

**GARRA KALAKADENSIS, A NEW CYPRINID FISH FROM KALAKAD
WILDLIFE SANCTUARY, TIRUNELVELI DISTRICT, TAMIL NADU**

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INTRODUCTION

Kalakad Wildlife Sanctuary is located in the South-eastern part of Western Ghats, comprising the whole of the Kalakad reserve forest. The perennial rivers which drain the eastern part are the Pachaiyar, Netterikal, Nambiyar and Kodumudiar and the rivers draining the western aspect are the Keelmanimuthar and its tributaries, Kulirattiar and Kusangular. These and other seasonal rivulets and streams were surveyed by the Zoological Survey of India team headed by Dr R. S. Pillai, Scientist 'SD' and Officer-in-Charge, Southern Regional Station, Madras. Eight surveys were conducted by Dr M. Vasanth and party from August 1984 to April 1987.

The new species was collected from most of the localities, and *G. mullya* (Sykes) was also collected from Sengaltheri. In order to study the specific identity of the different varieties, specimens from two different areas viz. the Northwest (190-350 m., 300 m. and 390 m. Altitude) and the Southeast (850 m., 900 m. and 980 m. Altitude) of Kalakad were compared. 16 morphometric characters were compared as shown in Table 1. Measurements were made with dial calipers with an accuracy of 0.05 mm, and methods given in Menon (1964) were followed. The description is based on 51 specimens collected from different altitudes.

***Garra kalakadensis* sp. nov.**

(Plate 1, figs. A and B)

Description : D. 2/8 ; P. 1/12-15 ; V. 1/7 ; A. 2/5 ; C. 18-19 ; L. 1. 31-33 ; L. tr. $4\frac{1}{2}/2\frac{1}{2}-3\frac{1}{2}$; predorsal scales 9-11 ; preanal scales 16-21.

Dorsal profile straight to slightly arched ; depth of body 4.42 (3.56-4.95), length of head 3.51 (3.11-3.83) in S. L. ; width of head 1.35 (1.25-1.49) in length of head ; height of head 1.61 (1.52-1.82), pupil of eye at or slightly behind the middle of the length of head

Table 1.

MORPHOMETRIC PROPORTIONS IN *Garra Kalakadensis* sp. nov.
FROM DIFFERENT ALTITUDES

CHARACTERS	190-350 m.	300 m.	390 m.	850 m.	900 m.	980 m.
Body depth/ S. L.	4·24 (3·83-4·51)	4·09 (3·56-4·24)	4·31 (3·70-4·84)	4·58 (4·18-4·92)	4·42 (4·19-4·63)	4·76 (4·61-4·95)
H. L./S. L.	3·51 (3·45-3·55)	3·55 (3·41-3·77)	3·46 (3·11-3·71)	3·47 (3·13-3·71)	3·53 (3·21-3·83)	3·50 (3·32-3·76)
H. L./H. W.	1·31 (1·26-1·36)	1·30 (1·25-1·34)	1·34 (1·25-1·42)	1·36 (1·28-1·44)	1·41 (1·31-1·49)	1·37 (1·30-1·46)
H. L./Height of head	1·66 (1·54-1·82)	1·58 (1·51-1·66)	1·62 (1·58-1·67)	1·60 (1·52-1·69)	1·63 (1·53-1·70)	1·58 (1·52-1·61)
H. L./Snout length	2·18 (2·15-2·25)	2·11 (1·94-2·29)	2·28 (2·11-2·51)	2·05 (1·87-2·21)	2·23 (2·06-2·59)	2·08 (1·94-2·27)
H. L./Eye diameter	4·76 (4·35-5·54)	4·48 (3·82-4·95)	5·21 (4·77-5·57)	4·76 (4·24-5·17)	4·52 (3·73-5·19)	4·63 (4·19-5·54)
H. L./I. O. W.	2·09 (1·97-2·22)	2·21 (2·05-2·37)	2·22 (2·13-2·37)	2·37 (2·24-2·56)	2·39 (2·14-2·94)	2·42 (2·21-2·52)
H. L./Length of disc	2·72 (2·51-2·86)	2·75 (2·57-2·95)	2·67 (2·55-2·85)	2·63 (2·32-2·90)	2·67 (2·45-3·27)	2·49 (2·25-2·88)
H. W./Width of disc	1·49 (1·39-1·60)	1·40 (1·29-1·49)	1·41 (1·30-1·48)	1·31 (1·26-1·38)	1·42 (1·28-1·71)	1·34 (1·23-1·43)

Width of disc/ Length of disc	1·41 (1·33-1·48)	1·52 (1·30-1·61)	1·41 (1·33-1·46)	1·47 (1·27-1·65)	1·33 (1·21-1·47)	1·36 (1·21-1·50)
Predorsal dist. S. L.	1·99 (1·91-2·06)	1·97 (1·92-2·01)	1·98 (1·80-2·12)	1·97 (1·85-2·10)	1·97 (1·89-2·08)	1·95 (1·88-2·03)
Pectoral/S. L.	3·94 (3·74-4·35)	3·99 (3·50-4·50)	3·80 (3·41-4·26)	3·76 (3·23-4·63)	4·08 (3·67-4·38)	4·23 (3·95-4·45)
Pectoral/H. L.	1·12 (1·07-1·22)	1·12 (0·97-1·29)	1·10 (1·01-1·20)	1·09 (0·87-1·41)	1·16 (1·00-1·28)	1·21 (1·11-1·28)
Vent to anal/Pelvic to anal fin	4·34 (3·94-4·57)	4·27 (3·51-4·91)	4·93 (4·32-5·96)	4·32 (3·72-4·94)	4·30 (3·59-5·36)	4·25 (3·87-4·85)
Width of C. P./ Length of C. P.	1·19 (1·13-1·26)	1·14 (1·07-1·21)	1·12 (1·01-1·25)	1·23 (1·15-1·35)	1·33 (1·1-1·53)	1·41 (1·30-1·48)
Length of Body cavity/S. L.	2·06 (2·01-2·12)	2·01 (1·94-2·08)	1·99 (1·87-2·08)	2·01 (1·96-2·09)	2·02 (1·90-2·14)	2·08 (1·90-2·14)
Pr. chamber of air bladder/S. L.		4·46 (4·20-4·76)		5·03 (4·60-5·64)	4·83 (4·04-5·66)	5·14 (4·21-5·76)
Length of air bladder/ S. L.		2·86 (2·71-3·07)		3·04 (3·02-3·07)	3·22 (2·78-3·55)	3·26 (2·90-3·63)

its diameter 4.68 (3.73-5.57), interorbital width 2.31 (1.97-2.94), snout 2.14 (1.87-2.59) in length of head length of disc 1.41 (1.21-1.65) in its own width, 2.65 (2.25-3.27) in head length ; width of disc 1.38 (1.23-1.71) in width of head ; predorsal distance 1.97 (1.80-2.12) in S. L. ; length of pectorals 1.13 (0.87-1.41) in head length, 3.98 (3.23-4.63) in S. L. ; distance from vent to anal fin 4.36 (3.51-5.96) in that between anterior origin of pelvic and anal fins ; width of caudal peduncle 1.25 (1.01-1.53) in its own length ; length of body cavity 2.03 (1.87-2.14) in S. L. ; posterior chamber of air bladder measured in 20 exs., 20.70 (17.36-24.75) percent in S. L. ; length of air bladder as measured in 18 specimens 31.95 (27.55-36.90) in S. L.

Chest and belly scaled, but scales on chest much reduced. In one specimen 49.0 mm S. L. there is an additional ray on the dorsal and anal fins.

Body colouration dark, sometimes lighter with a prominent lateral band extending to the middle rays of the caudal fin ; the first scale on the upper opercular margin very dark. Dorsal fin edge concave, in some the rays are darkened, and in some paler specimens, a faint band across the middle of the paired and vertical fins are seen.

Caudal lobes sometimes equal and in majority of the specimens the lower lobe is longer.

Two pairs of barbels, the nasal well-developed. In some large and mature specimens a distinct lateral tubercular area is seen almost projecting from the snout as lateral horns. In about 11 specimens dissected, the forms with tuberculate areas in the snout are found to be females.

Holotype : 77.0 mm S. L., 25. 4. 1987, Pachaiyar, 850 m. Alt. East of Sengaltheri, Kalakad Wildlife Sanctuary, Tirunelveli District, Tamil Nadu, Coll. Dr M. Vasanth. Reg. No. F. 2664, in the Depository of National Type Collections, Z. S. I., Calcutta.

Paratypes : 38 exs., 26.0 mm-66.0 mm S. L., Sengaltheri east (900 m.), 19.8.1984, Reg. No. F. 584 ; 5 exs., 49.0 mm-69.0 mm S. L., Nambiyar, (190-350 m.), 21.8.1986, Reg. No. F. 853 ; 26 exs., 21.0 mm-60.0 mm S. L., Thodathi odai, (390 m.), 25.8.1986, Reg. No. F. 854 ; 36 exs., 23.0 mm-75.0 mm S. L., Vilakkennai kasam (300 m.), 8.1.1987, Reg. No. F. 855 ; 28 exs. 20.0 mm-49.0 mm S. L., Pachaiyar (980 m.) near Karumandi amman temple, 24.4.1987, Reg. No. F. 856 and 144 exs., 25.0 mm-55.0 mm S. L., Pachaiyar (850 m.), east of Sengaltheri, 25.4.1987, Reg. No. F. 852, in Z. S. I., S. R. S. Madras.

Relationship : *Garra kalakadensis* sp. nov. differs from the widely distributed *G. mullya* (Sykes) in several characters viz. the marked difference in the position of vent which is near to anal fin in the former while in the latter it is well in advance of the anal fin ; the mental disc is well developed ; head length longer and body slender whereas in *G. mullya* (Sykes) the body is deeper, head shorter and mental disc restricted to the anterior third of the head, Plate : 2. (Fig A. & C.). The two differ in colour pattern also,

Garra kalakadensis sp. nov. shows some resemblance to *G. lamta* (Hamilton) in the presence of well developed lateral tubercular area (secondary sexual character) in the snout, the well developed mental disc and in its slender form. However in *G. lamta* (Ham.) the vent is very close to the anal fin, the pectoral fin is shorter, Plate : 2. (Fig. A. & B.) and the air bladder is much reduced (Menon, 1964).

DISCUSSION

While studying the fish material from Kalakad it was observed that some specimens were deeper with a prominent lateral band on a lighter body colour while some collected from the higher altitudes were of a uniform dark colour and with a more slender body. Within this population also, in some, the lateral band was prominent on a lighter ground colour.

A comparative study of the different morphometric characters of the populations from different areas and altitudes, to study the similarities or differences that exist in them are given in Table 1. It is seen that the two different varieties collected from different localities are the same species, as evidenced by their overlapping range in body proportions, and a gradual difference observed in certain body proportions may be changes brought about by difference in altitude and water flow.

With increase in altitude the following differences were observed viz. a reduction in body depth, slightly narrower head, a broader interorbital, better developed and broader mental disc, slender caudal peduncle and reduction in size of air bladder.

No differences were observed in the meristic characters except in the scalation on the chest, the preanal scales showing much variation within the population ranging from 16-21. In some specimens the chest is totally naked, while in some others the subcutaneous scales extend to this region, and in a few others the scales are quite visible between the pectoral base.

Regarding the length of pectoral and other fins, a positive correlation could not be arrived at. In general, *Garra* species from Kalakad Sanctuary have very well developed, long and horizontally placed, fan-like pectoral and ventral fins, with the outer rays muscular on the ventral side. The general tendency observed in Table 1 is towards a reduction in length with increase in altitude ; however, specimens collected from Pachaiyar at 850 m. have the longest pectorals, sometimes longer than head. The length is, however, found to be subject to much variation, and in one specimen (52.0 mm S. L.) it almost reaches the pelvic, which is also very long and extends beyond the anus reaching the anal fin ; a single freak specimen (45.0 mm S. L.) had very short pectorals extending only up to half the distance to pelvic origin.

The darker body colour seen in adults found in higher altitudes is probably to help in camouflage amongst dark rocks and pebbles in the upper evergreen forests. In the lower altitudes in the deciduous forests, however, the body colour is lighter to match the dull background.

From a study of the various characters which are subject to adaptive changes brought about by the stress factor in torrents, it could be suggested that in this stretch of Western Ghats, similar conditions have brought about highly adaptive modifications (viz. the streamlined body which offers least resistance to water currents and the well-developed adhesive devices in the form of a powerful mental disc and muscular fan-like pectoral fins) encountered in the peninsular form as in *G. lamta* (Ham.) in the Himalayas, Darjeeling, Assam, Sikkim, Nepal and Pakistan.

Key to the species of *Garra* of Peninsular India

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|-------|---|-----|---|
| 1. a. | One pair of barbels ; proboscis trilobed | ... | <i>G. bicornuta</i> Rao |
| 1. b. | Two pairs of barbels ; proboscis may or may not be present | | 2 |
| 2. a. | Proboscis present | ... | <i>G. gotyla stenorhynchus</i> (Jerdon) |
| 2. b. | Proboscis absent | ... | 3 |
| 3. a. | Depth of body about 5 or more than 5 times in S. L... | | 4 |
| 4. a. | Distance of vent to anal fin base 3 or less than 3 times in that between anterior origin of pelvic and anal fins (L. 1.35-38) | ... | <i>G. mcClellandi</i> (Jerdon) |
| 4. b. | Distance of vent to anal fin base 4 or more than 4 times in that between anterior origin of pelvic and anal fin base | ... | 5 |
| 5. a. | Back scaled, chest and belly naked ; L. 1.32-36 | ... | <i>G. menoni</i> Rema Devi and Indra |
| 5. b. | Back, chest and belly naked ; L. 1.36-38 | ... | <i>G. Hughii</i> Silas |
| 3. b. | Depth of body less than 5 in S. L. | ... | 6 |
| 6. a. | Vent to anal fin base less than 4 times in that between anterior origin of pelvic and anal fin, mental disc small, width of disc about 2 times in width of head | ... | <i>G. mullya</i> (Sykes) |
| 6. b. | Vent to anal fin base more than 4 times in that between anterior origin of pelvic and anal fin, mental disc large, width of disc less than 2 in width of head | ... | <i>G. kalakadensis</i> sp. nov. |

SUMMARY

A new species *Garra kalakadensis* is described from Kalakad Wildlife Sanctuary, Tirunelveli district, Tamil Nadu and compared with the widely distributed *G. mullya* (Sykes) and the North Indian form *G. lamta* (Hamilton). Representative specimens from six different altitudes in two localities (N. E. & S. W.) are compared. A key to the species of *Garra* from peninsular India is given.

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