

Morphological observations on the endemic Velvet leatherjacket, *Lalmohania velutina* Hutchins, 1994 (Family: Monacanthidae) and updated distributional records after three decades from its discovery in Gulf of Mannar, Tamil Nadu Coast, India

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Received 14 October 2015 ; revised 17 November 2016

The present study pertains to the occurrence of the fish commonly known as the velvet leatherjacket, *Lalmohania velutina* with extended distributional records that update its original scientific description. This paper delineates the morphological, genital and skeletal observations recorded of *L. velutina* based on 12 specimens collected from multiple fishing sites, from shore seine fishing operations practiced along the south-east coast of India. Group-wise (distribution, sex and type specimens) statistical analysis revealed that the specimens collected from the Palk Bay region are larger than the Gulf of Mannar specimens. Morphological, gonadal and skeletal examination of the collected specimens attest to these features proved its idiosyncrasy.

[**Keywords:** Leatherjacket, *Lalmohania velutina*, Palk Bay and Gulf of Mannar]

Introduction

Ichthyologists, J. E. Randall, K. Rama Rao and R.S. Lal Mohan, considered pioneer in their field had examined six specimens of the velvet leather jacket, *Lalmohania velutina* belongs to the family Monacanthidae, collected on 4th March 1975 and 12th March 1979 from the fish landings at Kilakarai in the Gulf of Mannar (GoM) along the southeast coast of India¹. In 1994 the collected specimens were, described as belonging to a new genus and species¹. Indian waters hold around 980 fresh water and 1,784 marine fishes of which 195 are endemic². In general, most species of Monacanthids are extensively diversified in the tropical and subtropical regions of the Indian and

Pacific Oceans³. The recently described *L. velutina* is the only Monacanthid fish which is endemic to Indian waters⁴. The family comprises about 27 genera comprising 102 species⁵, which are exclusively marine inhabitant recorded from all over the world², of which around 13 species have been recorded from Indian waters⁶. In India, the taxonomic studies on this group of fish are limited to just with few studies⁷⁻¹¹. This limited scholarship is mainly attributed to the lack of family-wise taxonomic specialists within the country. The present study shows that this species was found to be distributed in Palk Bay, a larger extent than earlier reported, prompting the authors to investigate its morphological, genital and skeletal

characters after a gap period of 32 years, when it was originally collected by the above-mentioned Ichthyologists and described 23 years back¹.

Most of the Monacanthids are moderate-sized fishes with a compressed body with tough leathery skin, and a prominent and depressible spine above the eye. They have a small mouth with a small gill slit. Filefishes and leather jackets are often found to occur in a coral reef, seagrass and seaweed beds^{12, 13} which are found to be abundant in the Gulf of Mannar and Palk Bay regions of the southeast coast of India¹⁰. Being poor swimmers, these fishes are easily caught and have a moderate to considerable occurrence in the landings of the bottom trawlers, whereas fewer occurrence in fishing gears like country trawl nets and shore seine net operations. They also constitute a significant percentage of the benthic-demersal species in the mechanized fishery of this area¹⁴. The seasonal occurrence of *L. velutina* is unpredictable and several other biological studies remain to be conducted to know more about this endemic species.

Materials and Methods

A total of 12 specimens of *L. velutina* were collected from the shore seine catches at Pudhumadam (N 09°16'15.7" E 079°00'36.8") in Gulf of Mannar and Ariyamaan beach (N 09°18'04.6" E 079°03'56.9"), Cherankottai (N 09°15'49" E 079°19'26") of Palk Bay regions (Fig. 1) during January 2014 to May 2014. The collected specimens were immediately photographed to record their body color and then preserved for further scrutiny. Specimens were subjected to morphometric meristic analysis as described by^{15, 16}. Parts of the species were examined under a stereo microscope (Nikon, SMZ 1000) while skeletal edifice was inspected with the help of X-ray photographs taken using an Adonis 300mA X-Ray system. Three preserved samples were deposited in Bombay Natural History Society of India (MWF 1, MWF 2 and MWF 3) and were recognized as paratypes. Statistical comparison using mean, standard deviation, range and one-way analysis of variance was done within the gender, distribution and type specimen groups to estimate the level of significance¹⁷.

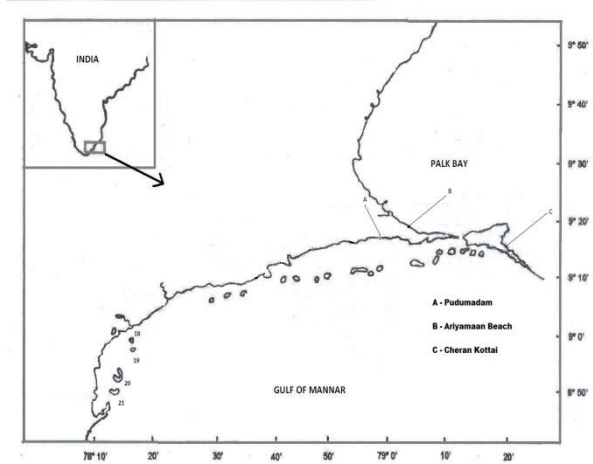


Fig. 1 - Catch location of *L. velutina* along the Gulf of Mannar and Palk Bay of Southeast coast of India.

Results

In the present study, the collected specimens of *L. velutina* met with all the characteristics described by Hutchins¹. The present specimens have a moderately deep and compressed body with a single large robust spine as the first dorsal fin, originating above the posterior margin of the eye. They also exhibit the presence of pelvic rudiment, a pointed snout, small terminal mouth with incisor teeth. The gill opening is slit-like and present above the pectoral fin base and a smooth velvet like skin composed of very small scales covers the body (except the head portion). In addition, X-ray investigations revealed 19 vertebrae and four pre-dorsal neural spines, a robust pelvis, pointed teeth and a unique ventral expansion of the basioccipital of *L. velutina* (Fig. 2). The narrow attachment of the pelvic rudiment on the dorsal side, was accompanied by a prominent space between segment 2 and 3 (Fig. 2).

Morphological differences and sexual dimorphism of male and female *L. velutina* were confirmed by gonad observations through dissection. Male specimens were observed to have small cup-shaped gonads nearly 2 mm in size, a distinctly elevated anterior portion of the soft dorsal fin, and an arrowhead-like shape in the rear caudal fin margin (Fig. 3). In contrast, the female specimens had larger gonads with a matured egg mass, a normal elevation in the anterior portion of the soft dorsal fin and a round shaped rear caudal fin margin (Fig.4).

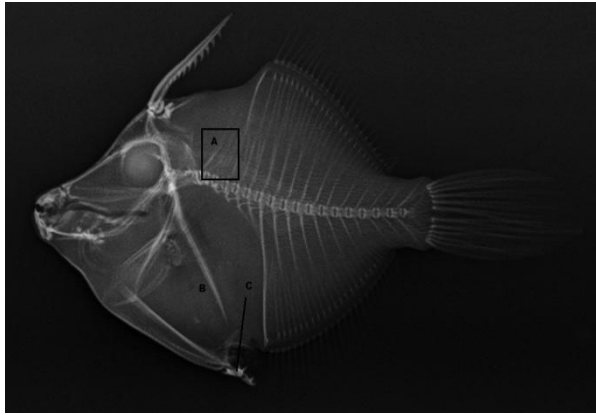


Fig. 2 - X-Ray Photography revealing the skeletal edifice of *L. velutina* (SL – 65 Female); (A) four pre-dorsal neural spines, (B) ventral expansion of the basioccipital, (C) distinct pelvic rudiment.

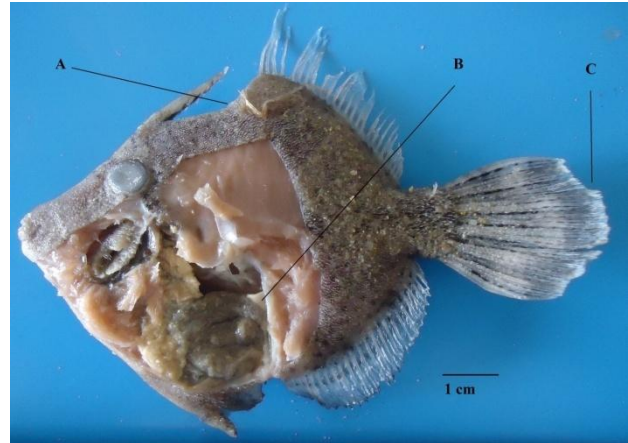


Fig. 3 - Male specimen of *L. velutina* collected from Pudumadam (SL – 68) showing, (A) distinct elevated anterior portion of the soft dorsal fin; (B) small gonad with sperm; (C) caudal fin with an arrowhead-like shape in the rear margin.

Table 1. Statistical summary of morphometric characters of *L. velutina* collected from Palk Bay and Gulf of Mannar regions (Min – Minimum; Max – Maximum; SD – Standard Deviation).

Characters	Palk Bay (n = 4)				Gulf of Mannar (n = 8)			
	Mean	Min	Max	SD	Mean	Min	Max	SD
Standard Length	73.75	56	90	15.92	66.12	60	81	6.59
Head length	24.75	19	29	4.64	24	23	27	1.30
Body depth	49	36	59	10.92	45.25	39	54	4.30
Body width	12.75	7	18	4.57	14	11	16	1.69
Snout length	17.5	12	21	4.35	15.75	13	20	1.98
Eye diameter	7.25	6	9	1.50	7.62	6	9	1.06
Interorbital width	7.98	7	8.9	0.77	7.87	7	9	0.64
Gill slit length	6.25	4.5	8	1.44	5.75	5	7	0.70
Snout to dorsal spine	24.75	19	29	4.64	23.62	22	27	1.59
Lower jaw to pelvic fin rudiment	45.75	33	55	9.28	43.5	38	50	3.66
Dorsal spine length	19.5	14	23	4.35	16.5	14	22	2.67
Inter dorsal space	19.25	14	26	4.99	16.62	15	19	1.50
Longest dorsal ray	12.5	8	15	3.31	9.75	8	15	2.64
Longest anal ray	10.25	8	12	2.06	8.37	6	12	1.66
Longest pectoral ray	10	8	12	1.82	9.75	9	11	0.70
Length of caudal fin	29.25	24	35	5.12	26.37	24	35	3.54
Length of dorsal fin base	30.75	22	38	7.54	25.75	22	34	3.73
Length of anal fin base	32	24	40	7.70	25.50	22	32	3.11
Length of caudal peduncle	8.25	6.7	11	1.96	8.37	7	10	1.18
Depth of caudal peduncle	11.25	8	14	2.75	9.75	9	13	1.38
Length of pelvic fin rudiment	7	5	10	2.16	5.87	4.5	8	1.09

Table 2. Proportional percentage morphometric measurements against the standard length of *L. velutina* based on distribution and sex groups (PB – Palk Bay; GoM – Gulf of Mannar).

Characters	Distribution		Gender	
	Palk Bay (n = 4)	Gulf of Mannar (n = 8)	Male (n = 6)	Female (n = 6)
Head length	6.4	6.8	6.6	6.7
Body depth	12.6	12.9	12.8	12.8
Body width	3.3	4	3.6	3.8

Snout length	4.5	4.5	4.4	4.5
Eye diameter	1.8	2.1	2.0	2.0
Interorbital width	2.0	2.2	2.2	2.1
Gill slit length	1.6	1.6	1.6	1.6
Snout to dorsal spine	6.4	6.7	6.6	6.6
Lower jaw to pelvic fin rudiment	11.8	12.4	12.3	12.1
Dorsal spine length	5.0	4.7	4.8	4.8
Inter dorsal space	4.9	4.7	4.7	4.9
Longest dorsal ray	3.2	2.7	2.9	2.9
Longest anal ray	2.6	2.3	2.5	2.4
Longest pectoral ray	2.5	2.7	2.7	2.7
Length of caudal fin	7.5	7.5	7.6	7.4
Length of dorsal fin base	7.9	7.3	7.5	7.6
Length of anal fin base	8.2	7.2	7.5	7.7
Length of caudal peduncle	2.1	2.3	2.3	2.2
Depth of caudal peduncle	2.9	2.7	2.8	2.8
Length of pelvic fin rudiment	0.8	1.6	1.6	1.75

Table 3. The result of ANOVA (one way) for morphometric value relationship of *L. velutina* in distribution, gender and type specimen groups.

Groups	F Value	Significance (<i>P</i>)
Distribution	117.7516167	3.18272×10^{-17}
Gender	293.1558	2.44×10^{-21}
Holotype Vs Present specimens	323.589	8.68618×10^{-22}

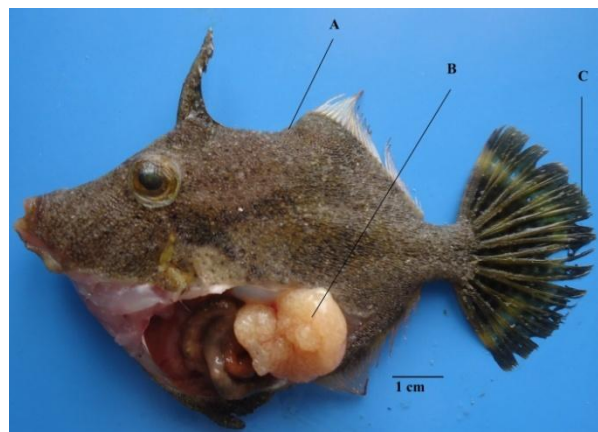


Fig. 4 - A dissected female specimen of *L. velutina* collected from Cherrankottai (SL - 65 mm); (A) normal anterior portion of the soft dorsal fin; (B) bigger gonad with developed egg mass; (C) caudal fin with a rounded shape in the rear margin.

The mean, standard deviation, and range of the morphometric characters of the 12 specimens of *L. velutina* were listed in Table 1. The mean values revealed that the specimens collected from Palk Bay are larger than those collected from the Gulf of Mannar region. The mean standard length for specimens collected from Palk Bay was 73.75 ± 15.92 , whereas for those of the Gulf of Mannar the

values were 66.12 ± 6.59 . Wide variations in morphometric measurement were observed among the specimens collected from the Palk Bay region which is obvious from the high range of measurements seen in all the 21 morphometric characters (Table 1).

When compared across distribution, the specimens from both Palk Bay and Gulf of Mannar exhibited more or less similar body proportions (Table 2). The highest proportion occupied by body depth (12.6% for PB and 12.9% for GoM) and the lowest proportions by gill slit length (1.6% for both PB and GoM). Comparison across sex also revealed equal body proportions with body depth exhibiting the highest proportion (12.8% for both male and female) and gill slit length exhibiting the lowest proportion (1.6% for both male and female). The level of significance (*P*) and F value for the 21 measured morphometric characters were compared between all the three groups (Table 3). All the three comparisons exhibited very high significance of variation which is apparent from the very low *P*-value (<0.05). Relatively higher level of significance was observed in the comparison between the holotype and present specimens (Table 3).

Discussion

L. velutina differs from its nearest congeners *Stephanolepis sp.* in scale structures, fin shapes, fin ray counts, lateral line sensory system, and pelvic fin rudiment morphology¹. Among the monacanthid fishes recorded *L. velutina* is a very colorful fish which has been important species representing in the marine ornamental fish trade from the Gulf of Mannar region especially during the lean fishing period for marine ornamental fish collection. Other Monacanthids so far reported along the Indian coasts are, *Cantherhines sandwhichiensis* from the Lakshadweep Islands¹⁸; *Oxymonacanthus longirostris* from the Lakshadweep Islands⁷; *Paramonacanthus tricuspis* from the western Indian ocean¹⁵; *Osbeckia scripta* from the Lakshadweep Islands⁷ and the Andaman Islands⁸; *Paramonacanthus choirocephalis* from the Andaman Islands⁸; *Thamnaconus modestus* from southwest Srilanka¹⁹; *Acreichthys tomentosus* from Visakhapatnam²⁰; *Aluterus Monoceros* from Vizhinjam, Veraval and the Mumbai coast^{9, 21, 22}; *Aluterus scriptus* from the Lakshadweep Islands¹⁸ and Andaman waters²³; *Paramonacanthus japonicus* from the Cuddalore Coast²⁴; *Anacanthus barbatus*, *Paraluteres prionurus* and *Paramonacanthus oblongus* from the west coast of India⁶.

Around 6 species *viz.*, *Paramonacanthus nipponensis*, *Aluterus scriptus*, *A. monoceros*, *Pseudalutarius nascicornis*, *Anacanthus barbatus* and *L. velutina* were recorded from the Gulf of Mannar¹¹, but the morphometric description of *L. velutina* was not made. Periodic distributional records for the study species, aids in the scientific understanding of its distribution and vulnerability. Thus far, since the 30 years since its description from the southern Bay of Bengal waters, there are no records of *L. velutina* from any other parts of Indian waters. From this, we propose that there is sufficient reason to provisionally that *L. velutina* Hutchins, 1994 is endemic to Gulf of Mannar and Palk Bay along the southeast coast of India. To its conclusiveness the fish diversity studies from Srilankan waters including the Gulf of Mannar shared waters has recorded around 9 species, whereas *L. velutina* has not been recorded which strengthens this species endemic nature^{19,26}. Further studies will be needed, especially in seagrass ecosystem to obtain a revised understanding of its distribution range, but also across other Indian fish landing sites to further establish its endemic status.

Acknowledgement

The first author was supported by Network for Fish Quality Management and Sustainable Fishing (NETFISH), Kochi, Kerala, Ministry of Commerce & Industry, Govt. of India. The second author is thankful for Department of Marine and Coastal Studies, Madurai Kamaraj University, Madurai, Tamil Nadu for the logistic support.

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