

**THE IDENTITIES OF *RASBORA PAUCISQUALIS* AHL IN  
SCHREITMÜLLER, 1935, AND *RASBORA BANKANENSIS*  
(BLEEKER, 1853), WITH THE DESIGNATION OF  
A LECTOTYPE FOR *R. PAUCISQUALIS*  
(TELEOSTEI: CYPRINIDAE)**

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**ABSTRACT.** - *Rasbora paucisqualis* has been misidentified or confused with *R. bankanensis* since its description; evidence is presented demonstrating that *R. paucisqualis* and *R. bankanensis* are separate species, easily separable by colour patterns, vertebral counts and morphometrics. Most information in the literature attributed to *R. bankanensis* likely pertains to *R. paucisqualis*. The confusion between *R. paucisqualis* and *R. bankanensis* probably is a result of the earlier inaccessibility of type materials. *Rasbora paucisqualis* has not been reported from Malaysia since its description in 1935 but samples reported on herein suggest it is widely distributed in southern Malaysia. The holotype of *Rasbora paucisquamis* Ahl, 1935, is designated the lectotype of *R. paucisqualis* Ahl in Schreitmüller, 1935, an action which makes *R. paucisquamis* a junior objective synonym of *R. paucisqualis*.

**KEY WORDS.** - *Rasbora paucisqualis*, *Rasbora bankanensis*, Cyprinidae, taxonomy.

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**INTRODUCTION**

*Rasbora paucisqualis* (= *R. paucisquamis* Ahl, 1935; see Kottelat, 1989) has not been reported from Malaysia since its description (Kottelat, 1991). Furthermore, other than its description, the referral of some material from Kampuchea to this species (Kottelat, 1985) is apparently the only additional record of the species in nature. Recently, an unidentified sample of *Rasbora* in the collections of The Natural History Museum, London, collected in Malaysia in 1984, was compared to a syntype of *R. paucisqualis*. Because of similarities in scale counts and a close correspondence of colour pattern it was concluded the unidentified material is conspecific with the syntype. A fortuitous comparison of the sample with another from Malaysia, identified as *R. bankanensis* (Brittan, 1954; CAS 139380), lead to the surprising conclusion that all were representatives of the same species. However, none of the specimens from either sample possess the large distinctive black blotch on the anal fin

the holotype of *Rasbora bankanensis* exhibits. A wider survey of samples identified as *R. bankanensis* revealed some material with a large black anal-fin blotch similar to that of the holotype of *R. bankanensis*, other without (Fig. 1). A wider investigation of the material produced evidence which supports the recognition of *R. bankanensis* and *R. paucisqualis* as separate species.

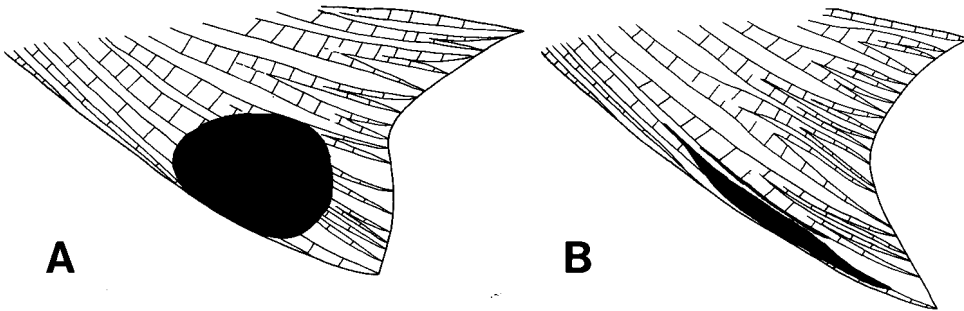


Fig. 1. Diagrammatic representation of the extent of pigmentation of the anal fin of *R. bankanensis* (A) and *R. paucisqualis* (B).

It is likely that only a single specimen of the type series of *R. paucisqualis* remains extant. This specimen is also the holotype of *R. paucisquamis*. In order to permanently and unequivocally associate the two names, a lectotype designation is made to render *R. paucisquamis* Ahl, 1935 a junior objective synonym of *R. paucisqualis*.

## MATERIALS AND METHODS

Colour pattern terminology follows Brittan (1954); vertebral counts follow Siebert (1991) with the exception that dorsal- and anal-fin positions are taken through their respective origins. Institutional acronyms are as follows: CAS - California Academy of Sciences, San Francisco; BMNH - The Natural History Museum, London; ZMB- Museum für Naturkunde, Berlin; ZRC - Zoological Reference Collection, National University of Singapore, Singapore.

**Materials examined of *Rasbora paucisqualis*** - Lectotype (holotype of *Rasbora paucisquamis*), ZMB 20873, Malayische Halbinsel, coll. W. Schreitmüller, Jan.1935. Malaysia, Johore: 13 ex., CAS 139380, Simpang Rengam, coll. A.W.Herre, 13 Oct.1940; 8 ex., BMNH 1995.5.14:101-107, 86 km N. of Johore Bahru, east of the road Mersing to Johore Bahru, pool at the side of a large river, coll. A.& B.Brown, 1984; 6 ex, ZRC 14405-14410, stream 10 min E. of Kulai, coll. P.K.L.Ng, 14 Mar.1990; 11 ex, ZRC 21290-21307, Sungei Selangi, 15 km Kota Tinggi - Tg. Sedili Rd., coll. P.K.L. Ng et al., 22 Apr.1992. Malaysia, Selangor: 25 ex, ZRC 27626-27650, Sabak Bernam, Sungei Bernam, coll. P.K.L. Ng et al., 19 Sep.1992. Malaysia, Pahang: 12 ex, ZRC 14259-14270, Taman Negara, Sungei Keniam at Kuala Permai, coll. K. Lim & K. Whooley, 1 Apr.1991.

**Materials examined of *Rasbora bankanensis*** - Holotype, BMNH 1866.5.2:160, Banka (Indonesia). Malaysia, Johore: 7 ex., ZRC 21290-21307, Sungei Selangi, 15km Kota Tinggi - Tg. Sedili Rd., coll. P.K.L. Ng et al., 22 Apr.1992. Indonesia, Pulau Banka: 7 ex., ZRC 31280-31286, 28 km N. of Payung, coll. M. Kottelat et al., 5 Mar.1993; 15 ex., ZRC 31214-31228, 5.5 km N. of Payung, coll. M. Kottelat et al., 5 Mar.1993. Indonesia, Pulau Batam: 14 of 70 ex., ZRC 14092, Batam N.W., coll. P.K.L. Ng & K. Lim, 25 Feb.1991. Indonesia, Kalimantan Barat (Borneo): 9 ex., BMNH 1982.3.29:55-64, Sungai Kenyatan, shaded forest tributary of Sungai Landak, 65km NE of Pontianak and 27km by road W of Ngabang, 0°24'N, 109°44.5'E, Kapuas 1976-8, coll. T.R. Roberts & S.Wirjoatmodjo, 14 Jul.1976.

**LECTOTYPE DESIGNATION FOR  
*Rasbora paucisqualis* Ahl in Schreitmüller, 1935**

Wilhelm Schreitmüller (1935) reported comparative information on scale size and gave observations of live colours for a fish from the Malaysian Peninsula under the name *Rasbora paucisqualis*. He attributed the name and information on scale size to Ernst Ahl; Schreitmüller apparently had given Ahl a specimen, in spirit, of the species for determination. Later that same year Ahl (1935) described the fish sent to him by Schreitmüller as a new species. Ahl, however, spelled the name "*paucisquamis*", in clear reference to the large scales of the species. Kottelat (1989) has pointed out that the spelling in Schreitmüller (1935) is the valid name, because it appeared first, despite its inappropriateness (Brittan, 1954).

Schreitmüller did not designate a holotype, nor did he report the number of specimens available to him. Neither was any mention made of intended disposition of material. Evidence for the existence of a type series rather than a holotype consists of Schreitmüller's report of size, shape and colour differences between males and females. Evidence for the inclusion of Ahl's specimen in the type series consists of Schreitmüller's closing remarks, in which he thanks Ahl and reports Ahl's observation on the scale pattern of the species, information which could have come only from the specimen in Ahl's possession. Thus the specimen sent to Ahl should be regarded as part of the syntype series. This specimen, ZMB 20873, is herein designated the lectotype of *Rasbora paucisqualis* Ahl in Schreitmüller, 1935. The same specimen is also the holotype of *R. paucisquamis* Ahl, 1935. The present lectotype designation renders *R. paucisquamis* Ahl, 1935, a junior objective synonym of *Rasbora paucisqualis* Ahl in Schreitmüller, 1935.

Kottelat (1991), Kottelat & Vidthayanon (1993), or even Brittan (1954), might be considered to have designated a lectotype previously by inference of a holotype since Article 74(b) of the International Code of Zoological Nomenclature (1885) stipulates that the first subsequent suggestion of a holotype, made in the absence of an original designation of a holotype and in absence of knowledge of the possible existence of syntypes, constitutes a lectotype designation if syntypes are subsequently discovered. However, since the existence of syntypes is clearly implied in Schreitmüller (1935) Article 74(b) does not apply.

**IDENTIFICATION OF  
*Rasbora paucisqualis* and *Rasbora bankanensis***

*Rasbora* material identified as *R. bankanensis* was sorted into two types according to the size of the anal-fin mark (Fig. 1). Further comparison of the sorted material revealed that other colour pattern elements, vertebral counts, and morphometrics all contribute toward the relatively simple task of distinguishing the two species. As implied above, material with a large blotch on the anal fin was identified as *R. bankanensis* by comparison with the holotype of *R. bankanensis*. Material without such a blotch was associated with the lectotype of *R. paucisqualis*. The lectotype of *R. paucisqualis* is faded, but its colour pattern is still evident under close examination. The extent, and position relative to the axial streak, of the dark lateral stripe of the lectotype of *R. paucisqualis* corresponds exactly to the recent material without a large black subdistal anal-fin blotch.

**Colour pattern** - *R. paucisqualis* is figured in Fig. 2 (See also Brittan (1954, Fig. 19) and Alfred (1966, Pl. 2.2); *R. bankanensis* is figured in Fig. 3. There are clear differences

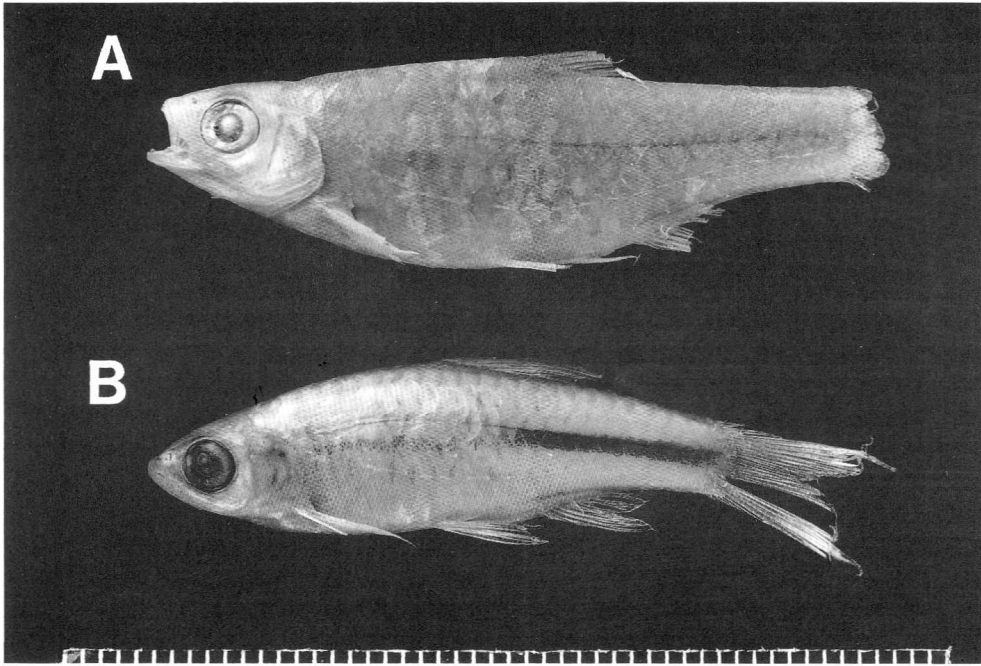


Fig. 2. A. Lectotype of *R. paucisqualis* Ahl in Schreitmüller, 1935, ZMB 20873, 39.1 mm SL. B. A recent formalin fixed specimen of *R. paucisqualis*, BMNH 1995.5.14: 101-107, 32.2 mm SL.

between the species in anal-fin markings and in the intensity and position of the dark lateral stripe. *Rasbora bankanensis* possesses a large subdistal black blotch on the anal fin which includes the 1st, 2nd, and 3rd principle fin-rays and their interradiated membranes (Fig. 1a). Some, but not all, material of *R. paucisqualis* have a much smaller, elongate dark mark on the 1st principal ray of the anal-fin (Fig. 1b) — in effect, a black streak. The differences in markings of the anal fin are apparent in size series of each species, from less than 10 mm SL to the largest specimens available. Alfred (1969) reported black markings on the anal fin of *R. bankanensis* only in juveniles and Brittan (1955) reported its anal fin to be only weakly marked. Absence of an anal-fin blotch in larger specimens of either species is not supported by present material, nor is the anal fin of *R. bankanensis* weakly marked. These reports might be a result of failing to distinguish the two species. Material of *R. paucisqualis* among the present samples is larger, in general, than that of *R. bankanensis*. Thus, if the two species were not distinguished, it would be reasonable to conclude that the size of the anal-fin blotch diminished with increase in body size as *R. paucisqualis* appears to be a larger species, yet possesses a much smaller blotch on the anal fin.

The dark lateral stripe of *R. paucisqualis* is very intense on the posterior half of the body, becoming much fainter anterior to the dorsal fin. The axial streak shows a similar pattern — more evident posteriorly, less so to faint anteriorly. The dark lateral stripe of *R. bankanensis* is much less intense, and exhibits much less contrast between its anterior and posterior portions.

The dark lateral stripe of *R. paucisqualis* slightly overlaps the axial streak on the caudal peduncle. Its anterior, less intense portion is situated well below the axial streak. The dark lateral stripe of *R. bankanensis* broadly overlaps the axial streak on the caudal peduncle by as much as 60% of its width. It is not separated from the axial streak anteriorly.

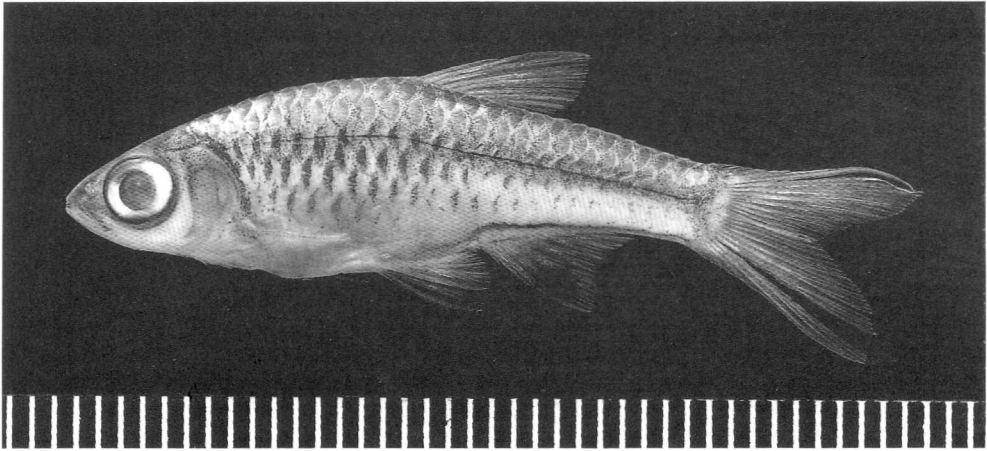


Fig. 3. Recent specimen of *R. bankanensis*, ZRC 31280, 28.7 mm SL.

**Vertebral counts** - Vertebral counts, fin positions, and number of ribs are reported in Table 1. *Rasbora paucisqualis* and *R. bankanensis* possess quite different vertebral patterns. *Rasbora bankanensis* possesses, on average, one less vertebra than *R. paucisqualis*. That it also possesses one less abdominal vertebra, one less rib, and its pelvic fins are positioned one vertebra further forward than in *R. paucisqualis* suggests the difference in total vertebral number results from the possession of one less abdominal vertebra anterior to the pelvic fin. Against the background of fewer total vertebrae than *R. paucisqualis*, the modal count of caudal vertebrae is higher for *R. bankanensis* than for *R. paucisqualis*. In particular, *R. bankanensis* possesses one more peduncular vertebra. The anal fin of *R. bankanensis* is positioned two vertebrae forward of that of *R. paucisqualis*. Possession of one fewer abdominal vertebra can account for half (one vertebra) of the further forward placement of the anal fin in *R. bankanensis*. Possession of one more peduncular vertebra suggests the additional one vertebra difference can be accounted for by a shift forward of one vertebra of the anal fin itself. There is thus merit in enumerating caudal vertebrae and anal-fin position

Table 1. Vertebral counts, fin positions reported as position along the vertebral column, and the number of ribs for *R. paucisqualis* and *R. bankanensis*; the value for the type is followed by the mean, standard deviation, and range, reported as the minimum and maximum observation. All means are significantly different (t-test) at  $p < .001$  except number of caudal vertebrae ( $p = .05$ ) and position of the dorsal fin, which was not different between the species.

	<i>R. paucisqualis</i> n=46		<i>R. bankanensis</i> n=40	
Vertebral number	32 <sup>1</sup>	31.9±0.48 (31-33)	31	31.1±0.55 (30-33)
Abdominal vertebrae	15	14.9±0.44 (14-16)	15	13.9±0.61 (13-15)
Caudal vertebrae	17	16.9±0.60 (16-18)	16	17.2±0.66 (15-18)
Peduncular vertebrae	8	7.8±0.64 (7- 9)	7	8.6±0.72 (7-10)
Dorsal-fin position	9	9.0±0.20 (9-10)	10	9.0±0.45 (8-10)
Anal-fin position	16	15.9±0.62 (13-17)	16	14.2±0.58 (13-16)
Pelvic-fin position	8	8.2±0.47 (7- 9)	9	7.4±0.54 (7- 9)
Rib number	11	11.0±0.49 (9-12)	10	9.8±0.59 (9-11)

<sup>1</sup> Kottelat & Vidthayanon (1993) erroneously report 33.

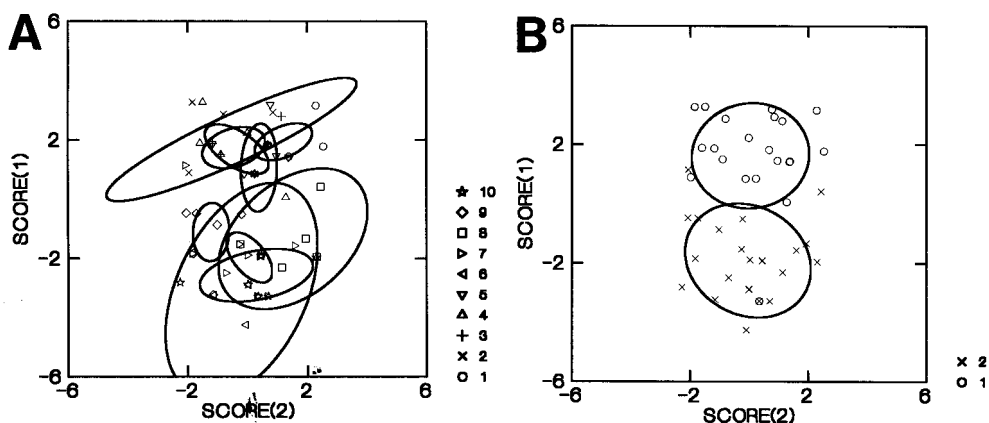


Fig. 4. Discriminant analysis of vertebral data (variables as in Tab. 1) for samples of *R. paucisqualis* and *R. bankanensis*. Standardised canonical discriminant functions are: Axis I — abvert 0.621, afin 0.579, caudv 0.179, pedv -0.229, ribs 0.207, pelfin -0.145; Axis II — abvert 0.759, afin 0.473, caudv 0.611, pedv 0.420, ribs -0.353, pelfin -0.716. Axes 1 and 2 account for 88% of dispersion. A. Confidence ellipses ( $p = .95$ ) of individual sample centroids in the discriminate space of Axes 1 and 2; *R. paucisqualis*  $\leq 5$ ; *R. bankanensis*  $\geq 6$ . B. Confidence ellipses ( $p = .80$ ) for grouped samples (by species) of *R. paucisqualis* ( $= 1$ ) and *R. bankanensis* ( $= 2$ ); axes identical to A.

along the vertebral column independently for *Rasbora* species. The pattern of these differences between the species is summarised visually in Figure 4.

**Morphometrics** - Selected morphometrics for *R. paucisqualis* and *R. bankanensis* are reported in Table 2. *Rasbora bankanensis* has a longer head and larger eye than *R. paucisqualis*. The difference in anal-fin positions in terms of anal-fin position along the vertebral column is reflected in the much shorter preanal length observed for *R. bankanensis*.

Table 2. Selected morphometric variables reported as percent standard length for *R. paucisqualis* and *R. bankanensis*; the mean is followed by the standard deviation with the range, reported as the minimum and maximum observation, recorded in parentheses.

	<i>R. paucisqualis</i> n=44		<i>R. bankanensis</i> n=26	
Head length	27.0±1.30	(24.4-29.7)	29.1±0.85	(27.2-30.4)
Eye length	8.8±0.91	(6.9-10.7)	10.9±0.75	(9.6-12.4)
Predorsal length	54.9±0.96	(52.7-56.6)	56.3±1.17	(54.6-59.6)
Preanal length	68.6±1.76	(65.2-73.2)	65.3±1.70	(62.0-67.0)

**Scale counts** - *R. paucisqualis* and *R. bankanensis* are characterised by rather low lateral line scale counts. Counts reported in Brittan (1954) for *R. bankanensis* actually apply to *R. paucisqualis*. Modal counts of lateral line scale counts for *R. bankanensis* material included herein are even lower (mode followed by the range expressed as the minimum and maximum observation: lateral line 23, 22-24; lateral series 25, 23-26; and pored scales 22, 17-23 vs. lateral line 24, 20-25; lateral series 26, 24-28; and pored scales 25, 22-27 for *R. paucisqualis*).

## DISCUSSION

The species identified as *R. paucisqualis* and *R. bankanensis* in this study differ trenchantly in colour patterns, vertebral patterns, and morphometrics. The colour pattern differences are obvious even at very small sizes (< 10 mm SL); thus, identification of specimens of juveniles should not be problematic.

There can be little doubt that *R. paucisqualis* and *R. bankanensis* are separate species. They are separable by a diverse array of characters, highly likely to be independent of one another, that are consistent across each species' geography. Each species was represented by at least four populations from widely separated localities, at one of which they were sympatric. The colour, vertebral (Fig. 4), and morphometric patterns are all consistent within and between species among populations across their distributions. All populations of one are more similar to each other than any population of the other species; *R. bankanensis* from Kalimantan Barat are more like *R. bankanensis* from Pulau Banka than they are to any population of *R. paucisqualis*.

Given the journal in which *R. paucisqualis* was described and the state of world politics at the time of publication it is perhaps not surprising that the ichthyological community initially was unaware of its description, nor, perhaps, of that of *R. paucisquamis* (e.g. Herre & Myers (1937) misidentified material of it as *Rasbora lateristriata*). Subsequent confusion of material of *R. paucisqualis* with *R. bankanensis* is more problematic. Initially it may have been an extension of earlier misidentifications but almost certainly could eventually only be a consequence of inaccessibility of the types of *R. paucisqualis* (see Brittan, 1955; housed in Berlin) and *R. bankanensis* (see Brittan, 1954; housed in London). Confusion of the two species since 1955 almost certainly follows Brittan. Alfred (1969), however, was aware of the possibility of confusion (pers. com. through P.K.L. Ng) and only included *R. paucisqualis* in the synonymy of *R. bankanensis* with question marks. There probably is no better demonstration of the necessity, even when very difficult, to check type material than the six decades of confusion over the identities of these two species.

Based on material included in this study, and on the redetermination by K. Lim (ZRC) of material previously reported as *R. bankanensis* (Lim & Ng, 1990; Lim et al., 1990; Kottelat et al., 1992 in part), *R. paucisqualis* is widely distributed over the Malay Peninsula; it is known from Singapore and the Malasian states of Johor, Pahang, Selangor, Kelantan and Terengganu. If the referral (Kottelat, 1985) of some Kampuchean material to *R. paucisqualis* is correct the species may well be widely distributed over mainland South East Asia, though Kottelat now doubts the identification (pers. com.). Reports that *R. bankanensis* is widely distributed over peninsular Malaysia (Brittan, 1955; Alfred, 1969) are probably based on misidentifications of *R. paucisqualis*, and thus may be overstated. Redetermination of material previously identified as *R. bankanensis* (as above) is required to confirm the extent of its distribution. Material of *R. bankanensis* included in this study originates from Pulau Banka, Pulau Batam, the southern tip of peninsular Malaysia and Kalimantan Barat. Tan & Tan (1995) report the species present also on Pulau Bintan, Indonesia and P. Ng and K. Lim (pers. com.; ZRC) confirm it from Pulau Lingga and Terengganu and Sarawak states, Malaysia. The distributions of *R. paucisqualis* and *R. bankanensis* overlap in southern (Johor) and eastern (Terengganu) peninsular Malaysia. Whether the distribution of *R. paucisqualis* extends beyond peninsular Malaysia to areas inhabited by *R. bankanensis* to the south and east isn't known, nor is it known if the distribution of *R. bankanensis* includes the northwestern areas of peninsular Malaysia inhabited by *R. paucisqualis*.

Both *R. paucisqualis* and *R. bankanensis* are thought to be members of the *R. trifasciata*-group (Brittan, 1954; Kottelat & Vidthayanon, 1993). This group is characterised, in part, by rather low lateral line scale counts (Brittan 1954). Within the *R. trifasciata*-complex *R. paucisqualis* is remarkably similar in body shape to *R. trifasciata*, *R. hubbsi*, *R. rutteni*, *R. meinkenii*, and an undescribed species from the Barito River, Kalimantan Tengah (Siebert & Guiry, 1996), a subgroup characterised by a lateral stripe that terminates in a distinctive precaudal blotch. However, *R. paucisqualis* lacks this precaudal blotch (Fig. 2) and thus cannot at present be placed within this subgroup. Absence of the a precaudal blotch does not however exclude *R. paucisqualis* from a close relationship with the group.

#### ACKNOWLEDGEMENTS

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