

A NEW SPECIES OF *ICHTHYOPHIS* (AMPHIBIA: GYMNOPHIONA: ICHTHYOPHIIDAE) FROM KARNATAKA, INDIA

MARK WILKINSON^{1,3}, DAVID J. GOWER¹, VENU GOVINDAPPA² AND G. VENKATACHALAIAH²

¹Department of Zoology, The Natural History Museum, London SW7 5BD, UK

²Centre for Applied Genetics, Department of Zoology, University of Bangalore, Bangalore 560056, India

ABSTRACT: A new species of Indian striped *Ichthyophis* is described on the basis of six specimens from near the Western Ghats town of Madikeri, southern Karnataka (where it is sympatric with its congener *I. beddomei*), plus a seventh specimen of less certain provenance. The new species is distinguished from all other striped *Ichthyophis* by its combination of color, numbers of annuli and teeth, position of tentacular aperture, and the distribution and numbers of scale rows. A dichotomous key is provided to separate the four striped species of *Ichthyophis* of the Western Ghats.

Key words: Caecilians; Herpetology; South Asia; Systematics; Western Ghats

THE WESTERN Ghats region of peninsular India is a major center of caecilian diversity (e.g., Bhatta, 1997, 1998; Pillai and Ravichandran, 1999; Ravichandran, 2004). Recent descriptions of six new species of caeciliid caecilians from the Western Ghats (Bhatta and Prasanth, 2004; Bhatta and Srinivasa, 2004; Bhatta et al., 2007; Giri et al., 2003, 2004; Ravichandran et al., 2003) have more than doubled the number of recognized Indian caeciliids and emphasized that caecilian diversity within this recognized biodiversity hotspot (e.g., Bossuyt et al., 2004) remains very incompletely known and that the discovery of further new species is to be expected (Gower et al., 2004). The South and South-East Asian genus *Ichthyophis* can be divided into species that, post-metamorphosis, have a lateral cream or yellow stripe and those in which a stripe is completely lacking (Taylor, 1968). These divisions are not monophyletic (Gower et al., 2002), but they are useful for identification. Three species of striped *Ichthyophis*, *I. beddomei* Peters, 1879, *I. tricolor* Annandale 1909 and *I. longicephalus* Pillai, 1986, are endemic to the Western Ghats. In addition, there are numerous historical literature reports of *I. glutinosus* from the region (see Bhatta, 1998 and references therein), but this species is considered endemic to Sri Lanka (Dutta, 1987, 2002; Nussbaum and Gans, 1980; Taylor, 1968). Recently collected striped *Ichthyophis* from Madikeri, southern Karnataka have a distinctive combination of features that distin-

guish them from all other described striped *Ichthyophis* and warrant the description of this form as a new species.

SPECIES DESCRIPTION

Ichthyophis kodaguensis sp. nov.
(Figs. 1–3, Table 1)

Diagnosis.—*Ichthyophis* with narrow (<2.5 mm) lateral yellow stripe extending from close to eye to level of vent, broken across collars, weakly indicated on lower jaw; body uniformly dark chestnut brown above, paler lilac-grey-brown below. Known range in total length of metamorphosed animals 158–274 mm, about 20–25 times midbody width; 276–305 annuli; 25–31 inner mandibular (= splenial), 33–44 dentary, 41–52 vomeropalatine and 38–49 premaxillary-maxillopalatine teeth, increasing with total length, inner mandibular row shorter than dentary row, at least ten more dentary than inner mandibular teeth. Tentacle much less than twice as far from naris (TN) than from eye (TE), ratio TN/TE = 1.25–1.58. Scales as far anterior as collars, with many (six) rows in posterior annuli of larger specimens.

Other striped *Ichthyophis* from the Western Ghats differ most obviously in having a whitish midventral stripe (*tricolor*) and/or the tentacle relatively closer to (*longicephalus*, TN/TE > 1.75) or further from (*beddomei* and *tricolor*, TN/TE < 1.25) the eye. In addition, no other Indian striped *Ichthyophis* (including the northeastern *I. garoensis*) has such a relatively short inner mandibular tooth

³ CORRESPONDENCE: e-mail, mw@bmnh.org



FIG. 1.—Holotype of *Ichthyophis kodaguensis* sp. nov. (BNHS 4179) in dorsal and lateral views. Scale = 20 mm.

row, or so many more dentary than inner mandibular teeth.

Other striped *Ichthyophis* differ in lacking scales in the anteriormost annular folds (*atricollaris* and *supachai*), in having more (>315) annuli (*biangularis*, *glutinosus*, *humphreyi*, and *kohtaoensis*), and in having the tentacle more nearly (*hypocyaneus* and *pseudangularis*) or more than (*bannanicus*, *bernisi*, *elongatus* and *paucisulcus*) twice as close to the eye than to the naris.

Holotype.—Bombay Natural History Society, Mumbai (BNHS) 4179. Venkidds Valley Estate, about 20 km south of Madikeri (= Mercara), Kodagu (= Coorg) District, southern Karnataka, India, 1143 m above sea level. Collected by Venu Govindappa, Sridhar Babu, and Monka between 15:30 and 17:00 hours, on 7 October 2002. The type locality is a mixed coffee and areca nut plantation, and the holotype was collected by digging in soil adjacent to a small stream (humidity 97%, soil temperature 28 C, air temperature 24.9 C).

Paratopotypes.—BNHS 4180–4184, same collection data as for the holotype.

Paratype.—BNHS 4185, collected in the Western Ghats region of Karnataka or Kerala sometime between January 2001 and April 2003, otherwise no data.

Description of the holotype.—Some morphometric and meristic data given in Table 1. BNHS 4179: mature female, good condition, small (c. 10 mm) midventral longitudinal

incision extending anteriorly from approximately 75 mm anterior to posterior terminus of body, few opened scale pockets.

Body subcylindrical, slightly dorso-ventrally compressed, tapering only posteriorly, gently so over last c. 60 mm anterior to vent, then more abruptly, ending in small nipple-like terminal cap. In dorsal view head broadens slightly from first collar anteriorly to jaw angle, straight-edged and narrowing very slightly between jaw angles and tentacles, snout gently rounded anterior to tentacles. In ventral view, straight-edged lower jaws narrow slightly anteriorly to form bluntly rounded tip. In lateral view, straight-edged head tapers gently anteriorly, edges of mouth ('lips') straight, jaw angles approximately equidistant from top and bottom of head. Mouth barely subterminal, snout projecting 0.9 mm beyond its anterior margin, ventral surface flat. Eyes surrounded by narrow whitish ring, visible through unpigmented skin as small (0.7 mm) dark circles with lighter grey central lens, slightly elevated above adjacent skin, approximately equidistant from top of head and mouth in lateral view, scarcely inset from edge of head in dorsal view. Tentacular aperture closer to eye (1.9 mm) than naris (2.9 mm), very close to lip, its margins elevated, slightly smaller than eye and larger than naris, visible in dorsal and more clearly in lateral and ventral views. In life tentacles long and thin; in preservative tips protrude slightly from tentacular sheaths,

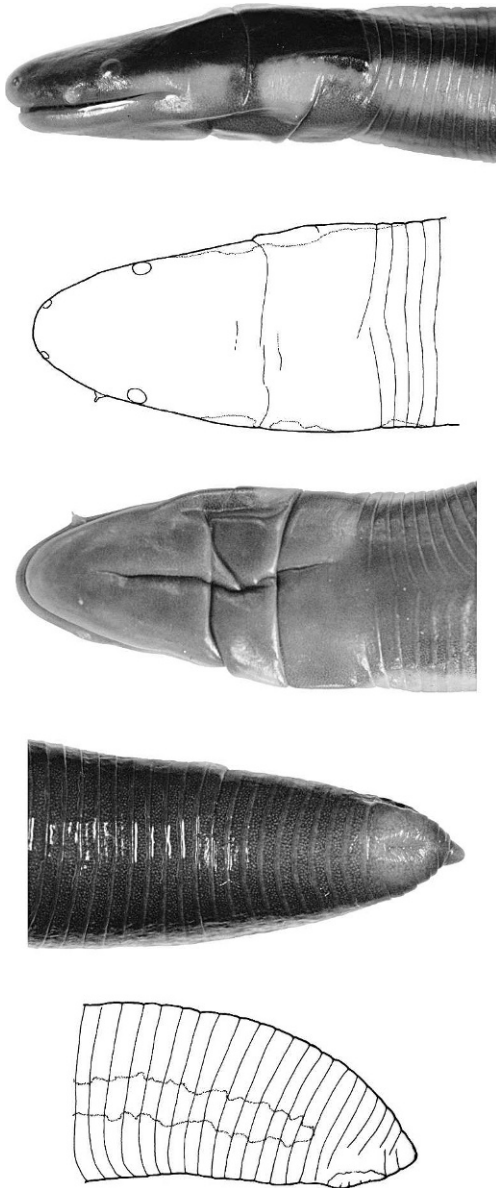


FIG. 2.—Holotype of *Ichthyophis kodaguensis* sp. nov. (BNHS 4179). From top to bottom: head and anterior of body in left lateral, dorsal and ventral views; terminus in ventral and lateral views. Finely dotted lines in drawings (from camera lucida sketches) indicate extent of lateral yellow stripes. Images not to scale - for dimensions see Table 1.

latter fill large circular tentacular apertures. Anteriorly and dorsolaterally positioned sub-circular nares approximately level with anterior margin of mouth, barely distant from

sides of head in dorsal view, visible also in lateral and anterior but not ventral views.

Teeth small and bicusped with strongly recurved apices; little variation in size within or between series, dentaries slightly larger than others, inner mandibular series extending posteriorly about three fifths of length of dentary series with at least seven dentary teeth posterior to last inner mandibular tooth on each side. Pinkish tongue with free margin, pointed anterior tip, deep longitudinal medial groove extending posteriorly from about level of 11th anteriormost dentary tooth of each side, few lingual plicae lying close to groove. Choanae difficult to see, rather slit-like, separated by distance equal to about four times their width.

Collar region a little wider than head and anterior body in dorsal view, scarcely deeper in lateral view. First (anteriormost) collar groove well marked as constriction separating head and trunk, but slightly irregular at first glance because of some creases here; curves very slightly anteriorly towards dorsal midline, where groove is complete but marginally offset; curves more strongly on venter, angled slightly posterodorsal-anteroventral in lateral view. Second collar groove absent dorsally, well indicated ventrally, parallel to first collar groove laterally, fading out about halfway up left side and two thirds up right side. Posterior border of nuchal region (third collar groove) not clearly differentiated from anteriormost annular grooves of body, or from dorsal transverse grooves on second collar, but here arbitrarily taken to be indicated by first groove clearly crossing lateral stripe and extending onto venter on both sides. Third collar groove dorsally complete with slight anteromedial curve, widely incomplete midventrally. Two evenly spaced transverse grooves on second collar dorsally, extending across midline parallel to third collar groove; first offset medially and extending to little less than halfway down lateral surface of the second collar, terminating at the dorsal margin of the stripe; second extends across lateral stripe and just visible ventrally on left. Second collar (3.7 mm, measured laterally) longer than first (3 mm). Ventral surface of nuchal region with somewhat irregular crease along midline, from little behind level of tentacles back across first collar to close to posterior end of second collar.

Annular count 294 (ventral) or 295 (dorsal). First annular groove (i.e., posterior margin of anteriormost annulus) narrowly incomplete ventrally. Subsequent grooves mostly complete, some narrowly incomplete ventrally. Anterior annuli strongly angulate ventrally, degree of posteromedial curvature increasing to about length of three annuli up to 60 mm behind snout tip, maintained until midbody, decreasing posteriorly to becoming orthoplicate (transverse) by 14th annulus anterior to vent disc, a few annular grooves immediately anterior to disc gently curve anteromedially. Dorsally, annuli curve slightly anteromedially on anteriormost three quarters of body, orthoplicate more posteriorly except for last 13 annuli which curve strongly anteromedially. No obvious patterns of substantial regional variation in size of annuli. At about 15th annulus behind collars, four scale rows dorsally, reducing to single row ventrolaterally, none ventrally. At about 20th annulus from terminal cap, at least six scale rows in very deep pockets dorsally.

In lateral view, body tapers over posteriormost fifteen annuli; dorsal margin gently convex, downturned; ventral surface slightly upturned onto very small tail. Longitudinal vent lies within small, whitish centrally, darker peripherally, subcircular disc (pinkish in life), margins of which formed by one small anteromedial denticulation and three smaller anterior and three larger posterior lateral denticulations on each side. Vent including denticulations interrupts five annuli. Posterior to disc, single regular annulus poorly indicated ventrally; body ends in small, nipple-like terminal cap, little longer than 1.5 times length of preceding annuli.

Dorsally, body uniform dark chestnut brown, snout anterior to eyes slightly lighter. Paler, lilac-grey-brown on venter and tip of terminal cap, slightly darker posteriorly and immediately adjacent to lateral stripe. Narrow longitudinal stripes bright cream-yellow in life, less yellow in preservative, irregular dorsal and ventral margins, width varying from 1.0–2.3 mm, fading out anteriorly just behind level of first transverse groove on second collar, reappearing as distinct spot on first collar that is barely visible below, not extending across first collar groove. Anterior to first collar,

stripes again present but narrower than elsewhere, fading out on upper jaw just behind level of eyes, weakly indicated on lower jaws where gradually merge into thin whitish lip border. Posteriorly, stripes terminate quite abruptly on anterior margin of first complete annulus anterior to vent. Where stripe fades out, body color more like that of venter than dorsum. Annular and transverse collar grooves edged in white (clearer with magnification). Disc whitish centrally, pinkish peripherally, margins of denticulations whitish like annular grooves. Skin immediately overlying mandibular rami slightly darker and greyer than that between rami, seemingly less glandular. Lower jaw with narrow whitish border, Ventral mandibular color also on underside of snout up to and between nares. Tentacles and spot surrounding tentacular apertures whitish.

Variation.—Species known additionally only from six paratypes. All except smallest (BNHS 4185) extensively dissected and eviscerated, one (BNHS 4184) decapitated. Variation in some meristic and morphometric data summarized in Table 1. Some differences between holotype and paratypes explained by latter having been preserved for longer time - disk and stripes whitish, no indication of pink or yellow. All paratypes lack irregular creases of ventral nuchal region of holotype, some have faint pale midventral line on and just anterior to first collar. Patterns of completeness and flexion of annular grooves generally resemble those of holotype; in particular last few annuli of most paratypes orthoplicate or with only weakly anteromedially curved grooves.

Stripe ends less abruptly, extends little more posteriorly in two specimens, reaching third annulus interrupted by vent in BNHS 4182; anteriorly ends between level of anterior margin of eye and approximately halfway between jaw angle and eye. Stripe-spot on first collar larger and marginally more visible ventrally in two specimens. First and second collar grooves distinctly darker or paler on venter than in holotype; tip of tail distinctly paler or not. Lingual plicae more extensive on tongue, absent from tip in three specimens. In smallest specimen, small scales present in first transverse groove on second collar, fewer scales (three rows) in posterior folds dorsally;

TABLE 1.—Some morphometric and meristic data for the holotype (4179) and six paratype specimens of *Ichthyophis kodaguensis* sp. nov. All measures are in millimetres. The terminal cap is included as the final annulus in counts. † sum of lengths of headless body (255 mm) + slightly shrunk skull and anterior vertebrae (12.8 mm). * denotes measure recorded from specimens dissected extensively prior to fixation. / indicates separate measures of the left / right.

| BNHS no. | 4179 | 4180 | 4181 | 4182 | 4183 | 4184 | 4185 |
|---|---------|------|------|------|-------|------|------|
| Sex | f | f | f | f | f | f | f |
| Total length | 267 | 269 | 247 | 262 | 274 | 268† | 158 |
| Total annuli (counted ventrally) | 294 | 276 | 288 | 306 | 305 | 299 | 284 |
| Total annuli (counted dorsally) | 295 | 278 | 292 | 302 | — | — | — |
| Annuli interrupted by vent | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Post-vent annuli | 2 | 2 | 3 | 2 | 1 | 3 | 2 |
| Dorsal transverse grooves on 2nd collar | 2 | 2 | 3 | 2 | 3 | 2 | 1 |
| Distance between eyes | 5.6 | 5.1 | 5.0 | 5.0 | 5.5 | — | 3.9 |
| Distance between eye and tentacle | 1.9 | 2.0 | 1.7 | 1.7 | 2.0 | — | 1.3 |
| Distance between eye and naris | 4.4 | 4.3 | 4.0 | 4.2 | 4.3 | — | 3.0 |
| Distance between eye and tip of snout | 5.8 | 5.2 | 4.9 | 5.0 | 5.3 | — | 3.9 |
| Distance between eye and jaw angle | 2.8 | 2.7 | 2.9 | 2.8 | 3.2 | — | 2.0 |
| Distance between nares | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | — | 1.6 |
| Distance between naris and tentacle | 2.9 | 2.6 | 2.5 | 2.7 | 2.5 | — | 1.9 |
| Distance between naris and jaw angle | 7.5 | 7.3 | 7.5 | 7.2 | 8.3 | — | 4.9 |
| Distance between tentacles | 5.7 | 5.2 | 5.2 | 5.0 | 5.3 | — | 3.9 |
| Distance between tentacle and jaw angle | 4.7 | 4.5 | 4.6 | 4.6 | 5.1 | — | 3.5 |
| Distance between tentacle and tip of snout | 4.5 | 3.3 | 3.6 | 3.5 | 4.3 | — | 3.2 |
| Distance between tentacle and margin of lip | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | — | 0.2 |
| Projection of snout beyond anterior margin of upper lip | 0.9 | 0.9 | 1.0 | 0.7 | 0.9 | — | 0.8 |
| Depth of head behind jaw angle | 5.3 | 5.2 | 4.9 | 4.4 | 5.4 | — | 3.5 |
| Head width at jaw angles | 7.5 | 7.4 | 7.3 | 6.7 | 7.8 | — | 5.3 |
| Head width at occiput (lateral edge of first nuchal groove) | 8.2 | 7.7 | 7.7 | 7.4 | 8.3 | — | 5.6 |
| Distance between tip of snout and jaw angle | 8.3 | 8.3 | 8.0 | 8.4 | 9.0 | — | 5.9 |
| Distance between tip of snout and first nuchal groove | 11.4 | 11.9 | 11.2 | 10.7 | 11.8 | — | 8.0 |
| Distance from jaw angle to first nuchal groove. | 2.6 | 2.9 | 3.2 | 3.6 | 3.1 | — | 2.4 |
| Distance between tip of lower jaw and jaw angle | 7.8 | 7.7 | 7.8 | 8.1 | 8.6 | — | 5.4 |
| Length of first collar (measured laterally) | 3.0 | 2.9 | 3.1 | 2.8 | 2.8 | — | 2.5 |
| Length of second collar (measured laterally) | 3.0/3.8 | 3.0 | 3.4 | 2.9 | 2.9 | — | 2.4 |
| Width at midbody | 10.6 | 6.0* | 8.5* | 5.3* | 11.8* | 9.5* | 7.8 |
| Circumference at midbody | 34 | — | — | — | — | — | 23 |
| Width at anterior of vent | 4.1 | 4.5 | 3.5 | 3.2 | 4.3 | 3.3 | 2.9 |
| Width of lateral stripe at midbody | 1.7 | 1.7 | 1.7 | 1.5 | 1.7 | 2.0* | 1.6 |
| Length of tail from anterior end of vent | 3.4 | 3.6 | 3.8 | 3.5 | 3.3 | 3.7 | 2.8 |
| Length of tail from posterior end of vent | 2.0 | 2.1 | 2.4 | 2.0 | 1.7 | 2.2 | 1.4 |
| Length of disc surrounding vent | 2.0 | 2.8 | 2.3 | 2.4 | 2.5 | 1.9 | 2.1 |
| Width of disc surrounding vent | 2.5 | 2.6 | 1.9 | 2.1 | 2.5 | 1.6 | 1.7 |
| Premaxillary-maxillary teeth | c.48 | 43 | 45 | 42 | 49 | 48 | 38 |
| Vomeropalatine teeth | c.50 | 43 | 47 | 44 | 50 | 52 | 41 |
| Dentary teeth | c.40 | 42 | 38 | 39 | 43 | 44 | 33 |
| Inner mandibular teeth | c.26 | 25 | 26 | 28 | 31 | 30 | — |

larger specimens have five or six rows in each fold posteriorly. Smallest specimen (BNHS 4185) clearly transformed, no indication of any larval characters, but has fewest teeth and scales, which appear to increase with age in *Ichthyophis* (e.g., Taylor, 1968).

Tail ends in nipple-like cap, vent and disc interrupt five annuli in all paratypes, 1–3 annuli behind vent in all specimens. Vent denticulations mostly less regular in paratypes, with anteromedial denticulation and five or six main denticulations on either side,

often not bilaterally symmetrical, some subdivided by creases. Paired, large whitish papillae present lateral to vent in anterior half of disc of four paratypes, including smallest.

Other information from the paratypes.—Detailed examination of mouth possible in dried head of BNHS 4184 (Fig. 3); in both tooth series of upper jaws, anteriormost teeth small, increasing posteriorly then decreasing without becoming as small as anterior elements. Premaxillary-maxillopalatine (PM) teeth slightly larger on average than vomer-

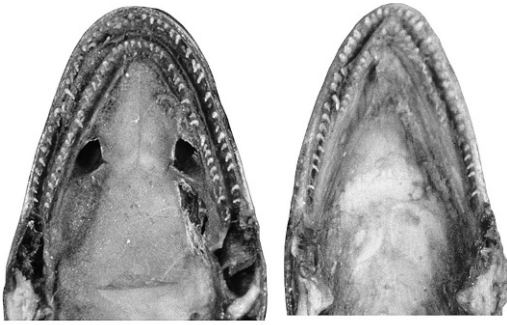


FIG. 3.—*Ichthyophis kodaguensis* sp. nov., inside of mouth of paratype BNHS 4184. Scale bar = 5 mm.

opalatines (VP); ridge bearing VP teeth not visible in lateral view. On lower jaws, eight dentary teeth posterior to last inner mandibular tooth on each side, inner mandibular series extending to between one-half and three-fifths length of dentary series. Smallest dentary teeth at anterior and posterior ends of series, increasing in size rapidly anteriorly, decreasing more gradually posteriorly. Dentaries distinctly larger than inner mandibulars, little larger than PMs. Inner mandibular teeth increase slightly in size from anterior to posterior, becoming about as large as largest VPs. PM, VP series converge slightly posteriorly, shape of VP series slightly more bluntly rounded anteriorly. Inner mandibular series meet at point anteriorly. In all series except dentaries curvature of teeth extreme, distal tooth crowns approaching horizontal. Choanae greatest length 1.1 mm, greatest width 0.7 mm, shortest distance between them 1.8 mm, subtriangular with shortest side medial (formed by vomers), longest side lateralmost, posterior side straightest (latter two formed by maxillopalatine). Medial margins of two choanae subparallel, diverging anteriorly; bony rim of each choana elevated. Vomers extend posteromedially almost to posterior margins of choanae, rounded posterior margins, separated medially by small notch of parasphenoid.

Superficial cranial features examined in BNHS 4182 via reflexion of skin. Full complement of cranial bones reported for ichthyophiids (Nussbaum, 1979); orbital foramina continuous anteriorly with unroofed tentacular grooves, latter entirely within max-

illopalatines. Each orbital foramen formed entirely by C-shaped circumorbital (postfrontal), dorsal arm extending a little more anteriorly than ventral. Premaxillae extend posteriorly beyond nares, forming their ventrolateral and anteromedial margins. Septomaxillae large, form posterolateral margins of nares, each with anterodorsal prong that partly divides naris posteriorly. Nasals contribute small parts of posterodorsal margins of nares. Prefrontals narrowly separated from septomaxillae by contact between nasals and maxillopalatines. Parietals separate frontals posteromedially. Long, thin triangular pointed tongue of each frontal almost separates nasals from prefrontals. Narrow contact between prefrontals and postfrontals, frontals and postfrontals, nasals and premaxillae; no contact between squamosals and prefrontals.

Squamation investigated in more detail in BNHS 4184. Scales apparently widespread on body and collars; progressively larger scales, deeper scale pockets, more scale rows more completely encircling body towards posterior. Small (1.2×0.6 mm) ovate scales present dorsally in anteriormost transverse groove on second nuchal collar. Dorsally at midbody, five or six rows of large (1.7×1 mm) scales per annular groove, in pockets that approach 1.5 times length of single annulus. Ventrally at midbody, five or six rows of scales (1.1×0.7 mm) in shallower pockets, a little longer than single annulus. Posteriorly (approximately 20 annuli anterior to vent), scale pockets deep on dorsum, extending forward below approximately three annuli (c. 3.4 mm), containing large (up to 1.8×1.7 mm) scales in six rows.

Remarks.—We have examined type material of all relevant striped Indian and some non-Indian *Ichthyophis* but have relied entirely upon literature reports (Nussbaum and Gans, 1980; Salvatore, 1975; Taylor, 1968, 1973) for comparative data on some species. The ranges in the diagnosis are based on the seven known specimens and would be expected to increase somewhat with larger samples. Similarly, many other species are known from few specimens, and some of the ranges that appear non-overlapping and diagnostic may prove not to be with more complete knowledge. The species is known only from females; increased samples of both

sexes and of other life history stages are needed for a more complete characterization of the species.

Etymology.—The specific epithet reflects the provenance of the type specimens from the District of Kodagu (also known as Coorg) in Southern Karnataka, India.

Suggested common name.—Kodagu Striped *Ichthyophis*.

Conservation status.—We suggest that *Ichthyophis kodaguensis* is currently of 'Data Deficient' status by IUCN criteria. Although several specimens were collected in a single day from an agricultural habitat, more information is needed on the range and ecological requirements of this species before it could be considered unthreatened.

DISCUSSION

Although yet to be found syntopically, *Ichthyophis kodaguensis* is sympatric with *I. beddomei* and is readily distinguished from this species in head shape, tentacle position and color. *Ichthyophis beddomei* has a more pointed head, often narrower than the body, the tentacle is relatively further from the eye and closer to the naris, and the stripe is typically broader and more extensive on the mandible. *Ichthyophis kodaguensis* differs from all other striped *Ichthyophis* of the Western Ghats in its tentacle position and in having far fewer inner mandibular than dentary teeth. Of the striped *Ichthyophis* from the Western Ghats, *I. kodaguensis* is most similar in color to *I. longicephalus*, which has more annuli and is known from a type locality 160 km further south. *Ichthyophis longicephalus* may also have fewer scale rows posteriorly but it is a poorly characterized species known only from specimens under 200 mm, and if the species obtains a larger maximum size the number of scale rows could be greater. The accompanying key should suffice to distinguish the Western Ghats species.

Compared to other striped *Ichthyophis*, the new species is perhaps most similar to the Sri Lankan endemic *I. pseudangularis*, which also has notably fewer inner mandibular than dentary teeth and an overlapping range of annuli (261–304, $n = 13$, Nussbaum and Gans, 1980) but differs primarily, as far as we can discern, in the position of the tentacle.

The possibility that these two species are closely related and the regional faunas not monophyletic, evidencing a more complex biogeographic history than is currently understood (Bossuyt et al., 2004), merits further investigation.

As might have been predicted from the recent description of five new caeciliids, the discovery of a new species of striped *Ichthyophis* suggests that the diversity of some other Western Ghats caecilian species groups may have also been underestimated. This conclusion is also supported for striped *Ichthyophis* by molecular data (Gower et al., 2002). In contrast, DNA sequences do not reject the hypothesis that the four previously described, superficially very similar unstriped, long-tailed *Ichthyophis* are members of a single species widespread throughout the Western Ghats (Gower et al., 2007). In the latter case, the legacy of previous taxonomic work was an overestimate of species diversity rather than the underestimate that might have been predicted.

The historical literature includes many reports of the striped Sri Lankan endemic *Ichthyophis glutinosus* from throughout the Western Ghats. While many of the reports of its occurrence in India may have been of *I. beddomei*, *I. tricolor* or the more recently described *I. longicephalus*, it is possible that some refer to as yet undescribed species, such that our current picture of the distribution of the named species is no doubt incomplete. Only partly in agreement with Pillai and Ravichandran (1999), our studies suggest that *I. tricolor* and *I. beddomei* are broadly distributed south and north of the Palghat Gap respectively. *I. longicephalus* is known with certainty only from the type locality just north of the Palghat Gap (Pillai, 1986) though a second specimen has been reported from much further south, toward the tip of the Indian peninsula (Pillai and Ravichandran, 1999). Unfortunately, both the type and this second specimen are in very poor states of preservation (M. Wilkinson, D. J. Gower, personal observation) and it is not possible to definitely say whether they are conspecific or not. Determining the specific status of the southern population will probably require additional collecting from both localities.

KEY TO THE STRIPED
ICHTHYOPHIS OF THE WESTERN GHATS

1. Whitish midventral stripe *tricolor*
 No whitish stripe on venter 2
2. Tentacle more than twice as far from naris
 than from eye, more than 320 annuli. *longicephalus*
 Tentacle less than twice as far from naris
 than from eye, fewer than 320 annuli 3
3. Tentacle much closer to eye than naris,
 head broad and rounded, narrow lateral
 stripe indistinct on mandible, inner man-
 dibular tooth row much shorter than
 dentary row *kodaguensis*
 Tentacle almost as close to naris as to eye,
 head narrow and pointed, broad lateral
 stripe extensive on mandible, inner man-
 dibular tooth row not much shorter than
 dentary row *beddomei*

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