterus* group, was originally described by Bleeker (1855) based on a single specimen from Ambon, Indonesia, and has been regarded as a unique species of the group for about 100 years. In 1958, the second species of the red-fin *Decapterus* group was described as a subspecies of *D. kurroides* by Abe (1958a) on the basis of the holotype and two paratypes from the Pacific coast of central Japan, as *Decapterus kurroides aka-adsii*. Subsequently, Suzuki (1962) raised the subspecies to full species status, *D. akaadsi*, without any explanation. The third species, *D. tabl*, was described by Berry (1968) based on the holotype and 51 paratypes from the Caribbean Sea and West Atlantic off Florida.

In the present account, we have revised the species belonging to the red-fin *Decapterus* group based on the critical examination of types and many specimens collected mainly from East and Southeast Asia. We recognize four species among the group, redescribe *D. akaadsi*,

D. kurroides, and *D. tabl*, and herein describe *Decapterus smithvanizi* as a new species.

Materials and methods

Counts and measurements generally followed Hubbs and Lagler (1947) except for body depth which was measured at the origin of the second dorsal fin. All measurements were made with a digital caliper (≤ 180 mm) or a divider and scale (> 180 mm). To compare with the previous papers, the equations of standard length (SL)–fork length (FL) relationship are given for each species. Cyanine blue was used to examine and count scales. The junction of the curved and straight parts of the lateral line is decided using a ruler placed along the straight part. Scutes are defined according to Smith-Vaniz and Carpenter (2007). The count of scutes terminates at the posterior margin of the hypural plates. The supraneural and pterygiophore insertion patterns were determined from soft X-ray photographs and expressed in accordance with Springer and Smith-Vaniz (2008). Descriptions of the color of fresh-conditioned specimens were based on the color images. Institutional codes follow Fricke and Eschmeyer (2012). Cleaned and stained specimens are indicated by asterisked registration number of specimens.

The red-fin *Decapterus* group

As stated above, we recognize the following four species in the red-fin *Decapterus* group: *D. akaadsi*, *D. kurroides*, *D. smithvanizi* sp. nov., and *D. tabl*. These four species have a red-colored caudal fin, and usually reddish head and second dorsal and pectoral fins (Fig. 1). Additionally, these four species share the following characters: the straight part of the lateral line consists almost entirely of scutes (0–8 cycloid scales present on anterior straight part of lateral line in *D. smithvanizi* and *D. tabl*), predorsal scaly area reaching anteriorly to or beyond the level of center of eye at least in specimens larger than 150 mm SL, and comparatively fewer gill rakers (25–33 on lower arch). Although the reddish coloration of the caudal fin is a diagnostic character of the entire group, these four species can be easily distinguished by characters of squamation from *D. macarellus*, *D. macrosoma* and *D. muroadsi* (scutes covering half or three-quarters of straight part of lateral line in the latter four species), and *D. macrosoma* and *D. russelli* (predorsal scaly area not reaching to the level of center of eye). *Decapterus maruadsi* is also distinguished from *D. akaadsi*, *D. kurroides*, and *D. smithvanizi* by having more numerous lower gill rakers (33–38 on lower arch vs. 25–32 in the latter three species). *Decapterus tabl* has 28–33 gill rakers on lower arch, but it

is distinguishable from *D. maruadsi* in having a somewhat slender body (body depth 16.6–23.0 % SL vs. 20.8–25.4 % SL in *D. maruadsi*) and shorter pectoral fin not reaching to a vertical through second dorsal-fin origin (vs. reaching to or beyond the vertical). *Decapterus punctatus* differs from the species of the red-fin *Decapterus* group in having several black spots along the curved part of the lateral line (vs. no black spots on the lateral line) and the posterior end of the upper jaw broadly rounded.

Smaller specimens of *D. macrosoma*, approximately 100–200 mm SL, sometimes have a caudal fin with orange or reddish posterior margin. However, in this account we

exclude the species from the red-fin *Decapterus* group because the reddish coloration fades out and changes into dark greenish yellow in larger specimens. *Decapterus macrosoma* also differs in having the posterior end of the upper jaw broadly rounded.

Key to the species of the red-fin *Decapterus* group

- 1a. Curved part of lateral line with 43–53 cycloid scales (Table 1); body depth 23.4–27.9 % SL (Fig. 2a) 2

Fig. 1 Color photographs of the red-fin *Decapterus* group. **a** *Decapterus akaadsi*, FRLM 34190, 212 mm SL, from Taipei, Taiwan (flesh condition), **b** *Decapterus kurroides*, FRLM 34789, 282 mm SL, from Bitung, North Sulawesi, Indonesia (flesh condition), **c** *Decapterus smithvanizi* sp. nov., MZB 21372, holotype, 176 mm SL, from Bitung, North Sulawesi, Indonesia (flesh condition), **d** *Decapterus tabl*, FRLM 34643, 313 mm SL, from Miyake Island, Japan (thawed condition)

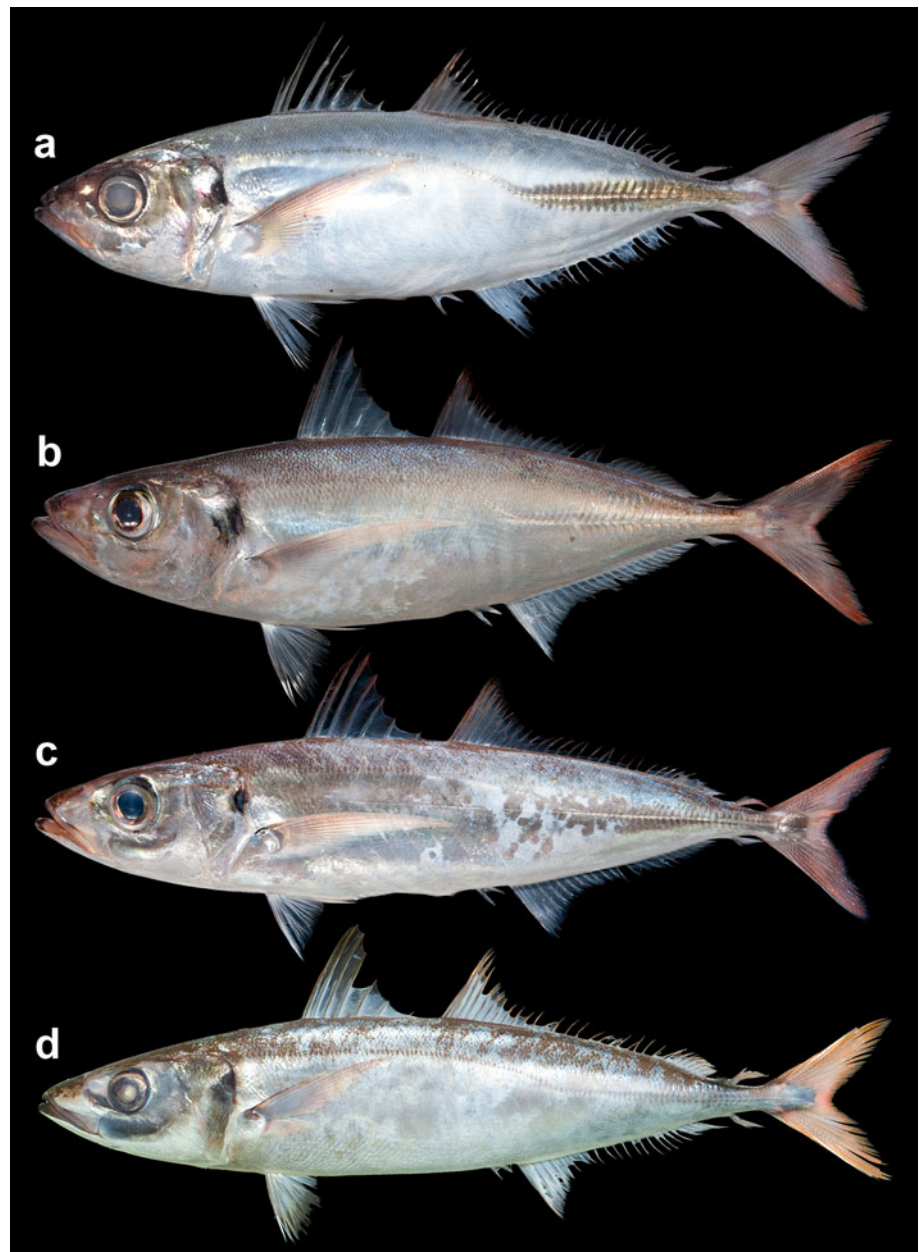


Table 1 Frequency distributions of gill rakers on lower arch, cycloid scales on curved part of lateral line, and scutes on straight part of lateral line for four species belonging to the red-fin *Decapterus* group

Gill rakers on lower arch																														
	25	26	27	28	29	30	31	32	33																					
<i>D. akaadsi</i>			7	7	23	6	2	1																						
<i>D. kurroides</i>			2	2	8	7																								
<i>D. smithvanizi</i>	1	2	14	9	3		1																							
<i>D. tabl</i>				1	1	19	12	10	6																					
Cycloid scales on curved part of lateral line																														
	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
<i>D. akaadsi</i>	3	1	1	2	7	10	14	8	5	3																				
<i>D. kurroides</i>	2	1	5	7	3	1	1																							
<i>D. smithvanizi</i>					2	1	1	2	9	3	3	1	2																	
<i>D. tabl</i>										1	2	4	6	6	5	7	4	4	3	1	1									
Scutes on straight part of lateral line																														
	26	27	28	29	30	31	32	33	34	35	36	37	38	39																
<i>D. akaadsi</i>	4	11	20	18																										
<i>D. kurroides</i>					4	6	2																							
<i>D. smithvanizi</i>			1		2	6	6	10																						
<i>D. tabl</i>					1	1	5	4	1	10	3	5	5	2																

Fig. 2 Proportions of four body parts to standard length in the red-fin *Decapterus* group.

a Body depth, **b** head length, **c** distance from snout to anus, **d** pectoral-fin length. Blue symbols *D. akaadsi*, green symbols *D. kurroides*, red symbols *D. smithvanizi* sp. nov., yellow symbols *D. tabl*

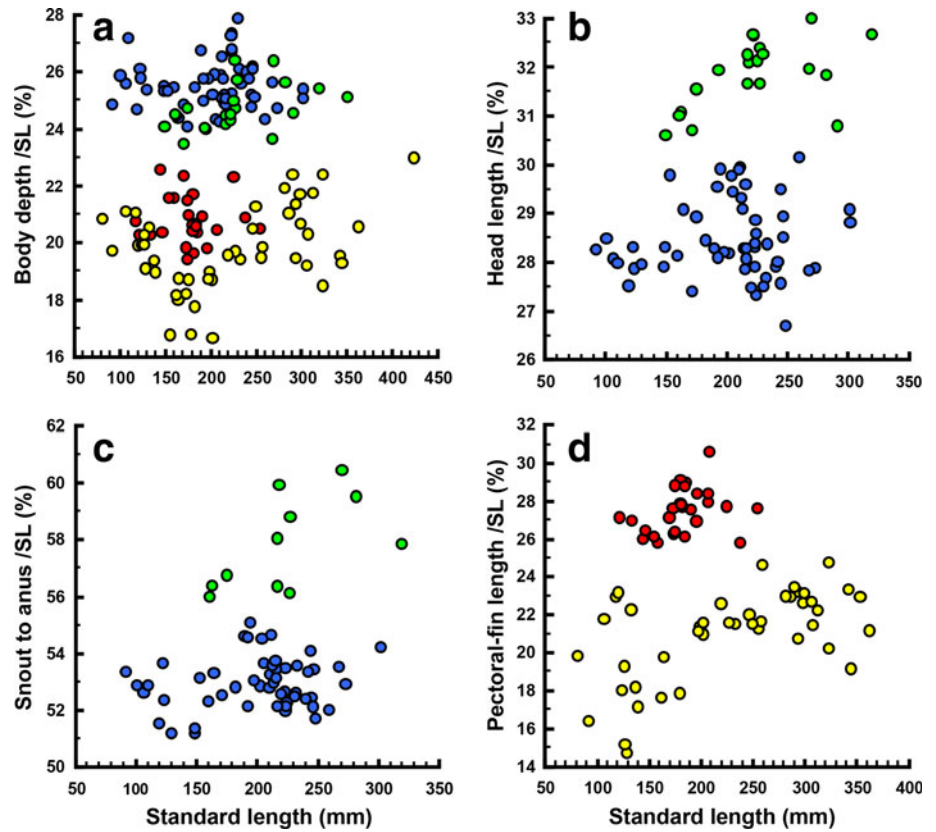


Fig. 3 Holotypes of the red-fin *Decapterus* group. **a** *Decapterus akaadsi*, ZUMT 49749, 175 mm SL, from Shizuoka Pref., Japan, **b** *D. kurroides*, RMNH.PISC. 26977, 150 mm SL, Ambon, North Maruku, Indonesia, **c** *D. tabl*, USNM 202744, 198 mm SL, from the Caribbean Sea, off Colombia (photographed by S. Raredon, USNM)



- 1b. Curved part of lateral line with 54–72 cycloid scales (Table 1); body depth 16.6–23.0 % SL (Fig. 2a). . . 3
- 2a. Straight part of lateral line with 26–29 scutes (Table 1); head length 26.7–30.1 % SL (Fig. 2b); distance from snout to anus 51.2–55.1 % SL (Fig. 2c). *Decapterus akaadsi*
- 2b. Straight part of lateral line with 30–32 scutes (Table 1); head length 30.3–33.0 % SL (Fig. 2b); distance from snout to anus 56.0–60.4 % SL (Fig. 2c). *Decapterus kurroides*
- 3a. Curved part of lateral line with 54–62 cycloid scales (Table 1); tip of upper jaw not hooked; posterior tip of pectoral fin reaching to or beyond a vertical through second dorsal-fin origin *Decapterus smithvanizi* sp. nov.
- 3b. Curved part of lateral line with 61–72 cycloid scales (Table 1); tip of upper jaw usually hooked in adults; posterior tip of pectoral fin not reaching to a vertical through second dorsal-fin origin. *Decapterus tabl*

Decapterus akaadsi Abe 1958

(New English name: Red Scad) (Japanese name: Akaaji) (Figs. 1a, 3a, Table 2)

Decapterus kurroides (not of Bleeker): ?Zheng 1963: 255, fig. 197 (Zhoushan Islands, East China Sea); Gushiken 1976: 42 (Wakayama Prefecture, Pacific coast of central Japan; Okinawa Pref., Japan); Kimura and Suzuki 1981: 1 (Mie Pref., Pacific coast of central Japan); Kyushin et al. 1982: 219 (South China Sea); ?Chu and Meng 1985: 82, fig. 407 (Taiwan Strait); Mok 1993: 337, pl. 92-2 (Taiwan); Smith-Vaniz 1999: 2718 (in part, Japan and Taiwan); Kimura 2009: 122 (Phuket, Thailand).

Decapterus kurroides aka-adsis Abe 1958a: 176 (type locality: Hatsushima Island, Shizuoka Pref., Pacific coast of central Japan; paratypes from Shizuoka and probably Chiba prefectures, central Japan); Abe 1958b: 1215, pl. 235 (redescription and color figure of holotype).

Decapterus akaadsi: Suzuki 1962: 222 (Owase, Mie Pref., Japan); Gushiken 1983: 181 (Wakayama Pref. and Okinawa Pref., Japan); Gushiken 1984: 154, pl. 137K (southern Japan to South China Sea); Matsuura 1985: 488 (southern Japan; East China Sea; South China Sea); Kimura (1997): 326 (southern Japan; East China Sea; South China Sea); Senou 2002: 797 (Niigata Pref., San'in District, and Pacific coast of southern Japan; East China Sea; South China Sea); Yamada et al. 2007: 678 (mainly Kyushu, Japan; East China Sea; South China Sea).

Holotype. ZUMT 49749, 175 mm SL, Hatsushima Island, Sagami Bay, Shizuoka Pref., Japan, 19 April 1956, collected by H. Isokawa, purchased by T. Abe at the market of Ito City, Shizuoka Pref.

Other materials. Fifty-four specimens, 92–303 mm SL. CAS 58346 (1 specimen, 302 mm SL), Hong Kong; FRLM 1868, 2247, 2782, 2783, 2784–2786, 2939, 2940, 3156, 5792, 9380, 12501, 37051, 37053–37055 (17, 149–274), Pacific coast of Mie Pref., Japan; FRLM 19993–19996, 20002, 20006 (6, 107–123), East China Sea; FRLM 30005, 30006, 33682, 33683, 33686–33689 (8, 190–216), Phuket, Thailand, FRLM 33704–33708 (5, 223–231), off Goto Islands, Nagasaki Pref., Japan, FRLM 34190–34194 (5, 212–221), Taipei, Taiwan; FRLM 34880 (1, 245), Bitung, North Sulawesi, Indonesia; FRLM 36331 (1, 303), Okinawa Pref., Japan; KAUM-I 1299 (1, 195), East China Sea; KAUM-I 3583, 3584, 20628, 20629 (4, 193–268), Kagoshima Pref.; KAUM-I 12188, 153 mm SL, Sabah, Malaysia; NSMT-P 69194 (1, 247), Nha Trang, Vietnam; NSMT-P 72572 (2, 92–101), Ambon, North Maluku, Indonesia; SFU 7366 (1, 260), Zhoushan Islands, Zhejiang, China.

Diagnosis. A species of the red-fin *Decapterus* group defined by the following combination of characters: tip of the upper jaw not hooked; opercular membrane entire without serrations; posterior tip of pectoral fin reaching to or beyond a vertical through origin of the second dorsal fin; curved part of the lateral line with 43–53 cycloid scales (Table 1), straight part of lateral line with 26–29 scutes (Table 1); head length 26.7–30.1 % SL (Fig. 2b), body depth 24.0–27.9 % SL (Fig. 2a).

Description. Counts and measurements of the holotype and 54 other specimens are shown in Table 2. Body elongate, comparatively deep and compressed; dorsal and ventral profiles almost equally convex; anus situated just below the origin of second dorsal fin. SL–FL relationship $FL = 1.08 SL - 1.71$ ($r = 0.998$). Dorsal contour of snout anterior to posterior nostril somewhat bulged; tip of upper jaw not hooked; tip of lower jaw slightly more protruding than tip of upper jaw; snout just shorter than upper jaw length; posterior end of upper jaw slightly extending beyond a vertical through anterior margin of eye; posterior margin of upper jaw slightly concave (including holotype) or truncate with usually angular dorsal and round ventral corners (including holotype); teeth on jaws minute, arranged in two rows on upper jaw and in a single row on lower jaw; vomerine teeth poorly developed in most specimens including holotype; adipose eyelid developed; opercular membrane entire without serrations. Supraneural and pterygiophore insertion pattern 0/0-0/2/ (18 specimens including holotype). First dorsal fin higher than the second; a single finlet present both dorsally and ventrally on caudal

Table 2 Counts and measurements of *Decapterus akaadsi*

	Holotype	Other specimens
Standard length (mm)	175	92–303 (202.3, 54)
Counts		
Dorsal fin	VIII + I, 28	VIII + I, 26–31 (28.5, 54)
Anal fin	II + I, 23	II + I, 21–25 (23.0, 54)
Pectoral fin	21	19–23 (20.8, 54)
Pelvic fin	I, 5	I, 5 (-, 54)
Gill rakers on upper arch	11	9–12 (10.9, 45)
Gill rakers on lower arch	31	27–32 (28.8, 45)
Cycloid scales on the curved part of lateral line	49	43–53 (49.3, 53)
Scutes on the posterior curved part of lateral line	3	2–5 (3.1, 52)
Cycloid scales on the anterior straight part of lateral line	0	0 (-, 52)
Scutes on the straight part of lateral line	27	26–29 (28.0, 52)
Measurements		
As % of standard length		
Head length	28.9	26.7–30.1 (28.4, 54)
Predorsal length	35.0	32.5–36.4 (34.1, 54)
First dorsal-fin base length	14.7	14.3–20.5 (16.8, 53)
Second dorsal-fin base length	37.7	34.3–39.9 (37.7, 54)
Anal-fin base length	28.5	26.3–32.6 (29.3, 53)
Snout to pectoral-fin insertion	29.4	26.6–30.6 (28.3, 53)
Snout to pelvic-fin insertion	33.9	30.9–34.6 (32.8, 54)
Snout to anal-fin origin	55.7	52.6–58.8 (55.9, 53)
Pelvic-fin insertion to anal-fin origin	22.8	21.2–28.0 (24.7, 53)
Snout to anus	No data	51.2–55.1 (52.9, 53)
Caudal peduncle length	12.5	6.1–15.0 (11.9, 53)
Body depth	24.1	24.0–27.9 (25.5, 54)
Caudal peduncle depth	3.7	3.4–4.5 (3.9, 53)
Pectoral-fin length	27.4	24.3–32.1 (28.8, 53)
Pelvic-fin length	14.0	12.9–16.2 (14.4, 54)
Length of second spine of first dorsal fin	13.7	11.1–16.7 (14.3, 53)
First anal-fin spine length	4.6	3.1–5.0 (4.3, 53)
As % of head length		
Snout length	31.3	30.0–36.3 (32.7, 54)
Upper jaw length	35.4	35.2–40.1 (37.1, 54)
Eye diameter	28.2	23.4–32.3 (28.2, 54)
Postorbital head length	42.8	39.5–47.4 (42.8, 54)
Interorbital width	27.6	23.4–33.1 (29.3, 53)

Figures in parentheses indicate mean values and sample size

peduncle; pectoral fin almost equal to head length, its posterior tip reaching to or beyond a vertical through second dorsal-fin origin (including holotype). Predorsal scaly area reaching to the level of anterior margin of eye; lateral line slanted down from just below second dorsal-fin origin, running straight from below the base of 10th–15th second dorsal-fin soft ray (12th in holotype); straight part of lateral line shorter than curved part; scutes covering posterior curved part and entire length of straight part of lateral line.

Color of fresh specimen. Head and body pale bluish black dorsally, silvery white laterally and ventrally; snout

and upper jaw reddish; a black blotch smaller than pupil in diameter present on upper edge of opercle; margins of both dorsal fins, caudal fin, pectoral fins, and dorsal finlet red; anal fin, pelvic fins, and ventral finlet white.

Color of preserved specimen. Head and body brown dorsolaterally and pale white ventrolaterally; a prominent black blotch present on upper edge of opercle; both dorsal fins, caudal fin, pectoral fins, and dorsal finlet pale brown, anal fin, pelvic fins, and ventral finlet white.

Distribution. This species is distributed in the western Pacific and eastern Indian oceans from Japan (Shizuoka,

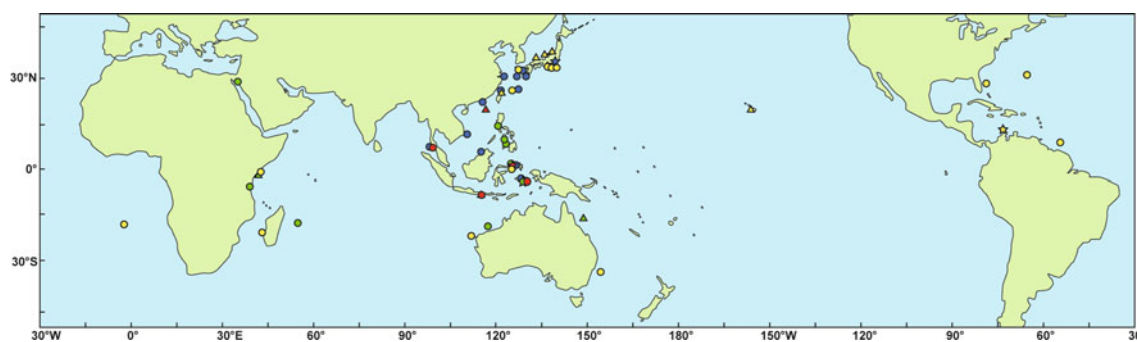


Fig. 4 Distributional records of *Decapterus akaadsi* (blue symbols), *D. kurroides* (green symbols), *D. smithvanizi* sp. nov. (red symbols), and *D. tabl* (yellow symbols). Circles specimens examined, triangles bibliographic information, stars type localities

Mie, Nagasaki, Kagoshima, and Okinawa prefectures), the East China Sea, China (Zhoushan Islands), Taiwan, Vietnam (Nha Trang), Thailand (Phuket), Malaysia (Sabah), and Indonesia (North Sulawesi and Ambon) (Fig. 4).

Comparison. *Decapterus akaadsi* is closely similar to *D. kurroides* in general body shape and counts, but differs in having fewer scutes along the straight part of lateral line (26–29 vs. 30–32 in *D. kurroides*, Table 1) and a slightly shorter head length (26.7–30.1 % SL vs. 30.3–33.0, Fig. 2b). *Decapterus akaadsi* differs from both *D. smithvanizi* sp. nov. and *D. tabl* by fewer cycloid scales along the curved part of lateral line (43–53 vs. 54–62 in *D. smithvanizi* and 61–72 in *D. tabl*, Table 1) and a deeper body depth (24.0–27.9 % SL vs. 19.4–22.5 % SL in *D. smithvanizi* and 16.6–23.0 % SL in *D. tabl*, Fig. 2a). *Decapterus akaadsi* is very similar to *D. maruadsi* when the reddish color of the former is faded out, but differs in having fewer lower gill rakers (27–32 vs. 33–38 in *D. maruadsi*, Table 1).

Remarks. *Decapterus akaadsi* was originally described by Abe (1958a) based on the holotype collected from Hatsushima Island, western Sagami Bay, Shizuoka Pref., Pacific coast of central Japan, and two paratypes, ABE '57-120, 193 mm SL, collected from the Central Wholesale Market of Tokyo [transported from Ito (near Hatsushima), Shizuoka Pref.] and ABE '57-265, 183 mm SL, collected from the Central Wholesale Market of Tokyo (transported from probably Wada, Chiba Pref., the Pacific coast of Boso Peninsula (Abe 1958a, b). Only the holotype is still available at ZUMT; the two paratypes in the private collection of Dr. Abe could not be found and are considered to have been lost. In his osteological study of the Carangidae, Suzuki (1962) treated this species not as a subspecies of *D. kurroides*, but a valid species of the genus *Decapterus*. However, he gave no explanation for this change of the rank from subspecies to species. Gushiken (1976) had treated *D. akaadsi* as a junior synonym of *D. kurroides*, but subsequently Gushiken (1983) changed his opinion and

recognized *D. akaadsi* as a valid species, comparing morphological data of it with the holotype of *D. kurroides*. His data (Gushiken 1983: table 5) show that *D. kurroides* has a longer head, predorsal scaly area not extending beyond the anterior margin of eye (scaly area extending beyond the anterior margin of eye in our specimens), and vomerine teeth comparatively developed. These morphological characters are apparently different from those of *D. akaadsi*. However, our observations indicate that there are no clear differences in the predorsal scaly area or vomerine teeth in these two species. On the other hand, we found distinct differences in the number of scutes along the straight part of lateral line and the proportional distance from snout to anus as stated above.

Decapterus akaadsi has been considered to have a distribution restricted to southern Japan and the East and South China seas (Gushiken 1976, 1983; Matsuura 1985; Kimura 1997; Senou 2002), but the species is widely distributed in the eastern Indian and western Pacific oceans from the Andaman Sea to North Sulawesi, north to central Japan. Smith-Vaniz (1999) regarded *D. akaadsi* as a junior synonym of *D. kurroides*, but here both are considered to be valid species based on their clear morphological differences and sympatric distribution as stated above.

Zheng (1963) and Chu and Meng (1985) recorded “*D. kurroides*” from Zhoushan Islands in the East China Sea and from Taiwan Strait, respectively. Their line drawings of the specimens are similar to *D. akaadsi*, and the proportions of body depth and head length agree with those of *D. akaadsi*. However, their counts of cycloid scales along the curved part of the lateral line (57 in Zheng 1963 and 54–58 in Chu and Meng 1985) are more numerous than those of *D. akaadsi* (43–53) obtained here. The counts of cycloid scales on lateral line in the species of *Decapterus* are somewhat difficult to make because the pored scales are sometimes partly hidden by surrounding scales. Therefore we consider that their “*D. kurroides*” are misidentified *D. akaadsi*. Kyushin et al. (1982) and Mok (1993) also

reported “*D. kurroides*” and included color photographs of specimens from the South China Sea and Taiwan, respectively. Their photographs indicate specimens with comparatively small heads, and we here identify them as *D. akaadsi*. The color photograph of “*D. kurroides*” from Phuket, Thailand in Kimura (2009), FRLM 30005, is also based on a misidentification of *D. akaadsi*.

Gushiken (1983) identified “*D. kurroides*” reported by Oshima (1925) from Donggang, southern Taiwan as *D. akaadsi*. Oshima (1925) described his “*D. kurroides*” as having 29 second dorsal-fin soft rays, 24 anal-fin soft rays,

30 scutes, 55 lateral-line scales and 30 lower gill rakers. However, these counts are inconsistent with those of *D. akaadsi* and *D. kurroides* redescribed here, but agree with those of *D. russelli* (Kimura and Katahira, unpublished data). Therefore Oshima’s (1925) “*D. kurroides*” is also probably based on misidentified *D. russelli*.

Decapterus kurroides Bleeker 1855

(English name: Redtail Scad) (Figs. 1b, 3b, Table 3)

Table 3 Counts and measurements of *Decapterus kurroides*

	Holotype	Other specimens
Standard length (mm)	150	161–351 (232.8, 20)
Counts		
Dorsal fin	VIII + I, 27	VIII + I, 27–31 (28.5, 20)
Anal fin	II + I, 23	II + I, 21–24 (22.7, 20)
Pectoral fin	21	19–21 (20.3, 20)
Pelvic fin	I, 5	I, 5 (-, 20)
Gill rakers on upper arch	10	9–12 (10.4, 18)
Gill rakers on lower arch	29	27–30 (29.1, 18)
Cycloid scales on the curved part of lateral line	47	45–51 (47.8, 19)
Scutes on the posterior curved part of lateral line	3	3–4 (3.4, 11)
Cycloid scales on the anterior straight part of lateral line	0	0 (-, 11)
Scutes on the straight part of lateral line	32	30–32 (30.7, 11)
Measurements		
As % of standard length		
Head length	30.6	30.3–33.0 (31.8, 20)
Predorsal length	36.0	35.6–39.3 (37.3, 20)
First dorsal-fin base length	15.5	12.1–16.6 (15.2, 11)
Second dorsal-fin base length	37.3	32.7–41.0 (36.2, 20)
Anal-fin base length	32.4	23.7–31.0 (27.0, 11)
Snout to pectoral-fin insertion	29.9	29.8–32.5 (31.0, 11)
Snout to pelvic-fin insertion	35.3	32.7–36.7 (35.0, 20)
Snout to anal-fin origin	58.0	58.3–63.7 (60.8, 11)
Pelvic-fin insertion to anal-fin origin	23.5	24.1–30.1 (27.7, 11)
Snout to anus	No data	56.0–60.4 (57.8, 11)
Caudal peduncle length	12.2	11.5–13.9 (12.4, 11)
Body depth	24.1	23.4–26.4 (24.8, 20)
Caudal peduncle depth	3.6	3.3–4.0 (3.6, 11)
Pectoral-fin length	24.6	27.6–33.3 (31.2, 14)
Pelvic-fin length	11.7	13.6–15.9 (14.6, 17)
Length of second spine of first dorsal fin	12.6	12.3–16.5 (15.1, 11)
First anal-fin spine length	5.4	3.9–4.9 (4.4, 10)
As % of head length		
Snout length	29.9	26.0–36.0 (31.6, 20)
Upper jaw length	37.7	37.0–40.1 (38.3, 20)
Eye diameter	25.6	22.2–32.6 (26.2, 20)
Postorbital head length	39.9	36.3–43.9 (41.4, 20)
Interorbital width	24.4	20.8–31.4 (25.1, 11)

Figures in parentheses indicate mean values and sample size

Decapterus kurroides Bleeker 1855: 420 (type locality: Ambon, Indonesia); Smith-Vaniz 1984: Caran Deca 7 (Kenya, Tanzania, Réunion); Gloerfelt-Tarp and Kailola 1984:163 (Indian Ocean off Bali, Indonesia); Smith-Vaniz 1986: 650 (Kenya, Tanzania, Réunion); Hoese and Hanley 1989: 579 (Western Australia, Indo-West Pacific); Randall et al. 1990: 162 (Great Barrier Reef); Smith-Vaniz 1999: 2718 (Kenya, Tanzania, Reunion, Indonesia, Philippines, and Australia); Hoese and Gates 2006: 1158 (Western Australia).

Holotype. RMNH.PISC. 26977, 150 mm SL, Ambon Bay, Ambon, North Maruku, Indonesia.

Other materials. Twenty specimens, 161–320 mm SL. ANSP 240631 (5, 172–226), Visayan Sea, Philippines; ANSP 150401 (1, 291), Dar es Salam, Tanzania; BPBM 22152 (1, 269), Dumaquete Negros, Philippines; FRLM 23410, 23411* (2, 161–282), Ambon, North Maruku, Indonesia; FRLM 32727 (1, 227), Iloilo, Panay Island, Philippines; FRLM 34789–34791, 34806–34804 (6, 217–282), Bitung, North Sulawesi, Indonesia; MNHN 1985-0277 (1, 175), Manila, Philippines; MNHN1975-697 (1, 230), Réunion; MNHN 1987-1193 (1, 320), Gulf of Aqaba, Red Sea; WAM P.26208-001 (1, 351), Port Hedland, Western Australia, Australia.

Diagnosis. A species of the red-fin *Decapterus* group defined by the following combination of characters: tip of upper jaw not hooked; opercular membrane entire without serration; posterior tip of pectoral fin reaching to or beyond a vertical through origin of second dorsal fin; curved part of lateral line with 45–51 cycloid scales, straight part of lateral line with 30–32 scutes (Table 1); head length 30.3–33.0 % SL (Fig. 2b), body depth 23.4–26.4 % SL (Fig. 2a).

Description. Counts and measurements of the holotype and 20 other specimens are shown in Table 2. Body elongate, comparatively deep and compressed; dorsal and ventral profiles almost equally convex; anus situated just below the origin of second dorsal fin. SL–FL relationship $FL = 1.08 SL - 0.144$ ($r = 0.999$). Dorsal contour of snout anterior to posterior nostril somewhat bulged; tip of upper jaw not hooked; tip of lower jaw slightly more protruding than tip of upper jaw; snout subequal to upper jaw length; posterior end of upper jaw reaching to a vertical through anterior margin of eye; posterior margin of upper jaw slightly concave with usually angular dorsal and round ventral corners (including holotype); teeth on jaws minute, arranged in two rows on upper jaw and in a single row on lower jaw; teeth on anterior margin of vomer obvious, somewhat developed; adipose eyelid developed; opercular membrane entire without serration. Supraneural and pterygiophore insertion pattern 0/0-0/2/ (10 specimens including holotype). First dorsal fin higher than the second;

a single finlet present both dorsally and ventrally on caudal peduncle; pectoral fin almost equal to head length, its posterior tip extending beyond a vertical through second dorsal-fin origin. Predorsal scaly area reaching to (including holotype) or beyond the level of anterior margin of eye; lateral line slanted down from just below second dorsal-fin origin, running straight from below the base of 10th–12th second dorsal-fin soft ray (10th in holotype); straight part of lateral line shorter than curved part; scutes covering posterior curved part and entire length of straight part of lateral line.

Color of fresh specimen. Head and body brownish tinged with red dorsally, silvery white laterally and ventrally; snout and both jaws reddish; a black blotch subequal to pupil in diameter present on upper edge of opercle; margins of both dorsal fins, caudal fin, pectoral fins, and dorsal finlet red; anal fin, pelvic fins, and ventral finlet white.

Color of preserved specimen. Head and body brown dorsolaterally, pale white ventrolaterally; snout white; a prominent black blotch present on upper edge of opercle; both dorsal fins, caudal fins, pectoral fins, and dorsal finlet pale brown, anal fin, pelvic fins, and ventral finlet white.

Distribution. The specimens used in this study were collected from Indonesia (Ambon, North Maruku and Bitung, North Sulawesi), Australia (Western Australia), the Philippines (Panay, Negros, and Luzon islands), the Gulf of Aqaba (the Red Sea), Réunion, and Tanzania. Literature references indicate a wide geographic distribution in the Indo-West Pacific for this species, i.e., from the western Indian Ocean (Smith-Vaniz 1984, 1986), eastern Indian Ocean (Gloerfelt-Tarp and Kailola 1984), and eastern Australia (Randall et al. 1990) (Fig. 4).

Comparison. *Decapterus kurroides* closely resembles *D. akaadsi*, but both species are clearly distinguishable as stated in “Comparison” of *D. akaadsi*. *Decapterus kurroides* also differs from both *D. smithvanizi* sp. nov. and *D. tabl* by fewer cycloid scales along the curved part of lateral line (45–51 vs. 54–62 in *D. smithvanizi* and 61–72 in *D. tabl*, Table 1) and deeper body depth (23.4–26.4 % SL vs. 19.4–23.0 % in *D. smithvanizi* and 16.6–22.4 % SL in *D. tabl*, Fig. 2a). *Decapterus kurroides* is also very similar to *D. maruadsi* specimens in which the reddish color has faded, but differs in having fewer lower gill rakers (27–30 vs. 33–38 in *D. maruadsi*).

Remarks. The line drawings and descriptions of *Decapterus kurroides* by Smith-Vaniz (1984, 1986, 1999) generally agree with those of the present specimens, but he possibly confused the species with *D. akaadsi*. The photograph (Gloerfelt-Tarp and Kailola 1984) and the color illustration (Randall et al. 1990) of the species are probably correctly identifiable as *D. kurroides* based on their proportions of head length and body depth.

***Decapterus smithvanizi* sp. nov.**

(New English name: Slender Red Scad) (Fig. 1c, Table 4)

Decapterus kurroides (not of Bleeker): Kimura et al. 2003: 78 (in part, Bitung, Indonesia); Kimura 2009: 122 (in part, Phuket, Thailand).*Decapterus russelli* (not of Rüppell): Kyushin et al. 1982: 218 (South China Sea)**Holotype.** MZB 21372 (formerly FRLM 34882), 176 mm SL, fish market in Bitung, North Sulawesi,

Indonesia, 14 November 2008, collected by S. Kimura, H. Sakakibara, and T. Peristiwady.

Paratypes. Twenty-nine specimens, 118–255 mm SL. AMS I. 46180-001 (formerly FRLM 35693) (1, 185), Ambon, North Maruku, Indonesia; ANSP 145892 (4, 169–211), Bali, Indonesia; BMNH 1980.9.12.7–12 (1 of 5, 209), Bali, Indonesia; BMNH 2013.4.16.1 (formerly FRLM 35694) (1, 175), Ambon, North Maruku, Indonesia; FRLM 14499, 21607, 35688, 35690, 35791, 35792 (6, 118–226), Ambon, North Maruku, Indonesia; FRLM 26510, 26511, 34792, 34794, 34805, 34881 (7, 122–208),**Table 4** Counts and measurements of *Decapterus smithvanizi* sp. nov.

	Holotype	Paratypes
Standard length (mm)	176	118–255 (181.4, 29)
Counts		
Dorsal fin	VIII + I, 32	VIII + I, 28–33 (29.6, 29)
Anal fin	II + I, 25	II + I, 23–26 (24.3, 29)
Pectoral fin	20	19–21 (19.8, 28)
Pelvic fin	I, 5	I, 5 (-, 29)
Gill rakers on upper arch	10	9–12 (10.2, 29)
Gill rakers on lower arch	27	25–31 (27.5, 29)
Cycloid scales on the curved part of lateral line	61	54–62 (58.4, 26)
Scutes on the posterior curved part of lateral line	0	0–3 (0.6, 25)
Cycloid scales on the anterior straight part of lateral line	2	0–4 (0.5, 24)
Scutes on the straight part of lateral line	31	28–33 (31.9, 24)
Measurements		
As % of standard length		
Head length	30.3	28.8–31.7 (30.3, 29)
Predorsal length	36.2	34.2–38.1 (36.3, 24)
First dorsal-fin base length	17.7	11.1–20.0 (16.4, 23)
Second dorsal-fin base length	37.3	34.1–38.3 (36.5, 24)
Anal-fin base length	28.0	25.1–29.9 (27.8, 24)
Snout to pectoral-fin insertion	29.3	27.2–31.3 (29.3, 24)
Snout to pelvic-fin insertion	31.6	29.5–33.2 (31.9, 24)
Snout to anal-fin origin	60.3	56.1–61.5 (58.9, 24)
Pelvic-fin insertion to anal-fin origin	29.7	26.6–31.3 (28.1, 24)
Snout to anus	57.0	54.5–59.2 (56.4, 24)
Caudal peduncle length	10.5	6.8–13.0 (10.3, 24)
Body depth	21.0	19.4–22.5 (20.8, 24)
Caudal peduncle depth	3.4	3.0–3.9 (3.4, 24)
Pectoral-fin length	28.8	25.7–30.6 (27.4, 26)
Pelvic-fin length	13.0	11.7–14.8 (13.2, 24)
Length of second spine of first dorsal fin	13.1	9.9–17.1 (14.6, 24)
First anal-fin spine length	4.2	2.4–4.5 (3.7, 24)
As % of head length		
Snout length	31.9	31.5–34.7 (33.1, 24)
Upper jaw length	34.5	33.9–36.8 (35.1, 24)
Eye diameter	27.0	20.5–28.1 (24.6, 29)
Postorbital head length	44.5	44–48 (45.8, 24)
Interorbital width	24.4	21.2–28.8 (24.6, 24)

Figures in parentheses indicate mean values and sample size

Bitung, North Sulawesi, Indonesia; FRLM 33684, 33685 (2, 185–197), Phuket, Thailand; LBRC-F 3028 (formerly FRLM 34804) (1, 191), Bitung, North Sulawesi, Indonesia; LBRC-F 3029, 3030 (formerly FRLM 14500, 14603) (2, 181–186), Ambon, North Maruku, Indonesia; MNHN 2013-0642 (formerly FRLM 35790) (1, 147), Ambon, North Maruku, Indonesia; NSMT-P 112149 (formerly FRLM 35689) (1, 174) Ambon, North Maruku, Indonesia; RMNH.PISC. 36291 (formerly FRLM 21609) (1, 174), Ambon, North Maruku, Indonesia; USNM 410330 (formerly FRLM 21608) (1, 159), Ambon, North Maruku, Indonesia.

Diagnosis. A species of the red-fin *Decapterus* group defined by the following combination of characters: tip of upper jaw not hooked; opercular membrane entire without serration; posterior tip of pectoral fin usually extending beyond a vertical through origin of second dorsal fin; lower gill rakers 25–31; curved part of lateral line with 54–62 cycloid scales (Table 1), body depth 19.4–22.5 % SL (Fig. 2a); pectoral-fin length 25.7–30.6 % SL (Fig. 2d).

Description. Counts and measurements of the holotype and 29 paratypes are shown in Table 4. Body elongate, comparatively slender and compressed; dorsal and ventral profiles almost equally convex; anus situated just below the origin of second dorsal fin. SL–FL relationship $FL = 1.00 SL + 11.7$ ($r = 0.994$). Dorsal contour of head anterior to posterior nostril somewhat bulged; tip of upper jaw not hooked; tip of lower jaw slightly more protruding than tip of upper jaw; snout subequal to upper jaw length; posterior end of upper jaw reaching to a vertical through anterior margin of eye; posterior margin of upper jaw almost truncate (including holotype) or slightly concave with angular dorsal and round ventral corners; teeth on jaws minute, arranged in two rows on upper jaw and in a single row on lower jaw; vomerine teeth minute, forming an obvious tooth patch; adipose eyelid developed; opercular membrane entire without serration. Supraneural and pterygiophore insertion patterns -/0-0/0-2/ (13 of 17 specimens including holotype) or 0/0-0/2/ (4 of 17). First dorsal fin higher than the second; a single finlet present both dorsally and ventrally on caudal peduncle; pectoral fin almost equal to head length, its posterior tip usually extending beyond a vertical through second dorsal-fin origin (including holotype). Predorsal scaly area reaching usually to the level of anterior margin of eye (including holotype) or pupil; lateral line gently slanted downward from just below second dorsal-fin origin, running straight from below the base of 14th–17th second dorsal-fin soft ray (16th in holotype); straight part of lateral line shorter

than curved part; scutes covering posterior curved part and entire length of the straight part of lateral line.

Color of fresh specimen. Head and body pale black dorsally, silvery white laterally and ventrally; snout and upper jaw reddish; a black blotch smaller than pupil in diameter present on upper edge of opercle; margins of both dorsal fins, caudal fin, pectoral fins, and dorsal finlet red; anal fin, pelvic fins, and ventral finlet white.

Color of preserved specimen. Head and body brown dorsolaterally, pale white ventrolaterally; a prominent black blotch present on upper edge of opercle; both dorsal, caudal, and pectoral fins and dorsal finlet pale brown, anal and pelvic fins and ventral finlet white.

Distribution. This species is known from Indonesia (North Sulawesi, Ambon, and Bali) and the western coast of Thailand. A literature record indicates that the species probably occurs in the South China Sea (see Remarks) (Fig. 4).

Etymology. The specific name “*smithvanizi*” is named after Dr. William F. Smith-Vaniz, Florida Museum of Natural History, University of Florida, who gave the authors some morphological data of the specimens belonging to the red-fin *Decapterus* group and many valuable comments on the initial draft.

Comparison. *Decapterus smithvanizi* is closely similar to *D. tabl* in having a comparatively slender body, but differs in having fewer cycloid scales along the curved part of the lateral line (54–62 vs. 61–72 in *D. tabl*, Table 1), and slightly longer pectoral fin (25.7–30.6 % SL vs. 14.7–24.7 % SL, Fig. 2d) reaching to or extending beyond a vertical through the origin of second dorsal fin (not reaching to fin origin). In specimens of *D. smithvanizi* with faded reddish coloration, the species is very similar to *D. russelli* in general appearance, especially in the proportions of body depth (19.4–22.5 % SL vs. 19.0–26.3 % SL in *D. russelli*) and head length (28.8–31.7 % SL vs. 25.5–30.9 % SL), and in the arrangement of scutes covering almost entirely the straight part of the lateral line. However, the predorsal scaly area in the new species extends to the level of anterior margin of eye or pupil, but in *D. russelli* the scaly area reaches at most only to the level of center of eye.

Remarks. *Decapterus smithvanizi* is a rather common species in Indonesia, usually found in fish markets together with other congeners, and therefore the present species has possibly been misidentified as *D. kurroides* or *D. tabl*. Kyushin et al. (1982) described and figured a specimen of red-fin *Decapterus* collected from the South China Sea. The specimen shows elongate, slender body with rather long pectoral fin, its tip extending beyond a vertical

through the origin of second dorsal fin. They identified the specimen as *D. tabl*, but misapplied the name of the specimen as “*D. russelli*.” However, *D. russelii* has relatively short pectoral fins, not reaching to a vertical through the origin of second dorsal fin. The shallow body depth and long fins of the specimen suggest that it probably was *D. smithvanizi*. The color photograph of “*D. kurroides*” in Kimura et al. (2003), FRLM 26511, was also identified as *D. smithvanizi* in this

study. The supraneural and pterygiophore insertion patterns of *D. smithvanizi* show the intraspecific variation, -/0-0/0-2/ (13 of 17 specimens) and 0/0-0/2/ (4 of 17), although the other species of the red-fin *Decapterus* group have no intraspecific variation. Such intraspecific variations are also known in the congeneric species, *D. macarellus*, *D. maruadsi*, *D. muroadsi*, *D. punctatus*, and *D. russelli* (see Springer and Smith-Vaniz 2008).

Table 5 Counts and measurements of *Decapterus tabl*

	Holotype	Paratypes	Other specimens
Standard length (mm)	198	156–203 (179.7, 8)	81–424 (234.2, 40)
Counts			
Dorsal fin	30	29–32 (30.6, 7)	28–33 (30.7, 40)
Anal fin	25	23–26 (24.4, 7)	23–28 (24.4, 40)
Pectoral fin	22	20–21 (20.5, 6)	18–22 (20.7, 40)
Pelvic fin	I, 5	I, 5 (-, 8)	I, 5 (-, 40)
Gill rakers on upper arch	9	9–10 (9.9, 8)	9–12 (10.7, 40)
Gill rakers on lower arch	28	30–32 (30.6, 8)	29–33 (31.1, 40)
Cycloid scales on the curved part of lateral line	69	64–71 (67.4, 8)	61–72 (66.0, 35)
Scutes on the posterior curved part of lateral line	0	0 (-, 8)	0 (-, 34)
Cycloid scales on the anterior straight part of lateral line	5	0–6 (3.6, 8)	0–8 (4.5, 32)
Scutes on the straight part of lateral line	39	35–38 (35.9, 8)	31–39 (35.1, 28)
Measurements			
As % of standard length			
Head length	30.0	27.4–30.5 (28.9, 8)	25.4–32.0 (29.0, 40)
Predorsal length	36.9	35.1–37.4 (36.0, 8)	32.0–58.3 (37.4, 40)
First dorsal-fin base length	14.3	14.1–19.1 (16.2, 8)	13.6–19.9 (16.0, 29)
Second dorsal-fin base length	34.5	11.4–39.0 (34.8, 8)	31.6–43.5 (38.0, 40)
Anal-fin base length	27.0	27.5–37.0 (30.0, 8)	22.1–35.9 (27.9, 30)
Snout to pectoral-fin insertion	29.5	28.2–30.9 (29.3, 6)	24.6–30.7 (28.2, 30)
Snout to pelvic-fin insertion	32.4	29.9–33.9 (31.5, 8)	27.4–59.9 (32.4, 39)
Snout to anal-fin origin	No data	57.6–60.8 (58.9, 8)	52.0–62.0 (58.5, 28)
Pelvic-fin insertion to anal-fin origin	No data	26.8–29.0 (27.6, 8)	24.2–31.7 (28.4, 28)
Snout to anus		55.3–58.1 (56.5, 6)	49.6–59.6 (56.3, 26)
Caudal peduncle length	7	7.7–12.5 (10.8, 8)	6.8–12.3 (10.3, 30)
Body depth	18.7	16.6–18.7 (17.7, 8)	18.2–23.0 (20.2, 38)
Caudal peduncle depth	2.8	2.9–3.4 (3.2, 8)	2.7–4.1 (3.3, 30)
Pectoral-fin length	21.1	17.8–21.5 (20.1, 3)	14.7–24.7 (21.0, 39)
Pelvic-fin length	No data	10.8–13.0 (11.7, 8)	10.5–13.2 (11.9, 38)
Length of second spine of first dorsal fin	No data	10.7–15.0 (13.0, 7)	9.2–16.5 (12.7, 29)
First anal-fin spine length	No data	2.0–3.9 (3.0, 8)	2.1–8.6 (3.2, 29)
As % of head length			
Snout length	31.9	29.3–39.1 (33.9, 8)	28.1–36.6 (33.2, 40)
Upper jaw length	34.3	31.9–34.5 (33.3, 8)	32.2–35.8 (33.8, 40)
Eye diameter	24.0	21.6–25.6 (24.5, 8)	18.7–30.1 (24.6, 40)
Postorbital head length	41.8	39.3–45.9 (42.9, 8)	38.2–46.8 (43.3, 40)
Interorbital width	20.7	20.4–24.9 (22.9, 8)	20.4–33.3 (25.9, 30)

Figures in parentheses indicate mean values and sample size

Decapterus tabl Berry 1968

(English name: Roughear Scad) (Japanese name: Oaka-muro) (Figs. 1d, 3c, Table 5)

Decapterus russelli (not of Rüppell): Wakiya 1924: 149, pl. 15 (Japan); Suzuki 1962: 216 (Mie Pref., Japan); Masuda et al. 1975: 72, 247 (southern Japan; Indo-Pacific); Gushiken 1976: 45 (Okinawa, southern Japan); Kimura and Suzuki 1981: 1 (Mie Pref., Japan); Nakamura 1982: 228 (southern Japan; West Pacific; northern Australia; Indian Ocean; Red Sea).

Decapterus tabl Berry 1968: 152, fig. 1 (type locality: Caribbean Sea, West Atlantic Ocean); Gushiken 1983: 183, fig. 28 (southern Japan); Smith-Vaniz 1984: Caran Deca 5 (Kenya, Japan, Hawaiian Archipelago, Bermuda, South America off Columbia and Venezuela, St. Helena Island); Matsuura 1985: 491 (Indo-Pacific, Atlantic Ocean); Smith-Vaniz 1986: 651 (Kenya, Japan, Indonesia, Australia, Hawaiian Islands, and Atlantic Ocean); Hoese and Hanley 1989: 580 [Australia (Western Australia, Queensland, New South Wales)]; Randall et al. 1990: 163; Mok 1993: 338 (Taiwan); Kimura 1997: 327 (southern Japan, Indo-Pacific, Atlantic Ocean); Smith-Vaniz 1999: 2723 (Kenya, Japan, Indonesia Australia, Hawaiian Archipelago, Bermuda, South America off Columbia and Venezuela, St. Helena Island); Nakabo 2001: 197 (Pacific coast of Japan, Indian Ocean, Pacific Ocean, Atlantic Ocean); Senou 2002: 797 [Japan (Niigata and Toyama prefectures, San'in District, Pacific coast of southern Japan, Ryukyu Islands), Indo-Pacific, tropical Atlantic]; Hoese and Gates 2006: 1159 [Australia (New South Wales, Queensland, Western Australia)]; Randall 2007: 234 (Hawaii); Yamada et al. 2007: 672 (Japan, Kyushu-Palau Ridge, East China Sea, Indo-Pacific, Atlantic Ocean); Motomura et al. 2010: 116 [Japan (Yaku-shima Island, Kyushu)].

Holotype. USNM 202744, 198 mm SL, Caribbean Sea, off Colombia, 12°13'N, 72°29'W, 13 October 1965.

Paratypes. Eight specimens of 51 paratypes were examined, 156–203 mm SL. MNHN 1968-0003 (1, 176), Caribbean Sea, off Colombia, 11°08.5'N, 74°29'W; USNM 202745 (2, 202–203), collected with holotype; USNM 202746 (4, 156–183), collected with MNHN 1968-0003; RMNH.PISC. 25916 (1, 173), collected with MNHN 1968-0003.

Other materials. Forty specimens, 81–424 mm SL. ANSP 137596 (1, 424), western Bermuda; ANSP (1, 342), Okinawa, Japan; BMNH 1868.6.15.14 (1, 345), St. Helena Island; CSIRO CA 843, 846 (2, 140–163), New South Wales, Australia; CSIRO CA 3956 (1, 220), Western Australia, Australia; FRLM 2810, 2941, 2942, 3330, 3331, 25877, 25886, 32919, 36882, 36910, 36911 (11, 81–294), Pacific coast of Mie Pref., Japan; FRLM 32709 (1, 308),

Nagasaki Pref., Japan; FRLM 34639–34644 (6, 287–313), Miyake Island, Izu Islands, Tokyo, Japan; FRLM 34786–34788, 34793, 34798, 34799, 34802 (7, 121–323), Bitung, North Sulawesi, Indonesia; FRLM 35396, 35397 (2, 282–323), Shizuoka Pref., Japan; MCZ 64495 (1, 128), off eastern Florida, USA; MNHN 1998-0853 (1, 250), Madagascar, 23°36'4"S, 43°31'1"E; NSMT-P 41217, 41218(2, 156–165), off Suriname or French Guiana; SAI-AB 13407 (1, 363); Kenya; WAM P.26207-002, 28110-002 (2, 165–354), Western Australia, Australia.

Diagnosis. A species of the red-fin *Decapterus* group defined by the following combination of characters: tip of upper jaw usually hooked in specimens larger than 150 mm SL; upper and lower parts of opercular membrane with fine serration in specimens larger than 200 mm SL; posterior tip of the pectoral fin not reaching to a vertical through origin of second dorsal fin; lower gill rakers 28–33 (Table 1); curved part of lateral line with 61–72 cycloid scales (Table 1), body depth 16.6–23.0 % SL (Fig. 2a); pectoral-fin length 14.7–24.7 % SL (Fig. 2d).

Description. Counts and measurements of the holotype, 8 paratypes, and 40 other specimens are shown in Table 5. Body elongate, fusiform, and weakly compressed; dorsal and ventral profiles almost equally convex; anus situated posterior to the level of second dorsal-fin origin. SL–FL relationship $FL = 1.04 SL + 3.71$ ($r = 0.997$). Dorsal contour of head and nape almost straight; tip of lower jaw slightly more protruding than upper jaw; tip of upper jaw usually hooked in specimens larger than 150 mm SL; snout slightly longer than upper jaw length; posterior end of upper jaw not reaching to a vertical through anterior margin of eye; posterior margin of upper jaw almost truncate (including holotype) or rarely slightly concave with angular dorsal and round ventral corners; teeth on jaws minute, arranged monoserially; posterior vomerine teeth minute, but obvious; adipose eyelid well developed; upper and lower parts of opercular membrane with fine serration in specimens larger than 200 mm SL. Supraneural and pterygiophore insertion patterns -/0-0/0-2/ (22 specimens, including holotype). First dorsal fin higher than the second; a single finlet present both dorsally and ventrally on caudal peduncle; pectoral fin shorter than head length, its posterior tip not reaching to a vertical through second dorsal-fin origin. Predorsal scaly area reaching to the level between anterior margins of pupil and eye; lateral line gently slanted downward from just below second dorsal-fin origin, running straight from below the base of 13th–17th second dorsal-fin soft ray (14th in holotype); straight part of lateral line shorter than curved part; cycloid scales covering posterior curved part and usually anterior straight part of lateral line (including holotype).

Color of fresh specimen. Head and body dark greenish brown dorsally, silvery white laterally and ventrally; snout and upper jaw tinged with red; a black blotch smaller than pupil in diameter present on upper edge of opercle; brilliant blue longitudinal band present midlaterally on body in extremely fresh condition; margins of both dorsal fins, caudal fin, pectoral fins, and both finlets red; anal and pelvic fins white.

Color of preserved specimen. Head and body brown dorsolaterally, pale brown ventrolaterally; snout whitish; a prominent black blotch present on upper edge of opercle; all fins and finlets pale brown.

Distribution. This species is widely distributed in the Indo-Pacific and the Atlantic Ocean. The present materials were collected from Japan (Izu Islands of Tokyo, and Shizuoka, Mie, Nagasaki, and Okinawa prefectures), Indonesia (North Sulawesi), Australia (New South Wales and Western Australia), Kenya, St. Helena I., Bermuda, Madagascar, the Caribbean Sea, and Surinam or French Guiana. Literature records also indicate that the species is widely distributed in the Atlantic Ocean and Indo-Pacific, including the Hawaiian Islands (Fig. 4).

Comparison. Adult *Decapterus tabl* in fresh condition can be easily distinguished from the other congeners by having red-colored dorsal, anal, and caudal fins, hooked upper-jaw tip, and a partly serrated opercular membrane. Serration of opercular membrane in specimens larger than 200 mm SL is unique in the genus. Among the red-fin *Decapterus* group, this species is most similar to *D. smithvanizi* in general appearance of body; morphological differences of *D. tabl* and comparisons with other species of *Decapterus* were mentioned above. Preserved specimens of *D. tabl* are similar to *D. macarellus* in having a fusiform body, short pectoral fin, and hooked upper-jaw tip. However, it can easily be distinguished from *D. macarellus* by a serrated opercular membrane in adults and more numerous cycloid scales along the straight part of the lateral line (0–8 vs. 25–36). Adults of the two species also differ in the shape of their upper jaws.

Remarks. Wakiya (1924) described “*Decapterus russelli*” based on a specimen collected from Kii (the old name of Wakayama and the southern part of Mie prefectures) and illustrated the conspecific specimen collected from Tokyo Bay (CM 7706). His illustration is very similar to *D. tabl* and agrees with the diagnostic characters of the species, especially, hooked upper-jaw tip and a short pectoral fin not reaching to the level of the second dorsal-fin origin. Moreover, he stated the Japanese names of the species as “Oaka” or “Akamuro,” both local Japanese names currently used for *D. tabl*. The Wakiya’s (1925) “*D. russelli*” is identified as *D. tabl*, although it was reported to have more numerous scutes (45). Suzuki (1962), Masuda et al. (1975), Gushiken (1976), Kimura and Suzuki (1981), and

Nakamura (1982) followed this misapplication of the name of the species. Gushiken (1983) synonymized Bleeker’s (1851) and Oshima’s (1925) “*Decapterus kurra*”, and Günther’s (1860) “*Caranx kurra*” with *D. tabl*. However, those nominal species could not be identified by us because their diagnostic characters are obscure.

Comparative materials. *Decapterus macarellus*, 34 specimens, 128–377 mm SL: FRLM 1646–1651, 1743, 1820–1823, 1964, 2040, 2041, 2180, 2182–2186, 2889, 2890, 37527 (23, 168–377), Pacific coast of Mie Pref., Japan; FRLM 35681 (1, 211), Ambon, Indonesia; MNHN 5840, holotype of *Caranx jacobus* Cuvier in Cuvier and Valenciennes, 1833 (1, 264), Cape Verde Islands (East Atlantic); MNHN 5850, lectotype of *Caranx macarellus* Cuvier in Cuvier and Valenciennes 1833 (1, 255), Martinique Island (Caribbean Sea); MNHN 5851, syntypes of *Caranx pinnulatus* Eydoux and Souleyet 1850 (2, 190–199), Hawaiian Islands; MNHN 5950 (1, 147), Azoles Islands; MNHN 8972 (1, 191), Hawaiian Islands; MNHN A-6245, B-2880, paralectotypes of *C. macarellus* (2, 128–240), Martinique Island; SFU 66-1230 (1, 242), Yongxing Island, Xisha Islands, China; USNM 50846, holotype of *Decapterus canonoides* Jenkins 1903 (1, 213), Hawaiian Island. *Decapterus macrosoma*, 64 specimens, 74–273 mm SL: FRLM 1740–1742, 1877, 2042, 2583–2586, 2653, 2813, 2814–2816, 25928–25933 (20, 140–273), Pacific coast of Mie Pref., Japan; KAUM I.10976 (1, 140), Kagoshima Pref., Japan; KAUM I.12189, 12381, 22067–22071, 22073–22076, 22145, 22173–22176 (16, 112–59), Sabah, Malaysia; KAUM I.17103 (1, 141), Trrenganu, Malaysia; MNHN 1977-0215 (1, 176), Kuala Lumpur, Malaysia; MNHN 1978-0233 (1, 127), central Vietnam (?Nha Trang); MNHN 1985-0315 (1, 152), Manila, Philippines; NSMT-P 60199 (1, 138), Phuket, Thailand; NSMT-P 69018 (4, 140–148), Nha Trang, Vietnam; NSMT-P 72575 (2, 116–121), Ambon, Indonesia; NSMT-P 80724 (3, 112–143), Mahe Island, Seychelles; RMNH.PISC. 6084, syntypes of *D. macrosoma* (7, 136–167), Jakarta, Indonesia; RMNH.PISC. 6088, syntype of *Caranx pseudoptyerygius* Bleeker 1849 (1 of 20, 74), Makassar, Indonesia; RMNH.PISC. 23482, syntype of *D. macrosoma* (1, 164), Jakarta, Indonesia; SFU A6859 (1, 218), Xiamen, China; USNM 77733, holotype of *Decapterus afuerae* Hildebrand 1946 (1, 245), Lobos de Afuera Island, Peru; WAM-P.26256-010 (2, 104–157), east of Bedout Island, northern Western Australia. *Decapterus maruadsi*, 46 specimens, 86–278 mm SL: FRLM 1818, 1834, 1836, 1873, 2037–2039, 2514, 2517–2519, 2521–2523, 2573–2575, 2578, 2580–2582, 6437, 20541 (23, 86–278), Pacific coast of Mie Pref., Japan; FRLM 8287 (1, 148), East China Sea; FRLM 12876 (1,169), Xiamen, China; FRLM 25597–26601 (5, 116–187), Odawara, Shizuoka Pref.; FRLM 35444 (1, 215), Hai

Phong, Vietnam; FRLM, 35491, 35492 (2, 167–177), Ha Long, Vietnam; NSMT-P 55115 (1, 140), Hainan Island, China; NSMT-P 67827(1, 175), Hai Phong, Vietnam; NSMT-P 69001, 69210 (2, 138–139), Nha Trang; NSMT-P 70683 (2, 122–126), Da Nang, Vietnam; SFU 6487, 6488, 7343, 7378, (4, 151–201), Guangdong, China; SFU A6229, A7651 (3, 143–17), Xiamen, China. *Decapterus muroadsi*, 12 specimens, 135–332 mm SL; AMS I.4362, lectotype of *Decapterus leptosomus* Ogilby 1898 (1, 142), Sydney, Australia; AMS I.4363, paralectotype of *D. leptosomus* (1, 135), Sydney, Australia; FRLM 1750–1753, 1874–1876 (7, 239–330), Pacific coast of Mie Pref.; MNHN A-5691, holotype of *Caranx scombrinus* Valenciennes 1846 (1, 330, dry), Galapagos Islands; WAM I.28609 (2, 165–168), Cockburn sound, Western Australia. *Decapterus punctatus*, 19 specimens, 72–184 mm SL; MNHN 0000-5852, lectotype of *Caranx sanctaehelenae* Cuvier in Cuvier and Valenciennes 1833 (1, 171), St. Helena Island; MNHN A-2532, 0000-5946, 0000-5947, paralectotypes of *C. sanctaehelenae* (11, 75–184), St. Helena Island; MNHN 0000-5951 (5, 83–135), Martinique, Caribbean Sea; MNHN 1931-304 (1, 139), Virgin Island, Caribbean Sea; MNHN 1963-0216 (1, 182), St. Helena Island. *Decapterus russelli*, 84 specimens, 124–270 mm SL; FMNH 59468, holotype of *Decapterus dayi* Wakiya 1924 (1, 133), Taiwan; FRLM 2715 (1, 123), Pacific coast of Mie Pref., Japan; FRLM 10674, 24945 (2, 259–270), Iriomote Island, Okinawa Pref., Japan; FRLM 12066, 12072 (2, 128–138), Parawan Island, Philippines; FRLM 26270, 26621 (2, 125–139), Bitung, North Sulawesi, Indonesia; FRLM 33690–33696, 33698–33700, 34018, 34020 (12, 137–186), Phuket, Thailand; KAUM I.12338–12342, 12351–12356, 12382, 12515, 12516, 12566, 12567, 22072 (17, 116–185), Sabah, Malaysia; KAUM I.17001, 17101, 17102, 17164, 17165 (5, 124–139), Trengganu, Malaysia; MNHN A-6266 (1, 159), Red Sea; MNHN 0000-5848, holotype of *Caranx kiliche* Cuvier in Cuvier and Valenciennes 1833 (1, 159), Pondicherry, India; MNHN 1966-232–1966-235, 1966-238 (6, 112–142), Gulf of Suez, Egypt; MNHN 1948-240 (1, 176) Madagascar; RMNH.PISC. 6087, holotype of *Decapterus lajang* Bleeker 1855 (1, 195), Ternate, Indonesia; RMNH.PISC. 6088, 26978, syntypes of *Caranx pseudopterygius* Bleeker 1849 (20, 85–151), Makassar, Indonesia.

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