

**SOME OBSERVATIONS ON *GARRA HUGHII* SILAS  
FROM ANAMALAI HILLS, WESTERN GHATS, TAMIL NADU, INDIA**

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A study of the specimens of *G. hughi* collected from Anamalai Hills, and the paratypes of the species, revealed the presence of scales on the dorsum and ventral surface and a high variability in scalation in this species. Since the absence of scales is taken as a key character in the identification of this species, the validity of this character in distinguishing the species of *Garra* is discussed and a revised key to identification of Peninsular species is provided.

Key Words : *G. hughi*, squamation, biometry

**INTRODUCTION**

During the faunistic surveys of Anamalai Hills by SRS/ZSI, from 1996-98 an interesting collection of *Garra* (Plate 1 figs 1,3 & 4) was made. The specimens showed close affinities to *Garra hughi* Silas, (except for the presence of scales on the dorsum and belly) but, did not key to *Garra hughi* on the basis of taxonomic literature available so far (Menon, 1964; Jayaram 1981; Talwar & Jhingran 1991; Rema Devi 1992). Hence the types were examined before establishing the correct identity of this *Garra* from the Anamalai Hills.

A study of two paratypes of *G. hughi* Silas revealed the presence of scales on the dorsum and belly (Plate 1 figs. 2,5,6 & Pl. 2. fig.1), contrary to the established diagnostic feature of this species, since Silas (1952) had figured a paratype with complete absence of scales on the back and belly. To find out whether other differences exist in the specimens from Anamalais, some important biometric characters were recorded and compared with the original description (Silas, (opcit) and those of the paratypes and are presented in Table 1. The data is based on 20 specimens of length range 37.0 to 88.0 mm SL, Reg. No. F. 5330, ZSI/SRS; Paratypes 2 exs., 42.5 & 56.0 mm SL Reg. No. F. 747/2/ZSI Calcutta; and Silas's description, based on 52 specimens 15.02 to 77.0 mm SL. The table shows overlapping of several characters, but for a slight difference in body depth. Since Silas's samples included very small specimens, differences in the mean values and in the range of some characters like diameter of eye (Pl. 1, fig. 2) snout length, width of body, and height of caudal peduncle, were observed. Except for the presence of pre-dorsal and pre-ventral scales in all the specimens examined, no striking differences were observed in the specimens from Anamalais. Another prominent character in *G. hughi* (Silas 1954, p.3) is the presence of minute striations at the edge of the rostral fold which character is also seen in the Anamalai specimens (Plate-2, fig. 3). Silas (opcit) remarks that the scales on the upper half of the

body especially towards the dorsum have very dark bases and light margins. In the specimens from Anamalai also scales on the dorsum with dark bases are seen as two alternating or oblique rows of spots (Plate 1. Figs. 3 & 4).

Since absence of scales is considered a diagnostic character in the identification of *Garra hughi*, and since the paratypes of *G. hughi* showed the presence of pre-dorsal scales, the variation in squamation in the different *Garra* species were compared (Table 2 ; Menon 1964). A revised key to the identification of the peninsular forms based on these observations is provided.

### DISCUSSION

Scales in *Garra* are absent in some species, especially the African and Himalayan forms, in certain areas of the body like the dorsum, chest and belly and post pelvic regions. The scales are more commonly absent on the chest and belly; in a few species on the back, and in a lesser number of species in the post-pelvic region also. The absence/presence of scales in the 37 species described by Menon 1964 and the four species discovered subsequently, viz. *G. menoni* (Rema Devi & Indra, 1984), *G. manipurensis* (Waikhom & Sarojnalini, 1988), *G. kalakadensis* (Rema Devi, 1992) and *G. surendranathanii* (Shaji et. al. 1996), is given in Table 2. It is seen that the scales are completely absent on the back, chest, belly and post pelvic regions only in 2 species viz. in *G. ignesti* (Africa) & to a certain extent in *G. rupecula* (Manipur & Assam).

The only peninsular species reported to be sharing this character is *G. hughi*. From the present study it is seen that this is a highly variable character in this species as observed in the specimens collected from Anamalais, the same hill ranges from where *G. hughi* was discovered by Silas in 1954, and in the two paratypes examined. In 15 other species scales are reportedly absent in one or more areas mentioned earlier, and 23 species have been described as being fully scaled. Of the 17 species known from India, 8 species are found in the Peninsula and in these species it is a highly variable feature especially in the four species in which scales are lacking on the dorsal/ventral surfaces of the body. Scales are absent on chest and belly in *G. menoni*, on the chest and to a certain extent on the belly in *G. surendranathanii* and *G. kalakadensis*, and in *G. hughi* though reported to be absent on the dorsum, chest, belly and post pelvic, are found to be present, sometimes being sub-cutaneous. In all the 4 species mentioned above, it is consistently absent on the chest alone, other regions exhibiting presence or absence. Even Silas 1954, remarked on the variable nature of this character in his paper as follows, "The scales *totally absent* on the ventral surface as far back as and between the base of the pelvic fins. In a few specimens the scaleless area extends still further backwards to the origin of the anal fin. But generally in this post—pelvic area a few ill-defined scales almost completely embedded in the skin can be made out on careful examination. On the dorsum, the scales are generally absent in a broad streak from the occiput to origin of the dorsal fin. In a few examples the scaleless area is seen to extend along the entire dorsal surface as a broad streak from the occiput to the base of the caudal fin. This condition has been figured from one of the paratypes *vide* (Plate, 1, fig 4). In such specimens careful examination has shown the presence of two or three scattered scales almost completely embedded in the integument in the post-dorsal region. In a few small examples rudimentary scales are also noticeable in part of the pre-dorsal area, generally more towards the base of the dorsal fin."

Though the absence of scales, in combination with certain other characters, was used in the diagnosis of *G. hughi* by Silas, subsequent workers used the absence of scales as a key character in distinguishing *G. hughi*. The two paratypes 42.5 & 56.0 mm SL of *G. hughi* revealed the presence of 9 pre-dorsal and 6 pre-anal scales, paradoxically the figured scaleless specimen of Silas is also 56 mm SL. In all the 20 specimens from Anamalai Hills, about 12-14 pre-dorsal and 0 to 5 pre ventral scales were observed.

*Key to the peninsular species of Garra*

1. a. One pair of barbels; proboscis trilobed.....*G. bicornuta* Rao
- b. Two pairs of barbels; proboscis may or may not be present.....2
2. a. Proboscis present.....*G. gotyla stenorhynchus* Jerdon
- b. Proboscis absent .....3
3. a. Body with lateral blotches ..... *G. suerndranathanii* Shaji, Arun & Easa
- b. Body without blotches .....4
4. a. Depth of body about 5 or more than 5 times in SL .....5
- b. Depth of body less than 5 times in SL .....7
5. a. Snout with tubercles, about 2 times in head length; PD 8 to 10; rostral fold not demarcated from upper lip .....*G. mcClellandi* (Jerdon)
- b. Snout without tubercles, more than twice in HL, PD more than 10, rostral fold demarcated from upper lip .....6
6. a. Lateral line scales 32-36; eye comparatively bigger, about 5.5 times in HL; HL less than 4 times in SL; PD scales 11-13... .....*G. menoni* Rema Devi, & Indra
- b. Lateral line scales 36-38; eye small about 6.5 times in HL; HL 4 times in SL; PD scales 0-14 ..... *G. hughi* Silas
7. a. Distance from vent to anal fin base less than 4 times in that between anterior orision of pelvic and anal fin; mental disc small, width about twice in head width ..... *G. mullya* Sykes
- b. Distance from vent to anal fin base more than 4 times in that between anterior origin of pelvic and anal fin; mental disc large, width less than twice head width. ....  
.....*G. kalakadensis* Rema Devi

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**Table 1.** Comparison of morphometric characters of *Garra hughii* Silas 1954 with the specimens from Anamalai Hills and those of paratypes of *G. hughii*.

| Sl. No. | Characters                                     | Anamalai specimens<br>N = 20 |      | <i>Garra hughii</i> Silas<br>1954 |       | <i>G. hughii</i> Silas<br>paratypes N = 2 |      |
|---------|--|------------------------------|------|-----------------------------------|-------|---|------|
|         |  | Range                        | Mean | Range                             | Mean  | Range                                     | Mean |
| 1.      | TL/HL  | 4.51-5.52                    | 5.03 | 4.222-5.588                       | 4.914 | 4.91-5.15                                 | 5.04 |
| 2.      | TL/Depth of body                               | 6.07-7.42                    | 6.88 | 5.900-8.000                       | 6.862 | 7.64-8.00                                 | 7.82 |
| 3.      | TL/width of body                               | 6.97-8.09                    | 7.35 | 6.545-9.500                       | 8.194 | 6.50-6.60                                 | 6.65 |
| 4.      | TL/Caudal fin length                           | 4.10-6.37                    | 4.75 | 4.181-5.750                       | 4.789 | 4.40-5.67                                 | 5.03 |
| 5.      | SL/HL  | 3.65-4.38                    | 3.97 | 3.444-4.307                       | 3.870 | 3.79-4.24                                 | 4.01 |
| 6.      | SL/Depth of body                               | 4.93-5.82                    | 5.45 | 4.600-6.454                       | 5.428 | 6.29-6.44                                 | 6.36 |
| 7.      | SL/Width of body                               | 5.52-6.46                    | 5.81 | 5.272-7.500                       | 6.473 | 5.20-5.40                                 | 5.30 |
| 8.      | SL/Predorsal dist.                             | 1.77-2.11                    | 1.97 | 1.875-2.111                       | 2.000 | 1.98-2.09                                 | 2.04 |
| 9.      | SL/Postdorsal dist.                            | 1.70-2.11                    | 1.98 | 1.838-2.090                       | 1.960 | 1.89-1.98                                 | 1.93 |
| 10.     | SL/Prepelvic dist.                             | 1.75-2.07                    | 1.94 | 1.812-2.058                       | 1.946 | 1.96-2.01                                 | 1.98 |
| 11.     | SL/Postpelvic dist.                            | 1.93-2.32                    | 2.06 | 1.944-2.400                       | 2.052 | 1.99-2.04                                 | 2.01 |
| 12.     | SL/Caudal fin length                           | 2.39-4.69                    | 3.61 | 3.181-4.750                       | 3.789 | 3.40-4.66                                 | 4.03 |
| 13.     | HL/Width of head                               | 1.25-1.54                    | 1.33 | 1.166-1.800                       | 1.370 | 1.28-1.32                                 | 1.30 |
| 14.     | HL/Depth of head                               | 1.66-1.94                    | 1.77 | 1.272-2.000                       | 1.750 | 1.89-1.90                                 | 1.89 |
| 15.     | HL/Snout                                       | 1.84-2.10                    | 1.93 | 1.833-4.500                       | 2.346 | 1.94-2.20                                 | 2.07 |
| 16.     | HL/ED  | 5.05-7.73                    | 6.59 | 3.250-7.500                       | 5.358 | 5.60-6.29                                 | 5.94 |
| 17.     | Snout length/ED                                | 2.50-4.00                    | 3.34 | 0.800-4.000                       | 2.492 | 2.55-3.24                                 | 2.88 |
| 18.     | I.O.W./ED                                      | 2.05-3.38                    | 2.89 | 1.166-3.250                       | 2.339 | 2.35-2.67                                 | 2.51 |
| 19.     | HL/Height of Dorsal                            | 1.38-1.74                    | 1.57 | 1.250-1.714                       | 1.471 | 1.40-1.47                                 | 1.43 |
| 20.     | HL/Length of pectoral                          | 1.07-1.29                    | 1.20 | 1.000-1.666                       | 1.150 | 1.05-1.10                                 | 1.07 |
| 21.     | HL/Length of pelvic                            | 1.18-1.54                    | 1.40 | 1.269-1.666                       | 1.431 | 1.29-1.33                                 | 1.31 |
| 22.     | HL/Length of anal                              | 1.70-2.08                    | 1.87 | 1.500-1.875                       | 1.710 | 1.69-1.81                                 | 1.75 |
| 23.     | Length of CP/<br>Height of CP                  | 1.17-1.60                    | 1.36 | 1.500-2.00                        | 1.729 | 1.53-1.55                                 | 1.54 |
| 24.     | Post dorsal dist./<br>Predorsal dist.          | 0.95-1.07                    | 1.01 | 0.950-1.148                       | 1.020 | 1.00-1.10                                 | 1.05 |
| 25.     | Depth of body/<br>Height of dorsal             | 1.00-1.33                    | 1.15 | 0.875-1.200                       | 1.055 | 0.87-0.95                                 | 0.91 |
| 26.     | Width of mental disc/<br>Length of mental disc | 1.15-1.42                    | 1.31 | 1.142-1.625                       | 1.407 | 1.48-1.60                                 | 1.54 |

**Table 2.** Squamation in *Garra* species  
(Based on data in Menon, 1954)

| Sl. No. | Species   | Back | Chest | Belly | Post pelvic scales | Pre dorsal scales | L.I.  | Distribution                                      |
|---------|---|------|-------|-------|--------------------|-------------------|-------|---|
| 1.      | <i>Garra variabilis</i><br>(Heckel)                 | +    | +     | +     | +                  | 12-14             | 34-38 | Asia : Syria, Iraq                                |
| 2.      | <i>G. rossica</i><br>(Nikolsky)                     | -    | -     | -     | +                  | -                 | 34-38 | Asia : Baluchistan<br>Afghanistan &<br>E. Persia. |
| 3.      | <i>G. tibanica</i><br>Trewavas                      | +    | +     | +     | +                  | 10-14             | 31-36 | Asia : S.W. Arabia,<br>Africa                     |
| 4.      | <i>G. quadrimaculata</i><br>(Ruppell)               | +    | +     | +     | +                  | 13-14             | 34-36 | Africa  |
| 5.      | <i>G. ignestii</i><br>(Gianferrari)                 | -    | -     | -     | -                  | -                 | 36    | Africa  |
| 6.      | <i>G. ornata</i><br>(Nichols & Griscom)             | +    | -     | ±     | +                  | 0/9-10            | 36-37 | Africa  |
| 7.      | <i>G. trewavasi</i><br>Monod                        | +    | -     | ±     | +                  | 0/5               | 36    | Africa  |
| 8.      | <i>G. makiensis</i><br>(Boulenger)                  | +    | +     | +     | +                  | 13                | 38-42 | Africa  |
| 9.      | <i>G. dembeensis</i><br>(Ruppell)                   | ±    | -     | ±     | +                  | 0/4-10            | 38-42 | Africa  |
| 10.     | <i>G. ethelwynnae</i><br>Menon                      | -    | -     | -     | +                  | -                 | 32-34 | Africa  |
| 11.     | <i>G. rufa rufa</i><br>(Heckel)                     | +    | +     | +     | +                  | 11-13             | 34-38 | Asia : Syria &<br>Palestine                       |
| 12.     | <i>G. rufa obtusa</i><br>(Heckel)                   | +    | -     | +     | +                  | 9-12              | 32-36 | Asia : Persia, Iraq,<br>Armenia                   |
| 13.     | <i>G. barreimiae</i><br>Fowler & Steinitz           | +    | -     | +     | +                  | 12                | 33-34 | Asia : Arabia,<br>Oman                            |
| 14.     | <i>G. lamta</i><br>Hamilton                         | +    | +R    | +     | +                  | 8-10              | 31-34 | Asia : N. E. India,<br>Nepal, Sikkim              |
| 15.     | <i>G. mullya</i><br>(Sykes)                         | +    | +R    | +     | +                  | 9-11              | 32-34 | Asia : India<br>(except N.E.)                     |
| 16.     | <i>G. ceylonensis</i><br><i>ceylonensis</i> Bleeker | +    | +R    | +     | +                  | 9-11              | 32-34 | Asia : ceylon.                                    |
| 17.     | <i>G. c. phillipsi</i><br>Deraniyagala              | +    | +R    | +     | +                  | 9-11              | 32-34 | Asia : Ceylon                                     |
| 18.     | <i>G. annandalei</i> Hora                           | +    | +R    | +     | +                  | 9-10              | 33-34 | Asia : N. E. India,<br>Nepal                      |
| 19.     | <i>G. lissorhynchus</i><br>(McClelland)             | +    | -     | -     | +                  | 11-14             | 32-35 | Asia : N. E. India.                               |
| 20.     | <i>G. rupecula</i><br>(McClelland)                  | -    | -     | -     | -                  | -                 | 32-34 | Asia : India :<br>Manipur & Assam.                |
| 21.     | <i>G. taeniata</i> Smith                            | +    | +     | +     | +                  | 9-10              | 32-33 | Asia : Siam;<br>Malaya.                           |

| Sl. No. | Species   | Back | Chest | Belly | Post pelvic scales | Pre dorsal scales | L.I.  | Distribution                                 |
|---------|---|------|-------|-------|--------------------|-------------------|-------|--|
| 22.     | <i>G. borneensis</i> (Vaill)                    | +    | +     | +     | +                  | 9-10              | 28-31 | Asia : Borneo                                |
| 23.     | <i>G. Yunnanensis</i> (Regan)                   | +    | +     | +     | +                  | 16                | 40    | Asia : China                                 |
| 24.     | <i>G. gracilis</i> (Pellegrin & Chevey)         | +    | +     | +     | +                  | 9-11              | 36-38 | Asia : Indo-China.                           |
| 25.     | <i>G. naganensis</i> Hora                       | +    | +R    | +     | +                  | 12-14             | 38-40 | Asia : India : Naga Hills, Assam.            |
| 26.     | <i>G. kempii</i> Hora                           | +    | -     | +R    | +                  | 12-14             | 38-40 | Asia : India : Assam.                        |
| 27.     | <i>G. mcClellandi</i> (Jerdon)                  | +    | +     | +     | +                  | 8-10              | 35-38 | Asia : P. India : W. Ghats.                  |
| 28.     | <i>G. hughii</i> Silas                          | ±    | -     | ±     | ±                  | 0-14              | 36-38 | Asia : P. India : W. Ghats.                  |
| 29.     | <i>G. imberbis</i> Vinciguerra                  | +    | +     | +     | +                  | 16                | 44-45 | Asia : Burma, Indo-China                     |
| 30.     | <i>G. imberba</i> Garmann                       | -    | +     | +     | +                  | -                 | 48-52 | Asia : China, Indo-China.                    |
| 31.     | <i>G. gotyla gotyla</i> (Gray)                  | +    | +     | +     | +                  | 9-10              | 32-35 | Asia : N. E. India, Pakistan, Burma          |
| 32.     | <i>G. g. stenorhynchus</i> (Jerdon)             | +    | +     | +     | +                  | 8-10              | 32-35 | Asia : P. India : W. Ghats.                  |
| 33.     | <i>G. rhynchota</i> Koller                      | +    | +     | +     | +                  | 9-10              | 33-34 | Asia : China.                                |
| 34.     | <i>G. nasuta</i> (McClelland)                   | +    | +     | +     | +                  | 9-10              | 33-34 | Asia : India : Assam; Burma ; S. Indo-China. |
| 35.     | <i>G. notata</i> (Blyth)                        | +    | -     | -     | +                  | 14-16             | 34    | Asia : Burma.                                |
| 36.     | <i>G. gravelyi</i> Annandale                    | +    | +     | +     | +                  | 8-9               | 32-34 | Asia : Burma,                                |
| 37.     | <i>G. bicornuta</i> Rao                         | +    | +     | +     | +                  | 8-9               | 31-32 | Asia : P. India : W. Ghats, Thunga System.   |
| 38.     | <i>G. menoni</i> Rema Devi & Indra              | +    | -     | -     | +                  | 11-13             | 32-36 | Asia : P. India : W. Ghats.                  |
| 39.     | <i>G. manipurensis</i> Vishwanath & Sarojnalini | +    | -     | +     | +                  | 10-11             | 34    | Asia : N. E. India, Manipur.                 |
| 40.     | <i>G. kalakadensis</i> Rema Devi                | +    | +R    | ±     | +                  | 9-11              | 31-33 | Asia : P. India : W. Ghats.                  |
| 41.     | <i>G. surendranathanii</i> Shaji, Arun & Easa   | +    | -     | ±     | +                  | 11-12             | 35-36 | Asia : P. India : W. Ghats.                  |

## Explanation of abbreviations/signs

+ Present ; ± Partially present/absent ; - Totally absent ; R. Reduced ; N.O. Not overlapping.