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Article

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Pseudochromine and pseudoplesiopine dottyback fishes from the Socotra Archipelago, Indian Ocean, with descriptions of two new species of *Pseudochromis* Rüppell (Perciformes: Pseudochromidae)

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Abstract

Species of pseudoplesiopine and pseudochromine fishes from the Socotra Archipelago are reported based mainly on collections made in 1999 and 2000. Two species of the pseudoplesiopine genus *Chlidichthys* Smith are recorded: *C. bibulus* (Smith) and *C. cacatuoides* Gill and Edwards. Seven species of the pseudochromine genus *Pseudochromis* Rüppell are recorded: *P. chrysospilus* **sp. nov.**, *P. leucorhynchus* Lubbock, *P. linda* Randall and Stanaland, *P. nigrovittatus* Boulenger, *P. sankeyi* Lubbock, *P. socotraensis* **sp. nov.** and an undetermined species (allied to *P. punctatus* Kotthaus). *Pseudochromis chrysospilus* belongs to a newly diagnosed *P. caudalis*-complex; it differs from other members of the complex in various meristic and coloration details. *Pseudochromis socotraensis* belongs to a newly diagnosed *P. dutoiti*-complex; it differs from other members of the complex in adult size, various meristic characters and live coloration. Based on both the collection records and additional visual records made in 1999 and 2000 the archipelagic distribution ranges of each species and the biotopes inhabited by them are described. Two additional species are tentatively reported from the Socotra Archipelago on the basis of sight records: *P. dixurus* Lubbock and *P. omanensis* Gill and Mee.

Key words: Indian Ocean, Socotra Archipelago, *Chlidichthys*, *Pseudochromis*, new species, Pseudochrominae, Pseudoplesiopinae

Introduction

In 1999 and 2000, under the auspices of the Environmental Protection Council of Yemen, the Senckenberg Research Institute, Frankfurt, conducted the Marine Habitat, Biodiversity and Fisheries Surveys in the framework of the United Nations Development Programme (UNDP) Global Environment Facility funded project "Conservation and Sustainable Use of Biodiversity of Socotra Archipelago." As part of the expedition the second author collected and recorded fishes at tidal and subtidal stations around the archipelago, which lies at the entrance to the Gulf of Aden, east of the Horn of Africa (Figure 1). The collections included 11 species of the Indo-Pacific fish family Pseudochromidae: two species of the subfamily Congrogadinae, which were reported on by Gill and Zajonz (2003); two species of the pseudoplesiopine genus *Chlidichthys* Smith, which were briefly discussed by Gill and Edwards (2004); seven species of the pseudochromine genus *Pseudochromis* Rüppell, two of which represent new species. We herein provide a key to the pseudoplesiopine and pseudochromine species of Socotra, collection and other details for each species and descriptions of the two new *Pseudochromis* species. The latter descriptions are based partly on additional specimens collected subsequently from the Archipelago in 2009 and 2010. Two additional species of *Pseudochromis* are tentatively reported that were visually recorded but lack voucher specimens.

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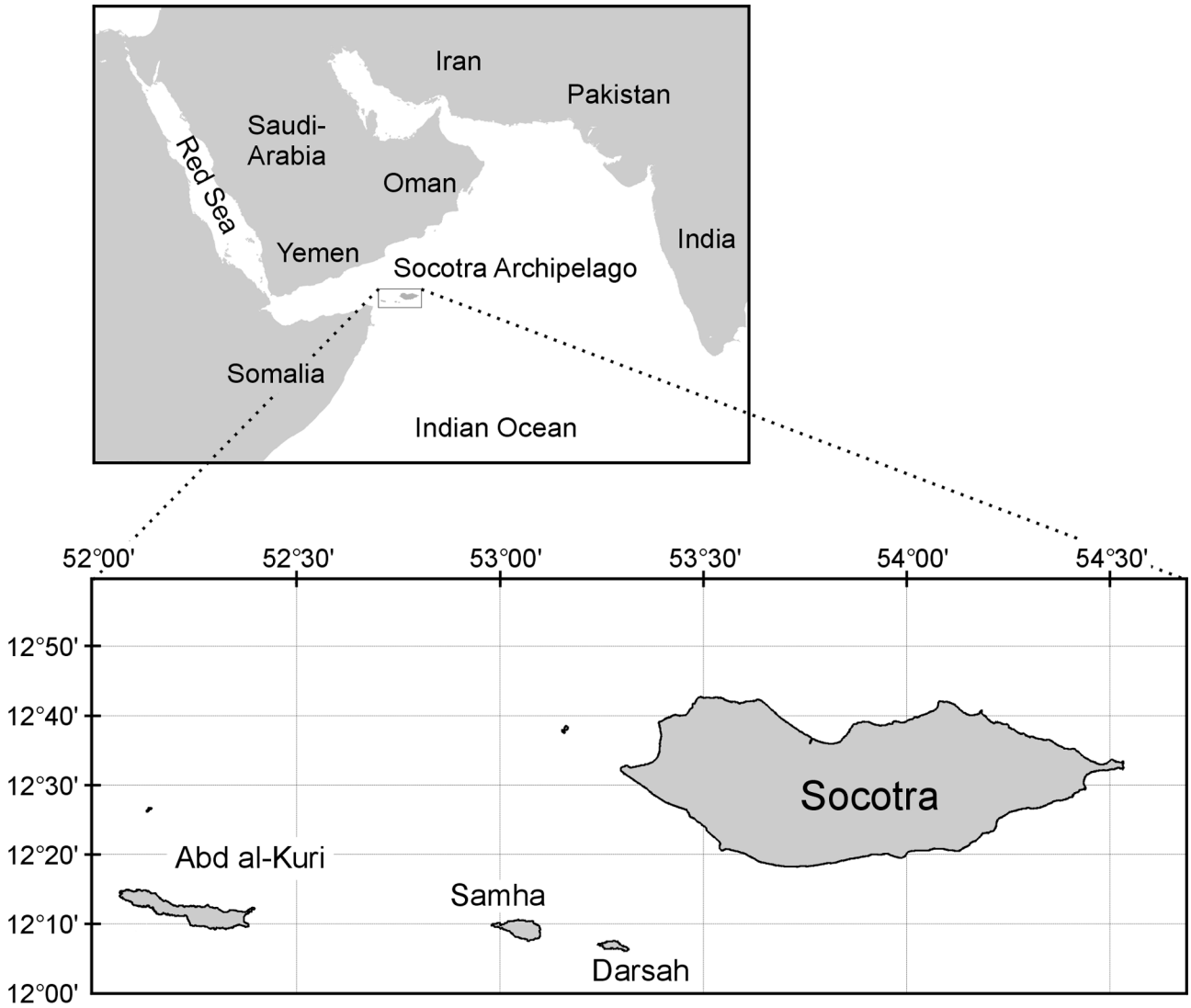

FIGURE 1. Map of the Socotra Archipelago.

Material and methods

Methods of counting, measuring and presentation follow Gill (2004) for *Pseudochromis* species, and Gill and Edwards (2004) for *Chlidichthys* species. Frequency distributions of counts of selected meristic characters for the two new *Pseudochromis* species are given in Table 1. Comparisons with other species are based on specimens listed in Gill (2004). Institutional codes follow Leviton *et al*. (1985), except for NHCY-P, which is for the fish section of the Natural History Collection of Yemen (currently curated at SMF). Based on the collection records and additional visual records made in 1999 and 2000 the archipelagic distribution ranges of each species and the biotopes inhabited by them are described. Statements concerning relative commonness, rarity and habitat preferences are based on presence/absence data of 74 detailed fish inventory sites (Zajonz & Khalaf 2002). Habitat and biotope information are based on the biotope classification scheme developed for Socotra (Klaus *et al.* 2002, Klaus & Turner 2004) and *in situ* observations of the second author and other team members of the then UNDP-GEF Project (Lyndon DeVantier, Michael Apel, Rebecca Klaus).

TABLE 1. Frequency distributions for selected meristic characters of *Pseudochromis chrysospilus* and *P. socotraensis*. * indicates characters for which bilateral counts are included.

	Segmented D rays				Segmented A rays			Pectoral rays*		
	28	29	30	31	18	19	20	17	18	19
P. chrysospilus	5	8	5	1	4	14	-	5	17	10
P. socotraensis	-	7	33	4	10	33	1	12	62	12

	Caudal rays														
	Upper procurrent				Lower procurrent			Total							
	6	7	8	9	6	7	8	29	30	31	32	33	34		
P. chrysospilus	-	2	14	2	-	13	4	-	-	2	11	2	2		
P. socotraensis	1	38	3	-	17	27	-	1	15	23	3	-	-		

	Scales in lateral series*														
	41	42	43	44	45	46	47	48	49	50	51	52			
P. chrysospilus	-	-	-	-	-	-	11	8	11	2	2	1			
P. socotraensis	1	7	18	20	27	11	4	-	-	-	-	-			

	Anterior lateral-line scales*														
	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
P. chrysospilus	-	-	-	-	-	-	-	1	5	6	4	9	4	3	1
P. socotraensis	6	6	15	18	11	7	2	1	-	-	-	-	-	-	-

	Termination of anterior lateral line (relative to segmented D rays)*											Scales between lateral lines*		
	16	17	18	19	20	21	22	23	24	25	26	3	4	5
P. chrysospilus	-	-	-	-	-	3	7	12	7	3	2	30	4	-
P. socotraensis	1	-	10	20	29	3	1	-	-	-	-	1	64	1

	Posterior lateral-line scales											
	Peduncular scales*									Caudal-fin scales*		
	5	6	7	8	9	10	11	12	13	0	1	2
P. chrysospilus	1	17	5	7	3	5	-	-	1	1	13	20
P. socotraensis	4	37	4	5	-	5	-	-	-	49	12	1

continued next page

TABLE 1. (continued)

	Horizontal scale rows above anal-fin origin											
	Below anterior lateral line*				Above anterior lateral line*			Total*				
	12	13	14	15	2	3	4	15	16	17	18	19
P. chrysospilus	1	11	24	2	5	30	3	-	2	12	21	3
P. socotraensis	4	33	46	5	8	75	5	2	4	33	41	8
	Circumpeduncular scales				Predorsal scales							
	19	20	21	22	19	20	21	22	23	24	25	
P. chrysospilus	1	17	-	1	2	7	4	4	1	1	-	
P. socotraensis	1	39	1	3	-	4	11	6	16	3	3	
	Gill rakers											
	Upper				Lower			Total				
	3	4	5	6	10	11	12	14	15	16	17	18
P. chrysospilus	2	13	4	-	2	14	3	2	13	3	1	-
P. socotraensis	-	21	22	1	-	13	31	-	8	18	17	1
	Pseudobranch filaments					Consecutive dorsal pterygiophores inserting in 1:1 relationship with interneural spaces behind neural spine 4					Predorsal scale termination relative to head pores	
	7	8	9	10	11	0	1	2	3	4	post. AIO	mid AIO
P. chrysospilus	-	1	4	10	4	-	-	1	11	1	3	16
P. socotraensis	1	7	24	9	3	11	23	6	2	-	14	20

Key to Pseudochromine and Pseudoplesiopine Species of the Socotra Archipelago

1. Anterior lateral line represented by single tubed scale at shoulder followed by series of centrally pitted scales; posterior (midlateral) lateral line represented by centrally pitted scales; pelvic rays I,4, all segmented rays unbranched 2
- Anterior lateral line represented by series of tubed scales; posterior (midlateral) lateral line represented by series of tubed scales; pelvic rays I,5, all segmented rays branched 3
2. Predorsal scales extend anteriorly to interorbital commissure, at point ranging from about one-half to two-thirds distance from anterior supraotic pore to anterior interorbital pore; suborbital pores 7; body with three dark brown to dark greyish brown stripes (in life stripes dusky orange to dark grey or black) . . . . . *Chlidichthys bibulus*
- Predorsal scales extend anteriorly only to supratemporal commissure; suborbital pores 6; no dark stripes on body . . . . . *Chlidichthys cacatuoides*
3. Gill rakers 6–8 + 15–16 = 21–24; head and body pale pinkish brown to white, dark olive to dark olive-brown on dorsal contour with a broad black stripe along midside of head and body and a broad black stripe on ventral part of head and body . . . . . *Pseudochromis sankeyi*
- Gill rakers 3–7 + 10–14 = 14–20; coloration not as above 4
4. Upper infraorbital, supraotic, upper preopercular and posttemporal pores surrounded by prominent dark brown to black spots . . . . . *Pseudochromis socotraensis* **sp. nov.**
- No prominent dark spots surrounding head pores 5
5. No prominent dark grey to black spot on opercular flap . . . . . *Pseudochromis chrysospilus* **sp. nov.**
- Prominent dark grey to black spot present on opercular flap 6
6. Dorsal-fin origin to pelvic-fin origin 31.6–34.8 % SL; predorsal scales 26–36 . . . . . *Pseudochromis linda*
- Dorsal-fin origin to pelvic-fin origin 21.5–27.1 % SL; predorsal scales 12–28 7
7. Segmented anal-fin rays 15; segmented dorsal-fin rays 26; dorsal contour of head and body abruptly darker than remainder of head and body . . . . . *Pseudochromis* sp.
- Segmented anal-fin rays 15–20, rarely 15; segmented dorsal-fin rays 26–32, rarely 26; coloration not as above 8
8. Sides of body with scattered small dark brown to black (dark blue in life) spots; segmented dorsal-fin rays 26–28, usually 27; segmented anal-fin rays 15–17 . . . . . *Pseudochromis nigrovittatus*
- No scattered small dark spots on sides, head and body generally pale brown with darker brown edging on body scale margins; segmented dorsal-fin rays 28–32, usually 30–31; segmented anal-fin rays 17–20 . . . . . *Pseudochromis leucorhynchus*

Chlidichthys bibulus (Smith)

Threestripe Dottyback

Figure 2

Wamizichthys bibulus Smith, 1954: 205, fig. 3 (type locality, Wamizi Island, Mozambique).
Chlidichthys bibulus; Gill & Edwards, 2004: 9, fig. 3, pl. 1D (description, synonymy, distribution, colour photo).

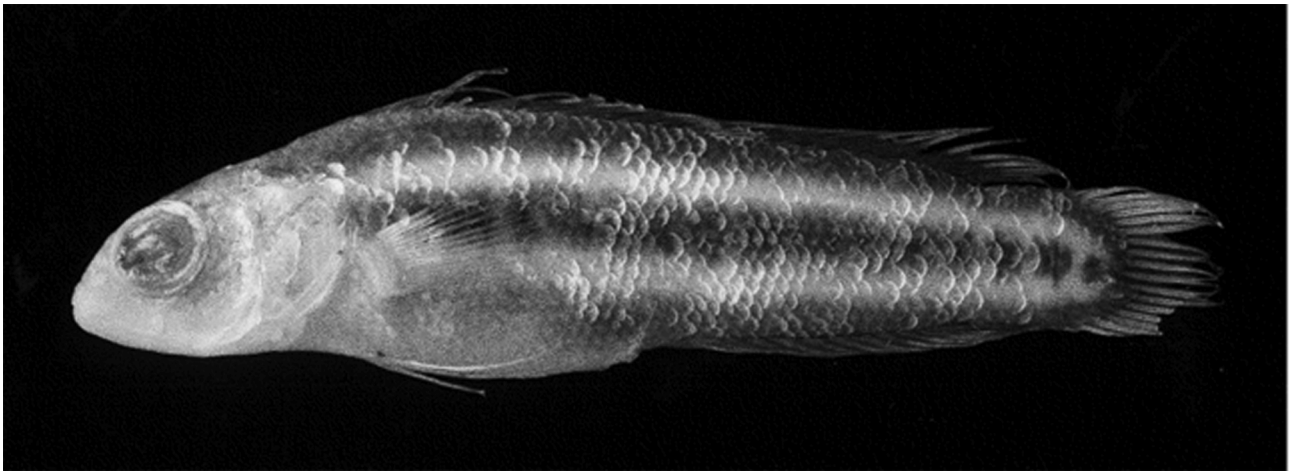

FIGURE 2. *Chlidichthys bibulus*, SMF 29235, 34.7 mm SL, Ras Qatanin Bay, SW coast of Socotra Island, Socotra Archipelago. (Photo by P. Hurst)

A single specimen of this species was captured from around a large boulder in a macroalgae dominated biotope, mixed with large sponges and sparse encrusting hard corals on rock platform in 8–11 m at Socotra Island; *C. bibulus* is otherwise known only from east Africa (Mozambique to Kenya) and Aldabra Island. In addition to the single

voucher specimen, the species was recorded once visually on the south coast of Socotra in a highly dynamic habitat with a mixed macroalgae and hard coral community (biotope S6.1.3), 5–6 m, 12 March 1999 (ST-021). The species appears to be very rare and is yet unknown from the other islands of the archipelago.

The voucher specimen was included by Gill and Edwards (2004) in their account of the species. It agrees well with specimens from east Africa (n = 11) and Aldabra (n = 1) in most details, except for slight differences in some morphometric characters: body depth at dorsal-fin origin 24.5 % SL (versus 20.9–24.3 % SL; n = 8); predorsal length 32.6 % SL (versus 26.6–32.3 % SL; n = 8); and pelvic-fin length 22.2 % SL (versus 20.2–21.6 % SL; n = 4). We do not attach any taxonomic significance to these differences owing to the small sample sizes.

Material examined. SMF 29235, 1: 34.7 mm SL, Socotra Archipelago, SW coast of Socotra Island, Ras Qatanin Bay, 12º21'17"N 53º32'39"E, large boulder (biotope S5.1.5), 8–11 m, U. Zajonz & F. N. Saeed, 9 April 2000 (ST-726).

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***Chlidichthys cacatuoides* Gill & Randall**
Cockatoo Dottyback
Figure 3

Chlidichthys cacatuoides Gill & Randall, 1994: 13, figs. 2 and 3 (type locality: Sawda Island, Al Hallaniyah Islands, Oman); Gill & Edwards, 2004: 11, figs. 1c, 2c and 5, pl. 1E (description, synonymy, distribution, colour photo).

This species was described by Gill and Randall (1994) on the basis of three specimens collected in 21 m on the edge of rocky bottom and adjacent rubble in the Hallaniyah Islands, southern Oman. Two specimens of this species were captured in the Socotra Archipelago, one in 15–20 m at Socotra Island, and the other in 27–29 m at Darsa Island. Considering these records, the species appears to have a preference for deeper habitats (15–30 m), e.g. at lower reef slopes and bases. The specimens agree well with the original description, and were used in a subsequent description of the species by Gill and Edwards (2004).

Material examined. SMF 29217, 1: 25.9 mm SL, Socotra Archipelago, Socotra Island, Ditimri, W of Rhiy di-Adho, 12º37'21"N 54º17'17"E, reef slope with rich coral diversity on rock (biotope S6.9.1), 15–20 m, U. Zajonz & M. Apel, 3 April 1999 (ST-148); SMF 29231, 1: 30.5 mm SL, Socotra Archipelago, NE coast of Darsa Island at anchorage, 12º07'03"N 53º18'18"E, small coral blocks on slightly sloping sand bottom, 27–29 m, U. Zajonz, 8 April 2000 (ST-723b).

FIGURE 3. *Chlidichthys cacatuoides*, SMF 29231, 30.5 mm SL, NE coast of Darsa Island, Socotra Archipelago. (Photo by U. Zajonz)

***Pseudochromis chrysospilus* sp. nov.**
Gold-spotted Dottyback
Figures 4–5; Tables 1–2

Holotype. SMF 29234, 56.1 mm SL, Socotra Archipelago, SW coast of Socotra Island, Ras Qatanin Bay, 12º21'17"N 53º32'39"E, large boulder (biotope code S5.1.5), 8–11 m, U. Zajonz & F.N. Saeed, 9 April 2000 (ST-726).

Paratypes. AMS I.45575-001, 1: 40.0 mm SL (cleared and stained), Socotra Archipelago, W coast of Socotra Island, Shuab Bay, Ras Asfar, 12°39'24"N 53°24'07"E, bedrock with encrusting corals and filter feeders in front of cliff (biotope code S4.2.3), 8–10 m, U. Zajonz & M. Apel, 9 March 1999 (ST-017); SMF 29207, 4: 31.1–42.6 mm SL, collected with AMS I.45575-001; SMF 33400, 3: 34.1–42.5 mm SL, collected with holotype; NHCY-P 4, 4: 38.9–51.6 mm SL, collected with holotype; SMF 33552, 1: 39.5 mm SL, Socotra Archipelago, Socotra Island, Ras Qatanin, 12°21'21"N 53°32'44'E, T. Alpermann, 11 February 2011; SMF 33553, 1: 44.9 mm SL, Socotra Archipelago, Socotra Island, Ras Shuab, 12°31'39"N 53°18'27"E, T. Alpermann, 11 February 2011; SMF 33554, 1: 50 mm SL, Socotra Archipelago, Socotra Island, Steroh, 12°19'00"N 53°52'51"E, T. Alpermann, 11 February 2011; SMF 33555, 1: 56.9 mm SL, Socotra Archipelago, Socotra Island, Ras Bidou, 12°39'15"N 53°23'51"E, H. Pulch & F.N. Saeed, 2 December 2009 (ST09-14-20); SMF 33556, 1: 64.7 mm SL, Socotra Archipelago, Socotra Island, Ras Qatanin, 12°21'09"N 53°32'36'E, H. Pulch & F.N. Saeed, 9 December 2009 (ST09-19-01); SMF 33557, 1: 55.6 mm SL, Socotra Archipelago, Socotra Island, Ras Qatanin,12°20'31"N 53°32'36'E, H. Pulch & F.N. Saeed, 10 December 2009 (ST09-20-18).

Diagnosis. A species of *Pseudochromis* with the following combination of characters: dorsal-fin rays III,28–31; anal-fin rays III,18–19; scales in lateral series 47–52; scales below lateral-line 12–15, usually 13–14; scales on upper flank each with dark blue to dark purple basal spot; and scales on posterior part of body with gold basal spots.

Description (based on 19 specimens, 31.1–64.7 mm SL; data for all types followed, where variation was noted, by data for holotype in parentheses). Dorsal-fin rays III,28–31 (III,29), all or all but first 1–3 segmented rays branched (all segmented rays branched); anal-fin rays III,18–19 (III,19), all segmented rays branched; pectoral-fin rays 17–19 (19/19); upper procurrent caudal-fin rays 7–9 (8); lower procurrent caudal-fin rays 7–8 (7); total caudal-fin rays 31–34 (32); scales in lateral series 47–52 (51/49); anterior lateral-line scales 36–43 (42/40); anterior lateral line terminating beneath segmented dorsal-fin ray 21–26 (24/23); posterior lateral-line scales 5–13 + 0–2 (10 + 1/8 + 1); scales between lateral lines 3–4 (3/3); horizontal scale rows above anal-fin origin 12–15 + 1 + 2–4 = 16–19 (14 + 1 + 3/14 + 1 + 3); circumpeduncular scales 19–22 (20); predorsal scales 19–24 (20); scales behind eye 3; scales to preopercular angle 5–6 (6); gill rakers 3–5 + 10–12 = 14–17 (4 + 11); pseudobranch filaments 8–11 (11); circumorbital pores 33–76 (54/53); preopercular pores 16–42 (25/24); dentary pores 3–5 (5/5); posterior interorbital pores 1–5 (2).

Lower lip incomplete; dorsal and anal fins without distinct scale sheaths, although often with intermittent small scales overlapping fin bases; predorsal scales extending anteriorly to point ranging from posterior AIO to mid AIO pores; opercle with 3–5 relatively distinct serrations; teeth of outer ceratobranchial-1 gill rakers varying from moderately developed and running most of raker length, to mostly weakly developed with well-developed teeth confined to raker tips; anterior dorsal-fin pterygiophore formula S/S/S + 3/1 + 1/1/1/1 + 1*/1 + 1* or S/S/S + 3/1 + 1/1/1/1/1 + 1 (S/S/S + 3/1 + 1/1/1/1/1 + 1); dorsal-fin spines stout and pungent; anterior anal-fin pterygiophore formula 3/1 + 1/1, 3/1 + 1/1 + 1 or 3 + 1/1 + 1/1 (3 + 1/1 + 1/1); anal-fin spines relatively stout and pungent, second spine much stouter than third; pelvic-fin spine moderately stout and pungent; second segmented pelvic-fin ray usually longest, sometimes subequal to third; caudal fin truncate to emarginate, often with only upper lobe produced; vertebrae 10 + 16; epineurals 15–18 (17); epurals 3.

Upper jaw with 2–4 pairs of curved, enlarged caniniform teeth anteriorly, and 4–5 (at symphysis) to 1–2 (on sides of jaw) inner rows of small conical teeth, outermost of rows of conical teeth much larger and more curved than inner rows; lower jaw with 2–4 pairs of curved, enlarged caniniform teeth anteriorly, and 3–4 (at symphysis) to 1 (on sides of jaw) inner rows of small conical teeth, teeth on middle of jaw larger and curved; vomer with 1–2 rows of small conical teeth, forming chevron; palatine with 1–3 rows of small conical teeth arranged in elongate, suboval patch, anterior part of tooth patch more-or-less contiguous with posterolateral arm of vomerine tooth patch; ectopterygoid edentate; tongue moderately pointed and edentate.

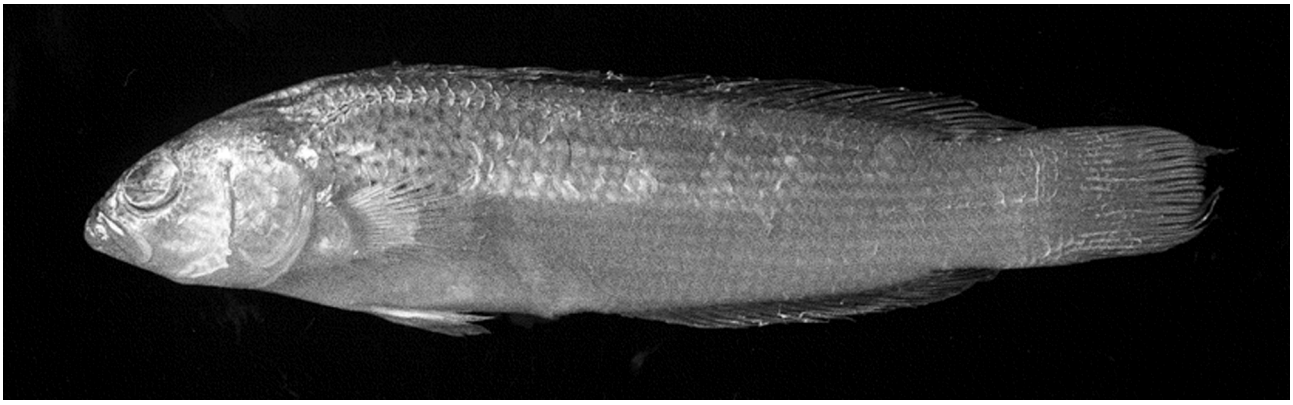

FIGURE 4. *Pseudochromis chrysospilus*, SMF 29234, 56.1 mm SL, holotype, Ras Qatanin Bay, SW coast of Socotra Island, Socotra Archipelago. (Photo by P. Hurst)

FIGURE 5. *Pseudochromis chrysospilus*, live, SMF 33400, 42.5 mm SL, paratype, Ras Qatanin Bay, SW coast of Socotra Island, Socotra Archipelago. (Photo by U. Zajonz)

As percentage of SL (based on 10 specimens, 34.1–64.7 mm SL): Head length 20.4–24.9 (21.9); orbit diameter 6.8–9.4 (7.7); snout length 4.8–5.9 (5.5); fleshy interorbital width 3.6–4.7 (3.6); bony interorbital width 2.5–3.1 (2.5); body width 19.6–11.7 (10.0); snout tip to posterior tip of retroarticular bone 10.2–13.5 (10.2); predorsal length 27.4–32.3 (29.1); prepelvic length 27.2–31.6 (28.5); posterior tip of retroarticular bone to pelvic-fin origin 16.8–20.1 (17.6); dorsal-fin origin to pelvic-fin origin 22.4–25.4 (24.4); dorsal-fin origin to middle dorsal-fin ray 32.3–37.1 (35.7); dorsal-fin origin to anal-fin origin 35.9–39.4 (37.1); pelvic-fin origin to anal-fin origin 27.0–31.4 (28.7); middle dorsal-fin ray to dorsal-fin termination 23.8–29.4 (26.7); middle dorsal-fin ray to anal-fin origin 22.1–24.2 (23.4); anal-fin origin to dorsal-fin termination 33.9–38.3 (37.4); anal-fin base length 29.0–35.2 (33.2); dorsal-fin termination to anal-fin termination 12.5–14.1 (13.4); dorsal-fin termination to caudal peduncle dorsal edge 9.5–11.8 (11.2); dorsal-fin termination to caudal peduncle ventral edge 16.3–18.0 (17.1); anal-fin termination to caudal peduncle dorsal edge 16.0–18.4 (18.0); anal-fin termination to caudal peduncle ventral edge 9.9–12.1 (11.9); first dorsal-fin spine 1.8–3.1 (2.9); second dorsal-fin spine 4.2–6.4 (4.6); third dorsal-fin spine 6.6–9.1 (7.7); first segmented dorsal-fin ray 10.2–11.5 (10.9); fourth last segmented dorsal-fin ray 13.8–15.2 (15.2); first anal-fin spine 1.8–2.7 (2.5); second anal-fin spine 4.2–6.5 (5.2); third anal-fin spine 5.1–7.3 (5.7); first segmented anal-fin ray 8.0–10.0 (8.9); fourth last segmented anal-fin ray 11.1–13.4 (13.4); third pectoral-fin ray 12.7–15.4 (13.2); pelvic-fin spine 7.4–10.0 (7.5); second segmented pelvic-fin ray 14.7–17.4 (16.2); caudal-fin length 22.1–23.8 (23.4).

Live coloration (based on field observations and colour slide of 42.5 mm SL paratype from Socotra; Figure 5). Head and body yellowish to orangish brown, darker dorsally, becoming purplish blue behind anal-fin origin; upper

part of operculum and head with dark purplish blue spots; two or three slightly oblique, dark blue stripes on cheeks beneath eye; snout and lips dark grey; iris bright red to brown with bright blue oblique line above and below pupil; scales of nape and upper flanks (immediately behind and above pectoral-fin base) each with dark blue to dark purple basal spot; scales of remainder of body each with orange-brown to bright golden yellow basal spot; dorsal fin yellowish to reddish brown, with three to six rows of elongate dark blue to purple spots, these curving proximally posteriorly to form broken oblique lines; anal fin blue to bluish hyaline, with several rows of yellow spots, these strongest on basal part of fin; caudal fin dark purplish grey, becoming greyish hyaline posteriorly; each scale of caudal-fin base with orange-brown basal spot; pectoral fins yellowish hyaline, brown basally; pelvic fins greyish hyaline to hyaline.

Preserved coloration. Pattern similar to live coloration, head and body becoming brown, paler ventrally; dark purple to blue spots on head, nape, flanks and dorsal fin become dark brown to dark grey, these darkest on flanks; stripes on cheek become brown, though often indistinct; dark grey-brown to dark grey spot usually present on edge of opercle immediately behind upper tip of preopercle; dark grey-brown stripe extending from midside of upper lip to midanterior edge of eye; orange-brown and yellow spots on body and fins become pale brown; caudal fin brown basally and brownish hyaline distally, usually with indistinct to distinct narrow, dark grey stripe near upper border of fin, and another near lower border; border of fin above and below stripes noticeably paler; pectoral fins and pelvic fins pale brown to hyaline.

Habitat and distribution. Collected from the south-west coast of Socotra Island at Ras Qatanin Bay, around a large boulder in 8–11 m from a macroalgae dominated biotope with large sponges and very sparse encrusting hard coral on rock platform with gravelly sand, and from the west coast of Socotra Island at Shuab Bay, Ras Asfar in 8–10 m on a sparse hard coral and filter feeder community on rock outcrops. Additional visual records were made in 2000 from a *Porites* dominated community on rock platform from the west coast near Ras Bidou (ST-736, biotope code 6.6.1). Recently (2009, 2011) the species has been recorded (by H. Pulch, F.N. Saeed and T. Alpermann) from Ras Qatanin, Shuab Bay and Ras Bidou again, and from the south of Socotra (off Steroh village). The species has not been collected at any of the relatively sheltered hard coral dominated biotopes at the north and north-east coast of Socotra, indicating tentatively a preference for the rather harsh, monsoon and upwelling impacted habitats in the south and west of Socotra Island. Two visual records from Hawlaf and Di Hamri at the north coast might represent misidentifications. The species has thus far only been recorded from the shallow depth range of 3–11 m. It does also not seem to inhabit the other islands of the Archipelago. This apparent range restriction requires confirmation.

Comparisons. *Pseudochromis chrysospilus* belongs to a species complex (hereafter termed the "*P. caudalis*-complex") that includes *P. caudalis* Boulenger (1898) from the Persian Gulf to South Asia, *P. mooii* Gill (2004) from Komodo Island, Indonesia, and *P. natalensis* Regan (1916) from south-eastern Africa. *Pseudochromis caudalis*-complex species are distinguished from congeners in having relatively high numbers of segmented dorsal- and anal-fin rays (modally 27–30 and 17–19, respectively), relatively small scales (scales in lateral series usually 43–50), and usually a large dark grey to dark greyish brown (bright blue in life) spot on the anterior part of the opercle behind the upper tip of the preopercle. Meristic characters separating the four species are summarised in Table 2. *Pseudochromis chrysospilus* differs from *P. caudalis* in having more segmented anal-fin rays (18–19, usually 19, vs. 17–19, rarely 19), more segmented dorsal-fin rays (28–31 vs. 28–29), and fewer scales below anterior lateral line (12–15, usually 13–14 vs. 15–17). It differs from *P. mooii* in having more segmented anal-fin rays (18–19, usually 19 vs. 17), more scales in lateral series (47–52 vs. 46) and fewer scales below anterior lateral line (12–15, usually 13–14 vs. 15). It differs from *P. natalensis* in having more segmented dorsal-fin rays (28–31 vs. 26–28, modally 27); more segmented anal-fin rays (18–19, usually 19 vs.16–18, modally 17); more total caudal-fin rays (31–34, modally 32 vs. 29–32, modally 30); and more scales in lateral series (47–52 vs. 41–50, usually 44–46). It further differs from these species in live coloration, particularly in having dark blue to dark purple basal spots on scales on the upper flanks and gold spots on the posterior part of the body.

Remarks. Research on the niche ecology and conservation genetics of *P. chrysospilus* is currently underway as part of a joint project of the second author with H. Pulch of the BiK-F.

Etymology. The specific epithet is from the Greek "chrysos," gold, and "spilos," spot, and alludes to the distinctive gold spots on the body.

Material examined. See above type material.

TABLE 2. Frequency distributions for selected meristic characters in members of the *Pseudochromis caudalis*-complex. * indicates characters for which bilateral counts are included.

	Segmented D rays								Segmented A rays					
	26	27	28	29	30	31	mean	S.D.	16	17	18	19	mean	S.D.
P. caudalis	-	-	14	12	-	-	28.5	0.5	-	15	10	1	17.5	0.6
P. chrysospilus	-	-	5	8	5	1	29.1	0.9	-	-	4	14	18.8	0.5
P. mooii	-	-	1	-	-	-	28.0	-	-	1	-	-	17.0	-
P. natalensis	7	32	5	-	-	-	27.0	0.5	1	38	4	-	17.1	0.3
	Scales in lateral series*													
	41	42	43	44	45	46	47	48	49	50	51	52	mean	S.D.
P. caudalis	-	-	-	-	1	3	5	17	13	9	2	1	48.5	1.4
P. chrysospilus	-	-	-	-	-	-	11	9	11	2	2	1	48.4	1.3
P. mooii	-	-	-	-	-	2	-	-	-	-	-	-	46.0	0.0
P. natalensis	1	1	6	15	24	27	9	5	1	1	-	-	45.4	1.5
	Total C rays								Scales above A origin to anterior lateral line*							
	29	20	31	32	33	34	mean	S.D.	12	13	14	15	16	17	mean	S.D.
P. caudalis	-	-	1	14	8	-	32.3	0.6	-	-	-	29	18	3	15.5	0.6
P. chrysospilus	-	-	2	11	2	2	32.2	0.8	1	11	24	2	-	-	13.7	0.6
P. mooii	-	-	-	1	-	-	32.0	-	-	-	-	2	-	-	15.0	0.0
P. natalensis	2	28	8	6	-	-	30.4	0.8	-	3	34	51	2	-	14.6	0.6

TABLE 3. Frequency distributions for selected meristic characters of Kenyan, Socotran and Omani specimens of *Pseudochromis leucorhynchus*. * indicates characters for which bilateral counts are included.

	Segmented A rays						Scales in lateral series*								
	17	18	19	20	mean	S.D.	41	42	43	44	45	46	47	mean	S.D.
Kenya	5	6	-	-	17.5	0.5	2	4	10	4	1	1	2	43.4	1.6
Socotra	1	17	2	-	18.1	0.4	-	-	2	18	15	3	2	44.6	0.9
Oman	-	4	3	1	18.6	0.7	-	-	2	1	7	4	2	45.2	1.2
	Anterior lateral-line scales*												Scales between lateral lines*		
	29	30	31	32	33	34	35	36	37	38	mean	SD	3	4	5	mean	S.D.
Kenya	1	2	9	7	2	1	-	-	-	-	31.5	1.1	3	18	1	3.9	0.4
Socotra	1	2	-	3	6	9	3	-	-	1	33.3	1.8	3	21	1	3.9	0.4
Oman	-	-	-	-	2	2	2	5	-	-	34.9	1.2	7	4	-	3.4	0.5

***Pseudochromis leucorhynchus* Lubbock**
White-nosed Dottyback
Figure 6; Table 3

Pseudochromis leucorhynchus Lubbock, 1977: 6, pls 2b and 3b (type locality: Shela, Lamu Island, Kenya); Gill, 2004: 128, tab. 8, fig. 33, pl. 8F (description, synonymy, distribution, colour photo).

Pseudochromis leucorhynchus was originally described from 11 specimens from Kenya by Lubbock (1977). Gill and Mee (1993) recorded two specimens of the species from southern Oman, but noted that the Omani specimens tended to have more segmented anal-fin rays, more anterior lateral-line scales, more scales in lateral series, and fewer scales between lateral lines than those from Kenya. These differences were confirmed by Gill (2004: table 8) based on six additional specimens from southern Oman. He noted "the possibility that this variation is worthy of separate species status must await the analysis of specimens from intermediate areas" (Gill 2004: 130). We record the species from the Socotra Archipelago on the basis of 20 specimens from the west and south coasts of Socotra Island. With the exception of one character (scales between lateral lines), counts for the specimens are intermediate between the Omani specimens to the north and the Kenyan specimens to the south (Table 3), and we therefore argue for the continued recognition of a single species.

Pseudochromis leucorhynchus was also visually recorded from around the entire Socotra Island coast and also once each from the north coast of Abd al-Kuri Island and the north-east coast of Semha Island. It was recently recorded again from the west coast (Ras Bidou) and south coast (off Steroh village) of Socotra Island (H. Pulch and T. Alpermann, pers. comm.). The species thus occurs thoughout the entire island group, with a relatively wide ecological niche ranging from filter feeder communities on highly dynamic bedrock and relict spur and groove habitat, over mixed macroalgae-dominated communities on rock platform with sparse hard corals of the south coast (for which it appears to have a preference on Socotra), to occasionally massive coral communities (*Porites*, *Galaxea*) and diverse coral biotopes dominated by branching species (staghorn *Acropora*). It was found at a depth range of 2–16 m.

Gill and Mee (1993) noted that *P. leucorhynchus* closely resembles the omobranchin blenniid *Oman ypsilon* Springer in live coloration, and suggested that the two may be involved in a mimetic relationship. The latter species is unknown from Kenya, but we newly record it from the Socotra Archipelago on the basis of an individual observed (but not collected) inside a *Diadema* urchin in 6–7 m at Di Hamri, Socotra, by the second author on 15 April 2007.

Material examined. SMF 29212, 2: 44.5–51.9 mm SL, Socotra Archipelago, W coast of Socotra Island, Shuab Bay, Ras Asfar, 12°39'24"N 53°24'07" E, bedrock with encrusting corals and filter feeders in front of cliff (biotope code S4.2.3), 8–10 m, U. Zajonz & M. Apel, 9 March 1999 (ST-017); SMF 29213, 10: 27.0–61.6 mm SL, Socotra Archipelago, S coast of Socotra island, E of Ras Qatanin, 150 m off the coast at position of the stranded ship wreck, 12°20'03"N 53°34"26"E, 2–4 m, U. Zajonz & M. Khalaf, 13 March 1999 (ST-024); SMF 29233, 8: 15.3–58.6 mm SL, Socotra Archipelago, SW coast of Socotra Island, Ras Qatanin Bay, 12º21'17"N 53º32'39"E, collected at large boulder (biotope code S5.1.5), 8–11 m, U. Zajonz & F.N. Saeed, 9 April 2000 (ST-726).

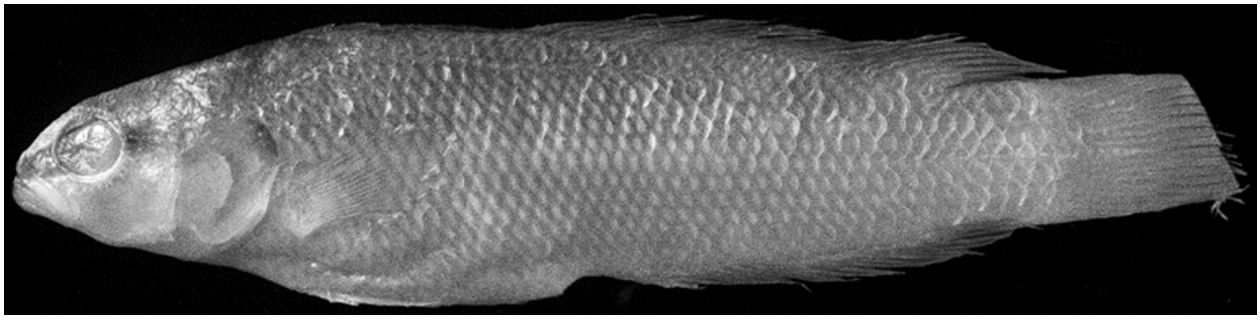

FIGURE 6. *Pseudochromis leucorhynchus*, SMF 29233, 58.6 mm SL, Ras Qatanin Bay, SW coast of Socotra Island, Socotra Archipelago. (Photo by P. Hurst)

***Pseudochromis linda* Randall & Stanaland**
False Olive Dottyback
Figure 7

Pseudochromis linda Randall & Stanaland, 1989: 107, figs 1–4 (type locality: Jana Island, Saudi Arabia, Persian Gulf); Gill, 2004: 130, figs 48–49, pls 8G–H (description, synonymy, distribution, colour photos).

Gill (2004) recorded this species from the Gulf of Aden, Arabian Peninsula, Persian Gulf and Pakistan. We record it from the Socotra Archipelago on the basis of ten specimens collected in 1999-2000 from Socotra Island and Abd al-Kuri Island, which agree well with Gill's re-description of the species.

Pseudochromis linda was visually also recorded from twelve additional sites in 1999-2000 including the islands of Semha and Darsa. The species is thus considered to occur throughout the entire Archipelago. It was even more often observed on Abd al-Kuri than on the much larger Socotra Island, coinciding with the observation that alpha-diversity increases in E-W direction and is highest on Abd al-Kuri. The species shows a preference for coral dominated biotopes with a three-dimensional complexity, ranging from monospecific *Galaxea astriata* on sheltered rock, hard coral communities of mixed *Acropora* spp. corals, to coral communities of diverse encrusting and massive Agariciidae, Pectiniidae, Mussidae and Poritidae. The species was not seen at the relatively harsh and upwelling impacted south coasts. It occurred in the depth range of 3–20 m. Recent records of 2009-2011 (H. Pulch, T. Alpermann, U. Zajonz) support these observations. Hence its ecological niche appears to differ from that of *P. leucorhynchus* in being more dependent on coral dominated biotopes.

Pseudochromis linda is replaced in the Red Sea by the closely related *P. olivaceus* Rüppell (1835). Western Indian Ocean records of *P. olivaceus* from outside the Red Sea are based on misidentified *P. linda*. As noted by Gill (2004), *P. linda* differs from *P. olivaceus* in caudal-fin shape (rounded to truncate, rarely weakly emarginated vs. weakly to strongly emarginate) and coloration (dark markings, if present, on sides of body round to vertically elongate vs. with crescent shaped markings); it also differs in having more extensive coverage of cycloid scales on the anterior body (see Gill 2004: fig. 49).

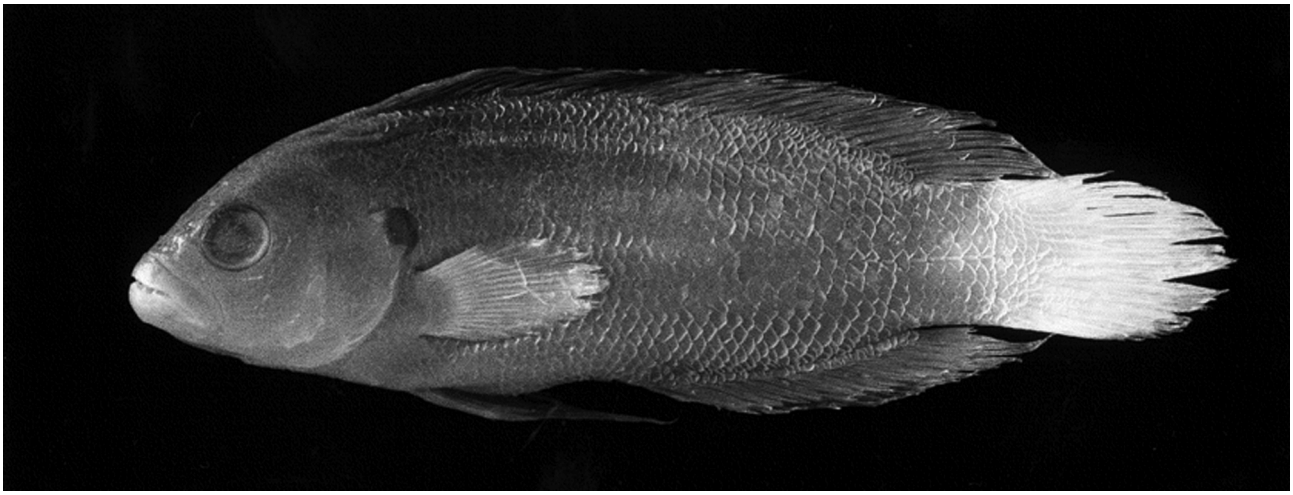

FIGURE 7. *Pseudochromis linda*, SMF 29210, 53.8 mm SL, Ditimri, Socotra Island, Socotra Archipelago. (Photo by P. Hurst)

Material examined. SMF 29205, 1: 47.3 mm SL, SMF 29211, 2: 47.4–48.1 mm SL, Socotra Archipelago, N coast of Socotra Island, Shanitan near Hadiboh off the cold store, 12°40'09"N 54°02'51"E, biotope code S6.7.1, 7–9 m, U. Zajonz, M. Khalaf & A. Plaga, 22 March 1999 (ST-095); SMF 29208, 1: 49.8 mm SL, Socotra Archipelago, N coast of Abd al-Kuri Island, E of Badh Issa, 12°12'16"N 52°16'30"E, biotope code S6.5.2, 5–7 m, U. Zajonz & A. Plaga, 12 April 1999 (ST-211); SMF 29210, 2: 40.5–53.8 mm SL, Socotra Archipelago, Socotra Island, Ditimri, W of Rhiy di-Adho, 12º37'21"N 54º17'17"E, reef slope with rich coral diversity on rock (biotope code S6.9.1), 15–20 m, U. Zajonz & M. Apel, 3 April 1999 (ST-148). Other (not examined in detail): SMF 29209, 2: 52.0–64.0 mm SL, Socotra Archipelago, Abd al-Kuri Island, E coast, Ras Anjara Bay, narrow fringing reef, 30 m width, 50–70 m in length, dominated by *Acropora intermedia* and *A. clathrata*, very high species richness

(biotope code S6.5.2), 3–9 m, U. Zajonz & M. Apel, 8 April 1999 (ST-173/150); SMF 29227; 2: 11.0–16.2 mm SL, Socotra Archipelago, NE coast of Abd al-Kuri Island, 700 m off Bir Al-Agooz, 12°11’39”N 52°19’18”E, coral dominated biotope, hard coral cover ranged from <10% to >50% depending on the patches (data taken from ST-251 of 1999; biotope code S6.5.2), 8–11 m, U. Zajonz & F.N. Saeed, 6 April 2000 (ST-718).

***Pseudochromis nigrovittatus* Boulenger**
Black-striped Dottyback
Figure 8

Pseudochromis nigrovittatus Boulenger, 1897: 421 (Mekran Coast, Persia); Gill, 2004: 150, fig. 47, pls 10C–D (description, synonymy, distribution, colour photos).

Pseudochromis nigrovittatus is relatively widely distributed throughout the northwestern Indian Ocean, from the Makran Coast and Persian Gulf around the Arabian Peninsula to the southern Red Sea and south to Socotra. However, records from the southern Red Sea and Socotra reported by Gill (2004) were based on photographs and sightings by J.M. Kemp. Two specimens were subsequently collected in the Socotra Archipelago by the second author, but voucher specimens are still lacking for the southern Red Sea. The species was visually also recorded from twenty-one additional sites in 1999-2000, including one record from Darsa Island and two from Abd al-Kuri Island. The species thus appears to occur throughout the entire Archipelago being, however, much more abundant on Socotra Island than elsewhere. It inhabits equally frequently mixed communities of macroalgae and hard corals and sparse hard coral communities on rock platform, including the south and west coast, as well as hard coral communities including those dominated by *Acropora*, *Porites*, *Galaxea*, and encrusting and massive Agariciidae, Pectiniidae, and Mussidae. *Pseudochromis nigrovittatus* is the second most frequently recorded dottyback species on Socotra Archipelago and was recorded from a depth range of 4–20 m. Recent records of 2009-2011 (H. Pulch, T. Alpermann, U. Zajonz) support these observations. Its ecological niche appears to be wider than that of *P. leucorhynchus* and *P. linda*, both of which also occur across the island group and inhabit similar depth ranges.

The two voucher specimens agree well in most details with the description provided by Gill (2004). However, they do extend slightly the minimum to maximum ranges for several meristic characters: scales between lateral lines 4–6 (previously 4–5); circumpeduncular scales 19–21 (previously 20–21); and upper gill rakers 3–5 (previously 4–5).

Material examined. SMF 29206, 1: 35.7 mm SL, Socotra Archipelago, N coast of Socotra Island, Shanitan near Hadiboh, 12°40’09”N 54°02’51”E, biotope code S6.7.1, 7–9 m, U. Zajonz, M. Khalaf & A. Plaga, 22 March 1999 (ST-095); SMF 29225, 1: 64.0 mm SL, Socotra Archipelago, Abd al-Kuri Island, SW coast, “Trident Bay”, 12°13’27”N 52°04’16”E, highly diverse assemblages of large massive and encrusting corals, and an associated diverse fish community, 6–15 m, U. Zajonz, F.N. Saeed, M. Apel & E. Zandri, 4 April 2000 (ST-709).

FIGURE 8. *Pseudochromis nigrovittatus*, SMF 29225, 64.0 mm SL, “Trident Bay”, SW coast of Abd al-Kuri Island, Socotra Archipelago. (Photo by P. Hurst)

***Pseudochromis sankeyi* Lubbock**
Schooling Dottyback
Figure 9

Pseudochromis sankeyi Lubbock, 1975: 145, pl. 2, fig. d (type locality: Massawa, Ethiopia, Red Sea); Gill, 2004: 169, fig. 42, pl. 11I (description, synonymy, distribution, colour photo).

Gill (2004) recorded *P. sankeyi* from the southern Red Sea, Golfe de Tadjoura (Djibouti) and Yemeni coast of the northern Gulf of Aden. We record it from the Socotra Archipelago on the basis of six specimens from Socotra Island. The specimens agree well with those from other localities.

Pseudochromis sankeyi was visually recorded from four additional sites in 1999-2000, including two records from Abd al-Kuri Island (including the rock islets of Kal Farun north of it). The species thus appears to occur throughout the entire archipelago, although it has not been recorded from Darsa and Semha, which are situated between Socotra and Abd al-Kuri. The species was rarely observed, despite its conspicuous colour pattern and ready visual identification. It was also rarely observed during subsequent surveys in 2009-2011 by H. Pulch, T. Alpermann and U. Zajonz. It was mainly recorded from the north coasts from hard coral communities including those dominated by *Millepora* and *Porites*, and encrusting and massive Agariciidae, Pectiniidae, and Mussidae, as well as from mixed communities of macroalgae and hard corals on rock platform and mixed encrusting communities on exposed rock platform, and a near vertical rocky drop off. Its depth range on Socotra (5–42 m) is wider than that of most other species.

Material examined. SMF 29215, 4: 43.2–62.1 mm SL, Socotra Archipelago, Socotra Island, Ditimri, W of Rhiy di-Adho, 12º37'21"N 54º17'17"E, reef slope with rich coral diversity on rock (biotope code 6.9.1), 15–20 m, U. Zajonz & M. Apel 3 April 1999 (ST-148); SMF 29238, 2: 39.1–54.0 mm SL, Socotra Archipelago, NE coast of Socotra Island, Roosh Protected Area, 12°37’13”N 54°21’14”E, biotope code 6.6.2, 15–18 m, U. Zajonz & M. Ismail, 14 April 2000 (ST-733); SMF 29214, 9: 30.6–50.6 mm SL, Socotra Archipelago, NE coast of Socotra Island, Roosh-Siqarah Protected Area, 12°37’14” N 54°21’05” E, biotope code S6.4.1, 11–17 m, U. Zajonz, 25 March 1999 (ST-106); SMF 29236, 1: 40.0 mm SL, Socotra Archipelago, N coast of Socotra Island, deep bedrock canyon with vertical drop-off near Ditimri, 35–42 m, U. Zajonz, 11 April 2000 (ST-730).

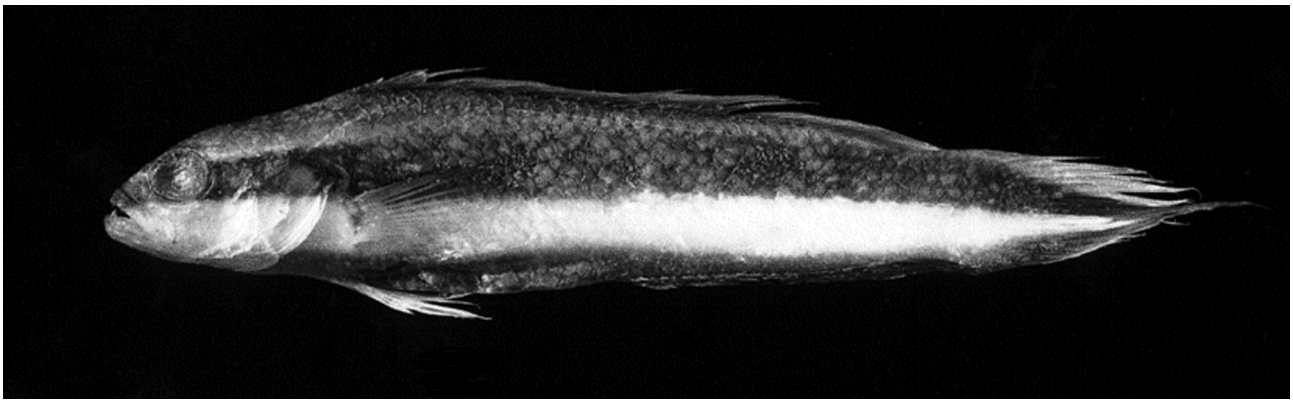

FIGURE 9. *Pseudochromis sankeyi*, SMF 29215, 46.9 mm SL, west of Rhiy di-Abho, Ditimri, Socotra Island, Socotra Archipelago. (Photo by P. Hurst)

***Pseudochromis socotraensis* sp. nov.**
Socotra Dottyback
Figures 10–13; Tables 1, 4–5

Holotype. SMF 29200, 62.7 mm SL, Socotra Archipelago, Abd al-Kuri Island, north coast, E of Badh Issa, biotope code 6.5.2, 5–7 m, U. Zajonz & Plaga, A., 12 April 1999 (ST-211).

Paratypes. SMF 33401 (ex 29200), 3: 33.1–52.4 mm SL, collected with holotype; SMF 29204, 9: 28.6–48.2 mm SL, Socotra Archipelago, Abd al-Kuri Island, E coast, Ras Anjara Bay, narrow fringing reef, 30 m width, 50–

70 m in length, dominated by *Acropora intermedia* and *A. clathrata*, very high species richness (biotope code S6.5.2), 3–9 m, U. Zajonz & M. Apel, 8 April 1999 (ST-173/150); SMF 29201, 5: 30.7–40.5 mm SL, Socotra Archipelago, NE coast of Socotra Island, Roosh-Siqarah Protected Area, 12°37’14”N 54°21’05”E, biotope code S6.4.1, 11–17 m, U. Zajonz, 25 March 1999 (ST-106); AMS I.45576-001, 2: 45.2-60.0 mm SL, Socotra Archipelago, Abd al-Kuri Island, SW coast, “Trident Bay”, 12°13’27”N 52°04’16”E, highly diverse assemblages of large massive and encrusting corals, and an associated diverse fish community, 6–15 m, U. Zajonz, F.N. Saeed, M. Apel & E. Zandri, 4 April 2000 (ST-709); BMNH 2011.9.27.1, 1: 47.4 mm SL, collected with AMS I.45576-001; SMF 29226, 3: 45.2–71.0 mm SL, collected with AMS I.45576-001; USNM 402766, 55.5 mm SL, collected with AMS I.45576-001; SMF 29230, 4: 22.5–37.1 mm SL, Socotra Archipelago, NE coast of Darsa Island at anchorage, 12º07'03"N 53º18'18"E, small coral blocks on slightly sloping sand bottom, 27–29 m, U. Zajonz, 8 April 2000 (ST-723b); SMF 29237, 3: 38.5–51.3 mm SL, Socotra Archipelago, NE coast of Socotra Island, Roosh Protected Area, 12°37’12’’ N 54°21’14’’E, biotope code 6.6.2, 15–18 m, U. Zajonz & M. Ismail, 14 April 2000 (ST-733); NHCY-P 5 (ex 29237), 10: 26.6-45.0 mm SL, collected with SMF 29237; SMF 33550, 1: 34.5 mm SL, Socotra Archipelago, N coast of Socotra Island, Di Hamri, 12 m, U. Zajonz, H. Pulch & F.N. Saeed, 15 June 2009 (ST09-02-01); SMF 33551, 1: 49.3 mm SL, Socotra Archipelago, N coast of Socotra Island, Ditimri, 12°37’13”N 54°18’02”E, H. Pulch & F.N. Saeed, 12 December 2009 (ST09-21-02).

Diagnosis. A species of *Pseudochromis* with the following combination of characters: dorsal-fin rays III,29–31; scales in lateral series 41–47; anterior lateral-line scales 29–36; head with two bright blue to turquoise stripes and conspicuous black pigmentation around upper laterosensory pores; body and fins generally dark grey to black.

Description (based on 44 specimens, 22.5–71.0 mm SL; data for all types followed, where variation was noted, by data for holotype in parentheses). Dorsal-fin rays III,29–31 (III,31), last 6–22 (11) segmented rays branched; anal-fin rays III,18–20 (III,19), last 5–16 (15) segmented rays branched; pectoral-fin rays 17–19 (19/19); upper procurrent caudal-fin rays 6–8 (8); lower procurrent caudal-fin rays 6–7 (7); total caudal-fin rays 29–32 (32); scales in lateral series 41–47 (44/44); anterior lateral-line scales 29–36 (32/30); anterior lateral line terminating beneath segmented dorsal-fin ray 16–22 (20/19); posterior lateral-line scales 5–10 + 0–1 (6 + 0/? + 0); scales between lateral lines 3–5 (4/4); horizontal scale rows above anal-fin origin 12–15 + 1 + 2–4 = 15–19 (13 + 1 + 3/13 + 1 + 3); circumpeduncular scales 19–22 (20); predorsal scales 20–25 (22); scales behind eye 3–4 (3); scales to preopercular angle 4–6 (5); gill rakers 4–6 + 11–12 = 15–18 (5 + 12); pseudobranch filaments 7–11 (9); circumorbital pores 15–42 (34/42); preopercular pores 9–24 (21/24); dentary pores 4–5 (4/4); posterior interorbital pores 1–2 (2).

Lower lip incomplete; dorsal and anal fins without scale sheaths, although sometimes with small scales intermittently overlapping fin bases; predorsal scales extending anteriorly to point ranging from posterior AIO to mid AIO pores; opercle with 3–6 weak to relatively distinct serrations; teeth of outer ceratobranchial-1 gill rakers well developed mainly on raker tips only, although often with well-developed teeth running most of length of upper few rakers (particularly in larger specimens); anterior dorsal-fin pterygiophore formula S/S/S + 3/1 + 1/1 + 1*/1/1/1 + 1*, S*/S/S + 3/1 + 1/1/1/1 + 1*/1 or S/S/S + 3/1 + 1/1 + 1/1/1 + 1/1 (S/S/S + 3/1 + 1/1/1 + 1/1/1 + 1); dorsal-fin spines relatively stout and pungent; anterior anal-fin pterygiophore formula 3/1 + 1/1 + 1/1 or 3/1 + 1/1/1 + 1 (3/1 + 1/1/1 + 1); anal-fin spines stout and pungent, second much stouter than third; pelvic-fin spine stout and pungent; second segmented pelvic-fin ray usually longest, sometime subequal to third; caudal fin rounded to truncate or emarginate, often with lower lobe produced; vertebrae 10 + 16; epineurals 17–19 (17); epurals 3.

Upper jaw with 2–6 pairs of curved, enlarged caniniform teeth anteriorly, and 4–5 (at symphysis) to 1–3 (on sides of jaw) inner rows of small conical teeth, outermost of rows of conical teeth much larger and more curved than inner rows; lower jaw with 2–5 pairs of curved, enlarged caniniform teeth anteriorly, and 3–5 (at symphysis) to 1 (on sides of jaw) inner rows of small conical teeth, teeth on middle of jaw larger and curved; vomer with 1–2 rows of small conical teeth, forming chevron; palatine with 2–3 rows of small conical teeth arranged in elongate, suboval patch, anterior part of tooth patch more-or-less contiguous with posterolateral arm of vomerine tooth patch; ectopterygoid edentate; tongue rounded to moderately pointed and edentate.

As percentage of SL (based on 15 specimens, 32.5–62.7 mm SL): Head length 20.9–25.2 (20.9); orbit diameter 6.3–9.2 (6.7); snout length 4.7–6.2 (5.6); fleshy interorbital width 4.7–5.6 (5.1); bony interorbital width 2.8–3.7 (3.0); body width 7.7–10.6 (7.8); snout tip to posterior tip of retroarticular bone 11.8–13.5 (11.8); predorsal length 27.4–31.5 (27.4); prepelvic length 27.3–31.1 (27.3); posterior tip of retroarticular bone to pelvic-fin origin 16.4–19.5 (16.4); dorsal-fin origin to pelvic-fin origin 21.5–24.3 (23.1); dorsal-fin origin to middle dorsal-fin ray 33.8–39.5 (38.8); dorsal-fin origin to anal-fin origin 35.7–40.9 (37.0); pelvic-fin origin to anal-fin origin 26.3–35.0

(28.5); middle dorsal-fin ray to dorsal-fin termination 23.5–29.3 (28.5); middle dorsal-fin ray to anal-fin origin 20.7–23.9 (22.0); anal-fin origin to dorsal-fin termination 34.5–39.4 (38.8); anal-fin base length 28.4–35.1 (32.4); dorsal-fin termination to anal-fin termination 12.2–14.3 (13.1); dorsal-fin termination to caudal peduncle dorsal edge 8.1–9.7 (9.7); dorsal-fin termination to caudal peduncle ventral edge 14.4–17.3 (16.3); anal-fin termination to caudal peduncle dorsal edge 15.8–17.8 (16.1); anal-fin termination to caudal peduncle ventral edge 8.7–11.1 (10.4); first dorsal-fin spine 1.5–2.8 (2.1); second dorsal-fin spine 3.5–5.2 (3.5); third dorsal-fin spine 5.6–7.1 (5.6); first segmented dorsal-fin ray 8.9–11.6 (10.0); fourth last segmented dorsal-fin ray 12.5–17.7 (17.7); first anal-fin spine 1.6–2.9 (2.2); second anal-fin spine 3.5–5.7 (4.5); third anal-fin spine 3.7–6.9 (4.6); first segmented anal-fin ray 6.6–9.5 (8.1); fourth last segmented anal-fin ray 11.1–15.5 (12.6); third pectoral-fin ray 10.5–13.5 (10.5); pelvic-fin spine 6.0–8.9 (6.5); second segmented pelvic-fin ray 14.2–16.6 (14.4); caudal-fin length 21.7–25.2 (23.1).

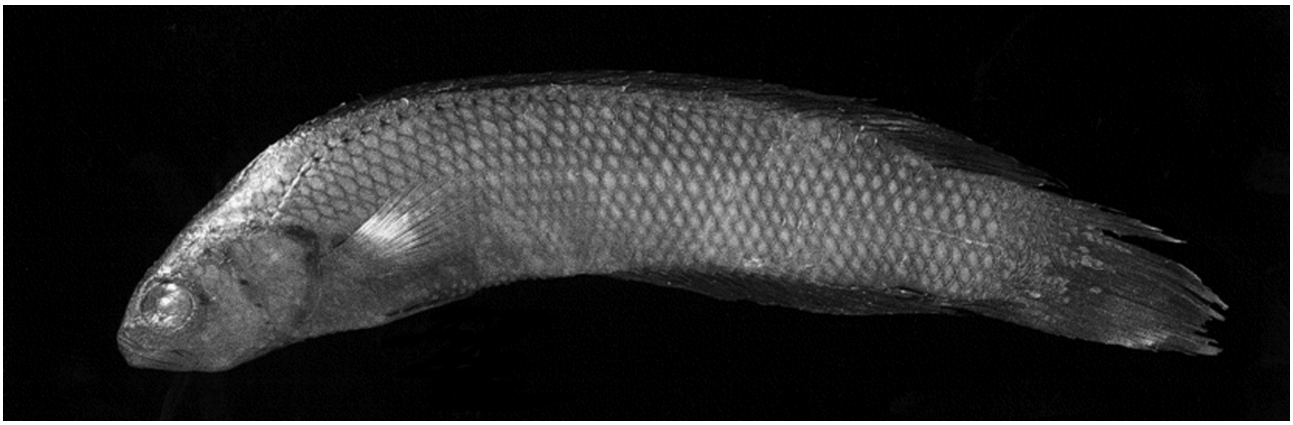

FIGURE 10. *Pseudochromis socotraensis*, SMF 29200, 62.7 mm SL, holotype, east of Badh Issa, N coast of Abd al-Kuri Island, Socotra Archipelago. (Photo by P. Hurst)

FIGURE 11. *Pseudochromis socotraensis*, freshly dead, SMF 33550, 34.5 mm SL, Di Hamri, Socotra Island, Socotra Archipelago. (Photo by H. Pulch)

Live coloration (based on photographs of live and freshly dead specimens—coloration more intense when alive; Figures 11–12). Head and body grey-brown to dark grey; black pigmentation surrounding sensory pores of head (including upper infraorbital, posterior otic, posterior preopercular, intertemporal, anterior temporal, lower supratemporal and posttemporal pores); large dark grey to black vertically-elongate spot on opercular flap, with bluish cast and edged posteriorly with gold; branchiostegal membranes grey-brown to dusky grey, usually forming series of 1–3 small dark spots immediately below large dark spot on opercular flap; bright blue to turquoise stripe extending from snout tip above eye and above horizontal portion of anterior lateral line to beneath anterior part of dorsal fin; second bright blue to turquoise stripe extending from middle of lower lip to lower edge of eye or mid-

upper part of preopercle; preopercle, subopercle and opercle (below opercle spot) edged with bright blue to turquoise; lips, lower part of head and breast sometimes bright blue to turquoise; iris reddish brown to bright red with oblique bright blue line above and below pupil; broad wedge of cobalt blue extending beneath basal third of pectoral fin from above pectoral-fin axil to lower abdomen; body scales each with reddish brown centres; all but anterior few scales of anterior lateral line each with prominent black basal spot, these becoming less distinct on posterior part of body; dorsal fin dark grey to black with broad bright blue submarginal stripe along distal third of fin; anterior dorsal-fin rays bright blue to turquoise near base, dark grey on remainder; black spot immediately behind base of each dorsal-fin ray; distal edge of dorsal fin bright blue, edged proximally with reddish brown to bright red; anal fin dark grey to black, sometimes with bright blue spot at base of each ray, with 2–3 rows of reddish brown to red spots; distal edge of anal fin bright blue, edged proximally with reddish brown to bright red; caudal fin dark grey to black; bright blue stripe through outer third of upper part of caudal fin; upper and lower distal margins of fin bright blue, edged distally with hyaline; pectoral fins reddish hyaline; pelvic fins pale blue, inner rays pinkish grey.

FIGURE 12. *Pseudochromis socotraensis*, live, same specimen as Figure 11. (Photo by H. Pulch)

Preserved coloration. Similar to live coloration: head and body brown to dark grey-brown; black markings on head and fins remain, becoming dark grey-brown to black, blue and turquoise markings become purplish grey.

Habitat and distribution. Collected mainly from coral dominated communities including biotopes dominated by *Millepora*, *Acropora* and *Porites*. One sample was also made in a mixed soft and hard coral community on large rock boulders. Additional visual records were made in 1999-2000 on similar biotopes, and additional hard coral biotopes dominated by *Galaxea*, and encrusting and massive Agariciidae, Pectiniidae and Musside, and at the few fringing reef sites. In addition the species was sighted on relict reef or spur and groove with mixed macroalgae and hard coral communities, and on mixed macroalgae and/or sparse hard coral communities on rock platform. With 38 occurrences at 74 fish inventory sites *P. socotraensis* is the most common and widespread dottyback species on Socotra Archipelago. Is has been recorded from all main islands of the Archipelago and at all coastal directions; its depth range being 3–29 m and beyond. These observations have been confirmed during recent surveys in 2009 and 2011 (H. Pulch, F.N. Saeed, T. Alpermann, U. Zajonz). Its ecological niche therefore appears to be relatively wide, but which variables actually constitute its ecological preferences are not yet clear.

Comparisons. *Pseudochromis socotraensis* belongs to a complex of species (hereafter termed the "*Pseudochromis dutoiti*-complex") that includes *P. aldabraensis* Bauchot-Boutin (in Arnoult *et al*. 1958) from the Arabian Peninsula and Persian Gulf to Pakistan and Sri Lanka (the type locality, Aldabra, is in error—see Gill 2004), *P. dutoiti* Smith (1955) from east Africa and *P. springeri* Lubbock (1975) from the Red Sea. Members of the complex differ from congeners—and form a demonstrably monophyletic clade—in having two bright blue stripes on the head and anterior body. Species within the complex can be mostly identified by live coloration characters (Table 4). *Pseudochromis socotraensis* differs further from *P. springeri* in body size (largest observed specimen 71.0 mm vs. 37.5 mm SL), and in having more scales in lateral series, and fewer anterior lateral line scales (Table 5). It also dif-

fers from *P. aldabraensis* in tending to have more scales in lateral series, more anterior lateral-line scales, and more segmented dorsal-fin rays (Table 5), although the latter character varies geographically in *P. aldabraensis* (see Gill 2004: table 3). The four species in the *Pseudochromis dutoiti*-complex are also differentiated on the basis of counts of laterosensory pores on the head, which proliferate with growth. *Pseudochromis springeri* has fewer pores than *P. aldabraensis*, which in turn has fewer pores than *P. socotraensis*, and *P. dutoiti* has the most pores (Figure 13).

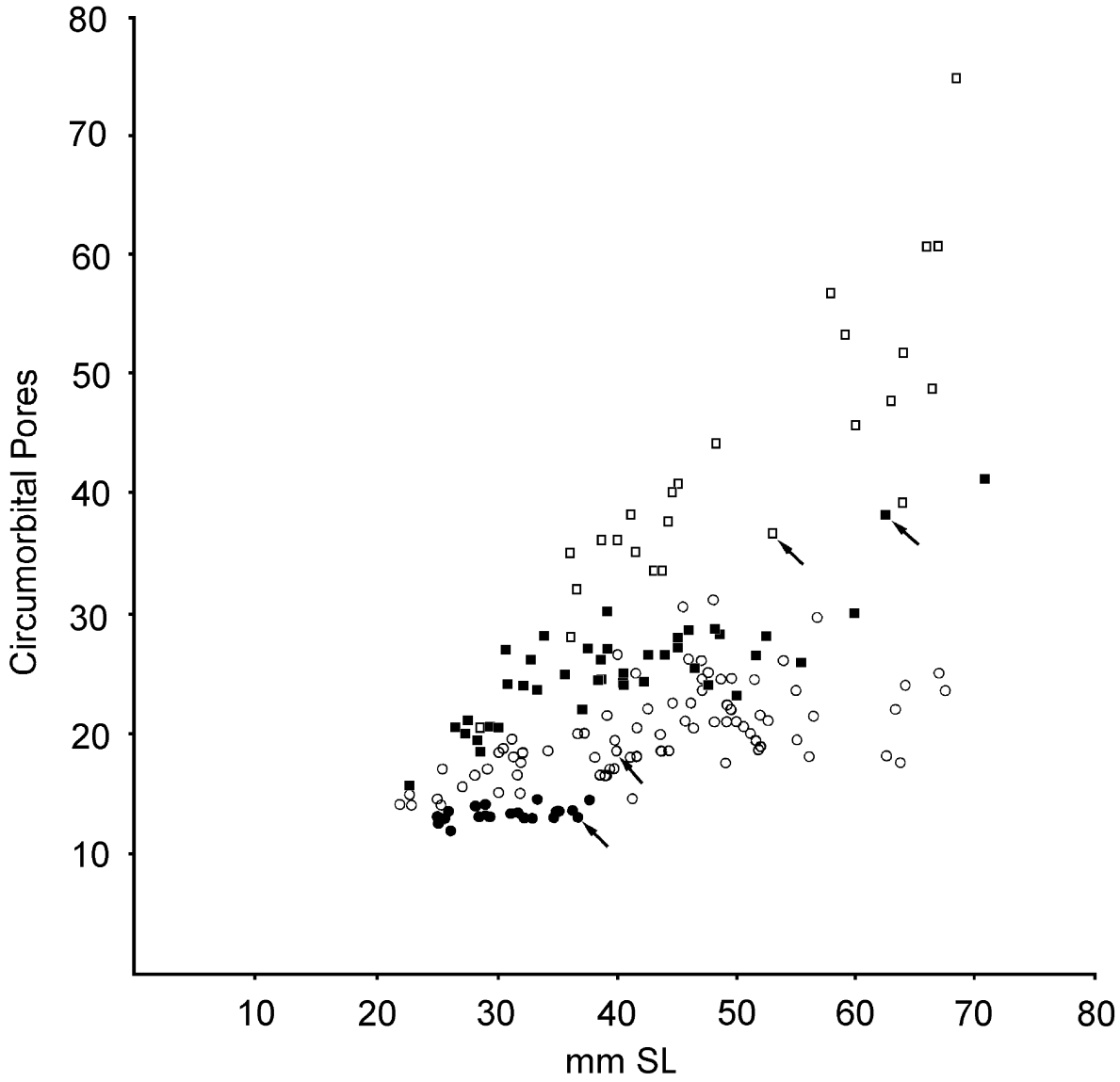

FIGURE 13. Plot of number of circumorbital pores (average of left and right sides) against standard length for *Pseudochromis aldabraensis* (open circles), *P. dutoiti* (open squares), *P. socotraensis* (closed squares) and *P. springeri* (closed circles). Holotype values are indicated by arrows.

Remarks. Putative synapomorphic coloration characters (Table 4) suggest that *P. dutoiti*, *P. socotraensis* and *P. springeri* form a clade exclusive of *P. aldabraensis* (synapomorphy: conspicuous black pigmentation surrounding upper laterosensory pores on the head). Relationships within this clade are inconclusive: one character (blue wedge extending under pectoral fin from pectoral-fin axil to pelvic-fin base) suggests a sister relationship between *P. socotraensis* and *P. dutoiti*, while the dark anal fin, caudal-fin and body coloration suggests a sister relationships between *P. socotraensis* and *P. springeri*.

Research on the niche ecology and conservation genetics of *P. socotraenis* is currently underway as part of by a joint project of the second author with H. Pulch of the BiK-F.

TABLE 4. Comparison of live coloration characters of species in the *Pseudochromis dutoiti*-complex. Putative synapomorphies marked with *.

	P. aldabraensis	*P. dutoiti*	*P. socotraensis*	*P. springeri*
Preorbital and dorsal contour of head	Reddish brown to orange	Dark grey	Dark grey	Dark grey
Lower part of head	Orange	Grey	Grey	Grey
Conspicuous black spots surround upper laterosensory pores on head?	No	Yes*	Yes*	Yes*
Lower blue stripe on head	Extends to spot on opercle edge	Extends to edge of opercle, below spot on opercle edge	Extends to preopercle edge, directed below spot on opercle edge	Extends to upper half of pectoral base, below spot on opercle edge
Body	Yellowish brown to orange	Brown, becoming yellowish ventrally and posteriorly	Dark grey-brown to dark grey*, with reddish brown spot on each body scale	Dark grey-brown to black*, usually with dark grey to black vertically elongate spot on a few to most scales
Blue wedge extending under pectoral fin from pectoral-fin axil to pelvic-fin base?	No	Yes*	Yes*	No
Ground coloration of anal fin	Orange, greyish orange to pale blue on distal third	Yellowish brown to olive, orange to red on posterior base	Dark grey to black*	Dark grey to black*
Ground coloration of caudal fin	Orange-yellow to orange-red	Reddish brown to orange-red basally, becoming dark grey to black dorsally and ventrally	Dark grey to black*	Dark grey to black*
Lower border of caudal fin fin (basal → distal)	Orange → blue [sometimes → hyaline]	Orange/red → blue → black → blue/hyaline	Black → blue → hyaline	Black → blue

TABLE 5. Frequency distributions for selected meristic characters in members of the *Pseudochromis dutoiti*-complex. * indicates characters for which bilateral counts are included.

	Segmented D rays								Scales in lateral series*														
	27	28	29	30	31	32	mean	S.D	35	36	37	38	39	40	41	42	43	44	45	46	47	mean	S.D.
P. aldabraensis	1	12	51	21	4	-	29.2	0.8	-	1	5	3	20	32	42	46	22	6	1	-	-	41.0	1.6
P. dutoiti	-	-	1	9	14	3	30.7	0.7	-	-	-	-	-	-	1	-	7	11	17	15	2	44.8	1.2
P. socotraensis	-	-	7	32	3	-	29.9	0.5	-	-	-	-	-	-	1	7	15	20	26	11	4	44.3	1.3
P. springeri	-	1	10	7	3	-	29.6	0.8	5	4	7	2	12	5	5	2	-	-	-	-	-	38.4	2.0
	Anterior lateral-line scales*																						
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	mean	S.D.
P. aldabraensis	-	-	-	-	-	-	-	-	-	8	7	21	28	36	25	12	11	9	3	-	-	-	28.1	2.1
P. dutoiti	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	6	6	9	11	10	-	-	32.2	1.4
P. socotraensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	13	17	10	7	2	1	31.8	1.6
P. springeri	2	-	1	3	4	2	6	10	4	1	1	-	-	-	-	-	-	-	-	-	-	-	20.7	2.3

Etymology. The specific epithet refers to the known distribution of the species.

Material examined. See above type specimens. Additional (non-type) specimens: AMS I.45576-002, 2 specimens (cleared and stained), Socotra Archipelago, Abd al-Kuri Island, SW coast, "Trident Bay", 12°13'27"N 52°04'15"E, highly diverse assemblages of large massive and encrusting corals, and an associated diverse fish community, 6–15 m, U. Zajonz, F.N. Saeed, M. Apel & E. Zandri, 4 April 2000 (ST-709); SMF 33402, 19: 21.0–58.5 mm SL, collected with AMS I.45576-002; SMF 29202, 1 specimen, Socotra Archipelago, W coast of Socotra Island, Shuab Bay, Ras Asfar, 12°39'24"N 53°24'07"E, bedrock with encrusting corals and filter feeders in front of cliff (biotope code S4.2.3), 8–10 m, U. Zajonz & M. Apel, 9 March 1999 (ST-017); AMS I.45577-001, 2 specimens (cleared and stained), Socotra Archipelago, Socotra Island, Ditimri, W of Rhiy di-Adho, 12º37'21"N 54º17'17"E, reef slope with rich coral diversity on rock (biotope S6.9.1), 15–20 m, U. Zajonz & M. Apel, 3 April 1999 (ST-148); SMF 29199, 2 specimens, collected with AMS I.45577-001; SMF 29203, 13: Socotra Archipelago, Semha Island, NW coast, biotope code 6.5.2, 10–13 m, U. Zajonz, F. Krupp & A. Plaga, 15 April 1999 (ST-267); SMF 29228, 3: Socotra Archipelago, NE coast of Abd al-Kuri Island, 700 m off Bir Al-Agooz, 12°11'40"N 52°19'18"E, coral dominated biotope (biotope code S6.5.2), 8–11 m, U. Zajonz & F. N. Saeed, 6 April 2000 (ST-718); SMF 29229, 1: Socotra Archipelago, Semha Island, NW coast, south of headland, biotope code 6.5.3, 18–39 m, U. Zajonz & M. Apel, 7 April 2000 (ST-721).

***Pseudochromis* sp.**

Figure 14; Table 6

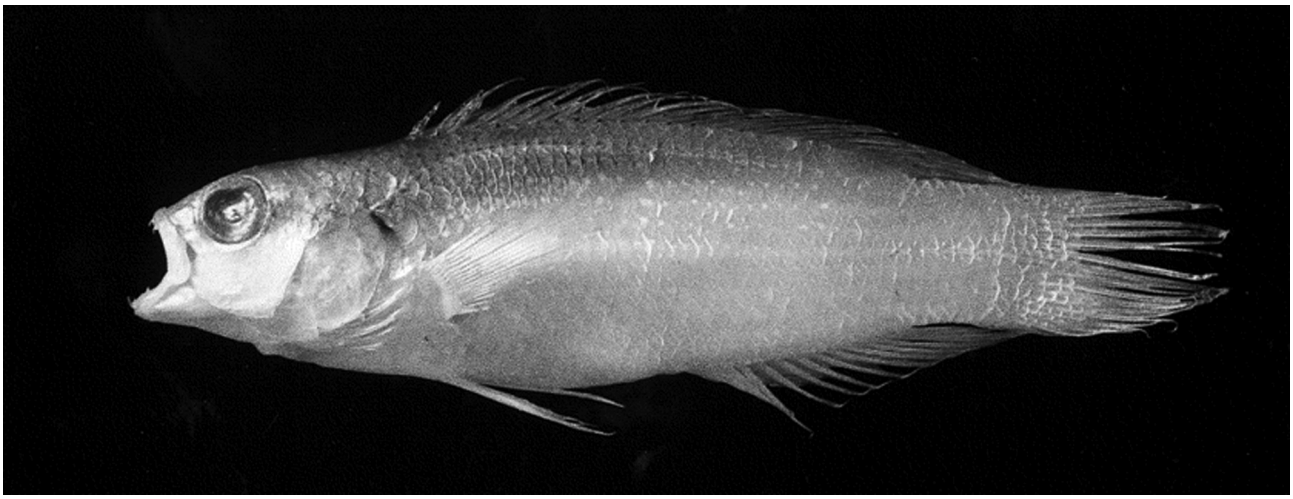

FIGURE 14. *Pseudochromis* sp., SMF 29232, 39.4 mm SL, NE coast of Darsa Island, Socotra Archipelago. (Photo by P. Hurst)

A single specimen of a species related to *P. aureolineatus* Gill (2004), *P. melas* Lubbock (1977), *P. pesi* Lubbock (1975) and *P. punctatus* Kotthaus (1970) was collected from Darsa Island by the second author. Species within this complex differ from congeners in having the following combination of characters: segmented dorsal-fin rays 25–27 (usually 26); segmented anal-fin rays 14–16 (usually 15); scales in lateral series 39–45; and (except in the dark form of *P. melas*) similar preserved colorations (dark spot on opercular flap; upper part of head and body brown to dark greyish brown, the remainder of head and body abruptly pale yellow to pale brown). They are differentiated from each other on the basis of a combination of coloration, meristic and morphometric characters (Table 6). The Socotra specimen exhibits a unique combination of these characters, suggesting that it is perhaps a new species. However, we suspect that it is actually referable to *P. punctatus*. In concluding this, we are influenced to some extent by the distribution of that species, which otherwise spans the Al Hallaniyah (Kuria Muria) Islands, southern Oman, and off Obia, Somalia. It differs from other *P. punctatus* specimens in two characters: anal-fin spots absent (versus present); and middle dorsal-fin ray to anal-fin origin 28.4 % SL (versus 23.1–25.0 % SL). However, the former character may simply reflect the relatively small size of the specimen (39.4 mm SL), as anal-fin spots are present only in relatively large specimens of *P. punctatus* (larger than about 55 mm SL). The apparent difference in

body depth possibly reflects the small sample sizes (only five comparative specimens of *P. punctatus* are known, the holotype from Somalia and four specimens from southern Oman). Further material is needed to refine our identification of the Socotran specimen.

Besides the single voucher specimen, similar looking individuals were recorded from *Acropora* dominated communities in 9–12 m depth from Darsa Island (ST-345, 366), and once from a sparse hard coral community on sand-inundated rock platform in 4–5 m depth at the N coast of Socotra. The visual records are rather tentative. The species is the rarest dottyback species collected and its distribution might not span the western islands.

Material examined. SMF 29232, 1: 39.4 mm SL, Socotra Archipelago, NE coast of Darsa Island at anchorage, 12º07'03"N 53º18'18"E, small coral blocks on slightly sloping sand bottom, 27–29 m, U. Zajonz, 8 April 2000 (ST-723b).

TABLE 6. Comparison of characters of *Pseudochromis* sp. and other species in the *P. punctatus*-complex.

	P. aureolineatus	*P. melas*	*P. pesi*	*P. punctatus*	*P.* sp.
D with spots?	No	Yes	Yes	Yes	Yes
A with spots?	No	Yes	No	Yes	No
C shape	emarginate to strongly emarginate	rounded to truncate	rounded to truncate	rounded to truncate	rounded with posterior margin truncate
Pectoral-fin rays	19	18–20, usually 19	17–18	17–18, usually 18	18
C length	26.3–26.6 % SL	25.4–29.2 % SL	28.9–31.6 % SL	27.5–31.6 % SL	28.4 % SL
Middle D ray to A origin	23.8–25.8 % SL	26.3–30.0 % SL	25.7–27.5 % SL	23.1–25.0 % SL	28.4 % SL
Fourth last segmented A ray	17.1–17.4 % SL	13.1–18.8 % SL	18.5–22.6 % SL	16.0–22.2 % SL	18.0 % SL

Additional species

Further to the above specimen-based records, two additional species are reported based on visual records. However, we regard the identifications as tentative pending the collection of specimens for detailed examination. The forktail dottyback, *Pseudochromis dixurus* Lubbock (1975), was seen at four sites at Socotra Island in 1999-2000 (ST-145, -147, -149, -702) in hard coral dominated biotopes at depths of 6–34 m. The species is otherwise known only from the Red Sea (Gill, 2004). The Oman dottyback, *P. omanensis* Gill & Mee (1993), was also recorded from four sites at Socotra Island (ST-017, -701, -702, -724/726) mostly from mixed macroalgae and/or sparse hard coral communities on rock platform at depths of 6–11 m. It is otherwise known only from central and southern Oman (Gill, 2004).

Discussion

Counting the two tentatively identified *Pseudochromis* species and the species of *Halidesmus* and *Haliophis* reported by Gill and Zajonz (2003), 13 pseudochromid species are now known from the Socotra Archipelago. This total is high for western Indian Ocean pseudochromid faunas; this is one more species than is known from the entire Red Sea (Golani & Bogorodski 2010). The high pseudochromid diversity is particularly striking as the total coastal length of the island group is estimated at about 650 km and the total area occupied by sublittoral biotopes at about 677 km² (Klaus *et al*. 2002), of which substantial areas represent clean mobile sand, large and small rock boulders or cobbles of low biological diversity (Klaus & Turner 2004). In comparison the Red Sea is nearly 2,000 km long and has about 5,143 km of shoreline, and a coastal shelf that, especially in its northern and central section, supports well developed biogenic reefs.

The relatively high diversity in part reflects the archipelago's position at "biogeographic crossroads" as postulated by various authors (e.g. Kemp 1998, DeVantier *et al*. 2004). For example, one pseudochromid species ranges

south to east Africa (*Chlidichthys bibulus*), four range north to the Gulf of Aden or beyond (*C. cacatuoides*, *Pseudochromis linda, P. nigrovittatus* and *P. sankeyi*) and two span either side of the archipelago (*P. leucorhynchus* and *Haliophis guttatus* (Forsskål)).

Phylogenetic relationships of the three endemic pseudochromid species may give insight into the historical biogeography of the archipelago. One of the species, *Halidesmus socotraensis* Gill & Zajonz, belongs to a clade (diagnosed by two synapomorphies: ventral lateral line with complex branching on abdomen; lateral-line pores opening to either ventral or dorsal margins of scales; see Gill & Zajonz 2003: 57, tab. 3), which includes *H. scapularis* Günther (1872) from southern Africa and *H. polytretus* Winterbottom (1982) from Kenya. The sister group to the three species is a clade (diagnosed by one synapomorphy: fleshy crest on snout and interorbital area; see Gill & Zajonz 2003: 57, tab. 3) of two species from farther north: *H. coccus* Winterbottom and Randall (1994) from southern Oman and *H. thomaseni* (Nielsen, 1961) from southeastern Oman to the Bay of Bengal. From a cladistic or comparative biogeographic perspective (sensu Parenti & Ebach 2009), these relationships suggest that the Socotra Archipelago is more closely related to east Africa than it is to the north-western Indian Ocean. Unfortunately, we are unable to convincingly resolve the phylogenetic and associated area relationships of the remaining two endemic species (*Pseudochromis chrysospilus* and *P. socotraensis*).

The latter two endemic species are also of interest in terms of their ecological biogeography. *Pseudochromis socotraensis* is by far the most common pseudochromid species in the archipelago, whereas *P. chrysospilus* is one of the rarest species. Furthermore, *P. chrysospilus* is known only from a few sites and appears to be even confined to the main island. It thus ranks among the rarest and potentially most vulnerable species of *Pseudochromis* in the Indian Ocean. Studies of the population genetics, niche and reproductive ecology of the two species, and of the climate change vulnerability of their preferred habitats is currently underway as part of a project on the conservation genetics of the coastal fishes of Socotra Archipelago of the second author with Hannes Pulch and other colleagues at the BiK-F.

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