

## A RE-EVALUATION OF THE TAXONOMY OF *MACROCALAMUS LATERALIS* GÜNTHER, 1864 (SERPENTES, COLUBRIDAE), WITH THE DESCRIPTIONS OF TWO NEW SPECIES

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**ABSTRACT.** – The discovery of a specimen of the Asian snake genus *Macrocalamus* (Serpentes, Colubridae) in South Thailand extends northwards the range of the genus, previously thought to be endemic to West Malaysia. Furthermore, this specimen shares four diagnostic characters with the holotype of *Macrocalamus lateralis*, characters absent from all other known specimens of *Macrocalamus lateralis* auctorum. Consequently, *Macrocalamus chanardi* sp. nov. is described to accommodate these latter specimens from Bukit Larut, Cameron Highlands and Bukit Fraser of West Malaysia. *Macrocalamus vogeli* sp. nov. is described for a specimen from Gunung Tahan of West Malaysia. An updated key to the genus is provided.

**KEY WORDS.**– West Malaysia, Thailand, Serpentes, *Macrocalamus lateralis*, *Macrocalamus chanardi*, *Macrocalamus vogeli*, new species.

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### INTRODUCTION

The genus *Macrocalamus* Günther, 1864, contains semi-fossorial species infested to forested hills and mountains. Previously it was believed that the genus was endemic to West Malaysia (Fig. 1). On the basis of freshly collected specimens, Vogel & David (1999) revised the genus *Macrocalamus* and referred the specimens from the highlands of West Malaysia with a bright yellow belly and lacking ventrolateral stripes to the new species *Macrocalamus schulzi*, whereas sympatric specimens with a bright red or coral belly, the presence of a lower, dark ventrolateral stripes and ocelli on the back were regarded as *Macrocalamus lateralis*. A slightly different specimen from Gunung Tahan, with a different pattern, was merely referred to as *Macrocalamus* cf. *lateralis*. Subsequently, Norsham & Lim (2002) described another species from West Malaysia, *Macrocalamus gentingensis*, leading to six the total number of species in the genus.

Recently, Mr. Tanya Chan-ard collected in Hala-Bala Wildlife Sanctuary, one of the best preserved rainforests in South Thailand, a small snake that undoubtedly belongs to the genus *Macrocalamus*. This specimen (THNHM 988), mentioned as *Macrocalamus lateralis* in Chan-ard et al. (2002: 57; Pl. 17),

represents, as stated these authors, the first record of this genus for Thailand and extends significantly its range northwards. This juvenile female specimen is described in detail in Table 1. Its morphological characters diagnostic for the genus *Macrocalamus* include a head not distinct from the neck, the lack of internasals, which are fused with prefrontals and a constant number of 15 DSR. Furthermore, its coral belly, ventrolateral stripe and ocelli on the back suggest a close relationship with *Macrocalamus lateralis* auctorum. However, this specimen shows “unusual” morphological characters for this latter species, namely (1) the lack of loreal scale, which is fused with the prefrontal, (2) a very short tail, and (3) the presence of a paired dark lateral stripe, each stripe being separated by a pale line. The combination of these three characters are met only in the holotype of *Macrocalamus lateralis*. As underlined in Vogel & David (1999), the holotype of *Macrocalamus lateralis* was regarded as anomalous in head scalation and body morphology. Vogel & David (1999) even noted that, although it was a male, this specimen has the body morphology of a female. The collection of a second specimen sharing the same combination of four characters with the holotype of *Macrocalamus lateralis*, which are not present in other specimens leads us to re-ascertain the definition of this species. The Thai

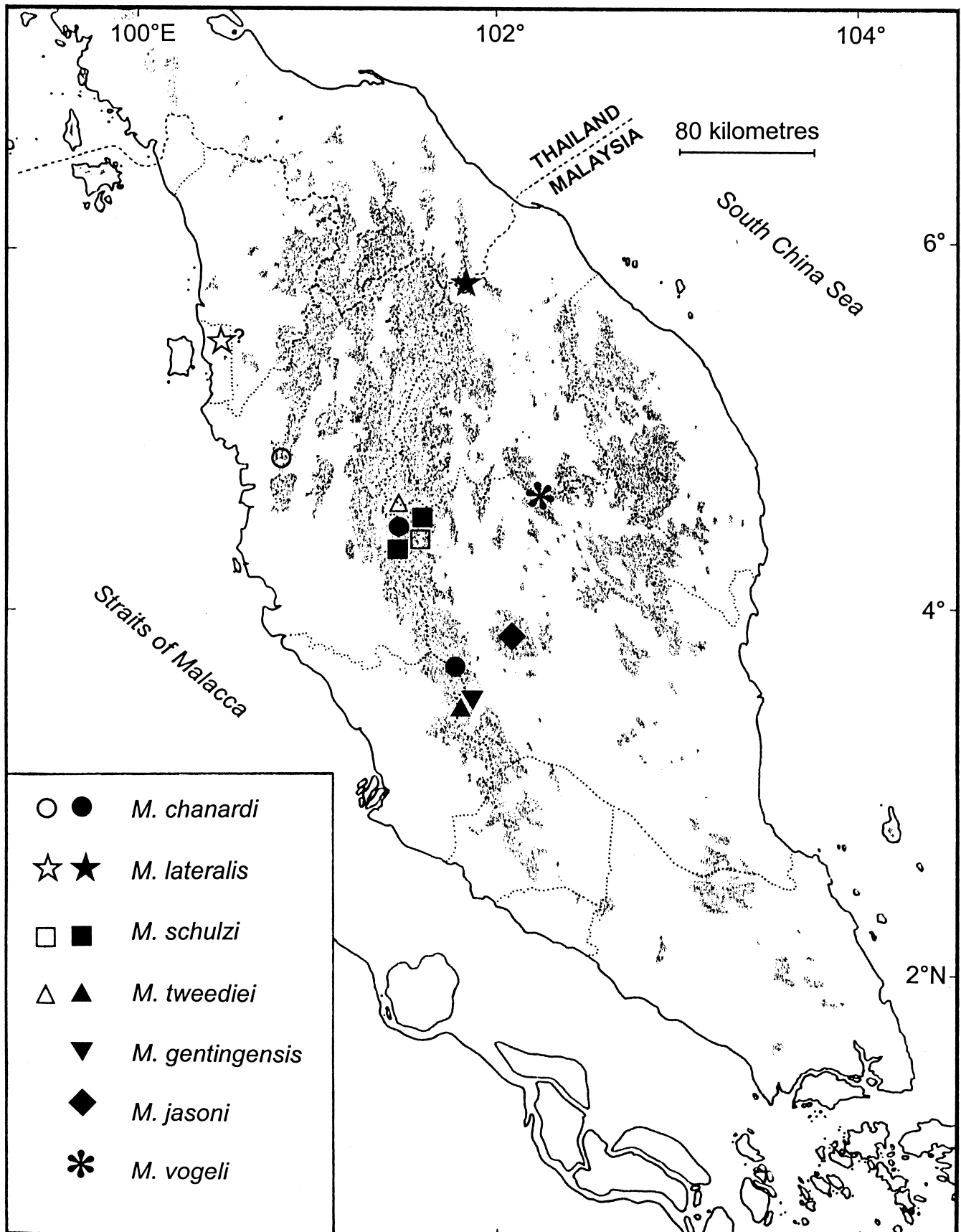


Fig. 1. Map of Peninsular Malaysia showing known localities of the seven recognized species of *Macrocalamus*. Shaded patches show areas above ca. 200 metres asl. Dotted lines are state boundaries. Species known from more than one locality have their type locality indicated by a hollow symbol; other localities are indicated by closed symbols. Species known only from their type locality appear only with a closed symbol.

Table 1. Morphological and meristical data of known specimens of *Macrocalamus lateralis*

Specimen	Sex	SVL	TaL	TL	TaL/TL	Ven	SC	Lor	SL	Tem	IL
BMNH 1946.1.7.23	M	262	36	298	0.121	114	21	no	8/8	1+2	7/7
THNHM 988	F	98.8	6.8	105.6	0.064	122	14	no	8/8	1+2	7/7

specimen should obviously be regarded as conspecific only with the holotype of *Macrocalamus lateralis*, whereas all other specimens identified as such by Vogel & David (1999) are considered to belong to a different species, which is described below. This discovery allows us to provide a redefinition of *Macrocalamus lateralis*.

As an offshoot of this study, the re-examination of many voucher specimens and the recent description of *Macrocalamus gentingensis* resulted in a better understanding of variation in this homogeneous genus, especially showing the importance of colour pattern. The specimen referred to in Vogel & David (1999) as *Macrocalamus* cf. *lateralis* is herein described as a second new species.

## MATERIAL AND METHODS

Morphometric, meristic and coloration characters were obtained by the examination of 50 preserved specimens of “*Macrocalamus lateralis*” auctorum and of 59 *Macrocalamus schulzi*, the list of which is given under each species account.

Coloration in life was drawn from David & Vogel (1999). Measurements, except body and tail lengths, were taken with a slide-caliper to the nearest 0.1 mm; measurements on body (all in millimetres) were measured to the nearest millimetre. Ventral scales were counted according to Dowling (1951). The terminal scute is excluded from the number of subcaudals. The number of dorsal scale rows, constant in the genus *Macrocalamus*, is given at midbody (at the level of the ventral plate corresponding to half of the total ventral number). Values for symmetric head characters are given in left/right order.

**Citation of place names.** – Malaysia is divided into states (Pahang, Perak, and so on). This word will not be repeated below. The Malaysian term *Gunung*, abbreviated as “Gg.”, refers to mountains.

**Morphological characters.** – Characters investigated and their abbreviations include: *Coloration and pattern.* – Dorsal colour; ventral colour; condition of the ventrolateral stripe; presence of a median stripe beneath the tail. *Morphometrical characters.* – Length of frontal scale (**L-Fr**); snout-vent length (**SVL**); tail length (**TaL**); ratio tail length/total body length (**TaL/TL**); width of frontal scale (**W-Fr**). *Scalation characters.* – Number of dorsal scale rows (**DSR**); number of infralabials (**IL**); presence of a loreal scale (**Lor**); number of preoculars (**PreOc**); number of postoculars (**PosOc**); number of subcaudals (**SC**); number of supralabials (**SL**); number of temporals (**Tem**); number of ventrals (**VEN**).

**Museum abbreviations.** – BMNH: The Natural History Museum, London; GV: Private collection of Gernot Vogel, Heidelberg; IRSNB: Institut Royal des Sciences Naturelles de Belgique; MNHN: Muséum national d'Histoire naturelle, Paris; MTKD: Staatliches Museum für Tierkunde, Dresden; THNHM: National Science Museum, Pathumthani, Thailand; ZFMK: Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn; ZMB: Zoologisches Museum für Naturkunde der Humboldt-Universität zu Berlin, Berlin; ZRC: Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore, Singapore.

## TAXONOMY

### *Macrocalamus chanardi*, new species

(Figs. 2-4)

*Macrocalamus lateralis* (non Günther, 1864) – Boulenger, 1894: 327, 1912: 153, fig. 47; Flower, 1899: 673; Smith, 1930: 57 (part); Smedley, 1931: 50, 1932 (part): 118; Tweedie, 1954: 53 (part), 1957: 55 (part), 1983: 60, fig. 13d (part); Lim, 1963: 100 (part), 1967 (part): 122 & 124; Grandison, 1972: 90 (part), 1978: 289; Welch, 1988: 75 (part); Manthey & Grossmann, 1997: 365 (part), 366: fig. 273; Chan-ard et al., 1999: 34 (part), 173; David & Vogel, 1999: 315; Chan-ard et al. (2002: 57, Pl. 17).

**Material examined.** – Holotype – BMNH1900.6.14.17 (adult female); “Larut Hills, Perak, 3500-4500 ft.”, now Bukit Larut, Perak, West Malaysia. Collector unknown; presented by A. L. Butler of Selangor Museum in Kuala Lumpur.

Paratypes (9 specimens) – West Malaysia. Perak. Bukit Larut (Maxwell Hill or Larut Hills): BMNH1900.6.14.18 (female), BMNH1900.6.14.19 (male), BMNH1900.6.14.20 (female), between 3500 and 4500 ft; ZRC 2.2783 (male), ZRC 2.2784 (female), ZRC2.2785 (male); ZMB52099 (male), near Taiping. – Pahang. Cameron Highlands: MNHN1997.3265 (female), ZRC.2.2768 (male).

Others (38 specimens) – West Malaysia. Perak. Bukit Larut (Maxwell Hill or Larut Hills): BMNH98.9.22.37-38 at 1340 m, BMNH1900.7.18.2 at 1220 m, BMNH1904.9.9.6 at 1220 m, ZRC.2.2786, at 1370 m, ZRC.2.2787, ZRC.2.2788 at 1370 m; BMNH1974.3900-3902, ZMB30293 at Taiping; ZMB52123 near Taiping, 1100m; Pahang. Cameron Highlands: BMNH1974.3893-3895, GV22-24, GV6104, MTKD39362, ZFMK53106 at 1500m, no locality; ZMB, unnumbered (2 specimens), ZRC.2.2780 at 1370 m; ZFMK16517-16518, ZFMK32301, ZRC.2.2771, 2772, ZRC.2.2774 at 1370 m, ZRC.2.2778, all from Tanah Rata; ZMB56889-56890, before Bala's, on Gunung Batu Berinchang, between 1550m and 1600m; Bukit Fraser (or Fraser's Hills): ZRC.2.2762, at 1220 m, ZRC.2.2763-2765; ZRC.2.3405, along road to Richmond House.

Table 2. Morphological and meristical data of paratypes of *Macrocalamus chanardi*, new species.

Number	Sex	Dorsal colour	Ocelli	Dark ventro-lateral stripe	SVL (mm)	TaL (mm)	Ratio TaL/TL	VEN	SC
BMNH1900.6.4.18	F	pale brown	brown dots	single	200	24	0.107	116	19
BMNH1900.6.4.19	M	brown	pale, dark-edged	single	121	19	0.136	109	24
BMNH1900.6.4.20	F	brown	pale, dark-edged	single	117	13	0.100	121	20
MNHN 1997.3265	F	brown	pale, dark-edged	single	215	24	0.100	119	20
ZMB52099	F	pale brown	brown dots	single	204	24	0.110	123	21
ZRC2.2768	F	dark brown	pale, dark-edged	single, faint	161	18	0.101	117	20
ZRC2.2783	M	brown	pale, dark-edged	single	183	34	0.157	106	26
ZRC2.2784	F	pale brown	pale, dark-edged	single	215	24	0.100	117	21
ZRC2.2785	M	pale brown	brown dots	single	165	30	0.154	109	26

**Diagnosis.** – *Macrocalamus chanardi* is characterized by (1) a red, pink or orange venter in life; (2) the presence of a single dark ventrolateral stripe on each side, composed of the dark colour of the outer edges of ventral plates, bordered above by a more or less faint light yellow or cream stripe; (3) dorsal colour brown bordered by, at least on the anterior part of body, on each side a dorsal row of white (yellow or ochre in life) stripe with dark-edged ocelli that are sometimes reduced to small black spots; (4) at least two, often three or four yellowish-ochre oblique bars, the first one on temporals, extending from the parietals to the throat, other(s) parallel to this temporal streak, extending on the neck from the top of the back down to the ventrals, (5) a ratio TaL/TL at least equal to 0.090 in females and 0.140 in males.

This species is distinguished from all other species, except *Macrocalamus lateralis*, by (1) the uniform “red” color of its venter (either uniform yellow or powdered or chequered in other species) and (2) the presence of light dorsolateral ocelli. From *Macrocalamus lateralis*, with which it shares these two characters, *Macrocalamus chanardi* is distinguished by (1) the presence of loreal scale, (2) a higher number of subcaudal scales, (3) the presence of a single dark ventrolateral stripe in *M. chanardi* instead of two close dark ventrolateral stripes separated by a narrow light stripe in *M. lateralis*, (4) the presence of a light dorsolateral stripe on which are located, in part for about half of their height, dorsolateral ocelli in *M. lateralis* (dorsolateral pale stripe absent in *M. chanardi*), (5) the absence of a dark vertebral

stripe, present in *M. lateralis*, (6) the presence of two to six parallel streaks on the body in *M. chanardi*, vs. a single yellow oblique streak on the neck and no streak present on the body in *M. lateralis*.

**Description of the holotype.** – Body cylindrical, moderately stout; head triangular, tapering anteriorly when seen from above, depressed anteriorly, barely distinct from neck; snout rounded, rather elongated, 2.3 times as long as eye diameter; tail short, tapering to point.

TL 264 mm (SVL 237 mm, TaL 27 mm); ratio TaL/TL 0.102.

DSR: 15 throughout, all scales smooth; VEN: 117 (+ 1 preventral); SC: 20, all paired; anal entire.

Rostral much higher than broad, triangular and largely visible from above, separating the nasals each from one another, and reaching the prefrontals between which it inserts slightly;

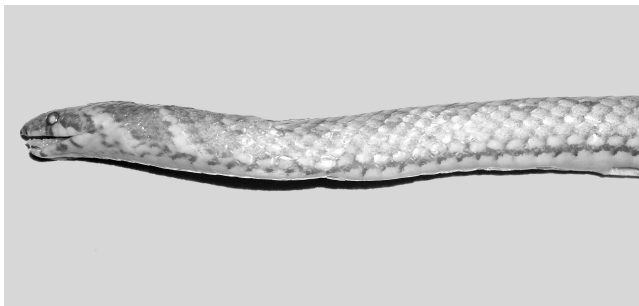


Fig. 2. *Macrocalamus chanardi*. Holotype (BMNH1900.6.14.17). Lateral view of the head and body (left side).



Fig. 3. *Macrocalamus chanardi*. Holotype (BMNH1900.6.14.17). Dorsal view.



nasals entire, pentagonal, higher than long; nostril piercing the anterior lower margin of the nasal, adjacent to the upper margin of the 1st supralabial and to edge of rostral; internasals absent, fused with prefrontals; one pair of large prefrontals; frontal hexagonal, pointing caudally, about 1.6 times as long as broad and 1.6 times longer than prefrontals, located between an undivided supraocular on each side; two enlarged parietals separated from the supralabials by the temporals; 1 elongated loreal, twice as long as wide; 1/1 PreOc; 1/1 PosOc; no subocular; Tem 1+2/1+2, anterior temporal rectangular and upper posterior temporal much longer than others; 8/8 SL, 1<sup>st</sup> and 2<sup>nd</sup> in contact with the nasal, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> in contact with the loreal, 4<sup>th</sup> and 5<sup>th</sup> entering orbit, 7<sup>th</sup> the largest; 7/7 IL, first pair in contact, 1<sup>st</sup> to 4<sup>th</sup> IL in contact with anterior chin shield, 6<sup>th</sup> the largest.

Dorsal surface pale brown, with many scales faintly and thinly edged with darker brown on their anterior part; on each side, a row of rather indistinct, wide pale brown (yellow or orange in life) ocelli on upper part of 5<sup>th</sup> DSR and lower part of 6<sup>th</sup> DSR, about one scale-long, irregularly edged with dark brown on their lower (lower half of 5<sup>th</sup> DSR) and upper (upper half of 6<sup>th</sup> DSR) parts respectively; these ocelli are well visible on anterior part of body, but are fading out after midbody, being identified by their darker margin; scales of 1<sup>st</sup> DSR cream; tips of ventrals dark brown, forming a broad, distinct ventrolateral stripe beginning on 1<sup>st</sup> ventral and extending up to the vent; this pale ventrolateral stripe strongly contrasts with the dark brown stripe extending below; two parallel oblique streaks, themselves parallel with the streak of the head (see below), the first one at level of 6<sup>th</sup> VEN and reaching upwards the vertebral row, the second one, nearly indistinct, at level of 9<sup>th</sup> VEN; tail as body above, with ocelli visible.

Head brown above, slightly darker than body; a pale yellowish-brown temporal streak extending from the parietals to the throat, through the posterior temporals, the corner of the mouth and posterior part of the neck; this streak is parallel with those of forebody, producing a pattern of three chevrons; throat dirty cream, with brown fleckings on infralabials.

Ventral and subcaudal scales uniformly very pale brown-ochre, with their outer tips dark brown.

**Description of the paratypes.** – A summary of morphological and meristical data of the paratypes is given in Table 2. All other morphological and scutellation features, including the presence of a loreal scale and numbers of DSR, SL and IL, agree with those of the holotype. There is little variation in

the coloration, excepted fading due to the preservation. The oblique temporal streak is present in all paratypes; two to three oblique, parallel yellow (in alcohol) streaks on neck side are present, some specimens showing the suggestion of a faint fourth streak. In life, these lateral streaks may be very conspicuous, especially in juvenile specimens.

**Variation (48 specimens).** – A summary of variation in *Macrocalamus chanardi* is presented in Tables 3 & 4. This is a rather small species, with a maximum known length of 263 mm (BMNH 1900.6.14.17; holotype), but most specimens have a total length under 250 mm. The head scalation as described above is quite constant in all observed specimens. The ratio L-Fr/W-Fr varies between 1.50 and 1.70.

Upper surfaces in life and alcohol chesnut brown to dark brown or dark greyish-brown, usually with on each side of the back a discontinuous dorsal row made of lighter, dark-edged, elongated ocelli, tan or orange-brown in life (pale ochre-brown or creamish-brown in alcohol), located on the 5<sup>th</sup> and 6<sup>th</sup> DSR, or 6<sup>th</sup> DSR only; if in alcohol these ocelli are usually well visible on anterior part of body, they are sometimes much subdued backwards, being noticeable only by their dark brown edge or as open ocelli; from two to six oblique, parallel yellow, orange or tan streaks on neck and anterior part of the body; a single dark ventrolateral stripe due to the dark brown tips of ventral plates, bordered above by a pale yellow or cream narrow stripe made by the pale colour of the 1<sup>st</sup> DSR.

Head as body or darker, with supralabials irregularly mottled with yellow; a pale (yellow or yellowish-brown in life) oblique streak running from the parietals to the throat.

The venter and throat are vividly pink, coral red or orange in life, becoming pale pink, very pale yellow or creamy-white in preservative; sometimes a few dark, scattered spots on venter; infralabials and chin irregularly spotted with dark brown; frequently a median dark brown, zigzag-like stripe beneath the tail.

The coloration of juvenile and adults is similar, but young are more vividly colored, at least in life. A rather unusually dark specimen, with a black body and a very contrasted pattern is depicted in Chan-ard et al. (1999: 173). The dark dorsal colour reduces the ocelli to elongated orange spots.

**Range.** – West Malaysia. Pahang: Cameron Highlands (Tanah Rata, Gunung Batu Berinchang), Bukit Fraser (Fraser's Hill); Perak: Bukit Larut (formerly Maxwell's Hills) (Fig. 1).

**Etymology.** – We are pleased to name this new taxon in honour of Mr. Tanya Chan-ard (National Science Museum, Pathumthani, Thailand), who was instrumental in collecting the Thai specimen that allowed us to redefine the taxonomy of *Macrocalamus lateralis* and in the name of his contributions to the herpetology of Thailand.

**Biological data.** – Data given under *Macrocalamus lateralis* in Vogel & David (1999) indeed refer to *Macrocalamus*



Fig. 4. *Macrocalamus chanardi*. Holotype (BMNH1900.6.14.17). General view.

*chanardi*. This species is a secretive, diurnal forest litter dweller, that has been found in tropical montane wet forests from 1100 to 1500m elevation, perhaps higher. Specimens have been collected under logs or found crossing forest tracks or roads, but sometimes encountered while basking on the road in early morning. This species feeds on earthworms, slugs, insects and their larvae. References for the biology were provided in Vogel & David (1999).

The description of *Macrocalamus chanardi* new species leads to the following redefinition of *Macrocalamus lateralis*, as follows:

***Macrocalamus lateralis* Günther, 1864**

(Figs. 5, 6)

*Macrocalamus lateralis* Günther, 1864: 199, Pl. 18: fig. D; **Type locality**. “From the continent”; **Holotype**. BMNH 1946.1.7.23 (adult male); collected or obtained by T. Hardwicke.

**Material examined**. – Holotype - **Malaysia**. BMNH 1946.1.7.23 (male), “From the continent”, no precise locality.

**Thailand**. THNHM 988 (female), Ban [= Village] Bala, Tambon [= Subdistrict] Lochut, Amphoe [= District] Waeng, Hala-Bala Wildlife Sanctuary, Narathiwat Province.

**Diagnosis**. – *Macrocalamus lateralis* is characterized by the combination of (1) a red, pink or orange venter in life; (2) the presence on each side of a pair of wide, dark brown, ventrolateral stripes separated by a narrow pale yellow or pale brown line; (3) a dorsal colour relatively light (in alcohol), pale brown or yellowish-brown, with on each side of the back, at least on the anterior part of body, a dorsolateral row of pale brown, dark-edged ocelli; (4) a ratio  $TaL/TL$  lower than 0.12 in males.

*Macrocalamus lateralis* differs from *Macrocalamus schulzi* by (1) the absence of a loreal scale, (2) the color of the venter (pink or red vs. bright yellow in life in *M. schulzi*), (3) the dorsolateral ocelli (absent in *M. schulzi*) and (4) morphological characters listed in Tables 3, 4.

From *Macrocalamus chanardi*, *M. lateralis* is distinguished by a combination of six characters listed above under the

account of *M. chanardi*.

**Description and variations**.—This species is known from only two specimens, the main characters of which appear in Table 1. Other characters include: 15 DSR, all smooth, a ratio of  $L-Fr/W-Fr$  of 1.2-1.3, and other characters listed in Tables 3, 4. Specimen THNHM 988 has a very short tail (ratio  $TaL/TL$ : 0.064), although it is entire and not damaged.

Upper surface in life and alcohol light brown or yellowish-brown, with on each side of the back a dorsolateral cream stripe, edged with a faint dark brown line below, extending on the 6<sup>th</sup> and 7<sup>th</sup> DSR, on which are surimposed, for a part slightly set off downwards, elongated, creamish-yellow, edged with blackish-brown, ocelli located on 5<sup>th</sup> and 6<sup>th</sup> DSR; these ocelli are visible only on the anterior part of body of the holotype, but are conspicuous (in life and alcohol) throughout the body (23 ocelli) and the upper tail surface (two) of specimen THNHM 988; a faint dark brown vertebral stripe, more conspicuous in the juvenile; in both known specimens, a double, broad, dark brown ventrolateral stripe beginning on 1<sup>st</sup> ventral and extending up to the vent; the lower part of the stripe, narrow and rather uneven, is made of dark brown tips of ventrals, the upper part, much wider, extending on upper half of 1<sup>st</sup> DSR and 2<sup>nd</sup> DSR; between the dark brown stripes, a yellowish brown line on 1<sup>st</sup> DSR, about as wide as lower dark brown stripe. No oblique yellow streak on anterior part of body.

Head brown, darker than body on its sides in both specimens, especially on the labials and temporals, paler on the snout; a large, oblique, yellow, triangular streak on the nape and neck, extending from the parietals, which it exactly borders on the whole of their posterior margins, on the posterior temporals down to the venter behind the lower jaws.

The venter of both specimens is now creamish yellow, speckled with dark brown near the margins of ventrals and especially near their tips. The venter of the freshly preserved juvenile was pinkish-white, probably pink or red in life. The lower surface of the tail is uniformly creamish yellow.

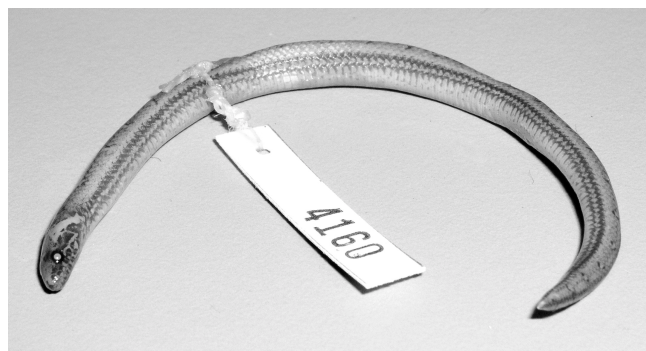


Fig. 5. *Macrocalamus lateralis* (THNHM 988). Lateral view.



Fig. 6. *Macrocalamus lateralis* (THNHM 988). General view.

Table 3. Comparison between *Macrocalamus lateralis*, *M. chanardi*, *M. schulzi* and *M. vogeli*. I. Ratio and scalation.

Taxon	Max. TL (mm)	MSR	General	Ratio TaL / TL	General	General	Ventrals	General	Subcaudals	Lor	SL	ATe	IL
<i>lateralis</i> (n = 2)	297	15	0.064-0.118	0.118	0.064	114-122	114	122	14-20	20	14	0	8 1 7
<i>chanardi</i> (n = 48)	263	15	0.093-0.161	0.139-0.161	0.093-0.114	104-127	104-114	114-127	18-28	24-28	18-21	1	8 1 7
<i>schulzi</i> (n = 59)	399	15	0.087-0.156	0.130-0.156	0.087-0.119	114-134	114-125	119-134	17-31	23-31	17-27	1	8 1 7
<i>vogeli</i> (n = 1)	?	15	——	0.151	——	——	125	——	——	29	——	1	8 1 7

Table 4. Comparison between *Macrocalamus lateralis*, *chanardi*, *schulzi* and *vogeli*. II. Coloration and pattern.

Taxon	Venter color (in life)	Venter pattern	Dark Ventrolateral stripe	Oblique head + body streaks	Dorsolateral ocelli	Median subcaudal stripe
<i>lateralis</i> (n = 2)	Pink (?)	Uniform	Double	1 + 0	Present, wide	None
<i>chanardi</i> (n = 48)	Red, pink or orange	Uniform	Single	1 + 2-6	Present, wide	Present (rarely absent)
<i>schulzi</i> (n = 59)	Bright yellow	Uniform	None	1 + 0	None	None
<i>vogeli</i> (n = 1)	Yellowish-brown (in alcohol)	Strongly speckled	Single	1 + 2	Present, reduced	Present, wide

**Range.**—Thailand: Hala-Bala Wildlife Sanctuary, Narathiwat Province; West Malaysia (?): mainland in regard of Pinang Island (see below) (Fig. 1).

The type locality was restricted by Lim (1963: 101) to “Cameron Highlands, State of Pahang, Malaya”, West Malaysia. This action is inappropriate, as all known specimens from Cameron Highlands are now referred either to *Macrocalamus chanardi* or *Macrocalamus schulzi*. Fortunately, this action is invalid according to the *Code*, which considers to be valid only restrictions of a type locality that are based on the designation of a lectotype or of a neotype.

The origin of the holotype of *Macrocalamus lateralis* is unknown. Günther (1864) stated that it was collected “From the mainland”, an evasive indication also bore by its museum label as “From the continent”. This specimen was collected, or at least obtained by Major-General Thomas Hardwicke. Smith (1943: 527) gave a brief report on specimens collected by this traveller. All Malaysian specimens were seemingly collected either in Singapore or on Pulau Pinang (Penang Island). Although we have no proof, we suggest that the holotype of *Macrocalamus lateralis* was collected on the mainland across from Pulau Pinang, a point which is distant from the known Thai locality by only about 160 airline kilometers.

All other specimens examined by us should be referred to *Macrocalamus chanardi*.

**Biological data.**— The specimen from Thailand was collected in March 2002 in a hill rainforest, at about 400 m above sea level (Chan-ard, pers. comm.), next to a bungalow of the Headquarters of the Wildlife Research Center. It was active on the ground during the daytime.

It is interesting to note that no specimen of *Macrocalamus chanardi* has been collected below 1100 m above sea level, so well above the sole known elevation for *Macrocalamus lateralis*.

Vogel & David (1999) discussed the differences between *Macrocalamus lateralis*, now for the largest part *Macrocalamus chanardi*, and *Macrocalamus schulzi*. *Macrocalamus chanardi*, *M. lateralis* and *M. schulzi* can be further distinguished by characters given in the key to the genus given below. However, Vogel & David (1999) noted that specimen BMNH 1968.764 did not fit with any other taxon. Considering the limited intraspecific variation in species of this genus (Vogel & David, 1999; Norsham & Lim, 2002), we refer this specimen to the new species:

***Macrocalamus vogeli*, new species**  
(Figs. 7-9)

*Macrocalamus lateralis* (non Günther, 1864) - Smith, 1922: 266; Smith, 1930: 57 (part).

**Material examined.** – Holotype - BMNH1968.764 (male); “Camp Padang, Gunong Tahan, Pahang, Malaya, 5.400-5.700 ft”, Gunung

Tahan, Pahang, West Malaysia, Malaysia; coll. F. M. S. Museum (Meteorological Survey), Sep.1921.

**Diagnosis.**— *Macrocalamus vogeli* is characterized by (1) a broad dark ventrolateral stripe on each side, bordered dorsally by a narrower yellow stripe; (2) a broad oblique yellow strike behind the head, followed by two narrow, faint oblique lines on the body; (3) small, yellow, dark-edged ocelli on anterior part of the body; (4) a yellow venter heavily powdered with brownish-black dots; and (5) a median stripe below the tail.

This species has both a single dark ventrolateral stripe and a yellow venter that is heavily speckled with black. *Macrocalamus vogeli* differs from *Macrocalamus lateralis* by (1) the presence of a loreal scale, (2) the dorsal pattern, with much reduced ocelli, no light dorsolateral stripe and a single dark ventrolateral stripe, (3) the color of the venter, and (4) by higher numbers of ventral and subcaudal scales. The new species differs from *Macrocalamus chanardi* by (1) the color and pattern of the venter, yellow and heavily speckled vs. red or orange and uniform in *M. chanardi*, and (2) the dorsal pattern with reduced ocelli (large in *M. chanardi*), and (3) a much higher number of ventral scales, with 125 in the holotype vs. 104-114 in *Macrocalamus chanardi*.

Lastly, *Macrocalamus vogeli* is distinguished from *M. schulzi* by the (1) the presence of a ventrolateral stripe (absent in *M. schulzi*) and (2) the pattern of the venter (uniform in *M. schulzi*, vs. strongly speckled in *M. vogeli*.) Scalation characters are otherwise rather similar.

**Description of the holotype.** – Body cylindrical, moderately elongated; head triangular, flat, tapering anteriorly when seen from above, not depressed anteriorly, barely distinct from neck; snout rounded, rather elongated, 1.9 times as long as eye diameter; tail rather long for the genus, ending with a sharp spine.

TL:192mm (SVL 163mm, TaL 29mm); ratio TaL/TL 0.151.

DSR: 15 throughout, all smooth; VEN: 125 (+ 1 preventral); SC: 29, all paired; anal entire.

Rostral higher than broad, triangular and largely visible from above, separating the nasals each from another, and reaching



Fig. 7. *Macrocalamus vogeli*. Holotype (BMNH 1968.764). Lateral view of the head and body (left side).



the prefrontals between which it inserts moderately deeply; nasals entire, trapezoidal, barely higher than long; nostril piercing the anterior lower margin of the nasal, adjacent to the upper margin of the 1<sup>st</sup> SL and to edge of rostral; internasals absent, fused with prefrontals; one pair of large prefrontals; frontal hexagonal, pointing caudally, about 1.6 times as long as broad and 1.6 times longer than prefrontals, located between an undivided supraocular on each side; two enlarged parietals separated from the supralabials by the temporals; 1 much elongated, irregularly hexagonal loreal, twice as long as wide; 1/1 PreOc; 1/1 PosOc; no subocular; Tem 1+1/(1+1) / 1+1/(1+1), anterior temporal rectangular and upper posterior temporal much longer than others; 8/8 SL, 1<sup>st</sup> and 2<sup>nd</sup> in contact with the nasal, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> in contact with the loreal, 4<sup>th</sup> and 5<sup>th</sup> entering orbit, 7<sup>th</sup> the largest; 7/7 IL, first pair in contact, 1<sup>st</sup> to 4<sup>th</sup> IL in contact with anterior chin shield, 6<sup>th</sup> the largest.

Dorsal surface dark yellowish-brown, with many scales faintly and thinly edged with darker brown; on each side, a row of small ochre-brown ocelli on upper part of 6<sup>th</sup> DSR, irregularly edged with dark; these ocelli are well visible on anterior part of body, but are fading away after midbody; scales of 1<sup>st</sup> DSR pale ochre-brown; tips of ventrals dark

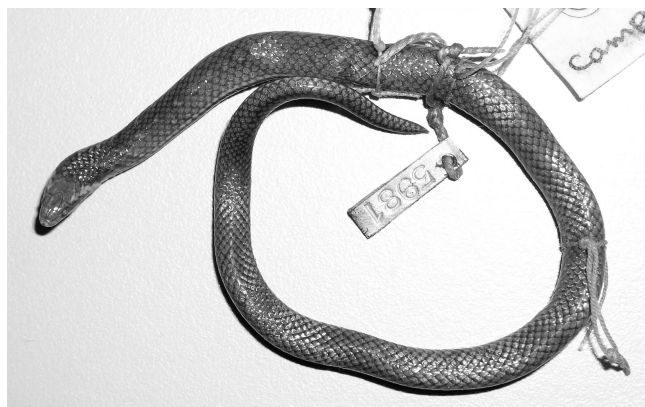


Fig. 8. *Macrocalamus vogeli*. Holotype (BMNH1968.764). Dorsal view.



Fig. 9. *Macrocalamus vogeli*. Holotype (BMNH1968.764). Ventral view.

brown, forming a broad, distinct ventrolateral stripe beginning on 1<sup>st</sup> ventral and extending up to the vent; two faint, narrow oblique yellow bands on the neck sides and anterior part of body, anteriorly edged with dark brown.

Head dark yellowish-brown above, much darker posteriorly in the occipital region, on the nape and on the body between the two oblique lateral stripes, producing a wide dark collar or hood; a wide, yellow temporal streak extending from the parietals to the throat, through the posterior temporals, the corner of the mouth and posterior part of the neck; this streak, which contrasts sharply with the dark color of the occiput and nape, widens near the venter and is parallel with those of forebody, but much wider; supralabials bright yellow; chin and throat dark yellow, with extensive brown fleckings on infralabials, except on the last two scales, and to a lesser extent on the chin and throat.

Ventral and subcaudal scales dark, dirty yellow, heavily speckled with brownish-black spots on the anterior margin, the middle and the outer tips of each ventral, making the venter progressively darker backwards; subcaudal scales heavily marked with dark brown; a dark, regular median, zigzag stripe beneath the tail.

**Range.**— West Malaysia: Pahang: Gunung Tahan (Fig. 1).

**Etymology.** — We are pleased to name this new taxon in honour of Dr. Gernot Vogel (Society for Southeast Asian Herpetology, Heidelberg), for his contributions to the taxonomy of the genus *Macrocalamus* and to the herpetology of Southeast Asia in general.

**Biological data.** — Nothing is known about this animal, except that it was caught between 1650m and 1750m above sea level.

The last in this group of four relatively similar species is *Macrocalamus schulzi*, the characters of which are summarized as follows:

#### *Macrocalamus schulzi* Vogel & David, 1999

*Macrocalamus schulzi* Vogel & David, 1999: 318; 319: Figs. 1, 2; Pls. 1, 4, 5, 9-12; **Type locality.** Tanah Rata (ca 4°29'N, 101°23'E), Cameron Highlands, Pahang, West Malaysia, Malaysia; **Holotype.** ZFMK 51159 (adult male), coll. Klaus-Dieter Schulz.

**Material examined (59 specimens).** — **Holotype** - West Malaysia. Pahang. Cameron Highlands: ZFMK 51159 at 1500 m, Tanah Rata.

West Malaysia. Pahang. Cameron Highlands: BMNH1974.3891-3892, BMNH1974.3896-3897, IRSNB 16668, IRSNB 16669a-16669b, MNHN1997.3268-3270, MTKD39360, ZMB54329-54330, ZRC.2.2782, GV 06, GV 11, GV 13, GV 15, GV 17-20, no precise locality; BMNH1974.3898-3899, ZFMK 16681, ZFMK32297-32300, ZFMK32302, ZFMK36516, ZFMK48527-48528, ZFMK48597, ZFMK51160, ZFMK53104, 53105 at 1500 m, ZRC.2.2766-2767, ZRC.2.2777, ZRC.2.2769-2770 at 1200-1500m, ZRC.2.2773 at 1435m, ZRC.2.2776 at 1280 m,

ZRC.2.2781 at 1370m, ZRC.2.2779 (in agricultural area, new clearings at 1280 m), all from Tanah Rata; ZFMK16519, ZFMK16682-16684, ZFMK53102 at 1800 m, ZMB49143, Gunung Batu Berinchang; ZMB56891-56894, between the entrance of Tanah Rata above Gunung Batu Berinchang and the beginning of Tringkap, between 1500 m and 1650 m; ZRC.2.2513, Boh tea estate, Prakash Division, about 4°27'N - 101°26'E, above 1370m; ZRC.2.2775, Telom Valley.

**Diagnosis.** – *Macrocalamus schulzi* is characterized by a uniformly yellow, unspeckled venter, the yellow colour being present both in young and adult specimens and retained in preservative, uniform dorsal coloration, the complete absence of ventrolateral stripes, and the number of ventrals ranging in males from 114 to 125.

**Description and variations.** – Data are provided in Tables 3 & 4. A complete description of this appeared in Vogel & David (1999). The head scalation may be summarized as follows: an elongated loreal always present; 8 SL, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> in contact with the loreal, 4<sup>th</sup> and 5<sup>th</sup> fifth entering orbit, 7<sup>th</sup> largest; 1/1 PreOc, excepted 2 PreOc at left in specimen ZRC 2-2773 due to the division of the 4<sup>th</sup> SL.

**Range.** – West Malaysia:Pahang:Cameron Highlands (Tanah Rata, Gunung Batu Berinchang). This species is currently known only from wet, forested mountains between 1000 and 1800m above sea level (Fig. 1).

#### Identification key to the genus *Macrocalamus*

1. Dorsum deep coal black, uniform or with a pair of yellow dorsal stripes or scattered yellow blotches; venter at least partly deep black .....2
- Dorsum pale to dark brown, reddish-brown or greyish-brown, never deep black and without bright yellow dorsolateral stripes; venter colour never black.....4
2. Venter chequered deep black and yellow; dorsal surface uniform, without stripes nor blotches; usually 7 (rarely 8) supralabials ..... *Macrocalamus tweediei*
- Venter black or yellow (or orange), but not chequered; dorsal surface with a pattern; 8 supralabials ..... 3
3. Venter uniformly bright yellow or orange; dorsal surface with a pair of bright yellow dorsal stripes ... *Macrocalamus jasoni*
- Venter black with a thin yellowish median line throughout its length; dorsal surface with large, scattered yellow lateral blotches anteriorly ..... *Macrocalamus gentingensis*
4. Loreal present; dark ventrolateral stripe single or absent ..... 5
- Loreal absent; a double dark ventrolateral stripe separated by a pale yellow line ..... *Macrocalamus lateralis*
5. Venter pink, orange or bright red in life (pinkish-cream in alcohol); open ocelli on the back; one dark ventrolateral stripe on each side ..... *Macrocalamus chanardi*, new species
- Venter bright yellow or yellowish-brown; no dorsolateral ocelli on the back (at least in alcohol) or reduced to dark spots; ventrolateral stripe present or absent ..... 6
6. No ventrolateral stripe; venter uniformly bright yellow in life, yellowish-brown or ochre in alcohol .... *Macrocalamus schulzi*
- A dark ventrolateral stripe present; venter dark yellowish-brown, heavily speckled with brownish-black ..... *Macrocalamus vogeli*, new species

#### ACKNOWLEDGEMENTS

We are indebted to Tanya Chan-ard (National Science Museum, Pathumthani) for his invaluable assistance, Colin J. McCarthy (Natural History Museum, London) for his help in this research, his comments and the loan of preserved specimens, and to Van Wallach, Museum of Comparative Zoology, Harvard University (Cambridge) for his constructive comments on the manuscript. We are also grateful to Wolfgang Böhme (Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn), Rainer Günther, Zoologisches Museum für Naturkunde der Humboldt-Universität zu Berlin (Berlin), Georges Lenglet and Georges Coulon (Institut Royal des Sciences Naturelles de Belgique, Brussels). Lastly, it is a pleasure to thank Chucheep (Teak) Chimsunchart (Phetchaburi) for her help in translating Thai literature, and Kelvin Lim Kok Peng (Raffles Museum of Biodiversity Research, National University of Singapore, Singapore), who kindly prepared the distributional map of the genus *Macrocalamus*.

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