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NOTES ON MATICORA BIVIRGATA (BOIE) AND ON BUNGARUS FLAVICEPS REINH.

by

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Loveridge (1944) published a key to the species and subspecies belonging to the genus *Maticora* Gray. This author emphasized that a much larger material than he had at his disposal should be examined, and that all records from literature should be studied, if a clear picture of the subspecies and their ranges was to be obtained. This led me to study the forms of *Maticora* occurring in the Netherlands East Indies. In the present paper the subspecies of *Maticora bivirgata* (Boie) are discussed, and some notes on *Bungarus flaviceps* are given, as specimens of the latter species have been referred to *Maticora* by several authors.

The material examined by me consists of 110 specimens from the collections of the Rijksmuseum van Natuurlijke Historie, Leiden (67 specimens), from the Zoölogisch Museum, Amsterdam (24 specimens), and from the Zoölogisch Museum, Buitenzorg (19 specimens). Moreover I examined one specimen belonging to the Raffles Museum, Singapore. Mr. A. Loveridge kindly sent me data on 7 specimens in the Museum of Comparative Zoölogy, Cambridge (Mass.). Thus data on 118 specimens have been included in the present paper.

Although I tried to trace all references to *Maticora bivirgata* in literature, the synonymies are certainly not complete. Many of the references are incorporated in the synonymies of the subspecies only on the base of the localities recorded. In most cases, records in literature do not mention data

on the lepidosis, coloration, and sex of the specimens, and this greatly reduces their value for studies as at present undertaken.

H. Boie (in F. Boie, 1827, p. 556) described *Elaps bivirgatus* from Java, Cantor (1839, p. 33) described *Elaps flaviceps* from Malacca, and Bleeker (1859, p. 201) described *Elaps tetrataenia* from Borneo. Later authors generally considered *flaviceps* and *tetrataenia* to be synonyms of *bivirgatus*. Boulenger (1896, p. 401) mentions three varieties (A, B, and C) of *Doliophis bivirgatus* that correspond to the forms described by Boie, Cantor and Bleeker. Not much attention has been paid to their value as distinct geographic forms. Indeed most authors do not mention them at all. In some cases one form has been mentioned from widely different regions, e.g., Boulenger (1896, p. 401) mentions his variety A both from Penang and Java, and Boettger (1898, p. 123) mentions *flaviceps* both from Sumatra and Java. In other instances two different forms have been recorded from one and the same locality, e.g., Boulenger (1896, p. 401) mentions his varieties A and C from Penang, and De Rooij (1915, p. 305) records the varieties A and C from Nias. A re-examination of the specimens concerned may show that these irregularities are due to a wrong identification, e.g., the specimen of var. A recorded from Nias by De Rooij (1915, p. 305) proved to be a juvenile *Bungarus flaviceps* Reinh. In other cases the locality record may be doubted, as is shown by three specimens in the Leiden Museum. These specimens are labelled Soerabaja (Java) and were presented to the museum in 1873 by Neeb; they show the coloration typical of Sumatran specimens. It is known from Neeb's correspondence (Gijzen, 1938, p. 139) that Neeb, while living in Soerabaja, received snakes from Deli, Sumatra, and an error in the label is obvious. Bourret (1936b, p. 414) applies to the three forms the ternary nomenclature generally used for subspecies (geographic races), but according to him the distribution is the same as given by Boulenger (1896, p. 401) for the three varieties. Loveridge (1944, p. 106), who had no Javan material for comparison, recognizes two subspecies, viz., *Maticora bivirgata bivirgata* from Sumatra, Java and adjacent islands, and *Maticora bivirgata tetrataenia* from Borneo.

The series examined by me leads me to the conclusion that three distinct subspecies can be recognized:

Maticora bivirgata bivirgata (Boie): Java;

Maticora bivirgata flaviceps (Cantor): (Burma?) Peninsular Siam, Malay Peninsula, Penang, Singapore, Rhio Archipelago, Sumatra and adjacent islands (Nias, Mentawei Ids., Banka);

Maticora bivirgata tetrataenia (Bleeker): Borneo.

Of the specimens examined by me all but one of those having definite

locality records and that have been collected in the last 30 or 40 years can be placed with subspecies and ranges mentioned above. The only exception is a specimen of *tetrataenia* in the Buitenzorg Museum that has a definite locality record from Sumatra (cf. p. 22). Whether an error has been made in this case I cannot say, but it seems likely to me.

The three subspecies mentioned above can be distinguished from one another by differences in colour pattern. As will be discussed below there is an indication that *Maticora bivirgata bivirgata* differs from the other two subspecies in the average number of ventrals, at least in the male sex. However, these differences are useless for the identification of isolated specimens as the ranges of variation in the number of ventrals widely overlap in the subspecies. The discussion of the range of variation and of the average number of ventrals and subcaudals will be given for the three subspecies together.

VENTRALS. In table I I have indicated the frequency of the variations in the number of ventrals for both sexes of the three subspecies; in this table I have also included a number of data from literature. Table II gives the range of variation for both sexes of each subspecies, and the average computed from the data of table I, together with the mean error of these averages. Moreover, the difference between the average numbers for the sexes of each of the subspecies, as well as the difference between the subspecies is given, together with the mean error of that difference. It may be recalled that a difference is to be considered significant if it exceeds two or three times the mean error of the difference.

Table I. Variation in the number of ventrals

Ventrals	*M. b. bivirgata*			*M. b. flaviceps*			*M. b. tetrataenia*		
	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?
230	—	—	—	—	♀	—	—	—	—
231	—	—	—	—	—	—	—	—	—
232	—	—	—	—	—	—	—	—	—
233	—	—	—	—	—	—	—	—	—
234	—	—	—	—	—	—	—	—	—
235	—	—	—	—	—	o	—	—	—
236	—	—	—	—	♀	—	—	—	—
237	—	—	—	—	—	—	—	—	o
238	—	—	—	—	♀	—	—	—	—
239	—	—	—	—	—	—	—	♀	—
240	—	—	—	—	♀♀	o	—	—	—
241	—	—	—	—	♀	—	—	—	—
242	—	♀	—	—	♀	o	—	—	—
243	—	♀	—	—	♀♀♀	—	—	—	—
244	—	—	—	—	—	—	—	♀	—

Ventrals	*M. b. bivirgata*			*M. b. flaviceps*			*M. b. tetrataenia*		
	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?
245	—	—	—	—	♀	—	—	—	—
246	—	—	—	♂	♀♀	—	—	♀	—
247	—	—	—	—	—	—	—	—	—
248	—	—	—	—	—	o	—	—	—
249	—	♀	—	—	♀♀	—	—	♀	—
250	—	—	—	♂	—	—	—	—	—
251	—	♀	—	—	—	—	—	♀♀	—
252	—	—	—	—	♀	—	—	♀	—
253	—	♀	—	—	♀♀	—	—	—	—
254	—	♀♀	—	—	—	—	♂	—	—
255	—	♀♀	—	—	—	—	—	—	—
256	—	—	—	—	—	o	—	—	—
257	—	♀	—	—	—	—	—	—	—
258	—	—	—	—	—	o	—	—	—
259	—	♀	—	—	—	—	♂♂	—	—
260	—	—	—	♂	—	—	—	—	—
261	—	—	—	♂	—	—	—	—	—
262	♂	—	—	♂	—	—	♂	—	—
263	—	—	—	—	♀	o	—	—	—
264	—	—	—	♂	♀	—	—	—	—
265	—	—	—	—	—	—	—	—	—
266	—	—	—	♂♂♂	—	—	—	—	—
267	—	—	o	♂♂♂♂	—	o	♂	—	—
268	—	—	—	♂♂	—	—	♂	—	—
269	—	—	o	♂♂♂	—	o	♂	—	—
270	♂	—	—	♂♂	—	o	♂♂	—	—
271	—	—	—	♂	—	o	—	—	—
272	—	—	—	♂	—	oo	—	—	o
273	—	—	—	♂♂	—	o	♂♂♂	—	—
274	—	—	—	♂	—	—	♂	—	—
275	—	—	—	♂	—	o	—	—	—
276	—	—	—	—	—	—	♂	—	o
277	—	—	—	♂♂	—	—	♂	—	—
278	—	—	—	—	—	—	♂♂	—	—
279	—	—	—	♂	—	—	—	♀	—
280	—	—	—	♂	—	—	♂♂	—	—
281	♂	—	—	—	—	o	♂	—	—
282	♂	—	—	—	—	—	—	—	—
283	—	—	—	—	—	—	♂♂	—	—
284	♂♂♂	—	—	—	—	o	—	—	—
285	—	—	—	—	—	—	—	—	o
286	—	—	—	♂♂	—	—	—	—	—
287	♂♂	—	—	—	—	—	—	—	—
288	—	—	—	♂	—	—	—	—	—
289	♂♂	—	—	♂	—	—	—	—	—
290	—	—	—	—	—	—	—	—	—
291	♂	—	—	—	—	—	—	—	—
292	—	—	—	—	—	—	—	—	—
293	—	—	—	♂	—	—	—	—	—
294	♂	—	—	—	—	—	—	—	—
295	♂♂	—	—	—	—	—	—	—	—
296	♂	—	—	—	—	—	—	—	—
297	—	—	—	—	—	—	—	—	—
298	—	—	—	—	—	—	—	—	—

Ventrals	*M. b. bivirgata*			*M. b. flaviceps*			*M. b. tetrataenia*		
	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?
299	—	—	—	—	—	—	♂	—	—
300	♂	—	—	—	—	—	—	—	—
301	—	—	—	—	—	—	—	—	—
302	—	—	—	—	—	—	—	—	—
303	—	—	—	—	—	—	—	—	—
304	—	—	—	—	—	—	—	—	—
305	—	—	—	—	—	—	—	—	—
306	—	—	—	—	—	—	♂	—	—

From Table II it is clear that a considerable difference in the average number of ventrals exists between males and females. The males have a much higher average than the females. When the males of *M. b. bivirgata* are compared with either those of *M. b. flaviceps* or *M. b. tetrataenia*, the difference is also significant. The difference between the males of *M. b. tetrataenia* and *M. b. flaviceps* is not significant as it is less than twice its mean error. Beween the females of *M. b. bivirgata* and *M. b. flaviceps* too a marked difference exists, although being only 2.6 times its mean error. The difference between the females of *M. b. tetrataenia* and those of either *M. b. bivirgata* or *M.b. flaviceps* is not significant. It is not impossible that a study based on still larger series, especially on a greater number of females of *M. b. tetrataenia*, will show significant differences in these cases too.

Table II. Range of variation in the number of ventrals

Subspecies	♂♂			♀♀			Difference between the sexes	Diff. / $e_{diff.}$
	Number of specimens	Range	Average	Number of specimens	Range	Average		
M. b. bivirgata .	17	262—300	286.47 ± 2.24	11	242—259	252 ± 1.55	34.47 ± 2.71	12.7
M. b. flaviceps. .	35	246—293	271 ± 1.66	20	230—264	245.80 ± 1.82	25.20 ± 2.47	10.2
M. b. tetrataenia	24	254—306	274.67 ± 2.32	8	239—279	251.38 ± 3.96	23.29 ± 4.59	5.1

Difference between the subspecies

Subspecies	♂♂		♀♀	
	Difference	Diff. / $e_{diff.}$	Difference	Diff. / $e_{diff.}$
M. b. bivirgata — M. b. flaviceps .	15.47 ± 2.79	5.5	6.20 ± 2.39	2.6
M. b. bivirgata — M. b. tetrataenia	11.80 ± 3.23	3.7	0.62 ± 4.26	0.1
M. b. tetrataenia — M. b. flaviceps	3.67 ± 2.86	1.3	5.58 ± 4.36	1.3

SUBCAUDALS. Table III gives the frequency of the variations in the number of subcaudals for both sexes of the three subspecies, as well as some data taken from literature. The average number of subcaudals has been computed for both sexes of each of the subspecies, and as in the case of

Table III. Variation in the number of subcaudals (pairs + 1); frequency

Sub-caudals	*M. b. bivirgata*			*M. b. flaviceps*			*M. b. tetrataenia*		
	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?	♂♂	♀♀	Sex ?
27	—	♀	—	—	—	—	—	—	—
28	—	—	—	—	—	—	—	—	—
29	—	—	—	—	—	—	—	—	—
30	—	—	—	—	—	—	—	—	—
31	—	—	—	—	—	—	—	—	—
32	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	—
34	—	♀	—	—	—	—	—	—	—
35	—	♀	—	—	—	o	—	—	—
36	—	♀♀♀	—	—	♀	—	—	♀	—
37	—	♀♀♀♀	—	♂	♀♀♀	—	—	—	o
38	—	—	—	♂	♀♀♀	—	—	—	o
39	—	—	—	—	♀♀♀♀	o	♂	♀	o
40	—	—	—	—	♀♀	oo	—	♀♀	—
41	♂	♀	—	♂	♀♀	oo	♂♂	♀♀	—
42	—	—	—	♂♂♂	♀♀	—	♂♂♂♂♂♂	—	—
43	—	—	—	♂♂	—	oooo	♂	—	—
44	—	—	o	♂	—	—	♂♂♂♂	—	—
45	♂♂	—	—	♂♂♂♂♂♂	♀	o	♂♂♂♂	—	—
46	♂♂♂♂	—	—	♂♂	—	ooo	♂	—	—
47	♂♂	—	o	♂♂♂♂♂♂	—	o	♂♂♂♂	—	—
48	♂♂♂	—	—	♂♂♂♂	—	o	♂	—	—
49	♂♂	—	—	♂♂	—	o	—	—	—
50	♂	—	—	—	—	—	—	—	—
51	—	—	—	—	—	—	—	—	—
52	—	—	—	♂♂	—	—	—	—	—

the ventrals the sexes and the subspecies have been compared (Table IV). Again there is a significant difference between males and females, the males having a higher average number of subcaudals. A significant difference is also found when males of *M. b. tetrataenia* are compared to those of either *M. b. bivirgata* or *M. b. flaviceps*; the difference between the males of *M. b. bivirgata* and *M. b. flaviceps* is not significant. Among the females those of *M. b. flaviceps* show a significant difference from the females of either *M. b. bivirgata* or *M. b. tetrataenia*. Here too it must be mentioned that a larger series may give more positive results. The data given in tables II and IV are published here to give an indication for further studies.

The subcaudals of *Maticora bivirgata* generally are placed in two rows with a single terminal scale. In two specimens of *M. b. flaviceps* (Table X)

single subcaudals are intercalated between the paired shields, and in one specimen the terminal four shields are single.

Table IV. Range of variation in the number of subcaudals (pairs + 1)

Subspecies	♂♂			♀♀			Difference between the sexes	Diff. / ediff.
	Number of specimens	Range	Average	Number of specimens	Range	Average		
M. b. bivirgata .	15	41—50	46.73 ± 0.66	11	27—41	35.73 ± 0.97	11.00 ± 1.17	9.4
M. b. flaviceps. .	31	37—52	45.48 ± 0.60	18	36—45	39.56 ± 0.55	5.92 ± 0.81	7.3
M. b. tetrataenia	24	39—48	43.92 ± 0.47	6	36—41	39.50 ± 0.61	4.42 ± 0.84	5.3

Differences between the subspecies

Subspecies	♂♂		♀♀	
	Difference	Diff. / ediff.	Difference	Diff. / ediff.
M. b. bivirgata — M. b. flaviceps .	1.25 ± 0.89	1.4	3.83 ± 1.12	3.4
M. b. bivirgata — M. b. tetrataenia	2.81 ± 0.81	3.5	0.06 ± 1.15	0.05
M. b. flaviceps — M. b. tetrataenia	1.56 ± 0.76	2.1	3.77 ± 0.82	4.6

LENGTH OF THE TAIL. In 68 specimens (45 ♂♂, 23 ♀♀) the length of the tail was compared to the length of head and body and to the total length. The results are given in Table V. Small but significant differences exist between the sexes in *M. b. bivirgata* and *M. b. flaviceps*. The number of

Table V. Relative length of tail

	Length of tail × 100 / Length of head and body						Length of tail × 100 / Total length					
	M. b. bivirgata		*M. b. flaviceps*		*M. b. tetrataenia*		*M. b. bivirgata*		*M. b. flaviceps*		*M. b. tetrataenia*	
	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀
8.1— 8.5	—	—	—	—	—	—	—	♀♀	--	—	—	—
8.6— 9.0	—	—	—	—	—	—	♂	♀♀♀♀	—	—	—	—
9.1— 9.5	—	♀♀♀	—	—	—	—	♂♂♂♂♂	♀♀♀	—	—	♂♂	—
9.6—10.0	♂♂	♀♀♀	—	—	♂	—	—	♀♀	♂♂♂♂	♀♀♀♀	♂♂♂♂♂♂♂	♀♀
10.1—10.5	♂♂♂♂	♀♀♀	—	—	♂	—	♂♂♂	—	♂♂♂♂♂	♀♀♀♀	♂♂♂♂♂	♀
10.6—11.0	—	♀♀	♂♂♂♂	♀♀♀♀	♂♂♂♂♂♂	♀	—	—	♂♂♂♂	♀	♂	—
11.1—11.5	♂♂	—	♂	♀♀♀♀	♂♂♂♂♂	♀♀	♂♂	—	♂♂	—	♂♂	—
11.6—12.0	♂	—	♂♂♂♂♂♂	♀	♂♂	—	♂	—	♂	—	—	—
12.1—12.5	♂	—	♂♂	—	♂	—	—	—	—	—	—	—
12.6—13.0	♂	—	♂♂	—	♂	—	—	—	—	—	—	—
13.1—13.5	♂	—	—	—	—	—	—	—	—	—	—	—
13.6—14.0	—	—	♂	—	—	—	—	—	—	—	—	—

Length of tail × 100 / Length of head and body

Subspecies	♂♂		♀♀		Difference between the sexes	Diff. / $e_{diff.}$
	Number of specimens	Average	Number of specimens	Average		
M. b. bivirgata	12	11.16 ± 0.34	11	9.98 ± 0.18	1.18 ± 0.38	3.1
M. b. flaviceps	16	11.79 ± 0.20	9	11.16 ± 0.15	0.63 ± 0.25	2.5
M. b. tetrataenia	17	11.20 ± 0.13	3	11.10 ± 0.11	0.10 ± 0.17	0.6

Difference between the subspecies

Subspecies	♂♂		♀♀	
	Difference	Diff. / $e_{diff.}$	Difference	Diff. / $e_{diff.}$
M. b. flaviceps — M. b. bivirgata .	0.63 ± 0.39	1.62	1.18 ± 0.23	5.1
M. b. tetrataenia — M. b. bivirgata	0.04 ± 0.36	0.11	1.02 ± 0.21	4.9
M. b. flaviceps — M. b. tetrataenia	0.59 ± 0.24	2.46	0.06 ± 0.19	0.3

females of *M. b. tetrataenia* is far too small to draw any conclusions from it. Significant differences between the subspecies are found between the males of *M. b. flaviceps* and *M. b. tetrataenia,* and between the females of *M. b. bivirgata* and *M. b. flaviceps*; the difference between the females of *M. b. bivirgata* and *M. b. tetrataenia* is based on too small a number of specimens of *M. b. tetrataenia* to be of any value.

MAXIMUM LENGTH. A marked difference exists between the sexes in the maximum length attained by the specimens, as is shown by the following measurements (in mm) of the largest males and females.

	♂♂		♀♀	
	total length	head + body	total length	head + body
Maticora b. bivirgata	—	1476	777	701
	1600	1417		
Maticora b. flaviceps	1557	1370	781	702
Maticora b. tetrataenia	1667	1506	806	724

POSITION OF THE HEART. In a previous paper (Brongersma, 1947a, pp. 420-421) I have referred to the position of the heart, as this is more or less characteristic for the genus. Since that time more specimens (60 in all) have been examined in this respect. The results are given in tables VI-VIII. Table

VI shows the variations in the ratio: $\frac{\text{distance from tip of snout to heart}}{\text{length of head and body}}$; the total range of variation for the species is 0.26-0.36. In table VII I have indicated at the level of which ventral the anterior border of the heart is situated. In *M. b. bivirgata* this level varies from the 83rd to the 93rd ventral in males, and from the 71st to the 86th in females; in *M. b. flaviceps* the range of variation is 84-96 in males, and 79-83 in females; in *M. b. tetrataenia* it is 82-98 in males, and 82-90 in females. These differences between the sexes appear to be due to the sexual differences in the total number of ventrals. A ratio that more or less approaches that computed from the length is: $\frac{\text{number of ventrals in front of heart}}{\text{total number of ventrals}}$. The variations in this ratio are given in table VIII. As far as the small number of specimens examined justify any conclusions, there seem to be slight differences in this ratio between the subspecies.

Table VI. Ratio $\frac{\text{distance tip of snout to heart}}{\text{length of head and body}}$

Ratio	*M. b. bivirgata*		*M. b. flaviceps*		*M. b. tetrataenia*	
0.25	—	—	—	—	—	—
0.26	—	—	—	—	♂	—
0.27	♂♂♂♂♂	—	—	—	♂	—
0.28	♂♂♂	♀♀	—	—	♂♂	—
0.29	♂	♀♀	♂	—	♂	—
0.30	♂	—	♂	—	—	—
0.31	♂♂	♀	♂♂♂♂♂	♀♀♀	♂♂♂♂	—
0.32	♂	♀♀♀	♂♂♂♂	♀	♂	♀♀
0.33	—	♀♀	♂	♀	♂♂	—
0.34	—	♀	—	—	♂	—
0.35	—	—	—	♀	—	♀
0.36	—	—	♂	—	♂	—

Table VII. Position of anterior border of heart

Ventral	*M. b. bivirgata*		*M. b. flaviceps*		*M. b. tetrataenia*	
71	—	♀	—	—	—	—
72	—	—	—	—	—	—
73	—	—	—	—	—	—
74	—	♀	—	—	—	—
75	—	—	—	—	—	—
76	—	♀♀	—	—	—	—
77	—	—	—	—	—	—
78	—	♀	—	—	—	—

Ventral	*M. b. bivirgata*		*M. b. flaviceps*		*M. b. tetrataenia*	
79	—	♀	—	♀	—	—
80	—	♀	—	—	—	—
81	—	♀	—	—	—	—
82	—	—	—	♀	♂	♀
83	♂	—	—	♀♀♀♀	—	—
84	—	♀♀	♂	—	—	—
85	♂♂	—	—	—	♂	—
86	♂♂	♀	—	—	—	—
87	♂♂♂	—	—	—	♂	—
88	♂	—	—	—	♂♂♂	♀
89	♂	—	—	—	—	—
90	—	—	♂	—	♂	♀
91	—	—	♂♂♂♂	—	♂	—
92	♂♂	—	♂♂♂♂	—	♂♂	—
93	♂	—	—	—	—	—
94	—	—	♂♂	—	♂♂	—
95	—	—	—	—	♂	—
96	—	—	♂	—	—	—
97	—	—	—	—	—	—
98	—	—	—	—	♂	—

Table VIII. Ratio $\frac{\text{total number of ventrals}}{\text{number of ventrals in front of heart}}$

Ratio	*M. b. bivirgata*		*M. b. flaviceps*		*M. b. tetrataenia*	
0.26	—	—	—	—	—	—
0.27	—	—	—	—	—	—
0.28	♂	—	—	—	—	—
0.29	♂♂	♀	—	—	—	—
0.30	♂♂♂♂♂♂	♀♀♀	—	—	♂♂	—
0.31	♂♂♂	♀♀♀	—	—	♂♂	—
0.32	♂	♀	♂	—	♂♂	♀
0.33	—	♀♀	♂♂♂♂	♀	♂♂♂	♀
0.34	—	—	♂♂♂♂♂	♀♀♀♀	♂♂♂♂♂	—
0.35	—	♀	♂♂♂	♀	—	—
0.36	—	—	—	—	—	♀
0.37	—	—	—	—	—	—

SHIELDS OF HEAD. The shields of the head show only very few variations. Generally there are six upper labials of which the 3rd and 4th enter the orbit: the third upper labial is in contact with the nasal. One specimen of *M. b. bivirgata* (reg. no. 8501, collector's number 1117) has 7 upper labials on the right side, of which the 3rd to 5th enter the orbit; on the left this specimen has 6 upper labials, the 3rd and 4th entering the orbit, but the 3rd is incompletely divided by an incisure. A specimen of *M. b. flaviceps* (reg. no. 8506, ♂) has 6 upper labials of which on the right side the 3rd to 5th

enter the orbit. Seven upper labials are also found on the left side of a specimen of *M. b. tetrataenia,* the 3rd and 4th entering the orbit. In all but two specimens there are two postoculars; in the two exceptions the lower postocular of one side of the head has fused with the fourth upper labial (reg. no. 8424, right side; reg. no. 8501, collector's number 2465, left side). Usually 1 + 2 temporals; in a few specimens (either on one side or on both sides) 1 + 1 or 1 + 1 + 1 temporals. In two specimens the anterior temporal is divided into two shields by an oblique suture, thus these snakes have two anterior temporals of which only the upper is in contact with the posterior temporal.

SEX RATIO. It is remarkable that the collections used contain more males than females. The reason for this may perhaps be sought for in the fact, that the males by their greater length are more conspicuous, and that therefore they are caught more often. It is interesting to note that in the case of the series of *M. b. bivirgata* from the estate Bandjarwangi (West Java, p. 13) the numbers of males and females are about equal (6 ♂♂, 8 ♀♀): in this case a premium has been paid for every snake (irrespective of size), so that all snakes found were offered for sale.

A number of references in literature (many of them dealing with anatomy) contain no indication as to the subspecies examined (e.g., no locality mentioned). These references are given in the following synonymy, those that could be attributed to one or more of the subspecies have been included in the synonymy of the separate subspecies.

Maticora bivirgata (Boie)

Elaps bivirgatus, Fitzinger, Syst. Rept., 1843, p. 28 (as type of the genus *Gongylocormus* Fitz.); Reinhardt, Vidensk. Medd. Naturhist. For. Kjøbenhavn (1860), 1861, p. 227 (absence of apical pits on scales); Reinhardt, Arch. Naturg., vol. 27, sect. 1, 1861, p. 146 (id.); Peters, Monatsber. Ak. Wiss. Berl. (1862), 1863, p. 636; Schlegel, Dierentuin, 1872, Kruipende Dieren, p. 48; Knauer, in: Martin, Illustr. Naturg. d. Thiere, vol. 2, pt. 1, 1882, p. 171.

Callophis bivirgatus, Peters, Monatsber. Ak. Wiss. Berlin (1862), 1863, pp. 636, 637, (skull; absence of pterygoid teeth); Meyer, Monatsber. Ak. Wiss. Berlin, 1869, pp. 204, 205, 206, 208, 210, 212, 213, 214, 215, pl. II figs. 9-11 (skull; poison glands); Meyer, Arch. Naturg., vol. 35, 1869, pp. 237, 238, 239, 241, 243, 244, 245, pl. XIII figs. 9-11 (id.); Meyer, CR. Ac. Sc. Paris, vol. 68, 1869, pp. 860, 861 (poison gland); Meyer, Ann. Mag. Nat. Hist., ser. 4, vol. 4, 1869, p. 74 (id.); Meyer, Proc. Zool. Soc. Lond., 1870, p. 368 (id.); Meyer, Natuurk. Tijdschr. Ned. Indië, vol. 31 (ser. 7, vol. 1), 1870, pp. 223-225 (id.); Reinhardt, Vidensk. Medd. Naturhist. For. Kjøbenhavn (1869), 1870, pp. 118-120 (poison gland); Cope, Rept. U. S. Nat. Mus. for year ending June 30, 1898, 1900, p. 701 (penis).

Adeniophis bivirgatus, Cope, Rept. U.S. Nat. Mus. for year ending June 30, 1898, 1900, p. 1243, pl. 29 fig. 5 (penis).

Doliophis bivirgatus, Anonymous, Encycl. Ned. Oost-Indië, 2nd ed., vol. 3, 1919, p. 798; Knowles, in: Byam & Archibald, The practice of Medicine in the tropics, vol. 1, 1921, p. 697; Phisalix, Animaux vénimeux, vol. 2, 1922, p. 287; Radovanović, Jenaische Zeitschr. Naturw., vol. 69 (n.s., vol. 62), 1935, pp. 323, 368, 400, figs. 53-55 (jaw muscles); Maass, Tabulae Biolog. period. vol. 2 (Tab. Biol., vol. 8), 1933, p. 365.

Maticora bivirgata, Westermann, Treubia, vol. 18, 1942, pp. 618, 619.

Maticora bivirgata bivirgata (Boie)

Elops n. sp. Kuhl & Van Hasselt, Alg. Konst- en Letterbode, 1822, no. 7, p. 100.

Elaps n. sp. Kuhl & Van Hasselt, Isis, 1822, pt. 4, p. 473; Kuhl, Bull. Sci. nat. géol. (2me sect. Bull. univ. Sci. Industr.), vol. 2, 1824, p. 80.

Elaps bivirgatus H. Boie, in: Schlegel, Bull. Sc. nat. géol. (2me sect. Bull. univ. Sci. Industr.), vol. 9, 1826, p. 238 (nomen nudum); H. Boie, in: Schlegel, Isis, vol. 20, pt. 3, 1827, p. 293 (nomen nudum); H. Boie, in: F. Boie, Isis, vol. 20, pt. 6, 1827, p. 556; Wagler, Nat. Syst. Amph., 1830, p. 193; Schlegel, Essai Phys. Serpens, vol. 1, 1837, pp. 182, 232 (part.), and vol. 2, 1837, p. 451, pl. XVI figs. 10, 11; Schlegel, Essay Physiogn. Serpents (transl. by Traill), 1832, pp. 180, 227 (part.); Schlegel, Abbild. neu. unvollst. bek. Amph., 1844, p. 138 (part.), pl. 47; Cantor, Journ. As. Soc. Beng., vol. 16, 1847, pp. 1030, 1071 (part.) (= Cat. Rept. Mal. Pen., 1847, pp. 109, 150 (part.)); Günther, Cat. Colubr. Sn. Brit. Mus., 1858, p. 230 (part.); Schlegel, Handl. Dierk., vol. 2, 1858, p. 41 (part.); Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 16 (ser. 4, vol. 2), 1858/59, p. 314; Jan, Elenco sist. Ofidi, 1863, p. 114; Veth, Java, vol. 1, 1875, p. 226; Kulagin, Iswestia Imp. Obtsjestva Ljuvitelei Estestvosnania, Anthr. i Ethnogr., vol. 56, pt. 2, 1888, p. 20.

Elaps bi-virgatus, Duméril, Bibron & Duméril, Erp. Gén., vol. 7, 1854, p. 1230 (part.).

Elaps (Helminthoelaps) bivirgatus, Jan, Rev. Magas. Zool., 1858, p. 518 (= Prodrome Icon. descr. Oph., 1859, p. 7).

Callophis bivirgatus, Günther, Proc. Zool. Soc. Lond., 1859, p. 81 (part.); Günther, Rept. Brit. India, 1864, pp. XXIII, 346, 348 (part.).

Adeniophis bivirgatus, Meyer, Sitz. Ber. Ak. Wiss. Berlin, 1886, pp. 612, 614; Sclater, List Sn. Ind. Mus., 1891, p. 57 (part.); Boettger, 29-32. Ber. Offenbach. Ver. Naturk., 1892, p. 133.

Doliophis bivirgatus, Flower, Proc. Zool. Soc. Lond., 1896, p. 895 (part.); Boettger, Kat. Rept. Samml. Mus. Senckenb. Naturf. Ges., pt. 2, 1898, p. 123; Flower, Proc. Zool. Soc. Lond., 1899, pp. 607, 692 (part.); Ouwens, Bull. Dépt. Agric. Indes Néerl. no. 20 (Zool., no. 3), 1908, p. 18; Barbour, Mem. Mus. Comp. Zoöl., vol. 44, no. 1, 1912, p. 201 (part.); Boulenger, Vertebr. Fauna Mal. Pen., Rept. Batr., 1912, p. 215 (part.); Koningsberger, Java zoöl. biol., pts. 11/12, 1915, p. 498; De Rooij, in: Kleiweg de Zwaan, Die Insel Nias, vol. 3, 1915, p. 305 (part.); Ouwens, Voornaamste Gifsl. Ned. Indië, 1916, p. 18, pl. XII fig. 17; De Rooij, Rept. Indo-Austr. Arch., vol. 2, 1917, p. 251, fig. 95 (part.), p. 302; Werner, Arch. Naturg., vol. 89, sect. A, pt. 8, 1923, pp. 167, 186 (part.); Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 245 (part.); Kopstein, Natuurk. Tijdschr. Ned. Indië, vol. 86, 1926, p. 143; Mertens, Zool. Anz., vol. 78, 1928, p. 79; Brongersma, Treubia, vol. 11, 1929, p. 68 (part.); Mertens, Senckenbergiana, vol. 11, 1929, p. 33; Van Heurn, Tropische Natuur, vol. 19, 1930, pp. 123, 124, fig. 2; Kopstein, Javaansche Gifsl., 1930, p. 108; Kopstein, Zeitschr. Morph. Ökol. Tiere, vol. 19, 1930, p. 339; Mertens, Abh. Senckenb. Naturf. Ges., vol. 42, pt. 3, 1930, p. 170; Kopstein, Meded. Dienst Volksgez. Ned. Indië, vol. 4, 1932, pp. 251, 256; [Kinghorn & Kellaway], Dangerous Snakes South-West Pacific Area, 1943, p. 28 (part.).

Maticora (Doliophis) bivirgata, Kopstein, Meded. Dienst Volksgez. Ned. Indië, vol. 4, 1932, p. 246.

Maticora bivirgata, Bourret, Serpents Indochine, vol. 2, 1936, p. 413 (part.); De Haas, Treubia, vol. 18, 1941, pp. 335, 336, 337, 339, 341, 349, 350; Loveridge, Rept. Pacific World, ed. Infantry Journal, 1945, p. 147 (part.) and ed. Macmillan, 1945, p. 154 (part.).

Maticora bivirgata bivirgata, Bourret, Serpents Indochine, vol. 2, 1936, p. 414 (part.); Loveridge, Proc. Biol. Soc. Wash., vol. 57, 1944, p. 106 (part.).

Elaps bivirgatus var. *javanica* Schlegel, Abb. neu. unvollst. bek. Amph., 1844, p. XIII.

Doliophis bivirgatus var. A (*Elaps bivirgatus*), Boulenger, Cat. Sn. Brit. Mus., vol. 3, 1896, p. 401 (part.).

Doliophis bivirgatus var. *flaviceps,* Boettger, Kat. Rept. Samml. Mus. Senckenb. Naturf. Ges., pt. 2, 1898, p. 123 (part.).

Doliophis bivirgatus, type C, Rosen, Ann. Mag. Nat. Hist., ser. 7, vol. 15, 1905, p. 180.

Doliophis bivirgatus var. *tetrataenia,* Boettger, Kat. Rept. Samml. Mus. Senckenb. Naturf. Ges., pt. 2, 1898, p. 123.

Specimens examined:

1 ♂, type, Java, leg. Kuhl & Van Hasselt, Mus. Leiden, reg. no. 1435.

1 ♂, Java, leg. Boie & Müller, Mus. Leiden, reg. no. 1434.

1 ♀ juv., Garoet, W. Java, ± 700 m, 1930-31, leg. Jhr. W. C. van Heurn, Mus. Leiden, reg. no. 8497.

1 ♂, 1 ♀, Estate Dajeuhmanggoeng near Garoet, W. Java, ± 1500 m, 11 and 16. XI. 1929, leg. Jhr. W. C. van Heurn, Mus. Leiden, reg. no. 8499.

1 ♂, Estate Ardjoena, near Penggalengan, W. Java, 4.IV.1931, leg. Jhr. W. C. van Heurn, Mus. Leiden, reg. no. 8498.

1 ♂, Mt. Sawal, W. Java, leg. J. de Voogt, 1931, don. Jhr. W. C. van Heurn, Mus. Leiden, reg. no. 8500.

1 ♂ juv., Estate Bandjarwangi, Tjikadjang, W. Java, 900 m, 1935, leg. C. P. J. de Haas, Mus. Leiden, reg. no. 6832 (collector's nr. 30).

6 ♂♂, 8 ♀♀, Estate Bandjarwangi, Tjikadjang, W. Java, 900 m, leg. C. P. J. de Haas, Mus. Leiden, reg. no. 8501 (♂♂: collector's nrs. 161, III. 1938; 1117, VIII. 1938; 1599, IX. 1938; 1668, X. 1938; 2906, IV. 1939; 2990, V. 1939; ♀♀: collector's nrs. 160, III. 1938; 926, VII. 1938; 997, 1162, VIII. 1938; 2203, XII. 1938; 2465, II. 1939; 2679, III. 1939; 2930, IV. 1939).

1 ♂, Mt. Pangerango, W. Java, from the collection of Major Ouwens, Mus. Buitenzorg (specimen c of table VIII).

1 ♂, Mt. Gedeh, W. Java, Mus. Buitenzorg (specimen d).

1 juv., Soekaboemi, W. Java, 1915, Mus. Buitenzorg (specimen e).

1 ♂, Java, don. Oltmans, 1880, Mus. Amsterdam (specimen a).

1 ♂, loc.?, from the Bleeker collection, Mus. Amsterdam (specimen b).

1 ♀, loc.?, Mus. Leiden, reg. no. 8503.

1 juv., loc.?, Mus. Buitenzorg (specimen f).

Type and terra typica. In the original description by H. Boie (in: F. Boie, 1827, p. 556) no locality is mentioned. It is clear, however, that Boie based his description on material collected by Kuhl & Van Hasselt. These authors (Kuhl & Van Hasselt, 1822a, p. 100; 1822b, p. 473; Kuhl, 1824, p. 80) mention that they had discovered new species of *"Elaps"*. One of these is *Elaps bivirgatus* Boie, 1827. There is only one specimen from Kuhl & Van Hasselt's collections in the Leiden Museum. On the label of this

specimen (reg. no. 1435) 283 ventrals and 50 subcaudals are mentioned, i.e., the same number as mentioned by Boie; the actual counts are 284 ventrals and 49 subcaudals. This specimen must be considered the type of *Elaps bivirgatus* Boie. The label gives only Java as locality. Kuhl & Van Hasselt's letter was sent from Tjihandjawar at the foot of Mt. Pangerango [1]). The manuscript notes by Kuhl & Van Hasselt mention this locality and also Kapangdungan. From notes on other species it is clear that Kapangdungan was a locality on Mt. Salak, for the authors wrote of a frog that it was taken: "In sylvis Zalaccae prope Kapangdungan". From which of these two localities the type comes, it is impossible to make out, but in any case the type locality may be restricted to West Java, region of Mt. Pangerango and Mt. Salak.

Colour. Head and tail red, the upper surface generally darkened by brown. Lower surface of head, body and tail uniformly red, varying from scarlet to salmon; in alcohol the red fades into whitish. Body blackish above. Along the sides of the body a whitish longitudinal band or line on the adjoining parts of the outer two scale rows. The extent to which this band is visible depends somewhat on the degree to which the scales overlap. Moreover, the skin between the scales is whitish, and when the skin becomes visible (as is often the case in injected specimens) the lateral band looks much broader. Generally the band is broadest anteriorly; it may be reduced to a narrow zigzag line on the adjoining borders of the outer two scale rows, and it may disappear almost completely posteriorly. In injected specimens the white skin between the scales forms numerous white longitudinal zigzag lines or a whitish reticulation on the back. The upper surface of the tail is brownred, but in none of the Javan specimens did I find a black vertebral line like in the specimens of *M. b. flaviceps.*

The variation of the number of ventrals and subcaudals is given in tables I-IV. The counts of the individual specimens are given in table IX.

The largest specimen examined is a male with a head and body length of 1476 mm; the largest female has a head and body length of 701 mm (cf. p. 8).

Distribution: Java. Recorded localities: "Kapangdungan" on Mt. Salak and Tjihandjawar at foot of Mt. Pangerango (Kuhl & Van Hasselt M.S.); Tapos (Boie M.S.; the specimen figured by Schlegel, 1844, pl. 47, is from this locality); Buitenzorg — Soekaboemi area (Ouwens, 1908, pp. 18, 19);

1) The name of this locality is written Tjichanjavar by Kuhl & Van Hasselt (1822a, p. 117), and misprinted Pjihorjavor (Kuhl & Van Hasselt, 1822a, p. 99; Kuhl, 1824, p. 79), Tjchorjavor (Kuhl & Van Hasselt, 1822b, p. 472), Pyhor Javor and Tychanjavor (Kuhl & Van Hasselt, 1822b, p. 899).

Tengger Mts., E. Java (Boettger, 1892, p. 133), and the localities in the list of specimens examined by me (vide supra).

Mertens (1929, p. 33) remarks that *Maticora bivirgata* was known only from East Java. This author overlooked the fact that the species was based on the collections of Kuhl and Van Hasselt, who visited West Java only. The records given above show that the species occurs in West Java too.

Stomach contents. One specimen (reg. no. 8501, collector's nr. 1599) had swallowed a *Calamaria* spec.

Native names: Ular tjabeh or Ular tjabeh asak (Malay); Oraj tjabeh (Javanese).

Table IX. *Maticora bivirgata bivirgata* (Boie)

Specimen	Sex	Ventrals	Subcaudals	Specimen	Sex	Ventrals	Subcaudals
reg. no. 1435	♂	284	48/48 + 1	reg. no. 8501	♀	257	36/36 + 1
reg. no. 1434	♂	289 + 1/0	48/48 + 1		♀	254	34/34 + 1
reg. no. 8498	♂	289	45/45 + 1		♀	249	35/35 + 1
reg. no. 8500	♂	300	45/45 + 1		♀	255	40/40 + 1
reg. no. 8499	♂	295	46/46 + ...		♀	259	35/35 + 1
	♀	254	35/35 + 1		♀	251	36/36 + 1
reg. no. 8497	♀	242	24/26 + 1		♀	255	36/36 + 1
reg. no. 6832	♂	287	46/46 + 1		♀	253	36/36 + 1
reg. no. 8501	♂	291	42/42 + ...	a	♂	270	44/44 + 1
	♂	295	47/47 + 1	b	♂	262	40/40 + 1
	♂	296	49/49 + 1	reg. no. 8503	♀	243	33/33 + 1
	♂	294	47/47 + 1	c	♂	284	44/44 + 1
	♂	287	46/46 + 1	d	♂	284	45/45 + 1
	♂	282	47/47 + 1	f	♂juv.	—	45/45 + 1

Maticora bivirgata flaviceps (Cant.)

Elaps flaviceps Cantor, Proc. Zool. Soc. Lond., pt. 7, 1839, p. 33; Barbour, Proc. New Engl. Zoöl. Club, vol. 5, 1914, p. 92 (as type of *Doliophis* Girard, and as synonym of *Elaps bivirgatus* Boie).

Doliophis flaviceps, Girard, Proc. Ac. Nat. Sc. Phil., 1857, p. 182; Girard, U.S. Expl. Exp., 1858, Herp., p. 176, pl. X figs. 1-5 (non vidi); Ouwens, Voornaamste Gifsl. Ned. Oost-Indië, 1916, p. 18 (as variety of *D. bivirgatus*).

Adeniophis flaviceps, Meyer, Sitz. Ber. Ak. Wiss. Berlin, 1886, pp. 612, 614.

Callophis flaviceps, Modigliani, Ann. Mus. Civ. Stor. Nat. Genova, vol. 27 (ser. 2, vol. 7), 1889, p. 123.

Doliophis bivirgatus var. C (*Elaps flaviceps*), Boulenger, Cat. Sn. Brit. Mus., vol. 3, 1896, p. 401; De Rooij, in: Kleiweg de Zwaan, Die Insel Nias, vol. 3, 1915, p. 305.

Doliophis var. C, *flaviceps,* Flower, Proc. Zool. Soc. Lond., 1899, p. 692.

Doliophis bivirgatus var. *flaviceps,* Boettger, Kat. Rept. Samml. Mus. Senckenb. Naturf. Ges., pt. 2, 1898, p. 123 (part.); Volz, Zool. Jahrb., Syst., vol. 20, 1904, p. 503; Lampe, Jahrb. Nass. Ver. Naturk., vol. 64, 1911, p. 204; Baumann, Zool. Jahrb., Syst., vol. 34, 1913, p. 272.

Doliophis bivirgatus, Form C (*flaviceps*), Schenkel, Verh. Naturf. Ges. Basel, vol. 13, 1901, p. 176.

Doliophis bivirgatus, type C, De Lange & De Rooij, in: Maass, Durch Zentral Sumatra, vol. 2, 1912, p. 517.

Maticora bivirgata flaviceps, Bourret, Serpents Indochine, vol. 2, 1936, p. 414. Brongersma, Zool. Meded. Mus. Leiden, vol. 27, 1947, p. 308.

Elaps bivirgatus, Günther, Cat. Colubr. Sn. Brit. Mus., 1858, p. 230; Schlegel, Handl. Dierk., vol. 2, 1858, p. 41 (part.); Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 15 (ser. 4, vol. 1), 1858, p. 262; Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 16 (ser. 4, vol. 2), 1858/59, pp. 16, 26, 46; Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 20 (ser. 4, vol. 6), 1859, p. 87, and 1860, p. 416; Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 21 (ser. 5, vol. 1), 1860, pp. 332, 334; Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 22 (ser. 5, vol. 2), 1860, p. 102; Ludeking, Geneesk. Tijdschr. Ned. Indië, vol. 9 (n.s., vol. 4), 1862, p. 48; Edeling, Natuurk. Tijdschr. Ned. Indië, vol. 31 (ser. 7, vol. 1), 1870, pp. 377, 379; Jan & Sordelli, Icon. Gén. Oph., vol. 3, 1875, p. 5, pt. 43, pl. I fig. 2; Hagen, Tijdschr. Kon. Ned. Aardr. Gen., ser. 2, vol. 7, 1890, p. 174; Van Lidth de Jeude, Notes Leyden Mus., vol. 12, 1890, p. 25; Ridley, Journ. Str. Br. Roy. As. Soc., no. 32, 1899, p. 195.

Elaps bi-virgatus, Edeling, Natuurk. Tijdschr. Ned. Indië, vol. 27 (ser. 6, vol. 2), 1864, p. 388.

Callophis bivirgatus, Günther, Proc. Zool. Soc. Lond., 1859, p. 81 (part.); Günther, Rept. Brit. India, 1864, pp. XXIII, 346, 348 (part.); Blanford, Proc. Zool. Soc. Lond., 1881, p. 216; Müller, Verh. Naturf. Ges. Basel, vol. 7, 1882, p. 170; Tirant, Rept. Cochin Chine, 1885, p. 33 (non vidi); Müller, Verh. Naturf. Ges. Basel, vol. 8, 1890, p. 276; Bourret, Serpents Indochine, vol. 1, 1936, pp. 13, 14.

Adeniophis bivirgatus, Boettger, Ber. Senckenb. Naturf. Ges., 1886/87, pp. 49, 54; Boulenger, Fauna Brit. India, Rept. Batr., 1890, p. 386 (part.); Sclater, List Sn. Ind. Mus., 1891, p. 57 (part.); Boettger, 29-32 Ber. Offenbach. Ver. Naturk., 1892, p. 111; Boulenger, Ann. Mus. Civ. Stor. Nat. Genova, vol. 33 (ser. 2, vol. 13), 1893, pp. 309, 327; Werner, Verh. Zool. Bot. Ges. Wien, vol. 46, 1896, p. 20; Fea, Ann. Mus. Civ. Stor. Nat. Genova, vol. 37 (ser. 2, vol. 17), 1897, p. 475; W[ray], Journ. Fed. Mal. St. Mus., vol. 2, 1907, p. 64.

Adeniophis (Doliophis) bivirgatus, Shelford, Naturalist in Borneo, 1916, p. 93.

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Zool., vol. 32, 1925, p. 319; Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 245; Dammerman, Treubia, vol. 8, 1926, p. 323; Bourret, Faune Indochine, Vertébr., Invent. Gén. Indochine, vol. 3, 1927, p. 244; Chasen & Smedley, Journ. Mal. Br. Roy. As. Soc., vol. 5, 1927, p. 354; Werner, Misc. Zool. Sum., no. 19, 1927, p. 2; De Jong, Treubia, vol. 10, 1928, p. 146; Brongersma, Treubia, vol. 11, 1929, p. 68 (part.); Kopstein, Javaansche Gifsl., 1930, p. 117 (part.); Brongersma & Wehlburg, Misc. Zool. Sumatr., no. 89, 1933, p. 5; Bourret, Serpents Indochine, vol. 1, 1936, p. 17; Janse, Tropische Natuur, vol. 29, 1940, pp. 197, 198; Van der Meer Mohr, Tropische Natuur, vol. 29, 1940, p. 164; Gharpurey, Snakes of India, 3rd ed., 1944, p. 59.

Maticora bivirgata, Smith, Ann. Mag. Nat. Hist., ser. 9, vol. 18, 1926, p. 78; Smith, Bull. Raffles Mus., no. 3, 1930, p. 68; Mertens, Arch. Hydrobiol., Suppl. vol. 12 (Trop. Binnengew., vol. 4), 1934, p. 695; Bourret, Comment déterm. Serp. Indochine, 1935, p. 16; Bourret, Serpents Indochine, vol. 1, 1936, pp. 31, 101, 106, 115, 124, and vol. 2, 1936, p. 413; Ladiges, Zool. Anz., vol. 128, 1939, pp. 236, 248; Tweedie, Poison. Anim. Malaya, 1941, p. 21; Loveridge, Rept. Pacific World, ed. Infantry Journal, 1945, p. 147, and ed. Macmillan, p. 134 (part.).

Doliophis (Maticora) bivirgatus, Bourret, Serpents Indochine, vol. 1, 1936, pp. 20, 24.

Maticora bivirgata bivirgata, Loveridge, Proc. Biol. Soc. Wash., vol. 57, 1944, p. 106 (part.).

Elaps bivirgatus var., Cantor, Journ. As. Soc. Beng., vol. 16, 1847, pp. 1030, 1031, 1032, 1071, 1078 (Cat. Rept. Mal. Pen., 1847, pp. 109, 110, 111, 150, 157).

Doliophis bivirgatus var. A (*Elaps bivirgatus*), Boulenger, Cat. Sn. Brit. Mus., vol. 3, 1896, p. 401 (part.).

Doliophis bivirgatus var. A, *bivirgata,* Flower, Proc. Zool. Soc. Lond., 1899, p. 692.

Doliophis bivirgatus (Typus), Boettger, Kat. Rept. Samml. Mus. Senckenb. Naturf. Ges., pt. 2, 1898, p. 123.

Doliophis bivirgatus var. B, *tetrataenia,* Flower, Proc. Zool., Soc. Lond., 1899, p. 692.

Doliophis trivirgatus Rensch, Geschichte d. Sundabogens, 1936, p. 65 (lapsus calami).

Specimens examined:

1 ♂, Port Dickson, Malaya, I. 1946, don. 1st Bat., Regt. Shocktroops, Roy. Neth. Army, Mus. Leiden, reg. no. 8323.

1 ♂, Malay Peninsula, leg. C. F. Kruizinga, Zool. Mus. Amsterdam (specimen c of table X).

1 ♂, Singapore, leg. Ong Pang Kiat, Raffles Mus., Singapore.

1 ♂, 1 ♀, Rhio, leg. Blokzijl, 1886, Mus. Leiden, reg. no. 5801.

1 ♂, Bintan, Rhio Archipelago, V. 1936, leg. Dr. Gremmee, Mus. Buitenzorg (specimen v).

1 ♂, Banka, 1852, Mus. Leiden, reg. no. 1436.

1 ♂, Banka, leg. J. F. R. S. van den Bossche, 1861, Mus. Leiden, reg. no. 504.

3 ♂♂, 3 ♀♀, Banka, leg. I. H. G. Vosmaer, 1874, Mus. Leiden, reg. no. 8424.

1 ♀, Banka, don. Natuurkundige Vereeniging, Mus. Leiden, reg. no. 5981.

2 ♀♀, Poepoet Bawah, Djeboes, Banka, 13. I. and 15.XI.1933, leg. J. H. Westermann, Mus. Buitenzorg (specimens t, u).

1 ♂, Gajoe districts, N. Sumatra, II.1918, leg. Dr. S. J. Bok, Mus. Buitenzorg (specimen x).

1 ♂, Deli, Sumatra, leg. Dr. L. P. le Cosquino de Bussy, 1908/09, Mus. Amsterdam (specimen g).

3 ♂♂, 1 ex., Deli, Sumatra, leg. Dr. L. P. le Cosquino de Bussy, 1915, Mus. Amsterdam (specimens h, i, j, k).

1 ♂, Deli, Sumatra, leg. Dr. L. P. le Cosquino de Bussy, 1920, Mus. Amsterdam (specimen l).

1 ♂, 1 ♀, Kisaran, Serdang, Sumatra, leg. Jhr. F. C. van Heurn, 1920, Mus. Amsterdam (specimens d, e).
1 ex., Estate Bandar Negri, Kisaran, Serdang, Sumatra, leg. Jhr. F. C. van Heurn, 1920, Mus. Amsterdam (specimen f).
1 juv., Estate Soengei Poetih, Serdang, Sumatra, 28.IX.1909, leg. F. K. Baron van Dedem, Mus. Amsterdam (specimen m).
1 ♀, Taloek, Sumatra, leg. Dr. J. P. Kleiweg de Zwaan, 1910, Mus. Amsterdam (specimen n).
1 ♂, Baloen, Moeara Laboe, Padang Highlands, Sumatra, VI.1914, leg. E. Jacobson, Mus. Leiden, reg. no. 8505.
1 ♂, 1 ♀, Padang, Sumatra, leg. J. F. R. S. van den Bossche, 1866, Mus. Leiden, reg. no. 8507.
1 ♂, Sumatra's West Coast, Sumatra, from the Ouwens collection, Mus. Buitenzorg (specimen cc).
1 ♂, Tambilahan, Sumatra, V. 1936, leg. Dr. Gremmee, Mus. Buitenzorg (specimen w).
1 ♂, Djambi, Sumatra, 1925, leg. Dr. O. Posthumus, Mus. Buitenzorg (specimen bb).
1 ♂, Palembang, Sumatra, leg. Dr. Salm, Mus. Amsterdam (specimen o).
1 ♂, Palembang, Sumatra, leg. P. van Kan, Mus. Amsterdam (specimen p).
1 ♂, 2 ♀♀, Tabenan, Palembang, Sumatra, VI.1936, from Dr. F. Kopstein's collection, Mus. Leiden, reg. no. 8506.
1 ♀, Talang Betoetoe, N. E. of Palembang, Sumatra, 20.XII.1918, Mus. Buitenzorg (specimen y).
1 ♂, Wai Lima, Lampong Districts, S. Sumatra, XI-XII.1921, leg. Karny and Siebers, Mus. Buitenzorg (specimen z).
1 ♀, Kotaboemi, Lampong Districts, S. Sumatra, 1939, leg. Miss F. S. Heubel, Mus. Buitenzorg (specimen aa).
1 ♂, 1 ♀, Sumatra, leg. G. F. Wienecke, Mus. Leiden, reg. no. 8508.
1 ♂, Sumatra, Mus. Leiden, reg. no. 8509.
1 ♀, Nias, leg. Dr. Kleiweg de Zwaan, 1910, Mus. Amsterdam (specimen q).
2 ♂♂, 1 ♀, labelled "Soerabaja" but probably from Deli, Sumatra, don P. G. Neeb, 1873, Mus. Leiden, reg. no. 8510.
1 ♂, Java or Central Sumatra, don. J. Th. Nooren, XI.1908, Mus. Leiden, reg. no. 8502.
1 ♂, loc.?, Mus. Amsterdam (specimen r).
1 ♂, "Java", don. Dr. A. B. F. A. Pondman, 1922, Mus. Amsterdam (specimen s).

Terra typica: Malacca.

Colour. This subspecies may be distinguished from the other two forms by the presence of a broad blue or purplish band along the sides; this band covers the outer two scale rows. In a few specimens a narrow white line on the adjoining borders of the outer two scale rows may divide the pale blue band into two halves. Some specimens show a tendency to develop a colour pattern resembling that of *M. b. bivirgata*; in these the blackish colour of the back encroaches on the pale band, which may become of a bluish white colour (e.g., the specimen from Talang Betoetoe). The upper surface of the tail is marked with a black vertebral line that in a few specimens is dissolved into small spots. Head, tail and belly red as in *M. b. bivirgata*.

The variation in the number of ventrals and subcaudals is given in tables I-IV. The counts for the individual specimens are given in table X.

Table X. *Maticora bivirgata flaviceps* (Cant.)

Specimen	Sex	Ventrals	Subcaudals
reg. no. 8323	♂	280	46/46 + 1
c	♂	288	47/47 + 1
Raffles Mus.	♂	277	41/41 + 1
reg. no. 5801	♂	260	$^{2}/_{2} + 6 + {}^{1}/_{1} + 2 + {}^{35}/_{35} + 1$
	♀	—	36/36 + 1
v	♂	273	47/47 + 2
reg. no. 1436	♂	266	45/45 + 1
reg. no. 504	♂	266	44/44 + 1
reg. no. 8424	♂	273	47/47 + 1
	♂	275	44/44 + 1
	♂	270	46/46 + 1
	♀	238	38/38 + 1
	♀	246	39/39 + 1
	♀	243	39/39 + 1
reg. no. 5981	♀	249	40/40 + 1
t	♀	240	36/36 + 1
u	♀	241	37/37 + 1
x	♂	286	51/51 + 1
g	♂	270	$^{34}/_{34} + 4 + {}^{10}/_{10} + 1$
h	♂	264	44/44 + 1
i	♂	267	44/44 + 1
j	♂	272	42/42 + 1
l	♂	266	46/46 + 1
M.C.Z. [1]) no. 46909	♂	250	38
d	♂	271	45/45 + 1
e	♀	264	41/41 + 1
f	?	267	45/45 + 1
m	juv.	271	40/40 + 1
n	♀?	263	42/42 + 1
reg. no. 8505	♂	267	47/47 + 1
reg. no. 8507	♂	274 + $^{1}/_{0}$	42/42 + 1
	♀	243	35/35 + 1
cc	♂	267	40/40 + 1
w	♂	268	41/41 + 1
bb	♂	267	41/41 + 1
o	♂	261	42/42 + ...
p	♂	246	36/36 + 1
reg. no. 8506	♂	277	46/46 + 1
	♀	236	37/37 + 1
	♀	242	38/38 + 1
y	♀	240	38/38 + 1
z	♂	289	44/44 + 4
aa	♀	245	44/44 + 1
reg. no. 8508	♂	279	43/43 + 1
reg. no. 8509	♂	269	44/44 + 1
M.C.Z. no. 7798	? ♀ juv.	235	40
q	♀	230 + $^{1}/_{0}$	38/38 + 1
reg. no. 8510	♂	269	44/44 + ...
	♂	268	46/46 + 1
	♀	243	40/40 + 1
reg. no. 8502	♂	286	51/51 + 1
r	♂	262	40/40 + ...
s	♀	253	41/41 + 1

1) M.C.Z. = Museum of Comparative Zoölogy, Cambridge (Mass.).

Largest male (specimen x) head and body 1370 mm, tail 187 mm; largest female (reg. no. 8424) head and body 702 mm, tail 79 mm.

As has been mentioned on p. 2 the specimen from Nias referred to Boulenger's var. A by De Rooij (1915, p. 305) belongs to *Bungarus flaviceps* Reinh. This is also the case with a Sumatran specimen collected by S. Müller, and which made Schlegel (1837, vol. 2, p. 182; 1844, p. 138) write that (young) specimens from Sumatra had a vertebral row of white spots. I have already referred to three specimens labelled "Soerabaja" (cf. p. 2) that belong, however, to the Sumatran form. In the Amsterdam Museum I examined a specimen labelled "Java", presented by Dr. A. B. F. A. Pondman; in the same jar were a specimen of *M. b. tetrataenia* and one of *Bungarus flaviceps*. The locality records of the collection presented by Dr. Pondman are extremely doubtful, as it contains several species that have never been found in Java (cf. Brongersma, 1934, p. 198). A specimen of *M. b. tetrataenia* with a definite locality record from Sumatra is mentioned on pp. 22-23.

Jan & Sordelli (1875, pt. 43, pl. I fig. 2) figured a specimen said to have come from Java; the distinct, very broad pale lateral band makes it more likely that this specimen belongs to *M. b. flaviceps*.

Distribution. Boulenger (1893, p. 327) mentions a specimen from Rangoon, while Tirant (fide Bourret, 1936a, p. 13) mentions this species from Cochin China. These records need confirmation. The species has been recorded from Peninsular Siam by Boulenger (1903, p. 169: Jalor) and by Smith (1930, p. 68: Bangnara, Patani; Singora). It is known from many localities in the Malay Peninsula, viz., from the states of Kedah (Kulim), Perak (Taiping, Larut Hills, Gng. Inas), Kelantan, Selangor, Negri Sembilan (Port Dickson), and Johore (Johore Bahru, Gng. Pulai); it has been recorded also from Penang Id., Province Wellesley, the Dindings, Malacca and Singapore. It occurs in the Rhio-Lingga Archipelago (Pulu Bintan (= Rhio); Pulu Batam; Pulu Singkep). In Sumatra the species has been recorded from many localities; besides those given in the list of specimens, the following localities are mentioned in literature: Labuan Deli, Bindjai, Tandjong Morawa, Sibolangit, Bandar Baru, Greahan Estate, Battak Mts., Siantar (Mus. Comp. Zoöl., nr. 46909), Estate Silau Doenia near Tebingtinggi, Benkalis, Indragiri, Fort de Kock, Singkarak, Indrapura, Lahat, on the road from Supat to Dawas (rivers), Redjang in Benkulen. It has been recorded too from Nias, from Siberut in the Mentawei Ids., and from Banka Id.

Stomach contents. A specimen from Port Dickson, Malaya, had a *Pseudorhabdion longiceps* (Cant.) in its stomach (Brongersma, 1947b, p. 308).

The specimen from Kotaboemi in the Lampong districts, S. Sumatra, was taken in the act of swallowing a *Calamaria* spec.

Native names. Ular sina mata hari (Malaya, Tweedie, 1941, p. 21); Ular tedong mata hari (Singapore, Sworder, 1923, p. 72); Ular gadung (Van der Meer Mohr, 1940, p. 164: the name was used by a Javanese man in Deli, N.E. Sumatra; according to De Rooij (1917, p. 206), Oraj gadung is the sundanese name for *Dryophis prasinus* Boie); Ular dua kapala (Deli, N.E. Sumatra, Janse, 1940, p. 197; this name, generally written Ular kapala dua, is commonly used for *Maticora intestinalis* (Laur.) and for *Cylindrophis rufus* (Laur.)).

Maticora bivirgata tetrataenia (Bleeker)

Elaps bivirgatus, Schlegel, Abb. neu. unvollst. bek. Amph., 1844, p. 138 (part.); Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 16 (ser. 4, vol. 2), 1858/59, p. 440; Mocquard, Nouv. Arch. Mus., ser. 3, vol. 2, 1890, p. 122; Bettencourt Ferreira, Jorn. Sci. math. phys. nat. Lisboa, ser. 2, vol. 2, 1891, p. 92; Mocquard, in: Whitehead, Explor. Mt. Kina Balu, 1893, p. 266; Bartlett, Sarawak Gazette, vol. 26, no. 367, August 1, 1896, p. 156 (in genus *Doliophis*).

Elaps bi-virgatus, Duméril, Bibron & Duméril, Erp. Gén., vol. 7, 1854, p. 1230 (part.).

Callophis bivirgatus, Günther, Proc. Zool. Soc. Lond., 1859, p. 81 (part.); Günther, Rept. Brit. India, 1864, pp. XXIII, 346, 348 (part.); Günther, Proc. Zool. Soc. Lond., 1872, p. 591; Peters, Ann. Mus. Civ. Stor. Nat. Genova, vol. 3, 1872, p. 41 (in genus *Adeniophis*).

Adeniophis bivirgatus, Boulenger, Fauna Brit. India, Rept. Batr., 1890, p. 386 (part.); Sclater, List Sn. Ind. Mus., 1891, p. 57 (part.).

Doliophis bivirgatus, Flower, Proc. Zool. Soc. Lond., 1896, p. 895 (part.); Flower, Proc. Zool. Soc. Lond., 1899, pp. 607, 692 (part.); Werner, Zool. Jahrb., Syst., vol. 13, 1900, p. 491 (part.); Shelford, Journ. Str. Br. Roy. As. Soc., no. 35, 1901, p. 67; Shelford, Rept. Sarawak Mus. 1901, 1902, p. 28; Nieuwenhuis, Quer durch Borneo, vol. 1, 1904, pp. 109, 161; Barbour, Mem. Mus. Comp. Zoöl., vol. 44, no. 1, 1912, pp. 130, 201 (part.); Boulenger, Vertebr. Fauna Mal. Pen., Rept. Batr., 1912, pp. XII, 205 (part.); Moulton, 11th Report Sarawak Mus. 1912, 1913, p. 24; Thompson, Proc. Zool. Soc. Lond., 1904, p. 400; De Rooij, in: Kleiweg de Zwaan, Die Insel Nias, vol. 3, 1915, p. 305 (part.); Shelford, Naturalist in Borneo, 1916, p. 93; De Rooij, Rept. Indo-Austr. Arch., vol. 2, 1917, p. 251, fig. 95 (part.), p. 299; Holtzinger, Arch. Naturg., vol. 85 (1919), sect. A, pt. 11, 1920, p. 111; Dunn, Journ. Mal. Br. Roy. As. Soc., vol. 1 (no. 87), 1923, p. 4; Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1925, p. 245 (part.); De Jong, Treubia, vol. 10, 1928, p. 148; Brongersma, Treubia, vol. 11, 1929, p. 68 (part.); [Kinghorn & Kellaway], Dangerous Snakes South-West Pacific Area, 1943, p. 28 (part.).

Maticora bivirgata, Stejneger, Medd. Zool. Mus. Kristiania, no. 2, 1922, pp. 7, 8.

Elaps tetrataenia Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 20 (ser. 4, vol. 6), 1859, p. 201; Edeling, Natuurk. Tijdschr. Ned. Indië, vol. 26 (ser. 6, vol. 1), 1864, p. 446; Bettencourt Ferreira, Jorn. Sci. math. phys. nat. Lisboa, ser. 2, vol. 2, 1891, p. 92.

Adeniophis tetrataenia, Meyer, Sitz. Ber. Ak. Wiss. Berlin, 1886, p. 614.

Doliophis tetrataenia, Ouwens, Voornaamste Gifsl. Ned. Oost-Indië, 1916, p. 18 (as variety of *Doliophis bivirgatus*).

Callophis bivirgatus var. (*Elaps tetrataenia*), Günther, Rept. Brit. India, 1864, p. 348.

Callophis bivirgatus var. *tetrataenia*, Meyer, Proc. Zool. Soc. Lond., 1870, pp. 368, 369; Mocquard, Mém. Soc. Zool. France, vol. 5, 1892, p. 193.

Doliophis bivirgatus var. B (*Elaps tetrataenia*), Boulenger, Cat. Sn. Brit. Mus., vol. 3, 1896, p. 401.

Doliophis bivirgatus, var. B, Flower, Proc. Zool. Soc. London, 1896, p. 693.

Doliophis bivirgatus, var. *tetrataenia*, Boettger, Kat. Rept. Samml. Mus. Senckenb. Naturf. Ges., pt. 2, 1898, p. 123 (part.).

Maticora bivirgata tetrataenia, Bourret, Serpents Indochine, vol. 2, 1936, p. 414; Loveridge, Proc. Biol. Soc. Wash., vol. 57, 1944, pp. 105, 106.

Elaps bivirgatus var. *quadrivirgatus* Jan, Elenco sist. Ofidi, 1863, p. 114.

Specimens examined:

1 ♂, Borneo, leg. Dr. J. Büttikofer, collector's nr. 106, Mus. Leiden, reg. no. 8425.

1 ♂, Nangaraoen, Borneo, V. 1894, leg. Dr. J. Büttikofer, Mus. Leiden, reg. no. 8393.

1 ♂, 1 ♀, Smitau, Borneo, 12-14.XII.1893, leg. Dr. J. Büttikofer, Mus. Leiden, reg. no. 8394.

1 ♂, Southern foot of Mt. Kenepai, Borneo, 26.XII. 1893, leg. Dr. J. Büttikofer, Mus. Leiden, reg. no. 8395.

1 ♂, Borneo, leg. Dr. J. Büttikofer, Mus. Leiden, reg. no. 8396.

1 ♂, Borneo, leg. Dr. J. Büttikofer, Mus. Leiden, reg. no. 6735.

1 ♂, Upper Mahakkam river, Borneo, leg. Dr. A. W. Nieuwenhuis, Mus. Leiden, reg. no. 5377.

1 ♂, West coast of Borneo, leg. Hekmeijer, 1872, Mus. Leiden, reg. no. 1410.

1 ♂, Pontianak, West Borneo, leg. Cajaux, 1893, Mus. Leiden, reg. no. 8266.

2 ♂♂, 1 ♀, Poeroek Tjahoe, Borneo, III.1929-X.1930, leg. Dr. Draaten, Mus. Leiden, reg. no. 8512.

1 ♂, Bandjermassin, Borneo, leg. Moens, 1863, Mus. Leiden, reg. no. 4627.

2 ♂♂, 1 ♀, Borneo, leg. C. A. L. M. Schwaner, Mus. Leiden, reg. no. 1438.

1 ex., Moeara Tebe, Borneo, leg. A. J. Salm, Mus. Amsterdam (part of body and tail lacking).

1 ♀, Moeara Djawa, Borneo, 28.V.1909, leg. H. A. Lorentz, Mus. Amsterdam (specimen a of table XI).

1 juv., Tenggarong, Koetei, Borneo, XII.1926, leg. Dr. Witkamp, Mus. Buitenzorg (specimen b).

1 ♀, Kampoeng Segoelang on the S. Serawai (a tributary of the S. Melawi), W. Borneo, 21.XI.1924, leg. A. Blanchemanche, Mus. Buitenzorg (specimen c).

1 ♂, North Borneo, 1912, leg. Mohari, Mus. Buitenzorg (specimen d).

1 ♂, North Borneo, Mus. Buitenzorg (specimen e).

1 ♂, Indian Archipelago, from the Bleeker collection, Mus. Leiden, reg. no. 3951.

1 ♂, "Java", don. Dr. A. B. F. A. Pondman, 1922, Mus. Amsterdam (specimen f).

1 ♂, loc.?, Mus. Leiden, reg. no. 8511.

1 ♂, 1 ♀, loc.?, Mus. Amsterdam (specimens g, h).

1 ♂, Goenoeng Toea (Padang Lawas), Tapanoeli, Sumatra, IV.1910, leg. Dr. Buitenhuis, Mus. Buitenzorg (specimen i).

Terra typica: Sintang, W. Borneo.

Colour. General colour of head, body and tail as in *M. b. bivirgata*. A white longitudinal band on the adjoining halves of the outer two scale rows. Moreover a pair of narrow white zigzag lines somewhat higher on the

back; each of these lines on the adjoining borders of the 5th and 6th scale rows. There is no vertebral stripe on the tail.

The data on the variation of the number of ventrals and subcaudals are given in tables I-IV. The counts for the individual specimens are given in table XI.

Largest male (reg. no. 8511) head and body 1506 mm, tail 161 mm; largest female (reg. no. 839) head and body 724 mm, tail 82 mm.

That the locality record "Java" for the specimen presented by Dr. Pondman is doubtful has been mentioned already on p. 20. A specimen in the

Table XI. *Maticora bivirgata tetrataenia* (Bleeker)

Specimen	Sex	Ventrals	Subcaudals	Specimen	Sex	Ventrals	Subcaudals
reg. no. 8425	♂	283	41/41 + 1	a	♀	239	39/39 + 1
reg. no. 8393	♂	262	44/44 + 1	b	juv.	285	38/38 + 1
reg. no. 8394	♂	280	44/44 + 1	c	♀	249	35/35 + 1
	♀	251	38/38 + 1	d	♂	269	40/40 + 1
reg. no. 8395	♂	277	44/44 + 1	e	♂	—	43/43 + 1
reg. no. 8396	♂	259	46/46 + 1	reg. no. 3951	♂	273	46/46 + 1
reg. no. 6735	♂	273	44/44 + 1	f	♂	278	41/41 + 1
reg. no. 5377	♂	270	40/40 + 1	reg. no. 8511	♂	299	43/43 + 1
reg. no. 1413	♂	268	43/43 + 1	g	♂	259	38/38 + 1
reg. no. 8266	♂	278	41/41 + 1	h	♀	251	40/40 + 1
reg. no. 8512	♂	281	43/43 + 1	i	♂	274	46/46 + 1
	♂	—	45/45 + 1	M.C.Z. [1]) no. 5150.	♂	270	47
	♀	279	40/40 + 1	M.C.Z. no. 15164..	♂	273	42
reg. no. 4627	♂	306	47/47 + 1	M.C.Z. no. 15172..	juv.	237	37
reg. no. 1438	♂	282 + 1/0 + 1	42/42 + ...	M.C.Z. no. 22955..	♂	254	43
	♂	276	41/41 + 1	M.C.Z. no. 9322..	♂	267	42
	♀	252	39/39 + 1				

Buitenzorg Museum has a definite record from Sumatra (Goenoeng Toea); it belongs certainly to *M. b. tetrataenia*; whether an error has been made in the label I cannot say.

Distribution: Borneo; besides the localities mentioned in the list of the specimens examined by me, De Rooij (1917, p. 252) mentions the following: Sandakan, Bongon, Sintang, Matang, Sibu, Busau, Kuching, Tegora, Limbang, Banting, Pankalan Ampat, Buntok, Landak, Balikpapan. The Museum of Comparative Zoölogy, Cambridge (Mass.), has specimens from the Baram District, Sarawak (no. 15164), Lundu Mt., Sarawak (no. 15172), Long Navang, N. Central Dutch Borneo (no. 22955); no. 5150 is from Borneo without any further indication as to the exact locality (Hornaday Collection).

Native name: Kendawang (Dyak, Bartlett, 1896, p. 166); Kranawang

1) M.C.Z. = Museum Comparative Zoölogy, Cambridge (Mass.).

(Dyak, De Rooij, 1917, p. 252). The label of the specimen from Kampoeng Segoelang on the S. Serawai gives "pito" as the native name.

Nieuwenhuis (1904, p. 161) mentions that the Dyaks of the Bahau tribe attach great importance to this snake as an omen. When on their way to the fields, these Dyaks meet this snake with its head pointing towards their house, they return home, and no work in the fields is done that day.

Bungarus flaviceps flaviceps Reinh.

Elaps bivirgatus, Schlegel, Essai Physion. Serpens, vol. 1, 1837, pp. 182, 232 (part.); Schlegel, Essay Physiogn. Serpents (transl. Traill), 1843, pp. 180, 227 (part.); Schlegel, Abb. neu. unvollst. bek. Amph., 1844, p. 138 (part.).

Elaps bi-virgatus, Duméril, Bibron & Duméril, Erp. Gén., vol. 7, 1854, p. 1230 (part.).

Doliophis bivirgatus, De Rooij, in: Kleiweg de Zwaan, Die Insel Nias, vol. 3, 1915, pp. 284, 287, 305 (part.: var. A, *Elaps bivirgatus*); De Rooij, Rept. Indo-Austr. Arch., vol. 2, 1917, p. 251 (part.).

Bungarus flaviceps Reinhardt, Videnskab. Selskr. Skrift., vol. 10, 1843, p. 267 (reprint, p. 35), pl. 3 fig. 4; Schlegel, Tijdschr. Nat. Gesch. Phys., vol. 10, 1843, Boekbesch., p. 193; Cantor, Journ. As. Soc. Beng., vol. 16, 1847, pp. 1033, 1071, 1078 (Cat. Rept. Mal. Pen., 1847, pp. 112, 150, 157); Duméril, Bibron & Duméril, Erp. Gén, vol. 7, 1854, p. 1274; Günther, Cat. Colubr. Sn. Brit. Mus., 1858, p. 221; Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 16 (ser. 4, vol. 2), 1858-59, p. 314; Reinhardt, Vidensk. Medd. naturhist. For. Kjøbenhavn 1860, 1861, p. 226; Reinhardt, Arch. Naturg., vol. 27, sect. 1, 1861, p. 145; Edeling, Natuurk. Tijdschr. Ned. Indië, vol. 31 (ser. 7, vol. 1), 1870, p. 377; Peters, Ann. Mus. Civ. Genova, vol. 3, 1872, p. 41; Mocquard, Nouv. Arch. Mus., ser. 3, vol. 2, 1890, p. 122; Mocquard, in: Whitehead, Expl. Mt. Kina Balu, 1893, p. 266; Bartlett, Sarawak Gazette, vol. 26, no. 367, 1896, p. 155 (part.); Boulenger, Cat. Sn. Brit. Mus., vol. 3, 1896, p. 371 (part.); Flower, Proc. Zool. Soc. Lond., 1896, p. 894; Boettger, Kat. Rept. Samml. Mus. Senckenb. Naturf., Ges., pt. 2, 1898, p. 120; Flower, Proc. Zool. Soc. Lond., 1899, pp. 607, 608, 690; Ridley, Journ. Str. Br. Roy. As. Soc., no. 32, 1899, p. 209; Werner, Zool. Jahrb., Syst., vol. 13, 1900, p. 502; Schenkel, Verh. Naturf. Ges. Basel, vol. 13, 1901, p. 175; Shelford, Journ. Str. Br. Roy. As. Soc., no. 35, 1901, p. 67; Brown, Proc. Ac. Nat. Sc. Philad., vol. 44, 1902, p. 181; Boulenger, Fasc. Malay., Zool., pt. 1, 1903, p. 176; Volz, Zool. Jahrb., Syst., vol. 20, 1904, p. 508; Cohn, Zool. Anz., vol. 29, 1905, p. 547; Wall, Journ. Bombay Nat. Hist. Soc., vol. 17, 1906, p. 60; Mocquard, Rept. Indo-Chine (Rev. Colon.), reprint, 1907, p. 53; Wall, Pois. Sn. Brit. India, 1907, p. 12, and id., 1908, p. 14 (non vidi); Wall, Journ. Bombay Nat. Hist. Soc., vol. 13, 1908, pp. 712, 713; Barbour, Mem. Mus. Comp. Zoöl., vol. 44, no. 1, 1912, p. 201; Boulenger, Vertebr. Fauna Mal. Pen., Rept. Batr., 1912, pp. 198, 200; Moulton, 11th Rept. Sarawak Mus. 1912, 1913, p. 24; Wall, Pois. Sn. Brit. India, 1913, p. 14 (non vidi); Moulton, 12th Rept. Sarawak Mus. 1913, 1914, p. 34; De Rooij, Rept. Indo-Austr. Arch., vol. 2, 1917, pp. 243, 245 (part.), 294, 299 (part.), 302; Boulenger, Journ. Fed. Mal. St. Mus., vol. 8, pt. 2, 1920, p. 291; Robinson & Kloss, Journ. Fed. Mal. St. Mus., vol. 8, pt. 2, 1920, p. 304; Phisalix, Animaux vénimeux, vol. 2, 1922, pp. 234, 287, fig. 100 (under side of tail); Smith, Journ. Nat. Hist. Soc. Siam, vol. 6, 1923, pp. 58, 61; Wall, Pois. Sn. Brit. India, 1923, p. 24 (non vidi); Werner, Arch. Naturg., vol. 89, sect. A, pt. 8, 1923, p. 166; Wall, Journ. Bombay Nat. Hist. Soc., vol. 30, 1924, p. 21; Brongersma, Treubia, vol. 11, 1929, p. 68; Cochran, Proc. U.S. Nat. Museum, vol. 77, art. 11, 1930, p. 36; Kopstein, Javaansche Gifsl., 1930, pp. 64, 108, 115; Kopstein, Zeitschr. Morph. Ökol. Tiere, vol. 19, 1930, p. 339; Smith, Bull. Raffles Mus., no. 3, 1930; Kopstein, Med. Dienst

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Megaerophis flaviceps, Günther, Rept. Brit. India, 1864, pp. XXIII, 346; Meyer, Proc. Zool. Soc. Lond., 1870, pp. 368, 369; Günther, Proc. Zool. Soc. London, 1872, p. 591; Tirant, Rept. Cochin-Chine (Excurs. et Reconnaiss., no. 20), 1885, p. 395 (non vidi); Meyer, Sitz. Ber. Ak. Wiss. Berlin, vol. 36, 1886, pp. 612, 614; Van Lidth de Jeude, Notes Leyden Mus., vol. 12, 1890, p. 256; Sclater, List Sn. Ind. Mus., 1891, p. 57; Sclater, Journ. As. Soc. Beng., vol. 60, pt. 2, no. 3, 1891, p. 245; Boettger, 29-32 Ber. Offenbach. Ver. Naturk., 1892, p. 111; Werner, Verh. Zool. Bot. Ges. Wien, vol. 46, 1896, p. 21.

Bungarus (*Maegerophis*) *flaviceps,* Bourret, Faune Indochine, Vertébr., Invent. Gén. Indochine, vol. 3, 1927, p. 244.

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Megaerophis formosus Gray, Ann. Mag. Nat. Hist., ser. 2, vol. 4, 1849, p. 247; Bleeker, Natuurk. Tijdschr. Ned. Indië, vol. 16 (ser. 4, vol. 2), 1858-59, p. 440.

Maticora intermedia Westermann, Treubia, vol. 18, 1942, p. 617.

Specimens examined:

1 juv., Banka, leg. P. Buitendijk, Mus. Leiden, reg. no. 5628.

1 juv., Banka, leg. J. F. R. S. van den Bossche, Mus. Leiden, reg. no. 559.

♀ juv., Klappa Sampit, Billiton, II.1941, leg. J. H. Westermann, Mus. Buitenzorg (type of *Maticora intermedia* Westermann, specimen a of table XII).

1 ♂, Deli, Sumatra, leg. Dr. L. P. le Cosquino de Bussy, 1915, Mus. Amsterdam (specimen b).

1 ♂, Silau Toea Estate, Kisaran, Sumatra, 28.III.1921, Mus. Amsterdam (specimen c).

1 juv., Padang, W. Sumatra, 1884, leg. Dr. Van Geitenbeek, Mus. Amsterdam (specimen d).

1 ♀ juv., Palembang, leg. P. van Kan, Mus. Amsterdam (specimen e).

1 juv., Sumatra, leg. S. Müller, Mus. Leiden, reg. no. 1437.

2 juvs., Sumatra, leg. G. F. Wienecke, 1865, Mus. Leiden, reg. no. 5772.

2 juvs., Nias, leg. J. D. Pasteur, Mus. Leiden, reg. no. 4333.

1 ♀ juv., Nias, leg. Dr. J. P. Kleiweg de Zwaan, Mus. Amsterdam (specimen f).

1 ♂, Smitau on the Kapoeas river, Borneo, 14.XII.1893, leg. Dr. J. Büttikofer, Mus. Leiden, reg. no. 8392.

1 juv., Java, don. Dr. A. B. F. A. Pondman, 1922, Mus. Amsterdam (specimen g).

1 ♂, 1 ♀, loc.?, Mus. Amsterdam (specimens h, i).

Recently I showed (Brongersma, 1947a, pp. 419-421) that *Maticora intermedia* Westermann (1942, p. 617) is a synonym of *Bungarus flaviceps* Reinh. Since that time I received one of the type specimens of *Maticora intermedia* from the Buitenzorg Museum. Examination of this specimen fully confirmed my point of view. The body cavity of this type had been

opened already; no trace could be found of the long poison gland characteristic of the genus *Maticora* Gray. Indeed, the poison gland was found in the position that is normal for *Bungarus*, i.e., in the head posterior to the orbit. The anterior tip of the heart lies at the level of the 54th ventral, and in this respect too the type agrees with *Bungarus flaviceps* (cf. Brongersma, 1947a, p. 421).

Several authors have already referred to the great similarity in coloration between *Bungarus flaviceps* Reinh. and *Maticora bivirgata* (Boie) (e.g. Reinhardt, 1843, reprint p. 36; Günther, 1864, p. 346; Meyer, 1886, p. 612; Werner, 1923, p. 166), and several authors have been misled by it. Schlegel (1837, p. 182; 1844, p. 138) mentions specimens from Sumatra, which he refers to *Elaps bivirgatus*, and which are characterized by a series of light spots on the vertebral region. A specimen in the Leiden Museum (reg. no. 1437) collected by S. Müller in Sumatra, and which was before Schlegel when he wrote his papers, proves to be a juvenile *Bungarus flaviceps flaviceps* Reinh. De Rooij (1915, p. 305) referred a snake from Nias to Boulenger's var. A of *Doliophis bivirgatus*, and this specimen too is a juvenile *B. f. flaviceps*. This also applies to a specimen from Deli, one from Kisaran, and one labelled Java, all in the Amsterdam Museum. The latter specimen was in a jar together with a specimen of *Maticora bivirgata flaviceps* (Cant.) and one of *M. b. tetrataenia* (Bleeker); these specimens have been presented to the Amsterdam Museum by Dr. A. B. F. A. Pondman. The fact that Dr. Pondman's collection contains several species that do not occur in Java makes the locality record Java doubtful. In fact I know of only two records of this species from Java, viz., the original description by Reinhardt, and a specimen mentioned by Boulenger (1896, p. 371). In both cases no more exact locality but Java is mentioned. The specimen mentioned by Boulenger was presented by Dr. Ploem, of whom it is known that for a time he lived at Tjiandjoer, W. Java. The occurrence of *Bungarus flaviceps* in Java needs further confirmation; if the species occurs there it is apparently very rare.

Boulenger (1896, pp. 371-372) distinguishes between four colour varieties of this species. His var. A from Sumatra is based on a specimen that has the back uniformly black. Such specimens are an exception, however. In the majority of the specimens each enlarged vertebral scale bears a whitish spot. The only specimen with the whole vertebral series of scales black is the male from the Silau Toea Estate, Kisaran, N.E. Sumatra. In a young female from Nias (leg. Kleiweg de Zwaan) the foremost vertebrals are black; in a male from Deli the black vertebrals reach further backwards, only the posterior vertebrals bearing white spots. That the presence or absence of white spots is not connected with age, is shown by the many

juvenile specimens that posses them, and by their presence in the large male from Smitau, Borneo (total length 1955 mm; tail 235 mm). In this latter specimen the spots have fused into a white vertebral stripe on the posterior part of the back.

Another character used by Boulenger is the presence of an elongate black marking on the back of the head in his var. B (from Penang and Java). However, a blackish elongate marking on the parietal suture is of common occurrence in Sumatran specimens too. In table XII I have indicated the presence or absence of this marking. There is apparently no connection with sex or age. In the young specimen collected by S. Müller (reg. no. 1437) the marking is absent, but there is a small brownish spot on the posterior border of the parietals. In a male of unknown locality the marking is replaced by two pairs of spots on the parietals.

A whitish lateral streak on the outer two scale rows is present in all specimens, although it is very narrow in some.

The characters show rather wide variation, and for the present I do not see any possibility to use them for distinguishing between the subspecies. All the specimens examined by me I refer to *Bungarus flaviceps flaviceps* Reinh. The only other subspecies worthy of recognition seems to be *Bungarus flaviceps baluensis* Loveridge (1938, p. 43).

The male from the Silau Toea Estate had swallowed two fairly sized *Dendrelaphis caudolineatus caudolineatus* Gray. The native name for *Bungarus flaviceps flaviceps* Reinh. is given on the label of the male from the Silau Toea Estate as Ular tandjon api.

Table XII. *Bungarus flaviceps flaviceps* Reinh.

Specimen	Sex	Ventrals	Subcaudals	Marking on parietals
reg. no. 5628 ..	♂ juv.	211	$20 + {}^{32}/_{32} + 1$	+
reg. no. 559 ..	juv.	217	$19 + {}^{2}/_{2} + 1 + {}^{22}/_{22} + 5 + {}^{1}/_{1} + 1$	—
a	♀	206	$33 + {}^{1}/_{1} + 2 + {}^{12}/_{12} + 1$	+
b	♂	226	$24 + {}^{20}/_{20} + ...$	+
c	♂	223	$22 + {}^{3}/_{3} + 2 + {}^{23}/_{23} + 1$	+
d	juv.	227	$20 + {}^{32}/_{32} + 1$	—
e	♀ juv.	224	$17 + {}^{22}/_{22} + 6 + {}^{1}/_{1} + 1 + {}^{6}/_{6} + 1$	+
reg. no. 1437 ..	juv.	225	?	—
reg. no. 5772 ..	♂ juv.	224	$23 + {}^{28}/_{28} + 1$	—
	♂ juv.	221	${}^{1}/_{1} + 17 + {}^{31}/_{31} + 1$	+
reg. no. 4333 ..	juv.	219	$26 + {}^{20}/_{20} + 1 + {}^{2}/_{2} + 1$	+
	juv.	219	$10 + {}^{2}/_{2} + 2 + {}^{36}/_{36} + 1$	—
f	♀ juv.	212	$12 + {}^{40}/_{41} + 1$	+
reg. no. 8392 ..	♂	228	$24 + {}^{1}/_{1} + 2 + {}^{24}/_{24} + 1$	—
g	juv.	212	$12 + {}^{26}/_{26} + 3 + {}^{1}/_{1} + 1 + {}^{4}/_{4} + 1$	+
h	♂	224	${}^{1}/_{1} + 16 + {}^{37}/_{37} + 1$	+
i	♀	224	$24 + {}^{27}/_{27} + 1$	—

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