



## New site records of *Gegeneophis goaensis* and *G. mhadeiensis* (Gymnophiona: Caeciliidae) from the Western Ghats of Goa and Karnataka

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In India the order Gymnophiona Müller is represented by 26 species under four genera in two families (Dinesh et al. 2009). The genus *Gegeneophis* Peters is endemic to India with 10 species, one endemic to northeastern India and the remaining nine restricted to the Western Ghats (Fig. 1). During the past six years seven new species were discovered in the northern and central parts of the Western Ghats (between 17°01'N-12°59'N) (Pillai & Ravichandran 1999; Giri et al. 2003; Ravichandran et al. 2003; Bhatta & Prashanth 2004; Bhatta & Srinivasa 2004; Bhatta et al. 2007a & Bhatta et al. 2007b). This

upsurge in the description of new species in *Gegeneophis* may be due to optimization of surveying techniques, and recent predictions (Dinesh et al. 2009) indicate future discovery of new species from this genus.

*Gegeneophis goaensis* was described by Bhatta et al. (2007a) from Keri Village, Sattari Taluk, North Goa District, Goa based on a set of three specimens collected in September 2006 and July 2008. *G. mhadeiensis* was described in 2007 from Chorla Village, Khanapur Taluk, Belgaum District, Karnataka from a set of three specimens collected during 2006 (Bhatta et al. 2007b). During our recent explorations for these secretive animals in the bordering districts of Maharashtra (Sindhudurg), Goa (North Goa) and Karnataka (Belgaum), we collected an individual of *G. goaensis* (Image 1) below the soil heap surrounding a banana plantation in Chorla Village (Karnataka) on 05 August 2009 (Table 1). All the morphological and morphometric details were in agreement with the description of Bhatta et al. (2007a). Morphometric and meristic variations noted in the vouchered specimen deposited at the Zoological Survey of India (ZSI), Kozhikode, Kerala (ZSI/WGRC/V/A/714) are presented in Table 3. The specimen has 121 primary annuli; secondary annuli making their appearance at the 76<sup>th</sup> primary annulus and the total number of secondary annuli accounting to 46. The other congeneric species found sympatric is *G. mhadeiensis*. Earlier Bhatta et al. (2007a) reported *G. goaensis* from Keri Village (Goa) at an altitude of 21m and the present report from Chorla Village (Karnataka) is a new site record from a much higher altitude of 780m. The present site record extends the distribution range further north by 20km from the type locality. The specimen collected is deposited at the national depository of ZSI, Kozhikode.

Between 5-7 August 2009, we collected five individuals of *Gegeneophis* resembling each other from three different localities of the above mentioned districts (Table 2). They were collected in homestead areas, alongside the man-made cow dung manure pits, under waste straw heaps and at the base of banana plantations. Laboratory studies confirmed the identity of these five individuals as *G. mhadeiensis* (Image 2). Field identification of these individuals was relatively difficult because of their superficial external resemblance with the congeneric species *G. carnosus*, *G. krishni* and young ones of *G. nadkarnii*. Morphometric and meristic variations noted in the vouchered specimens (ZSI/WGRC/V/A/715; 713a & 713b; 716a & 716b) are presented in the Table 3. In the studied specimens, primary annuli ranged from 118 to 125; secondary annuli made their appearance in the range of 87<sup>th</sup> to 98<sup>th</sup> primary annuli and the total number of secondary annuli were in the range of 24 to 32. The two individuals collected from Maan (Karnataka) were

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Image 1. *Gegeneophis goaensis* in life from Chorla Village, Karnataka (ZSI/WGRC/V/A/714)

Table 1. Collection localities for *G. goaensis* in Goa State.

SNo	Registration No.	Collection locality	Latitude Longitude	Altitude (a msl)
1	BNHS 4594 (holotype) BNHS 4595 (paratype)	Keri (Goa)	15° 21' 36" N 74° 02' 24" E	21
2	ZSI/WGRC/V/A/714 (present collection)	Chorla (Karnataka)	15° 39' N 74° 08' 24" E	780

robust when compared to other individuals from Chorla (Karnataka) and Surla (Goa). During our surveys in these localities, the very common sympatric species of caecilian, *G. nadjkarnii* was sighted.

On 08 August 2009 at Keri Village (Goa), we found a good population of *G. goaensis* within a 2-km radius of the type locality. No individuals were collected from this site. Here, *Ichthyophis bombayensis* was found to be sympatric with *G. goaensis*.

Although caecilians are often considered rare and thought to require pristine habitat (Gower & Wilkinson 2005), our present study reveals that systematic search in a suitable habitat with decomposing organic matter can yield good caecilian collections and also in synanthropic



Image 2. *Gegeneophis mhadeiensis* in life from Maan Village, Karnataka

environments. In India, systematic caecilian studies are recent, with most earlier museum collections being opportunistic. It is considered that most of the new species described since 1999 are documented from a few individuals. In this context, our endeavours in the

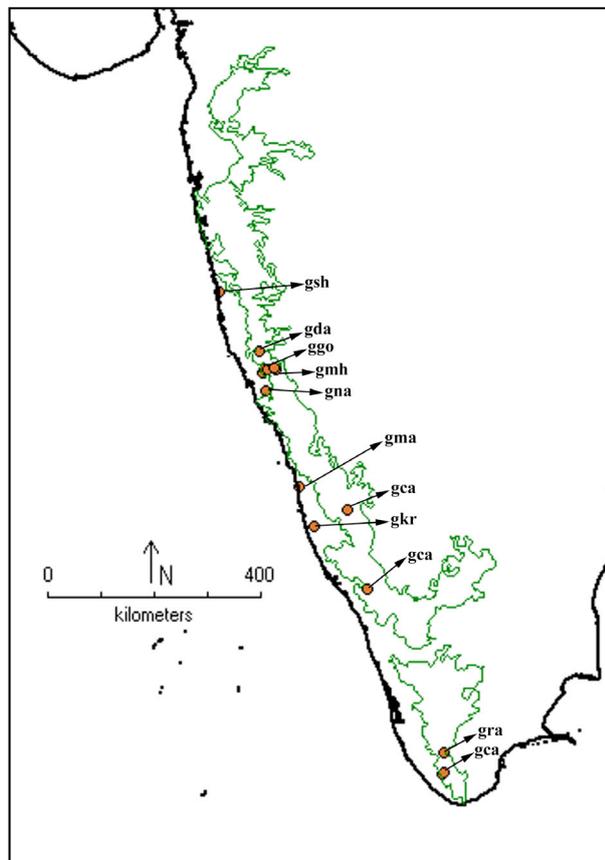
Table 2. Collection localities for *G. mhadeiensis* bordering Karnataka and Goa states.

SNo	Registration No.	Collection locality	Latitude (N)	Longitude (E)	Altitude (in m)
1	BNHS 4643 (holotype) ZSI/WGRC/V/A/640 (paratype) BNHS 4644 (paratype)	Chorla (Karnataka)	15°23'24"	74°08'	728
2	ZSI/WGRC/V/A/715 (present collection)	Chorla (Karnataka)	15°39'27"	74°08'36"	780
3	ZSI/WGRC/V/A/713a & 713b (present collection)	Surla (Goa)	15°40'19"	74°10'24"	750
4	ZSI/WGRC/V/A/716a & 716b (present collection)	Maan (Karnataka)	15°09'8"	74°09'08"	712

**Table 3. Some morphometric (in mm) and meristic data for *G. goaensis* and *G. mhadeiensis*. Measurements were made to the nearest 0.1mm with dial calipers, except for length and circumference, which were measured with a ruler and a piece of thread.**

ZSI/WGRC/V/A/	*714	^713a	^713b	^715	^716a	^716b
Total length	208	192	211	179	235	223
Head length	4.43	4.38	4.71	3.48	5.77	5.02
Head width at jaw angle	3.41	3.26	3.45	3.07	4.03	3.8
Circumference at mid body	16	17	17	13	21	21
Width of the body at 1st annular groove	3.53	4.23	4.52	3.3	4.36	4.23
Width of the body at broadest region	4.05	5.02	5.61	3.64	5.8	5.37
Width of the body at the level of vent	3.17	3.14	3.37	2.51	2.86	3.39
Length divided by width	51.35	38.24	37.61	49.17	40.51	41.52
Length of the snout projecting beyond mouth	1.16	1.05	1.36	1.06	1.14	1.53
Distance between jaw angle and top of head	1.27	1.26	1.21	1.27	1.9	1.55
Distance between jaw angle and ventral surface of lower jaw	1.57	1.49	1.34	1.02	1.36	1.3
Distance between jaw angle and tip of lower jaw	3.58	3.15	3.79	3.19	4.91	4.35
Distance between nostrils	1.77	1.49	1.86	1.61	1.77	1.9
Distance between nostril and snout tip	0.98	0.83	0.94	1	1.02	1.04
Distance between tentacles	2.54	2.62	2.95	2.46	3.41	2.9
Distance between tentacle and snout tip	1.94	2.24	2.55	2.13	2.51	2.2
Distance between tentacle and jaw angle	2.55	2.51	2.86	2.28	3.11	3.45
Distance between tentacle and nostril	1.26	1.43	1.42	1.08	1.69	1.56
Distance between tentacle and margin of upper lip	0.88	0.67	0.85	0.67	0.72	0.68
Distance between tentacle and top of head	0.83	0.65	0.8	1	1.55	1.3
Width at 1st nuchal groove	3.76	3.85	4.03	3.09	4.29	3.91
Width at 2nd nuchal groove	3.8	4.04	4.33	2.92	4.12	3.62
Length of 1st collar (laterally)	2	1.54	1.83	1.9	1.46	1.84
Length of 2nd collar (laterally)	1.84	1.92	2.37	2	2.76	2.7
Dist. between snout tip and 1st nuchal groove	5.71	5.25	6.16	4.98	6.86	6.29
Distance between snout tip and 2nd nuchal groove	6.91	6.29	6.96	6.43	8.2	7.59
Distance between snout tip and 3rd nuchal groove	8.48	7.98	9.6	7.79	10.57	9.82
Total number of primary annuli	121	118	121	121	122	125
Total number of primary annuli with secondary grooves	46	32	28	24	30	27
Anterior most primary annulus with secondary groove	76	87	94	98	93	98
No. of complete secondary annuli in front of vent	7	7	8	8	8	7
Width of disc surrounding vent	1.44	1.47	2.4	1.27	2.39	2.19
Length of disc surrounding vent	0.6	0.85	0.8	0.82	1.11	0.86
Width of vent	1.41	1.08	1.63	1.13	2	1.84
Number of denticles surrounding the vent	6	7	6	7	7	6

\* *G. goaensis*; ^ *G. mhadeiensis*



**Figure 1. Distribution of species of *Gegeneophis* in Western Ghats**  
 gsh - *Gegeneophis seshachari*; gda - *Gegeneophis danieli*;  
 ggo - *Gegeneophis goaensis*; gmh - *Gegeneophis mhadeiensis*;  
 gna - *Gegeneophis nadakarnii*; gma - *Gegeneophis madhavai*;  
 gca - *Gegeneophis carnosus*; gkr - *Gegeneophis krishni*;  
 gra - *Gegeneophis ramaswamii*

past (Bhatta et al. 2007c) and the present collections not only yield a good number of specimens, but also provide ample insights into the consistency in adoption of annuli count as a key character in caecilian (*Gegeneophis*) taxonomy.

Distribution and taxonomic data of caecilians are felt to be inadequate since most are poorly known. Our studies reveal sympatric associations between *G. nadakarnii*, *G. goaensis*, *G. mhadeiensis* and *I. bombayensis*. Among the seven new species described in the past six years, we have natural history only for *G. seshachari* Ravichandran

et al., 2003 (Gower et al. 2008). Since *G. nadakarnii* Bhatta & Prashanth, 2004, *G. goaensis* and *G. mhadeiensis* are now known from different localities our data is expected to promote further studies on the natural history of caecilians.

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