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Pterois andover, a new species of scorpionfish (Pisces: Scorpaenidae) from Indonesia and Papua New Guinea

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Abstract

A new species of scorpionfish, *Pterois andover*, is described on the basis of six specimens, 83.9-168.0 mm SL, collected at southwestern Halmahera and western New Guinea (Papua and Papua Barat provinces, Indonesia). It has also been photographed at northern Sulawesi and Flores, Indonesia and Milne Bay Province, Papua New Guinea. The new taxon superficially resembles *P. volitans*, a sympatric widespread Pacific species, but differs in having larger body scales (< 75 in lateral row and 13-15 below lateral line versus > 81 and 18-25 respectively) and usually 13 versus 14 pectoral-fin rays. The two species are readily distinguished underwater on the basis of dorsal fin morphology, particularly the shape and colour of the spine membranes. *Pterois andover* possesses a narrow membrane posteriorly on each spine, which is more or less uniform brown and terminates in an exaggerated pennant-like structure. In contrast, the membranes of *P. volitans* are broader, boldly striped, and usually lack a well differentiated terminal pennant. The new species also has consistently fewer and fainter spots on the caudal, soft-dorsal, and soft-anal fins except for the population of *P. volitans* from western Australia.

Zusammenfassung

Eine neue Art der Skorpionsfische: *Pterois andover*, wird auf der Grundlage von sechs Exemplaren mit 83,9-168,0 mm SL beschrieben, die am südwestlichen Halmahera und am westlichen Neuguinea (Provinzen Papua und Papua Barat, Indonesien) gefangen wurden. Außerdem gibt es fotografische Belege von Nord-Sulawesi und Flores, Indonesien, und der Provinz Milne Bay in Papua-Neuguinea. Das neue Taxon ähnelt vordergründig *P. volitans*, einer sympatrischen, weit verbreiteten pazifischen Art, unterscheidet sich aber durch größere Körperschuppen (< 75 auf der Seitenlinie und 13-15 unterhalb der Seitenlinie im Gegensatz zu > 81 bzw. 18-25) sowie im Normalfall 13 im Vergleich zu 14 Brustflossenstrahlen. Die beiden Arten lassen sich unter Wasser leicht an der Morphologie der Rückenflosse unterscheiden, insbesondere an Form und Farbe der Flossenstrahl-Membranen. *Pterois andover* hat an jedem Strahl nach hinten zu eine schmale Membran, die mehr oder weniger einheitlich braun gefärbt ist und in einer auffälligen wimpelähnlichen Struktur endet. Im Gegensatz dazu sind die Membranen bei *P. volitans* breiter und deutlich gestreift und haben keine deutliche Wimpelstruktur am Ende. Auch zeigt die neue Art immer weniger und schwächere Flecken auf den Schwanz-, weichen Rücken- und weichen Anal-Flossen, was aber nicht für die Population von *P. volitans* vor Westaustralien gilt.

Résumé

Une nouvelle espèce de Scorpénidé, *Pterois andover* est décrite sur base de six spécimens, de 83,9 à 168,0 mm de LS, collectés au sud-ouest de Halmahera et en Nouvelle-Guinée occidentale (provinces de Papua et Papua Barat, Indonésie). Elle a aussi été photoraphiée au nord de Sulawesi et à Flores, Indonésie et dans la province de Milne Bay, Papouasie-Nouvelle-Guinée. Le nouveau taxon ressemble superficiellement à *P. volitans*, espèce sympatrique largement distribuée dans le Pacifique, mais se distingue par de plus grandes écailles sur le corps (< 75 en rangée latérale et 13-15 sous la ligne latérle contre > 81 et 18-25 respectivement) et, généralement, par 13 rayons pectoraux au lieu de 14. Les deux espèces se distinguent facilement dans l'eau grâce à la morphologie de la dorsale, notamment par la forme et la couleur des membranes épineuses. *Pterois andover* possède une membrane étroite à l'arrière de chaque épine, plus ou moins uniformément brune et se terminant par une structure en forme de fanion surdimensionné. Par contre, les membranes de *P. volitans* sont plus larges, nettement lignées et n'ont généralement pas de fanion terminal bien distinct. La nouvelle espèce montre aussi bien moins de taches, et plus effacées, sur la caudale et les rayons mous de la dorsale et de l'anale, excepté pour la population de *P. volitans* de l'ouest de l'Australie.

Sommario

Una nuova specie pesce scorpione, *Pterois andover*, è descritta sulla base di sei esemplari di 83.9-168.0 mm SL raccolti lungo la costa sudoccidentale dell'isola di Halmahera e nella Nuova Guinea occidentale (province di Papua e Papua occidentale, Indonesia). La specie è stata anche fotografata a nord di Sulawesi e a Flores, Indonesia, e nella provincia di Milne Bay, Papua Nuova Guinea. Il nuovo taxon assomiglia superficialmente a *P. volitans*, una specie simpa-

trica ampiamente diffusa nel Pacifico, ma differisce per avere scaglie più larghe sul corpo (< 75 della linea laterale e 13-15 sotto la linea laterale rispetto a > 81 e 18-25, rispettivamente) e di solito 13 anziché 14 raggi pettorali. Le due specie sono facilmente distinguibili nell'ambiente naturale sulla base della morfologia della pinna dorsale, in particolare per la forma e il colore delle membrane delle spine. Ogni spina di *Pterois andover* possiede una sottile membrana posteriormente, che è quasi uniformemente marrone e termina in una larga struttura simile ad una banderuola. Per contro, le membrane di *P. volitans* sono più larghe, con strie ben marcate e generalmente mancano di una parte terminale differenziata a banderuola. La nuova specie ha anche macchie meno accentuate e in minor numero sulla caudale, sulla dorsale molle e sull'anale molle eccetto per la popolazione di *P. volitans* dell'Australia occidentale.

INTRODUCTION

The scorpaenid fish genus *Pterois* Oken, 1817, commonly known as lionfishes or turkeyfishes, is well known for its spectacular appearance and possession of dangerous venom associated with the dorsal, anal, and pelvic fin spines (Allen & Eschmeyer 1973). It occurs throughout the tropical Indo-west and central Pacific region. In addition, *P. volitans* (Linnaeus, 1758) has recently become established on the east coast of the United States due to aquarium releases (Whitfield et al. 2002) and *P. miles* (Bennett, 1828) has entered the Mediterranean from the Red Sea via the Suez Canal (Golani & Sonin 1992).

Previous taxonomic works (e.g. Smith 1957, Weber & de Beaufort 1962) recognize four wide-ranging species from the Indo-Pacific including *P. antennata* (Bloch, 1787), *P. radiata* Cuvier, 1829, *P. russelii* Bennett, 1831 and *P. volitans*. However, Schultz (1986) demonstrated the latter species is restricted to the western Pacific, being replaced in the Indian Ocean by *P. miles*. Other recognised taxa include *P. mombasae* (Smith, 1957) from the Indian Ocean and far-west Pacific, *P. sphex* Jordan & Evermann, 1903 from the Hawaiian Islands, and *P. lunulata* Temminck & Schlegel, 1843 from Japan.

The present paper describes a distinctive new taxon that is seldom encountered by divers due to its proclivity for turbid coastal environments. It was first illustrated by Kuiter & Tonozuka (2001) from Indonesian locations including Bitung, northern Sulawesi and Maumere, Flores. Three specimens were eventually obtained in September 2005 when the first author joined an exploratory cruise of southwestern Halmahera. Three additional examples were collected by the authors at western New Guinea (Papua and Papua Barat provinces) in 2006 and 2007. It has also been photographed underwater at Milne Bay Province, Papua New Guinea.

MATERIALS AND METHODS

Type specimens and comparative material are deposited at the Australian Museum, Sydney (AMS), Muséum national d'Histoire naturelle, Paris (MNHN), Nationaal Natuurhistorisch Museum, Leiden, Netherlands (RMNH), National Museum of Natural History, Washington, D.C. (USNM), Natural History Museum of London (BMNH), Pusat Penelitian dan Pengembangan Oseanologi, Jakarta, Indonesia (NCIP), and the Western Australian Museum, Perth (WAM).

Eschmeyer (1969) is followed for the terminology of head spines except for the use of lacrimal for the preorbital bone and spines. Lengths for specimens are standard length (SL), the straight-line distance from the front of the upper lip (when not protruded) to the base of the caudal fin (distal end of the hypural plate). Head length (HL) is measured from the same median anterior point to the most posterior end of the opercular membrane, and snout length from the same point to the bony edge of the orbit. Body depth is maximum depth vertically from the base of the dorsal spines (as they emerge from the body, not to their internal bases). Body width is the greatest width just posterior to the gill opening. Orbit diameter is the greatest bony diameter, and interorbital width the least bony width. Caudal-peduncle depth is the least depth, and caudal-peduncle length is measured horizontally from the rear base of the anal fin to the caudal-fin base. Lateral-line scales are readily distinguished by their external median tubule. The scales in longitudinal series are the near-vertical to oblique scale rows above the lateral line from the most anterior point at the upper end of the gill opening to the caudal-fin base. Scales above the lateral line are those in the middle of the body to the base of the dorsal fin and scales below the lateral line are counted nearly vertically to the base of the first anal spine. Counts of gill rakers are made on the first gill arch and are divided into those of the upper-limb and lower-limb.

Proportional measurements in Table I are given as percentages of the standard length. Counts and measurements in parentheses in the description refer to the paratypes if different from the holotype.

Pterois andover n. sp.
(Figs 1-2, 4-6; Tables I-VII)

Holotype: NCIP 6307, female, 168.0 mm SL, Marai, 01°43.862'S 135°46.398'E, southwestern Yapen Island, Cenderawasih Bay, Papua Province, Indonesia, 17 m depth, spear, M. V. Erdmann, 14 February 2006.

Paratypes: BMNH 2007.11.26.1, 105.9 mm SL, Fiabacet Island, 02°12.982'S 130°32.732'E, off southeastern Misool, Raja Ampat Islands, Papua Barat Province, Indonesia, 70 m depth, hand net, M. V. Erdmann, 10 November 2007; MNHN 2007-1930, 83.9 mm SL, Waigeo Island, 00°25.838'S 130°42.775'E, mouth of small bay in entrance to Kabui Bay, Raja Ampat Islands, Papua Barat Province, Indonesia, 31 m depth, hand net, G. R. Allen, 17 November 2007; NCIP 6317, 98.6 mm SL, Payahi Bay, 00°20.335'N 127°40.194'E, southwestern Halmahera, Indonesia, 5-8 m depth, spear, G. R. Allen, 24 September 2005; USNM 390776, 102.0 mm SL, collected with NCIP paratype; WAM P.32893-001, 122.8 mm SL, collected with NCIP paratype.

Comparative material: *Pterois miles* (20 specimens, 88.1-280.5 mm SL): BMNH 1862.12.19.13, Natal, South Africa, 103.2 mm SL; BMNH 1863.12.15.21-22, 2 specimens, 88.1-107.5 mm SL, Natal, South Africa; BMNH 1871.7.15.7, 220.2, Red Sea; BMNH 1886.8.6.1, 154.0 mm SL, Suakin, Sudan, Red Sea; BMNH 1900.1.22.2, 132.8 mm SL, South Africa; BMNH 1906.11.19.101, 231.5 mm SL, Natal, South Africa; BMNH 1934.2.22.57, 150.6 mm SL, Mauritius; BMNH 1936.10.5.12, 241.7 mm SL, Seychelles; BMNH 1951.1.16.675-676, 2 specimens, 154.5-180.0 mm SL, Israel, Gulf of Aqaba, Red Sea; BMNH 1962.1.22.87, 121.3 mm SL, Maldives; BMNH 1967.5.13.21, 144.6 mm SL, Israel, Gulf of Aqaba, Red Sea; BMNH 1985.7.9.513, 101.4 mm SL, Dar-es-Salaam, Tanzania; MNHN 6597, 280.5 mm SL, Red Sea (syntype of *Pterois muricata* Cuvier, 1829); USNM 161330, 182.8 mm SL, Red Sea; USNM 265830, 5 specimens, 110.0-163.0 mm SL, Aldabra; *Pterois russelii* (25 specimens, 54.1-180.5 mm SL): MNHN 6558, 180.5 mm SL, Ava Coast, Myanmar (holotype of *Pterois geniserra* Cuvier, 1829); MNHN 6595, 121.3 mm SL, Ava Coast, Myanmar (non-type, but collected with holotype of *P. geniserra*); RMNH 5868, 11 specimens, 54.1-176.3 mm SL, Banka, Java, and Sumatra, Indonesia (includes 9 syntypes of *Pterois kodipungi* Bleeker, 1852); WAM P.8273, 2 specimens, 90.7-99.0 mm SL, Exmouth Gulf, Western Australia; WAM P.8275-6, 2 specimens, 91.2-117.4 mm SL, Exmouth Gulf, Western Australia; WAM P.25996-002, 194.3 mm SL, Exmouth Gulf, Western Australia; WAM P.30019-001, 3 specimens, 62.3-169.0 mm SL, Shark Bay, Western Australia; *Pterois volitans* (37 specimens, 78.7-225.5 mm SL): AMS I.12941, 174.8 mm SL, Port Hedland, Western Australia (holotype of *Pterois volitans castus* Whitley, 1951); BMNH 1858.4.21.295-296, 2 specimens, 167.5-196.3 mm SL, Ambon, Indonesia; BMNH 1875.10.5.17, 133.6 mm SL, Samoa; BMNH 1927.2.11.151, 173.9 mm SL, Queensland, Australia; BMNH 1930.10.28.4-5, 2 specimens, 160.5-173.9 mm SL; East Indies (no other locality data); BMNH 1950.7.13.28, 174.0 mm SL, Christmas Island (Indian Ocean); BMNH 1984.1.18.252, 167.8 mm SL, Singapore; USNM 99682, 114.5 mm SL,

Fig. 1. Underwater photographs of *Pterois andover* approximately 200 mm TL, Bitung, Sulawesi, Indonesia (upper), and approximately 250 mm TL, Maumere, Flores, Indonesia (lower). Photos by R. C. Steene & R. H. Kuiter.

Indonesia (no other locality data); USNM 99683, 147.5 mm SL, Sulawesi, Indonesia; USNM 99686, 166.1 mm SL, Sulawesi, Indonesia; USNM 102539, 167.1 mm SL, Iloilo, Philippines; USNM 168167, 118.2 mm SL, Buang Bay, Philippines; USNM 265828, 225.5 mm SL, Halmahera, Indonesia; USNM 265833, 173.6 mm SL, Banda Sea, Indonesia; USNM 265953, 4 specimens, 142.7-177.5 mm SL, Sulawesi, Indonesia; USNM 38292, 162.5 mm SL, Nuka Hiva, Marquesas; WAM P.2994, 78.7 mm SL, Madang, Papua New Guinea; WAM P.5833, 130.7 mm SL, Shark Bay, Western Australia; WAM P.5972, 143.6 mm SL, Christmas Island (Indian Ocean); WAM P.8185, 126.1 mm SL, Shark Bay, Western Australia; WAM P.8268, 105.8 mm SL, Exmouth Gulf, Western Australia; WAM P.8269, 150.7 mm SL, Dampier Archipelago, Western Australia; WAM P.13757-8, 2 specimens, 113.5-142.4 mm SL, Exmouth Gulf, Western Australia; WAM P.14729-001, 104.0 mm SL, Abrolhos Islands, Western Australia; WAM P.24678-001, 167.0 mm SL, Lancelin, Western Australia; WAM P.26677-002, 143.4 mm SL, Shark Bay, Western Australia; WAM P.27595-015, 102.0 mm SL, Abrolhos Islands, Western Australia; WAM P.29044-003, 106.0 mm SL, Ashmore Reef, Timor Sea; WAM P.29913-009, 88.0 mm SL, Cocos-Keeling Islands (Indian Ocean); WAM P.32422-004, 91.0 mm SL, Shark Bay, Western Australia.

Diagnosis: A species of the scorpaenid genus *Pterois* with the following combination of characters: Dorsal rays XIII,11; anal rays III,7; pectoral rays 12-14 (usually 13); vertical scale rows in longitudinal scale series 62-72; horizontal scale rows above lateral line 9-10; horizontal scale rows below lateral line 13-15; dorsal spines with narrow, inconspicuous membrane on posterior edge with exaggerated pennant-like flap distally; relatively few dark spots on median fins, 5-28 on dorsal fin, 10-19 on anal fin, and 17-41 on caudal fin; first dorsal spine relatively short, average length 14.95% of SL.

Description: Dorsal rays XIII,11; anal rays III,7; all soft dorsal and anal rays branched, the last to base; pectoral rays 13 (12-14, usually 13), all unbranched; pelvic rays I,5; all soft rays branched; principal caudal rays 12, the upper and lower unbranched; upper and lower procurrent caudal spines 3, followed by segmented soft procurrent ray; gill rakers on first arch 3 + 8 (4-5 + 9) (plus 1-2 rudi-

Fig. 2. *Pterois andover*, freshly collected female holotype, 168.0 mm SL, Cenderawasih Bay, Papua Province, Indonesia. Photo by G. R. Allen.

Table I. Proportional measurements of type specimens of *Pterois andover* expressed as percentage of the standard length.

	Holotype NCIP 6307	Paratype WAM P.32893	Paratype USNM 390776	Paratype NCIP 6317	Paratype BMNH 2007.11.26.1	Paratype MNHN 2007-1930
Standard length (mm)	168.0	122.8	102.0	98.6	105.9	83.9
Head length	36.9	38.8	37.1	35.1	35.0	38.4
Body depth	40.5	36.7	37.3	31.3	33.1	36.0
Body width	25.0	20.8	21.7	18.7	19.6	21.3
Snout length	14.9	14.4	13.8	11.8	12.2	13.6
Orbit diameter	10.4	8.8	8.4	8.7	8.3	9.4
Interorbital width	7.7	8.3	7.2	6.7	6.7	7.4
Maxillary length	19.0	18.6	17.7	17.4	17.8	18.4
Caudal peduncle depth	10.1	11.2	10.7	9.8	9.7	10.7
Caudal peduncle length	17.9	15.5	16.1	15.6	17.8	17.3
Predorsal length	32.7	34.3	33.9	32.2	29.6	34.0
Preanal length	63.7	70.8	68.5	68.5	67.0	67.3
Prepelvic length	35.7	36.5	37.0	36.6	36.3	36.8
Dorsal fin base length	58.3	63.8	61.6	61.4	59.9	62.0
Anal fin base length	17.3	17.2	17.2	17.7	18.5	18.2
1st dorsal spine length	17.9	16.9	15.9	12.3	12.6	14.1
2nd dorsal spine length	22.6	26.4	27.8	27.6	25.5	31.2
3rd dorsal spine length	33.3	31.0	36.5	35.6	32.1	39.6
4th dorsal spine length	42.9	37.4	41.0	44.7	38.1	45.3
Tallest dorsal spine length (7th)	47.6	41.0	48.5	50.6	48.7	54.0
Last dorsal spine length	13.7	13.4	14.5	16.7	15.0	13.3
Tallest soft dorsal ray	30.4	30.1	29.8	31.4	29.1	30.2
1st anal spine length	7.1	6.8	7.0	5.7	6.8	7.4
2nd anal spine length	9.5	13.5	12.1	11.7	12.4	14.1
3rd anal spine length	14.3	18.1	15.3	17.2	15.7	18.5
Tallest soft anal ray (4th)	28.0	29.0	31.1	31.7	27.7	29.2
Pectoral fin length	66.7	77.2	101.5	107.5	76.5	105.2
Pelvic fin length	38.7	40.6	44.7	44.9	37.6	40.4
Pelvic spine length	16.7	19.1	20.4	20.3	17.2	18.8
Caudal fin length	40.5	39.3	40.3	41.4	38.1	41.0

Table II. Comparison of vertical scale row counts for species of *Pterois*.

Species	61-65	66-70	71-75	81-85	86-90	91-95	96-100	101+
P. andover	3	2	1					
P. miles				7	7	3		
P. russelii	3	4	1	1				
P. volitans				2	9	9	5	5

ments on upper and lower arch of holotype and most paratypes); branchiostegal rays 7; vertebrae 24.

Body depth 2.5 (2.7-3.2) in SL; body width 1.6 (1.6-1.8) in body depth; HL 2.7 (2.6-2.9) in SL; snout length 2.5 (2.7-3.0) in HL; outer rim of eye extending above dorsal profile of head; interorbital space V-shaped and relatively deep, the least width 4.8 (4.7-5.2) in HL; orbit diameter 3.5 (4.0-4.4) in HL; caudal-peduncle depth 3.6 (3.5-3.6) in HL; caudal-peduncle length 2.1 (2.0-2.5) in HL.

Mouth large, maxilla extending to below posterior edge of orbit, the upper-jaw length 1.9 (2.0-2.1) in head; lower jaw pointed and strongly projecting; gape of mouth slightly oblique, forming an angle of about 30 degrees to horizontal axis of head and body; jaws with a band of slender, conical, incurved, inwardly depressible teeth in about 5-6 rows at front of upper jaw and 7-8 rows at front of lower jaw, narrowing abruptly to 1-2 rows at posterior end; teeth progressively longer inwardly; vomer with small, close-set, conical teeth in about 5-6 rows, forming a V-shaped patch; no palatine teeth; tongue thick and broadly rounded, with free median triangular anterior part and a rounded fleshy tip; gill rakers short and stout with small spinules, the longest at angle about equal to length of longest gill filaments.

Head spines and bony ridges generally typical for genus, and spination can be expected to increase with growth; a median ridge-like protuberance or hump on snout formed by underlying median ascending process of premaxillary and flanked by pair of posteriorly directed nasal spines; other

paired spines include supraocular, postocular, parietal and nuchal (fused to a low ridge), and sphenotics (rudimentary); pterotic, posttemporal, and humeral, each as low ridge with feeble spine posteriorly; rear margin of operculum broadly rounded, preoperculum with pair of prominent spines above angle and a blunt process below; preorbital with radiating ridges, not spinate; suborbital ridge low and inconspicuous with 2-3 blunt spines.

Supraocular tentacle slender, about equal to orbit diameter (but damaged in holotype and largest paratype), or forming low, triangular, nubbin-like flap; also pair of prominent dermal flaps on ventral edge of preorbital, pair of smaller flaps on ventral margin of opercle, and pair of short slender cirri at tip of snout; cephalic sensory pores generally inconspicuous except for a few larger pores ventrally on mandible, below suborbital ridge, and laterally on snout; anterior nostril just below base of nasal spine with an elongate dermal flap that extends to hind edge of posterior nostril when laid back; posterior nostril with low fleshy rim, lying a short distance behind anterior nostril.

Scales entirely cycloid, very small on side of head and interobital region; no scales on snout/preorbital, chin, and outer margin of preopercle, also a narrow naked area behind eye to pterotic ridge; no scales on fins except basally on caudal and pectoral fins; lateral-line scales 28 (28-30); vertical scale rows in longitudinal series 70 (62-72); horizontal scale rows above lateral line in middle of body 10 (9-10); horizontal scale rows below lateral line to base of first anal spine 15 (13-14).

Origin of dorsal fin above supracleithral spine, the predorsal length 3.1 (2.9-3.4) in SL; first dorsal spine 2.1 (2.3-2.9) in HL; second dorsal spine 1.6 (1.2-1.5) in HL; third dorsal spine 1.1 (1.0-1.3) in HL; fourth dorsal spine 0.9(0.8-1.0) in HL; seventh dorsal spine longest, 2.1 (2.0-2.4) in SL; last dorsal spine 2.7 (2.1-2.9) in HL; fifth dorsal soft ray longest, 1.2 (1.1-1.3) in HL; first anal spine 5.2 (5.2-6.2) in HL; second anal spine 3.9 (2.8-3.1) in HL; third anal spine longest, 2.6 (2.0-2.4) in HL; fourth anal soft ray longest, 1.3 (1.1-1.3) in HL; caudal fin rounded, the length 2.5 (2.4-2.6) in SL; pectoral fins very long and free from connective membranes distally, the third ray longest, 1.5 (0.9-1.3) in SL; pelvic spine 2.2 (1.7-

Fig. 3. Underwater photograph of *Pterois volitans* approximately 250 mm TL, Milne Bay Province, Papua New Guinea. Photo by R. C. Steene.

2.0) in HL; second pelvic soft rays longest, 2.6 (2.2-2.7) in SL.

Colour in life (from underwater digital photographs, Fig. 1): head white to pale pink with about 12 red-brown bars, several including those at anterior edge of eye, below middle of eye, immediately behind eye, and from nape to upper pectoral-fin base wider and more vivid than others, which are mainly diffuse; pair of prominent dermal flaps on rear half of upper jaw with brown stripe along their length; enlarged supraorbital flaps or tentacles with brown stripe along their length and faint alternating white and brown bands; smaller scattered skin flaps on head mainly pink or whitish; body with about 13 relatively broad, vivid red-brown bars interspersed with equal number of white-edged relatively diffuse brown bars; dorsal spines with alternating pink/whitish and very faint reddish/brown bands, each with a narrow dark brown membrane posteriorly and pennant-like expansion distally, the latter pinkish to brown, sometimes with a horizontally-elongate dark brown spot near its centre; soft dorsal, caudal, and anal fins with translucent membranes and pinkish rays, the latter with several brownish bands/spots; pelvic fins mainly pinkish or white on basal half and brown on outer half with 2-3 horizontal rows of relatively large brown spots; pectoral fins pale grey-brown with about six equally-spaced

Fig. 5. Underwater photograph of *Pterois andover,* approximately 300 mm TL (fish at right) and *P. volitans*, Milne Bay Province, Papua New Guinea. Photo by R. C. Steene.

Fig. 4. Underwater photographs comparing dorsal-fin spines of *Pterois andover* (upper) and *P. volitans*. Photos by G. R. Allen.

Fig. 6. Underwater photographs comparing body scales of *Pterois andover* (upper) and *P. volitans*. Photos by G. R. Allen.

Table III. Comparison of horizontal scale rows counts for species of *Pterois.*

Above lateral line							
Species	8	9	10	11	12	13	14
P. andover		3	3				
P. miles				10	7	2	
P. russelii			3	6			
P. volitans				8	12	8	2

Below lateral line													
Species	13	14	15	16	17	18	19	20	21	22	23	24	25
P. andover	1	4	1										
P. miles					1	5	7	5	1				
P. russelii			1	3	2	2		1					
P. volitans						2	1	5	8	5	5	3	1

Table IV. Comparison of pectoral ray-ray counts for species of *Pterois.* A single asterisk (*) indicates that counts were taken for both right and left fins. A double asterisk (**) indicates data taken from underwater photographs.

Pectoral rays				
Species	12	13	14	15
*P. andover**	1	10	1	
*P. andover***		5		
P. miles		1	21	
*P. russelii**	3	43	4	
P. volitans			36	1

Table V. Comparison of the average length (as percentage of the standard length) of the first and fourth dorsal spines of species of *Pterois.*

Species	n	D1	D4
P. andover	6	14.95	41.56
P. miles	16	22.09	43.26
P. russelii	13	18.54	35.29
P. volitans	15	21.34	45.64

brown bands along length of upper rays, grading to 3-4 narrower brown bands/spots across lowermost rays; pectoral-fin base white to pink with pair of broad brown stripes/bands and narrow brown stripe between them.

Colour of holotype when fresh (Fig. 2): head and body with alternating red-brown and white to pinkish bars; most of brown bars on head narrower than pale bars except for one directly below eye, one immediately behind eye, and another from nape to upper pectoral-fin base; ventral surface of mandible with red-brown dash-like markings; primary brown bars on body relatively wide (about eye width or slightly narrower) with alternating narrower pale bars, each of the latter with a slender brown bar in the middle; dorsal-fin spines pink with alternating faint brown bands; soft dorsal, caudal, and anal fins pink with widely scattered brown spots; pelvic fins dusky red-brown with three rows of relatively large brown spots; pectoral fins pink with several brown bands/spots on each ray; pectoral-fin base with pair of broad brown stripes and 2-3 narrower brown stripes; breast region white with about 3-4 diffuse brown bars.

Colour in alcohol: similar to fresh coloration except pink/whitish areas are pale yellowish-tan and brown marking lack a reddish hue.

Remarks: *Pterois andover* is closely allied to *P. volitans* (Fig. 3) for which it is easily mistaken. The two species are easily differentiated in life or in underwater photographs by the structure/shape of the dorsal fin spines (Figs 4-5). Those of *P. andover* possess a very narrow membrane posteriorly on each spine, which gives it the impression of having longer, more slender spines. In contrast, the membranes of *P. volitans* are much broader (i.e. feather shaped), at least in adults. Additionally, the membranes of *P. andover* are generally dark, in contrast to those of *P. volitans*, which are conspicuously paler with prominent dark cross-bands. The distal tip of each dorsal spine of *P. andover* is distinctly enlarged, pennant-like, and much broader than the posterior membrane along the length of the spine. The "pennant" is generally brown and sometimes has a dark spot near its centre. In contrast, the distal tip of each spine in *P. volitans* is only slightly expanded compared to the adjacent posterior membrane and is generally whitish in adults. Although reliable as a diagnostic field character, the delicate fin membranes are invariably damaged in preserved specimens.

The two species also have a pronounced differ-

ence in the size of the body scales, which is reflected in the counts of both vertical and horizontal scale rows (Tables II-III). The scales of *P. andover* are considerably larger than those of *P. volitans*, hence they form a readily visible network, imparted by individual scales on the side of the body that are thinly outlined with dark brown (Fig. 6, upper). In contrast, the individual scales are not easily discerned in *P. volitans* when viewed underwater or in photographs (Fig. 6, lower).

The new species further differs in usually having 13 pectoral rays, compared to a normal count of 14 rays in *P. volitans* (Table IV). Schultz (1986) indicated that although 14 rays is the normal count for the latter species, it sometimes has 15-16 rays in South Pacific populations (Vanuatu, Fiji, Samoa, Tahiti, Marquesas, and Pitcairn Group).

A comparison of dorsal spine length as indicated by the first and fourth spines reveals that those of *P. andover* are generally shorter than those of *P. miles* and *P. volitans* (Table V). Data were taken for a relatively small portion of the available comparative material due to the high incidence of broken spines.

There is also a difference in the pattern of small dark spots on the median fins. The new species consistently possesses fewer, less vivid spots than *P. volitans* and *P. miles* (Table VI). A notable

Fig. 7. Underwater photograph of *Pterois miles*, approximately 200 mm TL, Nosy Be, Madagascar. Photo by G. R. Allen.

Fig. 8. Underwater photograph of *Pterois russelii*, approximately 200 mm TL, Bali Indonesia. Photo by G. R. Allen.

Table VI. Comparison of number of spots on median fins of species of *Pterois.* The abbreviation WA is used for Western Australia. An asterisk (*) indicates data from underwater photos.

Caudal fin spots								
Species	< 25	26-35	36-45	56-65	66-75	76-85	86-95	96+
P. andover	2	3	1					
*P. andover**	2	2	2					
P. miles				2	1	4	7	5
P. volitans					5	9	2	3
P. volitans (WA)	5							

Dorsal fin spots							
Species	6-15	16-25	26-35	36-45	46-55	56-65	66+
P. andover	4	1	1				
*P. andover**	3	2	1				
P. miles			2	1	9	5	2
P. volitans				2	7	10	
P. volitans (WA)	3	1	1				

Anal fin spots						
Species	6-15	16-25	26-35	36-45	46-55	56-65
P. andover	4	1				
*P. andover**	3	3				
P. miles			1	9	7	3
P. volitans			1	6	10	2
P. volitans (WA)	2	3				

Table VII. Frequency distribution of supraocular tentacle-shape for species of *Pterois.* Data were taken from underwater photographs.

Species	Nubbin	Ray-like	Feather-like	Mixed
P. andover	10	2		
P. miles		4		2
P. volitans	2	12	16	2

exception is that specimens of *P. volitans* from Western Australia generally have sparse spotting, and are therefore similar to *P. andover* in this respect. We have examined Whitley's (1951) holotype of *Pterois volitans castus* and nine additional specimens from Western Australia and conclude they represent a geographic colour variant of the wide-ranging Pacific species. Although differing in the number of median fin spots, they possess small scales (>85 in lateral series) and 14 pectoral rays, which is typical for the nominal species.

The delicate membranes associated with dorsal spines and cephalic skin flaps/tentacles are invariably damaged by handling or specimen processing. Hence, underwater photographs provide the best means of evaluating these structures.

Shapes of supraocular tentacles for *P. andover*, *P. miles*, and *P. volitans* were studied from the first author's underwater photographs and a summary of the frequency for the various shapes is presented in Table VII. This structure forms either a short (about equal to eye diameter) ray-like tentacle or abbreviated nubbin in *P. andover*. In contrast, most specimens of *P. miles* and *P. volitans* have either ray-like or feather-like tentacles. Fishelson (2006) suggested that populations of *P. volitans* (= *P. miles)* from the Red Sea have rapidly (over the past 25 years) evolved a unique phenotype consisting of a feather-like supraocular tentacle (often bearing a small ocellus) instead of the typical ray-like tentacle. However, from our experience, mainly in the Indo-Malayan region, both types of supraocular structures are commonly encountered among populations of *P. volitans*. Moreover, occasional photographed individuals exhibit a "feather" over one eye, and "ray" over the other. Some individuals possess a ray-like basal stalk and a feather-shaped structure occupying the outer one-third to one-half of the tentacle (Fig. 3). Most likely, the outer portion is readily damaged and frequently missing, resulting in a short ray-like appendage.

There is also an apparent ecological difference. *Pterois volitans* occurs in a variety of habitats including clear offshore coral reefs as well as sheltered inshore waters. In contrast, *P. andover* is

much more ecologically restricted. Virtually every observation has occurred on or near turbid inshore reefs surrounded by soft sand-mud bottoms, often in the proximity of freshwater discharge, at depths between 3-70 m. The species has thus far been collected only from Indonesia at Halmahera and western New Guinea (Papua and Papua Barat provinces). However, Kuiter & Tonozuka (2001) included three photographs taken at Bitung, northern Sulawesi and Maumere Bay, Flores. In addition, Roger Steene photographed it during a recent visit to Milne Bay Province, Papua New Guinea where a lone individual in company with several *P. volitans* was encountered (Fig. 5). Judging from this notable range extension, the species probably ranges widely in the East Indian region and could certainly be expected at locations such as Sabah and the Philippines.

Our study of *Pterois andover* included comparisons with 37 specimens of *P. volitans* and 20 specimens of *P. miles* (see list of comparative material above). Schultz (1986) provided evidence for the recognition of the latter species, which was previously considered a synonym of *P. volitans*. Although the two species are very similar in appearance (Figs 3-7), Schultz (1986) showed that *P. volitans* has consistently larger pectoral fins, almost always 11 soft-dorsal rays, and seven soft-anal rays compared to the usual counts of 10 and six rays respectively in *P. miles*. Although recent authors (e.g. Allen & Adrim 2003, Poss 1999, Randall 1995, and Eschmeyer 1986) have recognized *P. miles* as a valid species, Fishelson (2006) concluded there was a lack of sufficient knowledge to warrant its separation from *P. volitans.* However, Schultz's (1986) recognition of separate Pacific and Indian Ocean species is followed here, pending further genetic work currently in progress by Paul Barber (Boston University) and the authors. Moreover, Kochzius et al. (2003) concluded that the two species were clearly separable on the basis of mtDNA sequences.

There are apparently no extant type specimens of *Gasterosteus volitans* Linnaeus, 1758. There is a dried specimen from the Gronovius collection labelled as a syntype at the Natural History Museum of London (BMNH 1853.11.12.9). However, examination of this specimen, 109 mm SL, revealed that it is *Dendrochirus zebra* (Cuvier, 1829). The specimen was discussed by Wheeler (1958), who identified it as *D. brachypterus* (Cuvier, 1829). According to Wheeler, the original description by Linnaeus (based primarily on literature sources) is adequate and "there is no necessity to interfere with the accepted nomenclature of this well known species".

Bennett's (1828) description of *Scorpaena* (= *Pterois) miles* was based on a drawing of a specimen from Ceylon (Sri Lanka) that is clearly diagnostic. Based on personal communication received from R. Myers, Fishelson (2006) indicated the oldest name for this species is *Scorpaena mahe* Lacépède, 1801. This opinion was perhaps based on Cuvier (in Cuvier & Valenciennes 1829), who considered *S. mahe* a junior synonym of *P. volitans*. However, Lacépède's pectoral ray count of 17 would appear to preclude the identification of this species as *P. miles*. There is no type specimen of *Scorpaena mahe.*

We have also examined 25 specimens of *Pterois russelii*, which bears a superficial resemblance to *P. andover*. Both species usually possess 13 pectoral-fin rays and larger, hence fewer vertical scale rows on the body than for *P. volitans* and *P. miles* (Tables II-III). However, *P. russelii* is readily distinguished by its lack of spotting on the median fins (Fig. 8). Moreover, it generally has shorter dorsal spines (Table V) and lacks pigmentation on the lower jaw. There are no known type specimens of *P. russelii*, which was described by Bennett (1831) on the basis of a drawing (no. 133) that appeared in Russell (1803). This species generally occurs on soft mud bottoms, typically offshore in depths of 15-60 m, but is occasionally seen in shallow estuaries.

Our examination of *P. russelii* specimens included the syntypes of *P. kodipungi* (see list of comparative material above), which was previously recognized as a valid species by Kuiter & Tonozuka (2001) and Allen & Adrim (2003). No significant characters were detected to distinguish it and therefore we agree with the earlier assessment of de Beaufort & Briggs (1962), which treated it as a junior synonym of *P. russelii*. We have also identified the holotype of *P. geniserra* Cuvier, 1829 as *P. russelii*. Although Cuvier's name was published two years before Bennett's description it has never been used and should therefore be suppressed under Article 23.9.1 of the International Code of Zoological Nomenclature. In contrast, *P. russelii* has been used for this species in numerous publications over the past 100 years.

Etymology: The new species is named *andover* to honour the request of Sinduchajana Sulistyo, who has given generously to support Conservation International's Bird's Head Seascape marine conservation initiative. The name is in honour of the Andover group of companies, including Andover Leisure, which is dedicated to promoting greater public

appreciation of the oceans and marine conservation in Asia. It is treated as a noun in apposition.

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