



## Two new fish species of the subfamily Anthiinae (Perciformes, Serranidae) from the Marquesas

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### Abstract

Two new species of anthiine fishes are described from the Marquesas Islands, French Polynesia. *Plectranthias flammeus* was found at depths from 20–45 m and is characterized by dorsal rays X, 14 or 15, with spines 1–6 bearing fleshy white tabs at their tips, longest fleshy tab on spine 4; 14 unbranched pectoral rays; lateral line incomplete with 16–17 tubed scales; preopercle with 8–10 small spines along posterior margin and 2 antrorse spines on ventral margin; broad, fiery red-orange streak across lower cheek; head and body with irregularly spaced maroon-ringed yellow blotches on a white background; pair of small dark oblong spots (red with black centers in life) on the bases of the middle rays of the caudal fin. *Pseudanthias oumati* was found on the outer reef slope of Fatu Hiva at a depth of 50–55 m and is characterized by 3rd dorsal spine elongate and tipped with fleshy yellow filament extending beyond tip of spine; lateral-line scales 43; gill rakers 10 + 28; no papillae on posterior edge of orbit; front of upper lip not thickened (male condition unknown); caudal fin lunate; color of female yellow, all fins yellow with narrow magenta margin (except pectoral fin, which lacks magenta); no stripe from snout to pectoral base; small scales located on basal quarter of soft-dorsal fin from segmented rays 1–12; dorsal profile of head slightly concave.

**Key words:** perchlet, anthias, *Plectranthias flammeus*, *Pseudanthias oumati*, French Polynesia, endemic

### Introduction

The Marquesas Islands, the northernmost archipelago in French Polynesia, are home to a diverse and highly endemic (11.6%) fish fauna (Randall & Earle, 2000). We conducted an extensive survey of the Marquesan ichthyofauna in 2011, during which every island in the group was visited and sampled. Preliminary results indicate approximately 526 fish species occur at the Marquesas, including about 68 endemic species (many of them undescribed). If these results hold, the percentage of endemism for the Marquesas will increase to 12.9%. Specimens of as many as 22 or more possibly undescribed species were collected including a single specimen of a small yellow anthias and four specimens of a colorful small perchlet, which are described herein. The perchlet, named herein as the Flame Perchlet, was reported for the first time by Bacchet *et al.* (2006) based on an underwater photograph taken at the Marquesas at a depth of 35–45 m, but no specimens had been collected. The new yellow anthias species was unknown before our expedition.

Randall (1980), in the only major revision of the genus *Plectranthias*, recognized 30 valid species. Wu *et al.* (2011) summarized the taxonomic changes following Randall’s (1980) revision and described two new species. Anderson and Heemstra (2012) point out that 18 new species of *Plectranthias* have been described since 1980, and discuss the need to review the generic placement of some species. There are currently four recognized species of *Plectranthias* known from French Polynesia: *P. nanus* Randall, 1980, *P. winniensis* Tyler, 1966, *P. kamii* Randall, 1980, and *P. rubrifasciatus* Fourmanoir & Randall, 1979. In addition, Patrick Plantard photographed a specimen (Fig. 1) of yet another French Polynesian species of *Plectranthias* (about 6 to 7 cm long; an undescribed species similar to *Plectranthias inermis* Randall, 1980) in a cave off Rangiroa at a depth of 65 m, but was unable to collect the specimen.

The genus *Pseudanthias* has not been revised. There are currently 65 species recognized as valid (FishBase, accessed 29 November 2012; Heemstra & Akhilesh, 2012; Allen & Erdmann, 2012), including two species endemic to the Marquesas: *Ps. hiva* Randall & Pyle, 2001 and *Ps. regalis* (Randall & Lubbock, 1981). The new yellow anthias adds another species to the growing list of Marquesan endemics and brings the total number of recognized *Pseudanthias* species to 66.

The purpose of this paper is to describe the new species of *Plectranthias* and *Pseudanthias*, both currently known only from the Marquesas Islands.

## Materials and Methods

Methods of counting and measuring follow Anderson and Heemstra (2012). The dorsal ray-pterygiophore-neural spine interdigitation pattern is presented as a formula with “0” representing a supraneural, “/” a neural spine, and numerals indicating the number of spines borne by each pterygiophore. Values for the holotypes are presented first with paratype values following in parentheses when different. Type specimens of the new species are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM) and Museum National d’Histoire Naturelle, Paris (MNHN). Abbreviations used: standard length (SL), head length (HL), lateral line (LL), dorsal fin (D), and anal fin (A).

Morphometric data for the new species are presented in the descriptions as proportional measurements of SL or HL, rounded to the nearest 0.5.

Whole genomic DNA was extracted from fin clips preserved in 96% EtOH. DNA extraction was performed using QIAextractor (QIAGEN, Crawley) according to manufacturer's protocols. To conduct our genetic analysis, a fragment of the mitochondrial gene coding for cytochrome C oxidase subunit 1 (COI) was amplified with the primers designed by Ward *et al.* (2005). PCR amplifications and sequencing were performed following Williams *et al.* (2012) protocol.

A 650 base-pair fragment of the two new species, *Pseudanthias oumati* and *Plectranthias flammeus*, was sequenced for comparative purposes among congeners found during the campaign and obtained from GenBank with a representative of the Anthiinae used as the outgroup (Table 1). All sequences are deposited in GenBank.

Two different tree-building methods were used to construct branching diagrams. Neighbor-joining (NJ) analysis based on K2P model of sequence evolution was conducted using the software package MEGA 5 (Tamura *et al.* 2011). The ML analysis was run using the Geneious implementation of PHYML (Drummond *et al.* 2010, Guindon & Gascuel 2003). The appropriate model of nucleotide substitution was determined using jModeltest version 3.07 (Posada 2008). Confidence in topologies was evaluated based on 1000 bootstrap replicates or posterior probability. The two analyses resulted in identical tree topologies.

**TABLE 1.** Specimens included in the molecular analysis for this study.

| Species                          | GenBank Accession number                |
|----------------------------------|---|
| <i>Plectranthias flammeus</i>    | KC565477 - KC565480                     |
| <i>Plectranthias fourmanoiri</i> | KC567662, KC567663                      |
| <i>Plectranthias japonicus</i>   | JQ681323, JQ681324                      |
| <i>Plectranthias nanus</i>       | JQ432001 - JQ432004, KC565481, KC567661 |
| <i>Plectranthias winniensis</i>  | KC565482, KC565483                      |
| <i>Pseudanthias connelli</i>     | JF494282 - JF494286                     |
| <i>Pseudanthias cooperi</i>      | GU805058                                |
| <i>Pseudanthias evansi</i>       | JQ350254, JQ350255, JQ350256            |
| <i>Pseudanthias fasciatus</i>    | JF494290 - JF494293                     |
| <i>Pseudanthias hiva</i>         | KC565486, KC565487                      |
| <i>Pseudanthias huchtii</i>      | FJ583925                                |

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**TABLE 1.** (Continued)

| Species                          | GenBank Accession number                          |
|----------------------------------|---|
| <i>Pseudanthias lori</i>         | FJ583926 - FJ583930                               |
| <i>Pseudanthias mica</i>         | KC503492  |
| <i>Pseudanthias mooreanus</i>    | JQ432050, JQ432051, KC565489, KC565492            |
| <i>Pseudanthias olivaceus</i>    | JQ432053, JQ432054                                |
| <i>Pseudanthias oumati</i>       | KC565493  |
| <i>Pseudanthias pascalus</i>     | FJ583931 - FJ583933, JQ432055, JQ432056, KC565491 |
| <i>Pseudanthias pleurotaenia</i> | FJ583936 - FJ583938                               |
| <i>Pseudanthias pulcherrimus</i> | KC503495  |
| <i>Pseudanthias randalli</i>     | KC503493, KC503494                                |
| <i>Pseudanthias regalis</i>      | KC565484, KC565485, KC565488                      |
| <i>Pseudanthias squamipinnis</i> | FJ583955, FJ583956                                |
| <i>Pseudanthias truncatus</i>    | FJ583957 - FJ583960                               |
| <i>Pseudanthias ventralis</i>    | KC565490  |
| <i>Odontanthias tapui</i>        | JQ431935  |
| <i>Hemanthias signifer</i>       | GU440335  |
| <i>Anthias anthias</i>           | JQ774769  |



**FIGURE 1.** An undescribed species of *Plectranthias* (about 6–7 cm long) in a cave off Rangiroa, French Polynesia, at a depth of 65 m, photographed by Patrick Plantard.



conical teeth, largest teeth in innermost row; palatines with 2–4 rows of small, sharp-tipped conical teeth; tongue small, narrow, pointed, without teeth.



**FIGURE 2.** *Plectranthias flammeus*, holotype, USNM 409013, 21 mm SL, freshly collected at Nuku Hiva, Marquesas, French Polynesia, photographed by J.T. Williams.

Opercle with 3 prominent flat spines, middle spine slightly longer; preopercle with 11 (8–11) small spines along posterior margin and 2 antrorse spines on ventral margin; interopercle with 2 left–3 right (1–3 on each side) spines; subopercle with 1 spine. Anterior nostrils positioned at middle of snout, each with small rounded flap rising from anterior rim; posterior nostril an elliptical opening at anterior border of orbit.

Scales ctenoid; lateral line broadly arched over pectoral fin following body contour, tubed portion ending beneath middle of soft dorsal, pitted scales on posterior third of body extend midlaterally to caudal-fin base; fins have at most some small scales scattered along base of fins.

Dorsal spines 1–6 with fleshy white tabs, fourth dorsal spine longest and bearing longest fleshy white tab extending beyond tip; dorsal fin deeply incised before first segmented-fin rays; anal fin rounded with segmented ray 5–6 longest; caudal fin truncate to slightly rounded; pectoral fin lanceolate with middle rays longest and reaching vertical from anal-fin element 3–5; pelvic fins short, not reaching anus.

Color in life (based on photos of the freshly collected types and the underwater photo published by Bacchet *et al.* 2006). Head and body with numerous variously sized yellow blotches outlined with red or maroon border (red areas mixed with scattered melanophores); snout and lips with white mid-line stripe flanked on each side by a sequence of narrow red, yellow, then red stripes extending from eye across lips; remainder of chin, lower lip, chest and belly white; broad, brilliant red and orange streak extending from upper lip along dorsal half of maxilla and across cheek to angle of preopercle; top of head with scales broadly outlined with reddish maroon and small yellow blotches, pair of small, brilliant white spots on either side of head at middle of nape; red, orange and yellow zigzagging stripe from posteroventral border of eye across middle of cheek, gill cover, pectoral-fin base and terminating in pupil-sized red blotch on bases of middle pectoral-fin rays; pelvic fins white with small red spot at base; pale yellow blotch basally on dorsal spines 1–5 and extending onto body over 1–2 scale rows, smaller pale yellow blotch at base of spines 6–8, third pale blotch basally on dorsal spines 9–10 and first segmented ray; Spinous dorsal with small red-orange-yellow spots on middle of first two spines, at base of 5<sup>th</sup> and 8<sup>th</sup> spines and a few smaller spots scattered across middle of fin, white fleshy tabs on tips spines 1–6; second dorsal translucent with faint band of orange across basal quarter of fin; brilliant white saddle on caudal peduncle posterior to dorsal fin; caudal fin translucent with pair of pupil-sized red and black spots positioned basally on caudal rays just dorsal and ventral to midline of caudal fin; anal fin red blotch at base of spines 1–3, yellow-orange spots basally on segmented rays 1–2 and another on rays 5–7; pectoral fin translucent with rays outlined in red; iris of eye with alternating red and yellow blotches.



**FIGURE 3.** *Plectranthias inermis*, USNM 391341, about 30 mm SL, freshly collected from 27–30 m depth at Verde Island, Philippines, photographed by J.T. Williams.



**FIGURE 4.** *Plectranthias flammeus*, paratype, USNM 409025, 24 mm SL, freshly collected at Fatu Hiva Island, Marquesas, French Polynesia, exhibiting the white saddle on the peduncle and small spots at base of caudal fin, photographed by J.T. Williams.

Color in alcohol similar to pattern in life with red areas marked by scattered melanophores and yellow areas pale.

**Etymology.** The specific epithet *flammeus* is from the Latin *flammeus*, meaning fiery, and refers to the brilliant red and yellow diagonal streak across the lower cheek and the red-yellow-orange blotches on the body. The name is treated as a noun in apposition. The common name, Flame Perchlet, refers to the distinctive flame-like markings on the head and body.

**Remarks.** *Plectranthias flammeus* is distinguished from other members of the genus except *P. inermis*, *P. gardineri* (Regan, 1908), *P. nanus*, *P. longimanus* (Weber, 1913) and *P. winniensis*, by having unbranched pectoral-fin rays and an incomplete LL with fewer than 25 tubed scales. It differs from *P. inermis* (Fig. 3) and *P. gardineri* (Randall & Shimizu 1994) in color and in having two antrorse spines on the lower margin of the preopercle (*versus* none or one, respectively). The color pattern (Fig. 4) of *P. flammeus* readily distinguishes it from the barred color

patterns of *P. longimanus* (Fig. 5) and *P. nanus* (Fig. 6) as well as the generally uniform yellow and pinkish body of *P. winniensis* (Fig. 7). Its pectoral-fin ray count of 14 overlaps with *P. nanus* (14–16), but differs from *P. longimanus* (12–13) and *P. winniensis* (16–18). *Plectranthias flammeus* has a pair of small dark oblong spots (red with black centers in life; Fig. 4) on the bases of the middle rays of the caudal fin, whereas *P. nanus* has a dark, narrow vertical bar (red and black in life; Fig. 6) separated from the body by a pale area.



**FIGURE 5.** *Plectranthias longimanus*, 14 mm SL, freshly collected from 25–37 m depth about 20 miles west of Busuanga Island, Palawan Province, Philippines (field number BUS 03-39), photographed by J.T. Williams.



**FIGURE 6.** *Plectranthias nanus*, USNM 409250, 27 mm SL, freshly collected from 15–30 m depth at Motu One Island, Marquesas, French Polynesia, photographed by J.T. Williams.

*Plectranthias flammeus* is known only from the Marquesas Islands, where it has been found at the islands of Nuku Hiva and Fatu Hiva. It likely occurs throughout the Marquesas Islands, but its secretive nature and small size make it difficult to locate.

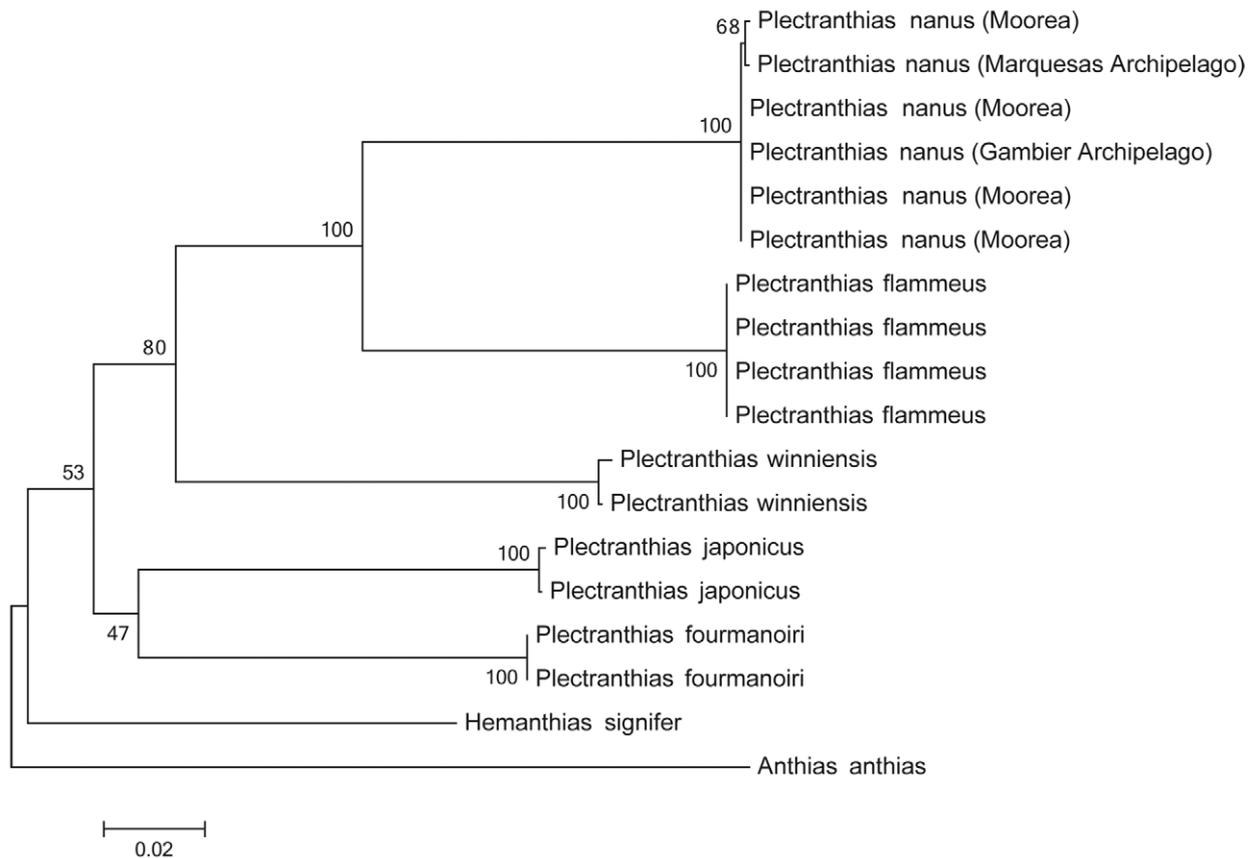
Genetic information and/or tissue samples are scarce for members of the genus *Plectranthias*, with COI sequences available for only five species of the genus (Table 1). Results from our molecular analysis reveal a well-supported genetic divergence between the *P. flammeus* lineage and its congeners (Fig. 8).

Phil Heemstra (pers. comm. 2013) informs us that the *Plectranthias winniensis* from the type locality (Western Indian Ocean) have a color pattern character distinct from our French Polynesia specimen. Although it is probable that the French Polynesia population represents an undescribed species, we retain the current name for our central Pacific form until further study of the complex can be completed.

In Randall's original description of *Plectranthias nanus*, he noted that his single specimen of *P. nanus* from the Marquesas has only 16 lateral-line scales, while specimens from other localities have 18–22. The specimen (Fig. 6) we collected in the Marquesas has 17 lateral-line scales. The COI sequences for *P. nanus* from the Marquesas and other localities (Gambier Archipelago and Moorea, French Polynesia) group together in a single lineage (Fig. 8). In the absence of any other distinguishing characters, we expand the range for the number of tubed lateral-line scales to 16–22 for *P. nanus* and interpret this character as being highly variable for the species. We note that this level of variation (seven rays) is highly unusual for a species of *Plectranthias*. Most species have a strongly modal pectoral-fin ray count with a range of variation of only two or three rays.



**FIGURE 7.** *Plectranthias winniensis*, USNM 400675, 16 mm SL, freshly collected from 25–31 m depth at Gambier Archipelago, French Polynesia, photographed by J.T. Williams.



**FIGURE 8.** Neighbor-Joining tree based on K2P model of sequence evolution (with 1,000 bootstrap replicates) for available members of the genus *Plectranthias*.

***Pseudanthias oumati*, new species**

Common Name: Saffron anthias

(Fig. 9)

Holotype. USNM 409433; female; 57.6 mm SL; French Polynesia, Marquesas Islands, Fatu Hiva, south of Baie Hanavave (Baie des Vierges) at tip of Pointe Matautu, on sloping deep reef terrace at bottom of steep rock wall; field number MARQ-2011-32; tissue voucher number MARQ-433; decimal latitude -10.4715, decimal longitude -138.6779; depth 50–55 m; collected by spear, collector Serge Planes; 10 Nov. 2011; vessel “Braveheart.”

**Diagnosis.** Dorsal rays X,16; third dorsal spine elongate and tipped with fleshy yellow filament extending beyond tip of spine; anal rays III, 7; pectoral rays 18; lateral-line scales 43; gill rakers 10 + 28; body depth 2.5 in SL; head length 3.3 in SL; no papillae on posterior edge of orbit; 5 serrae on margin of subopercle and 5 on interopercle; snout length 4.5 in HL; front of upper lip not thickened (male condition unknown); bony interorbital width 3.8 in HL; caudal fin lunate, caudal concavity 3.5 in SL; color of female yellow, all fins yellow with narrow magenta margin (except pectoral fin, which lacks magenta); no stripe from snout to pectoral base; small scales located on basal quarter of soft dorsal fin from segmented rays 1–12; dorsal profile of head slightly concave.

**Description.** Dorsal rays X,16 (spines 1–6 with fleshy filaments, spine 3 longest and with longest fleshy filament; 12<sup>th</sup> segmented ray with filamentous extension); anal rays III,7 (4<sup>th</sup> segmented ray with filamentous extension); pectoral rays 18 (upper 2 unbranched; lanceolate shaped with middle rays longest and reaching vertical from anal-fin origin when appressed); pelvic rays I,5; principle caudal rays 8 + 7, middle 13 branched (lunate shaped with filamentous dorsal and ventral lobes); upper-lower procurent rays 9–9 (posteriormost 3 segmented); LL with 43 tubed scales (left side with last tubed scale at base of caudal fin; right side with 2 additional tubed scales on caudal fin beyond base); scales above first LL scale to base of third dorsal spine 5; scales above LL to base of middle dorsal spines 3; scales below LL to origin of anal fin 16; circumpeduncular scales 27; gill rakers 10 + 28, total rakers 38; pseudobranchial lamellae 14; branchiostegal rays 7; vertebrae 10+16; supraneurals 3; supraneural-dorsal ray-pterygiophore-neural spine interdigitation pattern 0/0+0/2/1+1/1/1/1/1/2/1/1+1/1+1/1/1/1+1/1/1+1/1+1.

Body moderately deep for genus, body depth 2.5 in SL, and laterally compressed, its width 2.5 in body depth; head length 3.3 in SL; snout length 4.5 in HL, front of upper lip not thickened (male condition unknown); orbit diameter 3.1 in HL; bony interorbital width 3.8 in HL; maxillary length 2.0 in HL; caudal peduncle depth 2.1 in HL; caudal peduncle length 2.9 in HL; predorsal length 3.3 in SL; dorsal spine 3 longest, 1.6 in HL; preanal length 1.5 in SL; anal spine II longest, 1.7 in HL; pectoral-fin length 1.0 in HL, middle rays longest; prepelvic length 2.09 in SL; pelvic-spine length 1,7 in HL; longest pelvic ray 1.1 in HL; caudal fin lunate, its length 2.1 in SL; caudal-fin concavity 1.1 in HL.



**FIGURE 9.** *Pseudanthias oumati*, holotype, USNM 409433, 58 mm SL, freshly collected at Fatu Hiva Island, Marquesas, French Polynesia, photographed by J.T. Williams. (Note spear damage on side above pectoral fin.)

Mouth oblique, moderately large, maxilla scaled, reaching to below posterior half of eye; lower jaw barely projecting; posterior edge of maxilla truncate with upper half smooth, lower half weakly crenulate; no supramaxilla; upper jaw with 1–2 widely separated, slightly enlarged canines directed ventrally on each side of upper jaw at front of mouth, followed laterally by row of smaller canines with posteriormost teeth somewhat forward pointing, interior band of about three irregular rows of tiny inward projecting conical teeth; roof of mouth anterior to vomer with two large recumbent recurved canines directed medially toward vomer; vomer with somewhat triangular patch of tiny conical teeth; palatines with 1–2 irregular rows of tiny conical teeth; lower jaw with widely separated pair of stout canines projecting anterolaterally and projecting outside gape when mouth is closed (exposed outside upper lip), large recurved canine inside mouth about one-third distance from symphysis preceded by band of villiform teeth and followed on each side by single row of smaller slender canines pointed interiorly; tongue slender and sharply pointed.

No papillae on posterior border of orbit; anterior nostril with short membranous tube above upper lip, tube almost reaching posterior nostril when appressed; posterior nostril a somewhat oblong opening covered anteriorly by a thin, narrow membrane, positioned at about middle of anterior border of eye.

Opercle with three flat spines, lower two stout and acute, upper short with rounded tip; middle opercular spine largest and at level of center of eye; vertical margin of preopercle with 20 small serrae, largest at angle of preopercle, left side with one tiny serra on ventral base of large serra at angle, right side with one serra on ventral margin of preopercle, remainder of ventral margin of preopercle smooth; margin of subopercle with 5 serrae; margin of interopercle with 5 serrae.

Scales ctenoid on head and body, some head scales with auxiliary scales, no auxiliary scales on body; head scaled except lips, small area around nostrils and isthmus, cheek with 8 rows of scales; no scales basally on spinous dorsal and anal fins, small scales on basal quarter of segmented dorsal and anal fins; small scales cover basal half of caudal fin; small scales cover basal third of pectoral fin; small scales cover basal half of pelvic fin; midventral rectangular scaly process at base of pelvic fins extending posteriorly between fins for distance equal to about one-quarter length of fins.

Color of freshly collected holotype (Fig. 9): head and body yellow, scales on dorsal half of body with greenish yellow centers, scales on ventral half of head and body outlined with orangish-yellow; tip of snout orangish yellow; dorsal fin yellow, tips of spines 5–10 magenta, distal margin of soft dorsal with narrow magenta margin; caudal fin yellow with magenta dorsal and ventral margins, anal fin yellow with magenta margin; pelvic fins yellow with magenta anterior margin; pectoral fins yellow; orbit with narrow yellow border, iris yellow with broken outer magenta ring.

Color in alcohol: head and body pale with tan centered scales, fins translucent.

**Etymology.** The specific epithet *oumati* is the Marquesan word for sun and refers to the brilliant yellow color of its body and fins. The name is treated as a noun in apposition. The common name, Saffron anthias, refers to its bright yellow color.

**Remarks.** In the Marquesas Islands, *Pseudanthias oumati* is easily distinguished from other *Pseudanthias*, *Ps. hiva* (Fig. 10) and *Ps. regalis* (Figs. 11–12), by its brilliant yellow body and fins. The holotype was the largest specimen of a group of 5–6 similarly colored individuals found shoaling together on a deep reef within a meter of the bottom. *Pseudanthias oumati* is currently known only from 50–55 meters on a deep rocky reef at Fatu Hiva in the Marquesas Islands. It is likely to occur on other deep-reef habitats throughout the Marquesas Islands and it may be restricted to the Marquesas Islands. It has not been found at other French Polynesian islands, but the deep reefs have not been thoroughly surveyed.

In having an elongate third dorsal spine, lunate caudal fin and a relatively low lateral-line scale count, *Pseudanthias oumati* is similar to *Ps. pulcherrimus* (Heemstra & Randall, 1986) from the Indian Ocean, *Ps. mica* Allen & Erdmann, 2012, from Indonesia, and *Ps. randalli* (Lubbock & Allen, 1978) from the western Pacific. The female *Ps. oumati* differs from female *Ps. pulcherrimus* in having yellow tipped fleshy filaments on the anterior dorsal spines (versus magenta), yellow body and fins (versus body, pelvic and anal fins pink), lower limb gill rakers 28 (versus 23–27), and body depth 2.5 in SL (versus 2.9–3.0). *Pseudanthias oumati* differs from *Ps. mica* in lacking a stripe from snout to pectoral-fin base (versus magenta stripe present), having 43 LL scales (versus 36–38), and lower limb gill rakers 28 (versus 20–24). *Pseudanthias oumati* differs from *Ps. randalli* in having 43 LL scales (versus 45–50), and lower limb gill rakers 28 (versus 22–24).



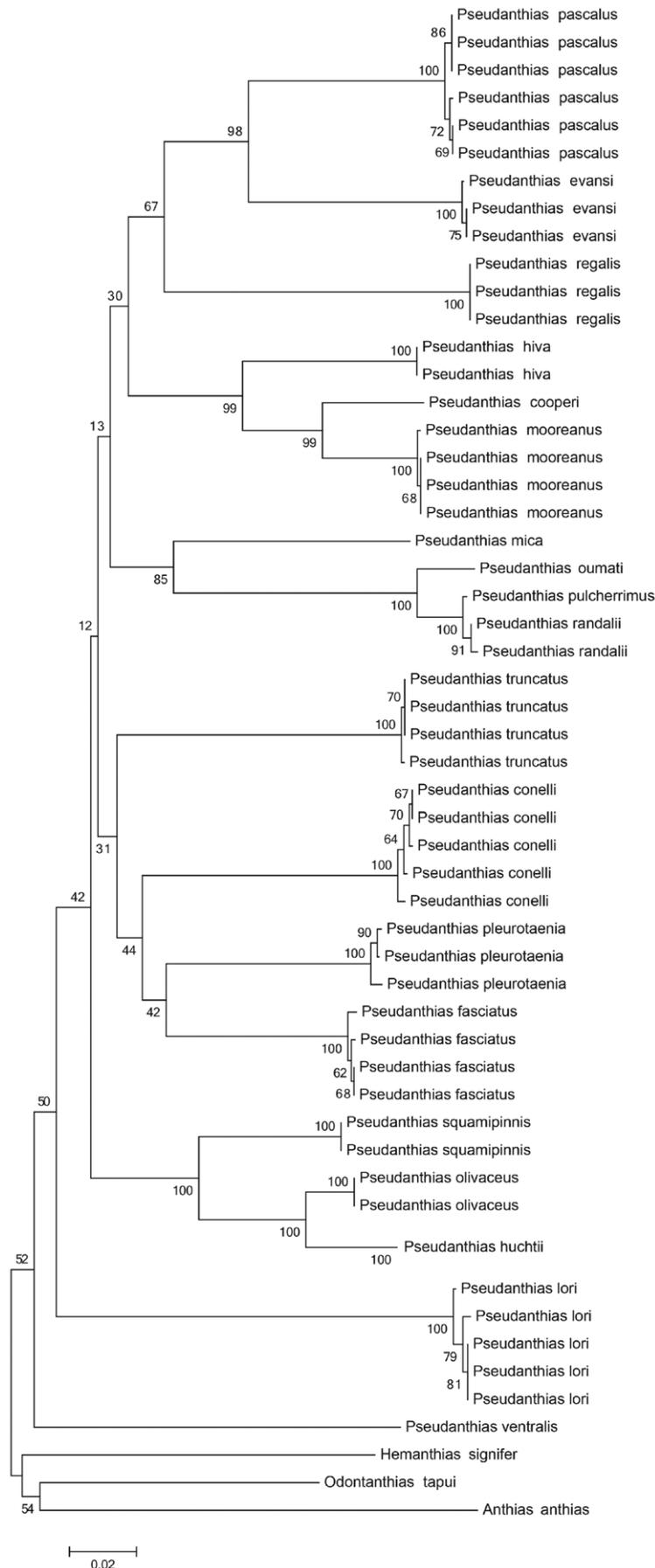
**FIGURE 10.** *Pseudanthias hiva*, USNM 409207, 50 mm SL, freshly collected at Eiao Island, Marquesas, French Polynesia, from 20–30 m, photographed by J.T. Williams.



**FIGURE 11.** *Pseudanthias regalis* initial phase female, USNM 408038, 42 mm SL, freshly collected at Mohotane Island, Marquesas, French Polynesia, from 5–27 m, photographed by J.T. Williams.



**FIGURE 12.** *Pseudanthias regalis* terminal phase male, USNM 409288, 51 mm SL, freshly collected at Ua Pou Island, Marquesas, French Polynesia, from 19–30 m, photographed by J.T. Williams.



**FIGURE 13.** Neighbor-Joining tree based on K2P model of sequence evolution (with 1,000 bootstrap replicates) for available members of the genus *Pseudanthias*.

*Pseudanthias huchtii* (Bleeker, 1757) and *Ps. squamipinnis* (Peters, 1855) also have an elongate third dorsal spine, lunate caudal fin and a relatively low LL scale count, but these both have a distinct stripe from snout to pectoral-fin base and 26 or fewer lower limb gill rakers (versus no stripe and 28 rakers for *Ps. oumati*). *Pseudanthias huchtii* and *Ps. squamipinnis* are found on relatively shallow reefs at depths of 2–20 m, rather than on the deep reefs inhabited by *Ps. oumati*.

We obtained COI sequences for 19 of the 66 described species of *Pseudanthias* (Table 1). Preliminary results are presented (Fig. 13) from a molecular analysis that includes all Polynesian species of *Pseudanthias* and the hypothesized (based on color pattern and morphological characters) closest relatives of *Pseudanthias oumati*. Our mtDNA analysis places *Ps. oumati* as a genetically distinct lineage that groups with *Ps. pulcherrimus*, *Ps. mica* and *Ps. randalli* in a more inclusive lineage that is distinct from other *Pseudanthias* (Fig. 13).

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## References

- Allen, G.R. & Erdmann, M.V. (2012) *Reef fishes of the East Indies. Volumes I–III*. Tropical Reef Research, Perth Australia, Vol. I: x + 1–424 + end note; vol. II: 425–855; vol. III: preface, map, contents and 857–1260; including Appendix 1 (new species descriptions) and Appendix II (addendum).
- Anderson, W.D. & Heemstra, P.H. (2012) Review of Atlantic and eastern Pacific anthiine fishes (Teleostei: Perciformes: Serranidae), with descriptions of two genera. *Transactions of the American Philosophical Society*, 102, 1–173.
- Bacchet, P., Lefèvre, Y. & Zysman, T. (2006) *Guide des poissons de Tahiti et ses îles*. Au Vent des Îles, Tahiti, 608 pp.
- Bleeker, P. (1857) Achtste bijdrage tot de kennis der vischfauna van Amboina. *Acta Societatis Regiae Scientiarum Indo-Neerlandicae*, 2, 1–102.
- Dereeper, A., Guignon, V., Blanc, G., Audic, S., Buffet, S., Chevenet, F., Dufayard, J.F., Guindon, S., Lefort, V., Lescot, M., Claverie, J.M. & Gascuel, O. (2008) Phylogeny.fr: robust phylogenetic analysis for the non-specialist. *Nucleic Acids Research*, 1, 36.  
<http://dx.doi.org/10.1093/nar/gkn180>
- Drummond, A., Ashton, B., Cheung, M., Cooper, A., Duran, C., Field, M., Heled, J., Kearse, M., Markowitz, S., Moir, R., Stones-Havas, S., Sturrock, S., Thierer, T. & Wilson, A. (2009) Geneious v4.6. Available from <http://www.geneious.com/> (Accessed 19 March 2013)
- Fourmanoir, P. & Randall, J.E. (1979) Three new species of serranid fishes of the genus *Plectranthias* from New Caledonia. *Micronesica*, 15, 315–324.
- Froese, R. & Pauly, D. (Eds.) (2012) FishBase. World Wide Web electronic publication. Available from <http://www.fishbase.org> (Accessed 29 November 2012).

- Guindon, S. & Gascuel, O. (2003) A simple, fast, and accurate algorithm to estimate large phylogenies by maximum likelihood. *Systematic Biology*, 52, 696–704.  
<http://dx.doi.org/10.1080/10635150390235520>
- Heemstra, P. C. & Akhilesh, K.V. (2012) A review of the anthiine fish genus *Pseudanthias* (Perciformes: Serranidae) of the western Indian Ocean, with description of a new species and a key to the species. *aqua, International Journal of Ichthyology*, 18, 121–164.
- Heemstra, P.C. & Randall, J.E. (1986) Serranidae. In: Smith, M.M. & Heemstra, P.C. (Eds.) *Smiths' Sea Fishes*. Springer-Verlag, Berlin, pp. 509–537.
- Lubbock, R. & Allen, G.R. (1978) A distinctive new *Anthias* (Teleostei: Serranidae) from the western Pacific. *Records of the Western Australian Museum*, 6, 259–268.
- Peters, W. (1855) Übersicht der in Mossambique beobachteten Seefische. *Monatsberichte der Akademie der Wissenschaft zu Berlin*, 1855, 428–466.
- Posada, D. (2008) jModelTest: Phylogenetic Model Averaging. *Molecular Biology and Evolution*, 25, 1253–1256.  
<http://dx.doi.org/10.1093/molbev/msn083>
- Randall, J.E. (1980) Revision of the fish genus *Plectranthias* (Serranidae: Anthiinae) with description of 13 new species. *Micronesica*, 16, 101–187.
- Randall, J.E. & Earle, J.L. (2000) Annotated checklist of the shore fishes of the Marquesas Islands. *Bishop Museum Occasional Papers*, 66, 1–9.
- Randall, J.E. & Lubbock, R. (1981) A revision of the serranid fishes of the subgenus *Mirolabrichthys* (Anthiinae: *Anthias*), with description of five new species. *Contributions in Science Natural History Museum of Los Angeles County*, 333, 1–27.
- Randall, J.E. & McCosker, J.E. (1982) Two new serranid fishes of the genus *Anthias* from the Central Pacific. *Journal of Aquaculture*, 2, 60–69.
- Randall, J.E. & Pyle, R.L. (2001) Four new serranid fishes of the anthiine genus *Pseudanthias* from the South Pacific. *Raffles Bulletin of Zoology*, 49, 19–34.
- Regan, C.T. (1908) Report on the marine fishes collected by Mr. J. Stanley Gardiner in the Indian Ocean. Percy Sladen Trust Expedition. *Transactions of the Linnean Society of London (Zoology)*, Series 2, 12, 217–255.
- Tamura, K., Peterson, D., Peterson, N., Stecher, G., Nei, M. & Kumar, S. (2011) MEGA5: Molecular Evolutionary Genetics Analysis using Maximum Likelihood, Evolutionary Distance, and Maximum Parsimony Methods. *Molecular Biology and Evolution*, 28, 2731–2739.  
<http://dx.doi.org/10.1093/molbev/msr121>
- Tyler, J.C. (1966) A new species of serranoid fish of the family Anthiidae from the Indian Ocean. *Notulae Naturae*, 389, 1–6.
- Ward, R.D., Zemlak T.S, Innes, B.H., Peter R. Last, P.R. & Hebert, P.D.N. (2005) DNA barcoding Australia's fish species. *Philosophical transactions of the Royal Society B*, 360, 1847–1857.  
<http://dx.doi.org/10.1098/rstb.2005.1716>
- Weber, M.C.W. (1913) *Die Fische der Siboga-Expedition*. Siboga-Expeditie LVII, E.J. Brill, Leiden, 710 pp.
- Williams, J.T., Delrieu-Trottin, E. & Planes, S. (2012) A new species of Indo-Pacific fish, *Canthigaster criobe*, with comments on other *Canthigaster* (Tetraodontiformes: Tetraodontidae) at the Gambier Archipelago. *Zootaxa*, 352, 80–88.
- Wu, K.-Y., Randall, J.E. & Chen, J.-P. (2011) Two new species of anthiine fishes of the genus *Plectranthias* (Perciformes: Serranidae) from Taiwan. *Zoological Studies*, 50, 247–253.