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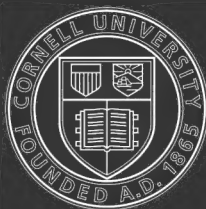
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Leptocephalids in the University Zoologi



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LEPTOCEPHALIDS
IN THE
UNIVERSITY ZOOLOGICAL MUSEUM
AT UPSALA

BEING A DISSERTATION
FOR THE ATTAINING OF THE DEGREE OF DOCTOR

PRESENTED BY PERMISSION
OF THE
MATHEMATICAL AND NATURAL SCIENCE SECTION
OF THE PHILOSOPHICAL FACULTY OF THE
UNIVERSITY AT UPSALA

FOR PUBLIC DISCUSSION
IN THE ZOOLOGICAL LECTURE-HALL
ON
WEDNESDAY MAY 27th 1896

AT
10 O'CLOCK A. M.

BY
PEHR HUGO STRÖMMAN
LICENCIATE OF PHILOSOPHY



UPSALA 1896
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Professor TYCHO TULLBERG, Director of the University Zoological Museum in Upsala, requested me in the year 1890 to examine and treat the Leptocephalids to be found in that Museum.

At that time the collection embraced, firstly, a number of specimens from the Straits of Messina, collected by Professor HJ. THÉEL and Dr. A. APPELLÖF during their stay at Messina in 1888, and secondly, specimens from extraeuropean waters, obtained by the late Captain G. VON SCHÉELE on his extensive travels in tropical seas, especially in the Malayan Archipelago.

In the meantime Dr. C. BOVALLIUS has enriched the museum with a number of specimens obtained in 1891 by him in Italy; and the late Captain A. FORSTRÖM has presented the Museum with some Leptocephalids from the Atlantic. But it is to the late Captain G. C. ECKMAN that the collection is especially indebted for additions. He handed over to the Museum a large number of specimens, which he had procured in the Central Atlantic.

At present the Museum contains 29 species of Leptocephalids, of which there are in all 541 representatives.

Fifteen of these twenty-nine species have been described before; thirteen belong to the genus *Leptocephalus* and two to that of *Tilurus*.

These are:

<i>Leptocephalus</i>	<i>Morrisii</i> GMEL.	(see p. 1 below)
"	<i>Köllikeri</i> KAUP.	(" " 3 ")
"	<i>Kaupii</i> FACC.	(" " 4 ")
"	<i>sicanus</i> FACC.	(" " 5 ")
"	<i>Yarrellii</i> KAUP.	(" " 6 ")
"	<i>Hœckelii</i> KAUP.	(" " 8 ")
"	<i>Bibroni</i> KAUP.	(" " 9 ")
"	<i>Gegenbauri</i> KAUP.	(" " 9 ")
"	<i>brevirostris</i> KAUP.	(" " 11 ")
"	<i>Maurolici</i> FACC.	(" " 11 ")
"	<i>inæqualis</i> FACC.	(" " 12 ")
"	<i>Bleekeri</i> FACC.	(" " 14 ")
"	<i>Kefersteinii</i> KAUP.	(" " 15 ")
<i>Tilurus</i>	<i>trichiurus</i> (COCCO) KAUP.	(" " 45 ")
"	<i>hyalinus</i> FACC.	(" " 46 ")

The remaining fourteen species, all belonging to the genus *Leptocephalus* and all extra-European, are new and hitherto not described.

They are as follows:

<i>Leptocephalus</i>	<i>Eckmani</i>	n. sp.	(see p. 16 below)
"	<i>immaculatus</i>	" "	(" " 20 ")
"	<i>Schœelei</i>	" "	(" " 21 ")
"	<i>Forsströmi</i>	" "	(" " 24 ")
"	<i>undulatus</i>	" "	(" " 27 ")
"	<i>humilis</i>	" "	(" " 29 ")
"	<i>javanicus</i>	" "	(" " 30 ")

<i>Leptocephalus</i>	<i>crenatus</i>	n. sp.	(see p. 32 below)
"	<i>fuliginosus</i>	" "	(" " 34 ")
"	<i>subinornatus</i>	" "	(" " 36 ")
"	<i>lanceolatus</i>	" "	(" " 37 ")
"	<i>hyoproroides</i>	" "	(" " 39 ")
"	<i>curvirostris</i>	" "	(" " 41 ")
"	<i>tiluroides</i>	" "	(" " 43 ")

The long and keenly debated question, "what is the real nature of Leptocephalids?" has been, quite recently, finally answered, as all are aware, by the studies GRASSI and CALANDRUCCIO have published upon these animal-forms. They found them to be normal larva-stages of fishes that belong to the group *Murænids*. It may perhaps seem, from this fact, that to continue to treat the Leptocephalids as though they formed one independent and systematic group is unjustifiable. Such treatment may however possibly be defended on the score of the intimate connection between Leptocephalid forms and Murænids respectively having only in a few cases been proved with any certainty. A further justification for the same lies in the fact that it will certainly be long before the intimate connection above mentioned has been fully exemplified for all forms. It is however evident that in reference to Leptocephalids the terms "genus" and "species" must not be accepted in the ordinary sense, but rather looked upon as a sort of temporary nomenclature.

Considering the limited knowledge at present possessed relative to these animal-forms it would be ven-

turesome, if indeed possible at all, to attempt to arrive at any natural grouping of them.

In this account of the collection of Leptocephalids in the Zoological Museum at Upsala I have not therefore considered it wise to do so in any degree; it seemed better first to treat those forms that are already known and then to take up the new ones that I have succeeded in discovering in the collection. Within, however, the bounds of these two categories, I have tried to arrange the species in such a way, that those which in habit most closely correspond and are in all probability nearly related to each other have been placed together. I have not deemed it necessary to give descriptions of the first category, since the species here have already been described in detail.

There is an agreeable duty that yet remains for me to discharge. I desire namely in this place to give expression to my heartfelt gratitude to my honoured teacher, Professor TYCHO TULLBERG, for the kind interest he has shown in my zoological studies, for the valuable advice and explanations he has constantly therein afforded me, and for the goodwill I have ever been the recipient of at his hands.

Genus **LEPTOCEPHALUS** GRONOVIVS.

Zoophyl. Gronov. 1763. Fasc. I. N:o 410. p. 135.

Subgenus **Helmichthys.**

Helmictis RAFINESQUE. Ind. d'ittiol. sic. 1810. p. 62.

The body is not compressed or but slightly so, and is cylindrical or subcylindrical in shape. Of the forms referred to this subgenus the following are found represented in the collection:

L. Morrisii GMEL., *L. Köllikeri* KAUP and *L. Kaupii* FACC.

1. **L. Morrisii** GMELIN.

C. A. LINNÉ, Syst. Nat. 1785. T. I. p. 1150.

In determining this species I have given it the same extent as Dr. FACCIOLÀ in his work: "Rivista delle specie di Leptocephalidi del mar di Messina"; it includes therefore *Helmichthys (Helmictis) punctatus* RAF., too.

There are three examples of the species in the collection. Two of them are typical *L. Morrisii*; one was obtained by Professor TAMERLAN THORELL off Nice, the other by Dr. ADOLF APPELLÖF off Messina; the third specimen, procured off Scilla in Calabria, in the Straits

of Messina by Dr. CARL BOVALLIUS, gives, on the other hand, evidence of possessing characters considered to be distinctive of *Helm. punctatus* RAF.

a) *Nice*. T. THORELL. 1 specimen. No date given.

Length of body	108 mm.
Greatest height of body	7 "
Distance from extremity of snout to origin of dorsal fin	29 "
Distance from extremity of snout to vent	45 "
Length of head	9 "
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	2 "

b) *Messina*. A. APPELLÖF. 1 specimen. 1888.

Length of body	92 mm.
Greatest height of body	6 "
Distance from extremity of snout to dor- sal fin	25 "
Distance from extremity of snout to vent	39 "
Length of head	8 "
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	2 "

c) *Calabria, Scilla*. C. BOVALLIUS. 1 specimen.

Feb. 11. 1891.

Length of body	104 mm.
Greatest height of body	7 "
Distance from extremity of snout to dor- sal fin	28 "
Distance from extremity of snout to vent	42 "

Length of head	8 mm.
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	2 "

2. *L. Köllikeri* KAUP.

Cat. Apod. Fish. Brit. Mus. 1856. p. 148. pl. XVII, fig. 10.

The museum possesses two specimens of this species, procured near Messina by Professor HJ. THÉEL and Dr. APPELLÖF, Feb. 1888.

a) Messina. HJ. THÉEL and A. APPELLÖF. 1 specimen. Feb. 1888.

Length of body	92 mm.
Greatest height of body	6 "
Distance from extremity of snout to dor- sal fin	17 "
Distance from extremity of snout to vent.	36 "
Length of head	10 "
Distance from extremity of snout to eye's anterior margin	3 "
Eye's diameter	2 "

b) [see a) above.]

Length of body	88 "
Greatest height of body	6 "
Distance from extremity of snout to dor- sal fin	17 "
Distance from extremity of snout to vent.	39 "
Length of head	9 "
Distance from extremity of snout to eye's anterior margin	3 "
Eye's diameter	2 "

3. *L. Kaupii* FACCIOLA.

Rivista sp. Leptoc, Atti R. Accad. Pelorit. 1883. Anno IV.
p. 185, t. f. 3.

This species, which resembles *L. Köllikeri* very closely, is represented in the collection by seven individuals, all from Messina. Six of them were collected by Professor THÉEL and Dr. APPELLÖF in Feb. 1888, while Dr. BOVALLIUS obtained the seventh on the 24th of Jan. 1891.

a-f) Messina. HJ. THÉEL and A. APPELLÖF. 6 specimens. Feb. 1888.

These six specimens have the following dimensions:

	<i>a)</i>	<i>b)</i>	<i>c)</i>	<i>d)</i>	<i>e)</i>	<i>f)</i>
	mm.	mm.	mm.	mm.	mm.	mm.
Length of body	99	99	90	85	82	77
Greatest height of body	6	6	6	6	6	6
Distance from extremity of snout to dorsal fin	23	23	22	18	21	18
Distance from extremity of snout to vent. . .	40	38	38	33	34	31
Length of head	9	9	8	8	8	8
Distance from extremity of snout to eye's an- terior margin	3	2	3	2	2	2
Eye's diameter	2	2	2	2	2	2

g) Messina; harbour, on the surface, at night.
C. BOVALLIUS. 1 specimen. Jan. 24. 1891.

Length of body	88 mm.
Greatest height of body	6 "
Distance from extremity of snout to dorsal fin	18 "
Distance from extremity of snout to vent.	36 "
Length of head	8 "

Distance from extremity of snout to eye's	
anterior margin	2,5 mm.
Eye's diameter	2 "

Subgenus **Euleptocephalus** n. subg.

The body is strongly compressed and more or less band- or leaf-shaped.

4. **L. sicanus** FACCIOLA.

Descr. n. sp. Leptoc. str. Messina. Atti Soc. Tosc. Sc. Nat. Pisa. 1883. Vol. VI. Fasc. I. p. 5. t. 4. f. 3.

It is probable that this form is quite distinct from *L. Yarellii* KAUP. The museum possesses three examples of it. One of them is from Capo di Faro in the Straits of Messina, the only locality, so far as I am aware, hitherto recorded for this species. The other two specimens were found by the late Captain G. VON SCHÉELE in 35° 40' South Lat. and 18° 45' East Long., that is, off the Cape of Good Hope. They agree completely in every respect with the description and drawing Dr. FACCIOLA gives of *L. sicanus*; hence they can without hesitation be referred to this form — thus giving a new illustration of the extensive distribution some of these fishes would seem to have. (In the same glass there was also a specimen of *L. Yarellii* KAUP., likewise agreeing in all particulars with specimens from Messina, which for this species too is the only recorded locality).

a) *Messina*. Capo di Faro. C. BOVALLIUS. 1 specimen. 1891. April 8.

Length of body	106 mm.
Greatest height of body	11 "

Distance from extremity of snout to dorsal fin	78	mm.
Distance from extremity of snout to vent	94	"
Length of head	7	"
Distance from extremity of snout to eye's anterior margin	2,5	"
Eye's diameter	2	"

b, c) Lat. 35° 40' S. Long. 18° 45' E. G. VON SCHÉELE. 2 specimens. 1885.

	<i>b)</i>	<i>c)</i>
	mm.	mm.
Length of body	122	87
Greatest height of body	14	10
Distance from extremity of snout to dorsal fin	86	64
Distance from extremity of snout to vent	108	78
Length of head	7	5,5
Distance from extremity of snout to eye's anterior margin	2,5	2
Eye's diameter	2	1,5

5. *L. Yarrellii* KAUP.

Cat. Apod. Fish. Brit. Mus. 1856 p. 149. pl. XVIII. f. 13.

There are five individuals of this species in the collection from Messina; three of them were procured by Dr. APPELLÖF in 1888, and two by Dr. BOVALLIUS 1891. Besides these there is the one already spoken of (p. 5), an individual from 35° 40' S. Lat. and 18° 45' E. Long., captured by Captain VON SCHÉELE.

a - c) Messina. A. APPELLÖF. 3 specimens. 1888.

	a)	b)	c)
	mm.	mm.	mm.
Length of body	121	119	109
Greatest height of body	14	12	11
Distance from extremity of snout to dorsal fin	70	79	68
Distance from extremity of snout to vent	90	94	83
Length of head	8	8	8
Distance from extremity of snout to eye's anterior margin	2,5	2,5	2,5
Eye's diameter	2	2	2

d) *Messina*; harbour, surface. C. BOVALLIUS. 1 specimen. Jan. 24. 1891.

Length of body	102 mm.
Greatest height of body	12 "
Distance from extremity of snout to dor- sal fin	57 "
Distance from extremity of snout to vent	76 "
Length of head	8 "
Distance from extremity of snout to eye's anterior margin	3 "
Eye's diameter	2 "

e) *Messina*; straits, surface, daytime. C. BOVALLIUS. 1 specimen. Feb. 12. 1891.

Length of body	103 mm.
Greatest height of body	12 "
Distance from extremity of snout to dor- sal fin	62 "
Distance from extremity of snout to vent	74 "
Length of head	8 "

Distance from extremity of snout to eye's anterior margin	2,5 mm.
Eye's diameter	2 "

f) *Lat.* 35° 40' *S.* *Long.* 18° 45' *E.* G. VON
SCHÉELE. 1 specimen. 1885.

Length of body	114 mm.
Greatest height of body	14 "
Distance from extremity of snout to dor- sal fin	70 "
Distance from extremity of snout to vent	87 "
Length of head	7 "
Distance from extremity of snout to eye's anterior margin	2,5 "
Eye's diameter	2 "

6. *L. Haeckelii* KAUP.

Ann. a. Mag. nat. hist. 1860. 3. Ser. VI. p. 270. pl. 3. f. B.

The museum is possessed of two examples of this species, which differs but slightly from *L. Yarrellii* KAUP. They were obtained by Dr. BOVALLIUS in the harbour of Messina on the 14th of March 1891.

a, b) *Messina*; harbour, surface. C. BOVALLIUS.
2 specimens. 1891. March 14.

	a) mm.	b) mm.
Length of body	116	108
Greatest height of body	14	12
Distance from extremity of snout to dor- sal fin	79	73
Distance from extremity of snout to vent	96	89
Length of head	8	7

Distance from extremity of snout to eye's anterior margin	3	2,5
Eye's diameter	2	2

7. *L. Bibroni* KAUP.

Cat. Apod. Fish. Brit. Mus. 1856. p. 149. pl. XVII. fig. 12.

Of this species too there are two specimens in the museum, procured by Dr. APPELLÖF near Messina 1888.

a, b) Messina. A. APPELLÖF. 2 specimens. 1888.

	<i>a)</i> mm.	<i>b)</i> mm.
Length of body	106	100
Greatest height of body	11	11
Distance from extremity of snout to dor- sal fin	42	50
Distance from extremity of snout to vent	58	65
Length of head	8	8
Distance from extremity of snout to eye's anterior margin	2,5	2,5
Eyes diameter	2	2

8. *L. Gegenbauri* KAUP.

Cat. Apod. Fish. Brit. Mus. 1856. p. 149. pl. XVII. fig. 11.

There are four specimens in the possession of the museum: one obtained by Dr. APPELLÖF near Messina in 1888 and three by Dr. BOVALLIUS also near Messina in the months of February and March 1891.

a) Messina. A. APPELLÖF. 1 specimen. 1888.

Length of body	98 mm.
Greatest height of body	11 „

Distance from extremity of snout to dorsal fin	33 mm.
Distance from extremity of snout to vent	45 "
Length of head	8 "
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	2 "

b, c) Messina; straits, surface, daytime. C. BOVALLIUS. 2 specimens. Feb. 12. 1891.

	<i>b)</i> mm.	<i>c)</i> mm.
Length of body	96	86
Greatest height of body	10	8
Distance from extremity of snout to dorsal fin	32	25
Distance from extremity of snout to vent	48	40
Length of head	9	8
Distance from extremity of snout to eye's anterior margin	2,5	2,5
Eye's diameter	2	2

d) Messina; harbour, surface. C. BOVALLIUS. 1 specimen. March 14. 1891.

Length of body	83 mm.
Greatest height of body	8 "
Distance from extremity of snout to dorsal fin	27 "
Distance from extremity of snout to vent	41 "
Length of head	8 "
Distance from extremity of snout to eye's anterior margin	3 "
Eye's diameter	2 "

9. *L. brevirostris* KAUP.

Cat. Apod. Fish. Brit. Mus. 1856. p. 150. pl. XVIII. fig. 15.

There is in the museum only one single specimen of this species. Dr. BOVALLIUS obtained it in *Messina harbour* March 14. 1891. Its dimensions are as follows:

Length of body	51 mm.
Greatest height of body	10 "
Distance from extremity of snout to dorsal fin	24 "
Distance from extremity of snout to vent	37 "
Length of head	4,5 "
Distance from extremity of snout to eye's anterior margin	1,5 "
Eye's diameter	1 "

10. *L. Maurolici* FACCIOLA.

Descr. n. sp. Leptoc. str. Messina. Att. Soc. Tosc. Sc. Nat. Pisa. 1883. Vol. VI. fasc. I. p. 7. t. 4. f. 6.

Of this species too the museum contains but one specimen, also procured in *Messina harbour* on March 14. 1891 by Dr. BOVALLIUS. Its dimensions are:

Length of body	88 mm.
Greatest height of body	7 "
Distance from extremity of snout to dorsal fin	64 "
Distance from extremity of snout to vent	81 "
Length of head	7 "
Distance from extremity of snout to eye's anterior margin	2,5 "
Eye's diameter	1,5 "

11. *L. inæqualis* FACCIOŁA.

Descr. n. sp. Leptoc. str. Messina. Att. Soc. Tosc. Sc. Nat. Pisa.
1883. Vol. VI. fasc. I. p. 7. t. 4. f. 5.

This species, apparently one of the commonest of the Leptocephalids met with near Messina, is represented by no less than twenty two individuals in the collection, all from that locality, some of them procured by Prof. THÉEL and Dr. APPELLÖF, some by Dr. BOVALLIUS. It might perhaps seem superfluous to record the dimensions of so many individuals belonging to one and the same species, but since the proportions of the different parts of the body to one another are of such great importance in differentiating the species, particularly in the family of the Leptocephalids, it cannot but be of great interest and moment, seeing we have at our disposal a large selection of individuals belonging to the same species, to observe how constant these proportions in reality prove to be.

a, b) Messina. A. APPELLÖF. 2 specimens. 1888.

	<i>a)</i> mm.	<i>b)</i> mm.
Length of body	114	104
Greatest height of body	10	10
Distance from extremity of snout to dorsal fin.	65	62
Distance from extremity of snout to vent	94	88
Length of head	7	7
Distance from extremity of snout to eye's anterior margin.	2	2
Eye's diameter	2	2

c - k) Messina. HJ. THÉEL and A. APPELLÖF. 9 specimens. Feb. 1888.

	<i>c)</i>	<i>d)</i>	<i>e)</i>	<i>f)</i>	<i>g)</i>	<i>h)</i>	<i>i)</i>	<i>j)</i>	<i>k)</i>
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Length of body	103	97	96	95	94	91	90	90	81
Greatest height of body . . .	9	9	9	8	9	8	7	7	8
Distance from extremity of snout to dor- sal fin . . .	62	59	58	57	59	56	51	53	47
Distance from extremity of snout to vent	89	83	83	81	82	80	76	77	69
Length of head	6	7	7	7	6	6	6	6	6
Distance from extremity of snout to eye's anterior mar- gin	2	2	2	2	2	2	2	2	2
Eye's diameter	2	2	2	2	2	2	2	2	2

l - v) Messina; straits, surface, daytime. C. BOVALLIUS. 11 specimens. Feb. 12. 1891.

Length of body:

	<i>l)</i>	<i>m)</i>	<i>n)</i>	<i>o)</i>	<i>p)</i>	<i>q)</i>	<i>r)</i>	<i>s)</i>	<i>t)</i>	<i>u)</i>	<i>v)</i>
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
	116	116	115	112	107	107	105	104	100	94	92
Greatest height of body:	10	9	11	9	9	9	9	10	10	9	9

Distance from
extremity of
snout to dor-
sal fin:

l)	m)	n)	o)	p)	q)	r)	s)	t)	u)	v)
mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
70	67	68	59	62	58	60	56	56	55	53

Distance from
extremity of
snout to vent:

90	90	95	82	95? ¹	85	85	84	83	79	77
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Length of head:

7	7	7	7	7	7	7	7	7	7	7
---	---	---	---	---	---	---	---	---	---	---

Distance from
extremity of
snout to eye's
anterior mar-
gin:

2,5	2	2	2	2	2	2	2	2,5	2	2
-----	---	---	---	---	---	---	---	-----	---	---

Eye's diameter:

2	2	2	2	2	2	2	2	2	2	2
---	---	---	---	---	---	---	---	---	---	---

12. *L. Bleekeri*. FACCIOLA.

Rivista sp. Leptoc. Att. R. Accad. Pelorit. 1883. Anno IV.
p. 196. t. f. 1.

There are four individuals of this species in the collection, all from Messina. Three of them were procured by Dr. APPELLÖF in 1888, and the fourth by Dr. BOVALLIUS in 1891.

a - c) *Messina*. A. APPELLÖF. 3 specimens. 1888.

¹ This specimen is in a bad state.

	a)	b)	c)
	mm.	mm.	mm.
Length of body	122	114	106
Greatest height of body	12	10	9
Distance from extremity of snout to dorsal fin	57	42	48
Distance from extremity of snout to vent.	85	71	70
Length of head	8	8	7,5
Distance from extremity of snout to eye's anterior margin	2	2	2
Eye's diameter	2	2	2

d) *Messina*; straits, surface, daytime. C. BOVALIUS. 1 specimen. Feb. 12. 1891.

Length of body	96 mm.
Greatest height of body	9 "
Distance from extremity of snout to dor- sal fin	36 "
Distance from extremity of snout to vent	56 "
Length of head	7 "
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	2 "

13. *L. Kefersteinii*. KAUP.

Ann. a. Mag. nat. hist. 1860. 3. Ser. VI. p. 270. pl. 3. f. A.

Dr. FACCIOIÀ states concerning this species in an essay, printed in *Il Naturalista Siciliano 1883* and entitled "*Note sui pesci dello stretto di Messina. I. Su di alcune specie nuove o poco note*", that it lacks teeth and pectoral fins ("*Non esistono denti*". — "*Manca*

ogni vestigio di pettorali“). The same author, however, in his *Rivista* says as follows: “Mascelle inferiore un tantino più corta della superiore, entrambe con denti“, and about the pectoral fins: “Pettorale lunga quanto l’occhio, affilata“. In the single example of the species in the collection, the teeth are well developed; the pectoral fins are however wholly wanting. The specimen was obtained by Dr. BOVALLIUS in the *Straits of Messina* on Feb. 12. 1891.

Its dimensions are as follows:

Length of body	68 mm.
Greatest height of body	5 ”
Distance from extremity of snout to vent	40 ”
Length of head	3,5 ”
Distance from extremity of snout to eye’s anterior margin	1,5 ”
Eye’s diameter	1 ”

14. *L. Eckmani* n. sp.

T. I. f. 1—3.

The body is very strongly compressed, elongate and low; its greatest height, contained between eleven and twelve times in its length, is situated about in the middle; the height decreases therefrom almost uniformly towards the head and the tail.

The head is small; its length is contained about two times and a half in the body’s greatest height. The upper profile is slightly convex and descends rapidly. The snout is pointed. The distance from the extremity of the snout to the anterior margin of the eye is one and a half times greater than the diameter

of the latter. The eye has a circular contour; its upper margin does not reach to the upper profile of the head. The posterior nostril lies immediately in front of the anterior margin of the eye; the anterior nostril is situated quite close to the posterior, the distance between them being somewhat less than half the diameter of the eye. The cleft of the mouth is somewhat oblique, tending upwards, and reaches about as far back as the middle of the under margin of the eye. The mandible is a trifle longer than the upper jaw; its lower profile is almost straight and retreats with a very prominent angle. There are teeth in both jaws.

The pectoral fins are rudimentary. The vertical fins are not much developed; the dorsal fin has its origin immediately behind the vent. The caudal fin is short and rounded.

The vent is situated near the hinder end of the body, the distance between it and the end of the tail is contained about twenty times in the total length of the body.

A row of pigmentary spots, broken here and there, runs the length of the belly side from the throat to the vent. A row of similar spots, very small, sparsely placed, stretches along the back too. Furthermore, pigmentary spots are to be found at the base of the vertical fins; finally, similar rows run along every myocomma beneath the lateral line, and these are so close together that to the naked eye they assume the form of one continuous dark line.

The museum possesses a particularly large number of examples of this species, collected in the *Cen-*

tral Atlantic by the late Captain G. C. ECKMAN while travelling to and fro between Europe and Savannah in Georgia in the years 1889, 1890, 1891, 1892 and 1895. The specimens obtained on the last voyage have been preserved in formol; this mode of preserving seems especially suited to these animals, for preserved thus they retain their natural form and transparency. Altogether there are 451 individuals of the species in the collection obtained at times and in localities as below stated.

a)	Lat. 21° N.	Long. 56°	W.	23 spec.	Jan. 31. 1889.
b)	" 24°	" "	65°	" 36	" Feb. 5. 1889.
c)	" 27°	" "	73°	" 57	" " 10. 1889.
d)	" 28°	" "	70° 3'	" 75	" Nov. 20. 1890.
e)	" 29°	" "	72°	" 1	" " 1890.
f)	" 20°	" "	55°	" 10	" March 27. 1891.
g)	" 22°	" "	64°	" 71	" April 1. 1891.
h)	" 22°	" "	65°	" 14	" " 1. 1891.
i)	" 22°	" "	65°	" 54	" " 2. 1891.
j)	" 23°	" "	67°	" 40	" " 4. 1891.
k)	" 25°	" "	70°	" 39	" " 5. 1891.
l)	" 22°	" "	65°	" 4	" Jan. 1892.
m)	" 24°	" "	70°	" 7	" " 1892.
n)	" 28°	" "	70° 30'	" 13	" March 15. 1895.
o)	" 28°	" "	70°	" 4	" " 16. 1895.
p)	" 29°	" "	69°	" 3	" " 17. 1895.

The individual figured in Pl. I., procured April 2, 1891 in *Lat. 22° N. and Long. 65° W.*, has the following dimensions:

Length of body	80 mm
Greatest height of body	7 "

Distance from extremity of snout to vent	77	mm.
Length of head	3	”
Distance from extremity of snout to eye's anterior margin	1,5	”
Eye's diameter	1	”

Referring the reader to the remark made upon *L. inaequalis* FACCIOLOÀ (p. 12), I now add some measurements for forty other examples of the species obtained on the same occasion as the one of which the dimensions have just been given.

Numbers of specimens.	Length.	Height.	Distance from extremity of snout to vent.
1-2	84	7	81, 80
3-4	82	7	79, 78
5-6	81	7	78
7-8	80	7	76
9-12	79	7	76
13-16	78	7	75, 75, 75, 74
17-20	77	7	74
21-22	76	7	73, 72
23-24	75	7	72
25	74	7	71
26-27	73	7, 6,5	70
28-31	72	6	70, 69, 69, 69
32-35	71	6	69, 69, 68, 68
36-37	70	6	68, 67
38	69	6	66
39-40	68	6	65

15. *L. immaculatus* n. sp.

Pl. I. f. 4 and 5.

The body is very strongly compressed, rather elongated and low; its greatest height, contained a little more than nine times in its length, is situated in the middle, whence the height diminishes about evenly towards head and tail.

The head is small; its length is contained about two and one third times in the greatest height of the body. Its upper profile is slightly convex and descends rapidly. The snout is pointed. The distance from the extremity of the snout to the anterior margin of the eye is about one and a half times greater than the diameter of the latter. The eye has a circular contour; its upper margin does not reach to the upper profile of the head. The posterior nostril is situated immediately in front of the eye's anterior margin; the anterior nostril is a short distance from the posterior — the distance being about one third of that between the anterior nostril and the extremity of the snout. The cleft of the mouth is almost horizontal, reaching back to the middle of the lower margin of the eye. The mandible has the same length as the upper jaw, its under profile is straight, retreating with a very prominent angle. Both jaws are toothed.

The pectoral fins are not much developed. The vertical fins are rudimentary; the dorsal fin has its commencement immediately in front of the vent. The caudal fin is short and rounded.

The vent is situated near the hinder end of the body; the distance between it and the end of the

tail is contained about twenty times in the body's length.

Pigmentary spots are wholly wanting.

Only one specimen is to be found of this species in the collection; its habit does not differ much from that of the preceding species. It was procured by Captain ECKMAN on the 23rd. of April 1890 in *Lat. 34° N. and Long. 65° W. (Central Atlantic)*. Its measurements read as follows:

Length of body	67	mm.
Greatest height of body	7	"
Distance from extremity of snout to vent	64	"
Length of head	3	"
Distance from extremity of snout to eye's anterior margin	1,5	"
Eye's diameter	1	"

16. *L. Schéelei* n. sp.

Pl. I. f. 6 and 7.

The body is compressed, elongated and high; its greatest height, contained more than nine times in its length, is situated in about the middle, whence the height diminishes almost uniformly towards head and tail.

The head is small; its length is contained about three times in the body's greatest height. Its upper profile is for the major part convex, but a little in front of the eye shows a very slight concavity. The snout is pointed. The distance from the extremity of the snout to the eye's anterior margin is about one and a half times greater than the diameter of

the eye. The eye has a circular contour. Its upper margin does not reach to the upper profile of the head. The posterior nostril, like a slit in form, and vertical, is situated somewhat in front of the eye's anterior margin. The anterior nostril is rounded. The distance between the two nostrils is about half that between the anterior nostril and the extremity of the snout. The cleft of the mouth tending upwards a little obliquely reaches backwards to beneath the centre of the under margin of the eye. The lower jaw is somewhat longer than the upper; its under profile is slightly convex, retreating with a somewhat prominent angle. There are teeth in both jaws.

The pectoral fins are rudimentary. The dorsal and anal fins are very low; the former has its origin immediately in front of the vent. The caudal fin is pointed.

The vent is situate near the inner end of the body; in the examples of this species in the collection the ratio of the distance between vent and tail-end to body's length is roughly as follows, 1 : 15, 1 : 19, 1 : 20, 1 : 22, and 1 : 24.

On the lower side for about the first fifth of the body's length there extends a row of pigmentary spots very close together especially at the hinder end. A little beyond where this row ceases, two other rows of spots begin, one on each side of the body; they run just above the alimentary canal and reach as far as the vent. These spots are so close together that to the naked eye they appear to form two continuous dark lines. Along the upper side, from a point a little behind the neck to the commencement of the dorsal fin a row of spots extends, somewhat

sparser. Further, another row of similar but very minute spots runs the length of the dorsal, caudal and anal fins at the base of the same. Finally a row of pigmentary spots, minute and closely packed, is to be found in every myocomma below the lateral line. This species, that seems to be very close in characters to *L. affinis* FACCIOLA, is represented in the museum by five specimens, one of which, that figured, comes from the *Malayan Archipelago*; it was obtained by the late Captain G. VON SCHÉELE; the others come from the *Atlantic Ocean*, collected by Captain VON SCHÉELE, the late Captain FORSSTRÖM and Captain ECKMAN. In the specimens from the Atlantic Ocean the height of the body is relatively less than in the one specimen from the Malayan Archipelago; in other respects the latter agrees perfectly with the others.

a) *Lat.* 9° 5' S. *Long.* 127° 40' E. G. v. SCHÉELE.

1 specimen. Sept. 9. 1887.

Length of body . . . ,	140	mm.
Greatest height of body	15	”
Distance from extremity of snout to vent	133	”
Length of head	5	”
Distance from extremity of snout to eye's anterior margin	1,5	”
Eye's diameter	1	”

b) *Lat.* 27° N. *Long.* 41° 45' W. G. v. SCHÉELE.

1 specimen. 1885.

Length of body	75	mm.
Greatest height of body	7	”
Distance from extremity of snout to vent	70	”

Length of head	3 mm.
Distance from extremity of snout to eye's anterior margin	1 "
Eye's diameter (hardly)	1 "

c, d) Lat. 24° N. Long. 68° W. G. C. ECKMAN.
2 specimens. Dec. 1892.

	<i>c)</i>	<i>d)</i>
	mm.	mm.
Length of body	68	58
Greatest height of body	5,5	5
Distance from extremity of snout to vent	65	55
Length of head	3	3
Distance from extremity of snout to eye's anterior margin	1	1
Eye's diameter (hardly)	1	1

e) Lat. 3° S. Long. 30° W. A. FORSSTRÖM. 1 specimen. Dec. 1892.

Length of body	193 mm.
Greatest height of body	15 "
Distance from extremity of snout to vent	185 "
Length of head	5 "
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	1 "

17. *L. Forsströmi* n. sp.

Pl. II. f. 1—3.

The body is compressed, rather short and high; its greatest height, contained about seven and a half times in its length is situated in the middle, whence the height recedes by slow degrees towards the head, but more rapidly towards the tail.

The head is small; its length is contained about two and two third times in the greatest height of the body. Its upper profile is slightly convex and slopes downwards. The snout is pointed. The distance from the extremity of the snout to the anterior margin of the eye is somewhat greater than the diameter of the latter. The eye has a circular contour; its upper margin does not reach up to the upper profile of the head. The posterior nostril is situated rather in front of and higher than the eye; the anterior, situated considerably lower than the posterior, is at a distance from it that is rather greater than that between itself and the extremity of the snout. The cleft of the mouth is almost horizontal, extending back nearly to the posterior margin of the eye. The lower jaw is shorter than the upper. Its lower profile is slightly convex and lacks the prominent angle backwards. Teeth are present in both jaws.

The pectoral fins are very rudimentary. The vertical fins are not highly developed either. The dorsal fin has its origin directly in front of the vent; the caudal fin is very short and rounded.

The vent is situated about the middle of the body.

Scattered pigmentary spots are to be found on the head in the neighbourhood of the gill-openings and under the throat. Along the lower side of the body there runs a row of these spots closely packed and along the upper side a row also, but here sparser and less regular. Along the bases of the dorsal, caudal and anal fins a row of extremely minute closely

packed spots extends. Finally, along the lateral line there is also a similar row.

There are four specimens of this species in the collection, all from the *Central Atlantic*. One of them was taken by Captain VON SCHÉELE, the others by Captain FORSSTRÖM.

a) *Lat. 4° S. Long. 34° 10' W.* G. v. SCHÉELE.
1 specimen. 1885.

Length of body	62	mm.
Greatest height of body	8	"
Distance from extremity of snout to dorsal fin	30	"
Distance from extremity of snout to vent	29	"
Length of head	3	"
Distance from extremity of snout to eye's anterior margin	1	"
Eye's diameter	1,5	"

b, c) *Lat. 3° S. Long. 30° W.* A. FORSSTRÖM. 2 specimens. Dec. 1892.

	b)	c)
	mm.	mm.
Length of body	60	59
Greatest height of body	8	8
Distance from extremity of snout to dorsal fin	28	26
Distance from extremity of snout to vent	30	28
Length of head	3	3
Distance from extremity of snout to eye's anterior margin	1	1
Eye's diameter	0,5	0,5

d) *Lat. 6° N. Long. 45° W.* A. FORSSTRÖM. 1 specimen. Date not given.

Length of body	58 mm.
Greatest height of body	8 „
Distance from extremity of snout to dorsal fin	26 „
Distance from extremity of snout to vent	33 „
Length of head	3,5 „
Distance from extremity of snout to eye's anterior margin	1,5 „
Eye's diameter	1 „

18. *L. undulatus* n. sp.

Pl. II. f. 4—6.

The body is compressed, elongate, low, of almost even height, a trifle higher nevertheless behind than in front; its greatest height is contained about fifteen times in its length.

The head is very small; its length is contained about one and a half times in the greatest height of the body. Its upper profile is in the form of a regular arch. The snout is pointed. The interspace between the snout-extremity and the front margin of the eye is equal to one and a half times the latter's diameter. The eye has a circular contour; its upper margin does not reach up to the upper profile of the head. The posterior nostril lies immediately in front of the eye; the anterior one is quite close to the other. The cleft of the mouth is horizontal reaching as far back as the eye's posterior margin. The lower jaw is of the same length as the upper and has a convex lower profile retreating with a slightly prominent angle. There are teeth in both jaws.

The pectoral fins are small and acutely pointed. The vertical fins are little developed; the dorsal fin has its origin near the hinder end of the body. The caudal fin is short and rounded.

The vent is situated in front of the middle of the body. The alimentary canal has not a straight course; at fairly equal distances it is incised, causing the fore part of the body's under profile to appear wavy.

Above each of these incisions in the alimentary canal there is a line of very minute pigmentary spots. These are found also in the majority of the myocommata beneath the lateral line, forming to the naked eye unbroken dark lines of differing length and fineness.

Of this characteristic species, which apparently closely resembles *L. Kefersteini* KAUP, the collection is in possession of only one representative, captured by Captain ECKMAN off the coast of Georgia in Lat. 29° N. and Long. 72° W., in the month of Nov. 1890. That specimen has the following dimensions:

Length of body	88	mm.
Greatest height of body	6	"
Distance from extremity of snout to dorsal fin	83	"
Distance from extremity of snout to vent	35	"
Length of head	4	"
Distance from extremity of snout to eye's anterior margin	1,5	"
Eye's diameter	1	"

19. *L. humilis* n. sp.

Pl. II. f. 7—9.

The body is strongly compressed, elongate and very low, and of almost uniform height, the hinder part though is a trifle higher than the fore. Its greatest height is contained about fifteen times in its length.

The head is very small; its length goes once and a half into the body's greatest height. Its upper profile is in the form of a regular arch. The snout is pointed. The interspace between the snout-extremity and the anterior margin of the eye is about half as great again as the eye's diameter. The eye has a circular contour; its upper margin does not reach to the head's upper profile. The posterior nostril is situated a little in front of the eye; the anterior about as far from the posterior as from the snout-extremity. The cleft of the mouth is horizontal extending to somewhat behind the middle of the eye's under margin. The lower jaw is a little shorter than the upper and has an under profile that is slightly convex retreating with a somewhat prominent angle. Teeth in both jaws.

The pectoral fins are extremely rudimentary. The vertical fins are also very slightly developed; the dorsal fin has its origin immediately in front of the vent; the caudal fin is very short and bluntly pointed.

The vent is situated in front of the body's middle. Along the lower side of the body from the throat to the vent extends a row, at many points discontinuous, of very minute, closely packed pigmentary spots; another row of somewhat larger spots, further apart,

runs along the upper side of the body to the origin of the dorsal fin. A series of very minute spots runs along the bases of the dorsal, caudal and anal fins. Similar ones are found too in most of the myocommata beneath the lateral line, forming for the naked eye unbroken dark lines, differing in length, but approximately alike in fineness.

In the collection there are two examples of this species, which in many respects coincide with the previous one. These two were obtained by Captain FORSTRÖM in the vicinity of the island of *Fernando Noronha*, off the coast of *Brazil* (3° S. Lat. 30° W. Long.). That was in Dec. 1892. Their dimensions are as follows:

	a)	b)
	mm.	mm.
Length of body	88	70
Greatest height of body	6	5
Distance from extremity of snout to vent	41	36
Length of head (hardly)	4	3
Distance from extremity of snout to eye's anterior margin	1,5	1,5
Eye's diameter (hardly)	1	1

20. *L. javanicus* n. sp.

Pl. III. f. 1—3.

The body is strongly compressed, moderately elongate and low; its greatest height, contained about eleven times in its length is situated rather behind the middle. It gradually diminishes in height from that point towards both head and tail in approximately equal degrees.

The head is elongate; its length is equal to the body's greatest height. Its upper profile is in the form of a regular shallow arch. The snout is pointed. The space from the snout-extremity to the eye's anterior margin is about three times as great as the diameter of the eye.

The eye has a circular contour; its upper margin does not reach up to the upper profile of the head.

The posterior nostril is situated a little in front of the eye. The anterior is distant from the snout-extremity four times as far as from the posterior nostril. The cleft of the mouth is horizontal, reaching back to the middle of the lower margin of the eye.

The mandible projects a little beyond the upper jaw; its lower profile is straight, retreating with a slightly prominent angle. Teeth in both jaws. Pectoral fins none. The vertical fins show but slight development; the dorsal fin has its origin a little in front of the vent; the caudal fin is pointed.

The vent is in front of the body's middle, approximately at one third of the length from the fore part.

There are some series of closely packed pigmentary spots grouped along the sides of the body immediately above the alimentary canal. There are moreover a few scattered ones on the head in the region of the gill-openings and the snout-extremity.

In the collection there is one example of this species, obtained by Captain VON SCHÉELE in 1885 in the *Bali Straits*. Its measurements are as follows:

Length of body	44 mm
Greatest height of body.	4 "

Distance from extremity of snout to dorsal fin	13 mm.
Distance from extremity of snout to vent	16 "
Length of head	4 "
Distance from extremity of snout to eye's anterior margin	1,5 "
Eye's diameter	0,5 "

21. *L. crenatus* n. sp.

Pl. III. f. 4 and 5.

The body is compressed, rather short and high; its greatest height, contained about ten times in its length is situated behind the middle; from this point the height decreases by degrees, quite considerably towards the head, but scarcely at all towards the tail. The upper profile of the body is almost straight, the lower one on the contrary is pretty considerably convex; both profiles are slightly wavy or crenulate.

The head is very small; its length goes into the body's greatest height about two and a third times. Its upper profile is in the form of a regular arch. The snout is obtuse. From the snout-extremity to the anterior margin of the eye there is a distance not quite equal to the double of the eye's diameter. The eye has a circular contour; its upper margin does not reach up to the head's upper profile. The posterior nostril is nearly circular and placed directly in front of the eye's anterior margin; the anterior nostril is shaped like a tube, very short in length. The interspace of the nostrils is about as great as the distance between the anterior nostril and the snout-

extremity. The cleft of the mouth is almost horizontal, reaching back to behind the middle of the eye's lower margin. The jaws are of the same length; the mandible has a slightly convex lower profile and lacks the prominent angle. Teeth in both jaws.

The pectoral fins are of moderate size, obtuse. The dorsal and anal fins are low; the dorsal commences a little in advance of the vent; the caudal fin is rounded.

The vent is situated in the middle of the body.

There is a broken line of minute pigmentary spots along the sides of the body, near the lower margin; also a row along the back as far as the origin of the dorsal fin, but they are not so close together, are larger and with unequal intervals. A row of very minute closely packed spots runs the length of the bases of the dorsal, caudal and anal fins. Finally beneath the lateral line in most of the myocommata there are series of minute pigmentary spots, unequal in length but all of the same fineness.

The collection contains of this species only one specimen, procured by Captain ECKMAN in Nov. 1892 off the coast of *Georgia* (Lat. 29° N. Long. 72° W.) — the same locality as for *L. undulatus*. Its measurements are herewith given:

Length of body	70 mm.
Greatest height of body	7 "
Distance from extremity of snout to dorsal fin	30 "
Distance from extremity of snout to vent	35 "
Length of head	3 "

Distance from extremity of snout to eye's anterior margin	1 mm.
Eye's diameter	1 "

22. *L. fuliginosus* n. sp.

Pl. III. f. 6 and 7.

The body is compressed, rather short and high; its greatest height, contained in its length about seven times, is situated at a point distant about two thirds of the total length from the front end. From this point towards the head the height diminishes slowly, towards the tail hardly at all.

The head is of moderate size; its length is contained not quite three times in the greatest height of the body. Its upper profile is strongly convex and in the form of a regular arch. The snout is blunt. The distance from the snout-extremity to the anterior margin of the eye is about the same as the latter's diameter. The eye has a circular contour; its upper margin does not reach up to the upper profile of the head. The posterior nostril lies close up to the anterior margin of the eye a little above the middle of it and is rounded. The anterior is not far from the end of the snout and is of a suboval form; it is parallel to the upper profile; the nostrils are twice as far apart as the distance between the anterior one and the extremity of the snout. The cleft of the mouth is horizontal reaching further back than the middle of the eye's lower margin. The lower jaw is a trifle shorter than the upper; its under profile is

convex and lacks the prominent angle. Teeth are present in both jaws.

Pectoral fins are wanting. The dorsal and anal fins are low. The dorsal fin commences immediately in front of the vent. The caudal fin is short and rounded.

The vent is situated behind the middle of the body; the distance between the vent and the end of the tail is contained about twice and three fifths in the body's length.

On the snout and round and behind the eye there are numerous pigmentary spots of different sizes scattered about. A row of minute very closely packed spots extends along the bases of anal and caudal fins and along the hind part of the dorsal fin.

Of this species the collection contains one specimen from the *Central Atlantic* (Lat. 24° N. Long. 68° W.) obtained by Captain ECKMAN in December 1892. Its measurements are:

Length of body	78 mm.
Greatest height of body	11 "
Distance from extremity of snout to dorsal fin	46 "
Distance from extremity of snout to vent	48 "
Length of head	4 "
Distance from extremity of snout to eye's anterior margin	1 "
Eye's diameter	1 "

23. *L. subinornatus* n. sp.

Pl. IV. f. 1 and 2.

The body is strongly compressed, fairly elongate and low; its greatest height, contained about eight times in its length, is situated approximately in the middle, whence the height diminishes gradually and uniformly towards head and tail.

The head is of moderate size; its length is somewhat less than the greatest height of the body. Its upper profile is convex towards the rear, slightly concave towards the fore; this causes the snout to appear considerably depressed. The snout is pointed. From its extremity to the anterior margin of the eye the distance is not quite double the eye's diameter. The eye has an almost circular contour; its upper margin does not reach up to the upper profile of the head. The posterior nostril is immediately in front of the eye's anterior margin above the middle of it; the anterior nostril is about equally distant from the posterior as from the extremity of the snout. The cleft of the mouth tends upwards obliquely and reaches back almost to the hind margin of the eye. The lower jaw does not project quite so far as the upper; it has an almost straight under profile, the prominent angle is almost wholly wanting. Teeth are present in both jaws.

Pectoral fins none. The vertical fins are very slightly developed; the dorsal fin has its origin just in front of the vent; the caudal fin is rounded.

The vent lies behind the middle of the body;

its distance from the end of the tail is contained very nearly three times in the body's length.

Scattered pigmentary spots are met with on the head, also along the base of the caudal fin, but few in number here, and small.

There is one specimen in the collection, obtained in 1885 by Captain VON SCHÉELE in the Indian Ocean off the *East Coast of South Africa* (Lat. 29° 20' S. Long. 38° 40' E.). The dimensions are as follows:

Length of body	36	mm.
Greatest height of body	4,5	"
Distance from extremity of snout to vent	23	"
Length of head	3	"
Distance from extremity of snout to eye's anterior margin	1	"
Eye's diameter	0,5	"

24. *L. lanceolatus* n. sp.

Pl. IV. f. 3 and 4.

The body is strongly compressed, short and high; its greatest height, contained rather more than six times in its length, is situated at a point a little in front of the middle; thence the height diminishes gradually almost uniformly towards head and tail, possibly rather more rapidly towards the latter.

The head is small; its length is a trifle greater than half the body's height. Its upper profile is convex at the back, sloping slightly downwards; in front of the eye it has a concavity, afterwards it is straight

and almost horizontal, causing the snout to appear strongly depressed in comparison with the hind part of the head. The snout is pointed. The distance from the extremity of the snout to the fore-margin of the eye is a trifle more than twice the eye's diameter. The eye has an almost circular contour; its upper margin does not reach up to the upper profile of the head. The posterior nostril is situated a short distance before the anterior margin of the eye upwards. The distance between them is about equal to that which separates the two nostrils. The cleft of the mouth tends obliquely upwards reaching back as far as the middle of the eye's under margin. The lower jaw projects a little beyond the upper; its under profile is straight, retreating at a very prominent angle. Teeth are present in both jaws.

The pectoral fins are rudimentary. The vertical fins are very slightly developed.

The vent is situated in the hinder part of the body; its distance from the end of the tail is contained about five and a half times in the body's length.

Pigmentary spots are quite wanting.

This species reminding us, in its external form, of *L. longirostris* KAUP, is represented in the collection by three specimens from the *Central Atlantic* (Lat. 34° N. Long. 65° W.). They were procured by Captain ECKMAN on the 23rd of April 1890. The largest of these specimens has the following dimensions:

Length of body	33 mm.
Greatest height of body	5 "

Distance from extremity of snout to vent	27 mm.
Length of head	3 "
Distance from extremity of snout to eye's anterior margin	1,5 "
Eye's diameter	0,5 "

25. *L. hyoprroides* n. sp.

Pl. IV. f. 5 and 6.

The body is compressed, short and high; its greatest height, contained about five times in its length, is in front of the middle; from that point the height decreases fairly rapidly towards the head, more slowly towards the tail.

The head is rather small and considerably depressed from the trunk; its length is contained about once and three fourths in the body's greatest height. Its upper profile is slightly convex, but has an inconsiderable depression just in front of the eye. The snout is blunt. From its extremity to the anterior margin of the eye the distance is nearly double the latter's horizontal diameter. The lower part of the eye is somewhat contracted, the vertical diameter tends somewhat obliquely frontwards; its upper margin does not reach to the head's upper profile. The posterior nostril is situated at a short distance from the eye's anterior margin about on a level with its middle point; the anterior nostril is as far from the posterior as from the extremity of the snout.

The cleft of the mouth is almost horizontal reaching back as far as the centre of the eye's lower margin. The lower jaw is of the same length as the upper; it has a straight under profile, and retreats at a prominent angle. Both jaws are toothed.

The pectoral fins are of moderate size and pointed. The dorsal and anal fins are low. The commencement of the dorsal is distant from the occiput the length of the head; the caudal fin is pointed.

The vent is situated in front of the middle of the body. A series of minute pigmentary spots runs along the lower margin of the upper jaw, another along the lower jaw and two likewise parallel to the gill-opening. A row of similar spots, but further apart and irregular, extends the length of the ventral margin of the body, and a row of rather thickly packed spots runs too along the side of the body immediately over the alimentary canal; both these rows end at the vent. The body has moreover such spots scattered all over it; most of them are placed on the myocommata.

Of this species, which recalls *Hyoprorus messanensis* KÖLLIKER very strongly as regards configuration there is one specimen in the collection. It was obtained by Captain ECKMAN in the Central Atlantic off the coast of Georgia (Lat. 27° N. Long. 73° W.). Feb. 10. 1889.

Its dimensions are as follows:

Length of body	34	mm.
Greatest height of body	7	"
Distance from extremity of snout to dorsal fin	8	"

Distance from extremity of snout to vent	15,5 mm.
Length of head	4 "
Distance from extremity of snout to eye's anterior margin	1,5 "
Eye's diameter	1 "

26. *L. curvirostris* n. sp.

Pl. V. f. 1 and 2.

The body is compressed, exceedingly elongated and rather low; for the greater part of its length it is almost uniform in height; its height, where it reaches a maximum, would go nearly twenty-four times into the length, towards the head the decrease is inconsiderable, but in the other direction it is so great that the end of the body is almost threadlike.

The head is small; its length is contained about once and two thirds in the greatest height of the body. Its upper profile is very convex in the hinder part, but just in front of the eye it makes a distinct concavity. This causes the slightly arched snout to appear in contrast depressed. The snout is pointed. The distance between the extremity of the snout and the anterior margin of the eye is about twice as large as the diameter of the eye. The eye has a circular contour; its upper margin does not reach up to the upper profile of the head. The posterior nostril is situated immediately above the anterior margin of the eye; the anterior nostril, in the shape of a short tube obliquely truncated, is situated a little in front of the posterior but rather lower. The cleft of the mouth

tends somewhat obliquely upwards, is arched and reaches back to beneath the eye. The lower jaw is somewhat longer than the upper and retreats at a very prominent angle. Teeth are present in both jaws.

The pectoral fins are very small and rather pointed. The dorsal and anal fins are very low; the dorsal fin has its commencement a little in advance of the vent.

The vent is situated far back; the distance from it to the extremity of the tail is contained about ten times in the total length of the body.

A row of closely packed minute pigmentary spots runs along the flanks of the body, just above the alimentary canal. Another row of exceedingly minute ones extends along the bases of the dorsal and anal fins. A third row of similar spots follows the course of the lateral line.

There is only one example of the species in the collection. It was obtained by Captain ECKMAN in the *Central Atlantic* (Lat. 22° N. Long. 65° W.). Its dimensions are:

Length of body	238	mm.
Greatest height of body	10	"
Distance from extremity of snout to dorsal fin	208	"
Distance from extremity of snout to vent	215	"
Length of head	5	"
Distance from extremity of snout to eye's anterior margin	2,5	"
Eye's diameter	1	"

27. *L. tiluroides* n. sp.

Pl. V. f. 3—5.

The body is compressed, very much elongated, low; its greatest height, contained about twenty-three times in its length is situated in front of the middle; the height decreases thence but little towards the head, considerably on the contrary in the other direction, the body tapering here to a filament.

The head is small; its length is equal to the greatest height of the body. Its upper profile makes a concavity in front of the eye, the snout being thereby depressed from the convex hinder part of the head. The snout is pointed. The distance from its extremity to the anterior margin of the eye is twice and a half as large as the diameter of the latter. The eye has an almost circular contour; its upper margin does not reach up to the upper profile of the head. The posterior nostril is immediately in front of the anterior margin of the eye above its middle point. The anterior is at a distance from the posterior that is the quarter of its distance from the extremity of the snout. The cleft of the mouth tends obliquely upwards reaching back to the middle of the eye's under margin. The lower jaw is a trifle longer than the upper; it has a straight under profile and retreats at a prominent angle. Teeth are present in both jaws.

The fins are extremely rudimentary.

The vent is situated in the hind part of the body; its distance from the point of the tail goes about eight times into the body's length.

A row of minute pigmentary spots extends the length of the body's flanks, immediately above the alimentary canal.

In the shape of its body this species resembles very much the species in the genus *Tilurus*. It is represented in the collection by only one individual, obtained by Captain VON SCHEELE in the *Atlantic Ocean* (Lat. 24° N. Long. 21° 50' W.) in 1885.

Its measurements are as follows:

The length of the body	115	mm.
The greatest height of the body	5	"
Distance from extremity of snout to vent	101	"
Length of head	5	"
Distance from extremity of snout to eye's anterior margin	2,5	"
Eye's diameter	1	"

Genus **TILURUS** KÖLLIKER.

, Verh. phys. medic. Ges. Würzburg. 1854. Bd IV. p. 100.

Both species of this genus, *T. trichiurus* (Cocco) KAUP and *T. hyalinus* FACCIOLÀ are represented in the museums collection of Leptocephalids.

1. **T. trichiurus** (COCCO) KAUP.

Syn. *Leptocephalus trichiurus* COCCO, Giorn. Sc. Lett. Art. Sicil. 1829. XXVI. p. 138.

T. Gegenbauri KÖLL., l. c. p. 101.

T. trichiurus KAUP, Cat. Apod. Fish. Brit. Mus. 1856. p. 145. pl. XVI. f. 5.

Oxystomus Rafinesquii FACC., Naturalista Sic. 1882. Anno I. N:o 8. p. 188. t. VII. f. 2.

There are five examples of this species in the collection; four of these Dr. APPELLÖF collected at Messina in 1888 and the remaining one was obtained by Dr. BOVALLIUS in the harbour of Messina on the 13th of Feb. 1891. Two of the former ones are in a very bad state, and hence their measurements could not be taken.

a, b) Messina. A. APPELLÖF. 2 specimens. 1888.

	<i>a)</i>	<i>b)</i>
	mm.	mm.
Length of body	309	300
Greatest height of body	9	8

	a)	b)
	mm.	mm.
Distance from extremity of snout to vent	291	258
Length of head	5	5
Distance from extremity of snout to eye's anterior margin	2	2
Eye's diameter	1	1

c) d) *Messina*. A. APPELLÖF. 2 specimens 1888, defective.

e) *Messina*; harbour, surface, night-time. C. BOVALLIUS. 1891. Feb. 13.

Length of body	260 mm.
Greatest height of body	6 "
Distance from extremity of snout to vent .	249 "
Length of head	5 "
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	1 "

2. *T. hyalinus*. FACCIOLA.

Syn. *Oxystomus hyalinus* RAFINESQUE. Ind. d'ittiol. sic. 1810. p. 62. t. 2. f. 2.

Oxystomus hyalinus FACC., Naturalista Sic. Anno I. N:o 8. 1882. p. 187. t. VII. f. 1.

Tilurus hyalinus FACC., Rivista sp. Leptoc. etc. 1883. p. 199.

This species too is represented by five individuals, four captured by Dr. APPELLÖF near Messina in 1888 and one by Dr. BOVALLIUS in the same locality on Feb. 20. 1891.

a - d) *Messina*. A. APPELLÖF. 4 specimens. 1888.

	a)	b)	c)	d)
	mm.	mm.	mm.	mm.
Length of body	309	267	263	242

	a)	b)	c)	d)
	mm.	mm.	mm.	mm.
Greatest height of body	12	12	12	12
Distance from extremity of snout to vent	291	261	254	227
Length of head	5	5	5	5
Distance from extremity of snout to eye's anterior mar- gin	2	2	2	2
Eye's diameter	1	1	1	1

e) *Messina*; Ganzirri, surface, C. BOVALLIUS. 1 specimen. 1891. Feb. 20.

Length of body	222 mm.
Greatest height of body	9 "
Distance from extremity of snout to vent .	215 "
Length of head	5 "
Distance from extremity of snout to eye's anterior margin	2 "
Eye's diameter	1 "

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Explanation of the plates.

Plate I.

Fig. 1.	Leptocephalus	Eckmani	n. sp.	Nat. size.
» 2.	»	»	»	Head. $\frac{8}{1}$.
» 3.	»	»	»	Part of the trunk. $\frac{2}{1}$.
» 4.	»	immaculatus	»	Nat. size.
» 5.	»	»	»	Head. $\frac{8}{1}$.
» 6.	»	Schéelei.	»	Nat. size.
» 7.	»	»	»	Head. $\frac{8}{1}$.

Plate II.

Fig. 1.	Leptocephalus	Forsströmi	n. sp.	Nat. size.
» 2.	»	»	»	Head. $\frac{8}{1}$.
» 3.	»	»	»	Part of the trunk in the region of the vent. $\frac{2}{1}$.
» 4.	»	undulatus	»	Nat. size.
» 5.	»	»	»	Head. $\frac{8}{1}$.
» 6.	»	»	»	Part of the trunk in the region of the vent. $\frac{2}{1}$.
» 7.	»	humilis	»	Nat. size.
» 8.	»	»	»	Head. $\frac{8}{1}$.
» 9.	»	»	»	Part of the trunk in the region of the vent. $\frac{2}{1}$.

Plate III.

- Fig. 1. *Leptocephalus javanicus* n. sp. $\frac{2}{1}$.
 » 2. » » » Head. $\frac{8}{1}$.
 » 3. » » » Part of the trunk (magnified).
 » 4. » *crenatus* » $\frac{2}{1}$.
 » 5. » » » Head. $\frac{8}{1}$.
 » 6. » *fuliginosus* » Nat. size.
 » 7. » » » Head. $\frac{8}{1}$.

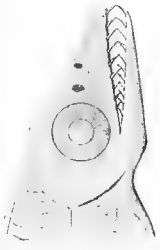
Plate IV.

- Fig. 1. *Leptocephalus subinornatus* n. sp. $\frac{2}{1}$.
 » 2. » » » Head. $\frac{8}{1}$.
 » 3. » *lanceolatus* » $\frac{2}{1}$.
 » 4. » » » Head. $\frac{8}{1}$.
 » 5. » *hyoproroides* » $\frac{2}{1}$.
 » 6. » » » Head. $\frac{8}{1}$.

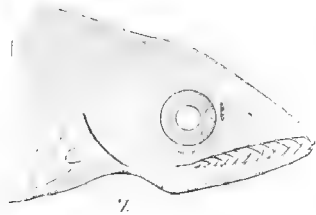
Plate V.

- Fig. 1. *Leptocephalus curvirostris* n. sp. Nat. size.
 » 2. » » » Head. $\frac{8}{1}$.
 » 3. » *tiluroides* » Nat. size.
 » 4. » » » Head. $\frac{8}{1}$.
 » 5. » » » Part of the trunk. $\frac{2}{1}$.





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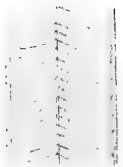
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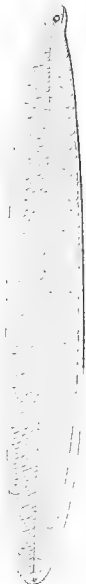
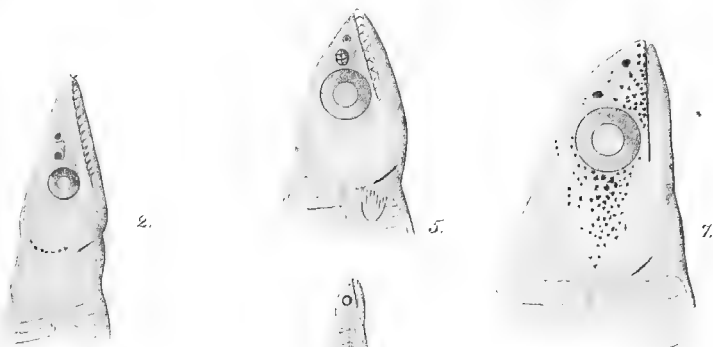
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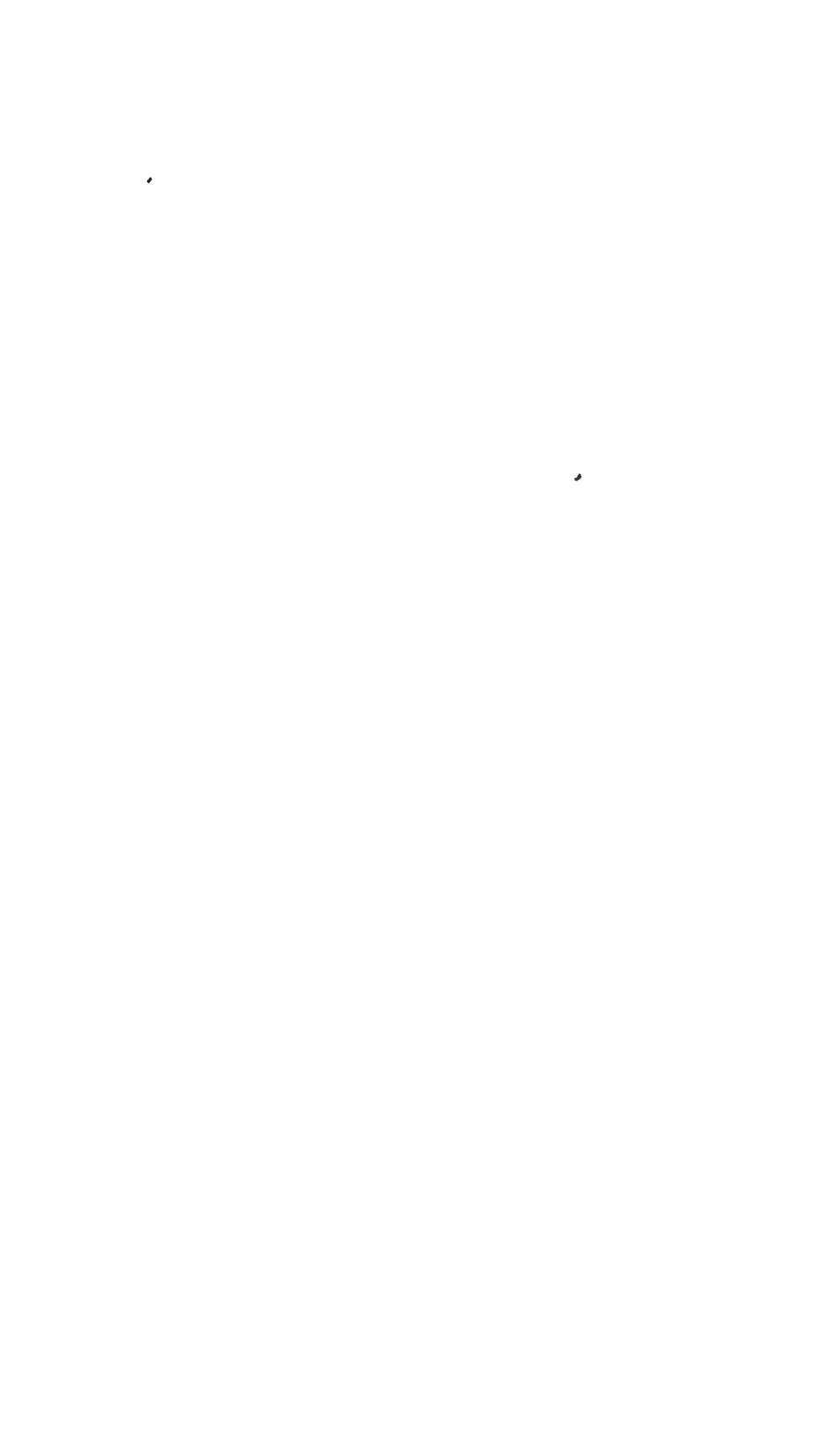


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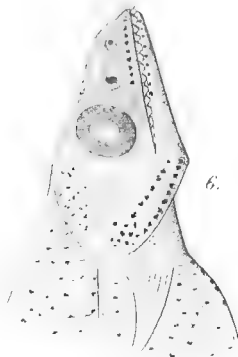




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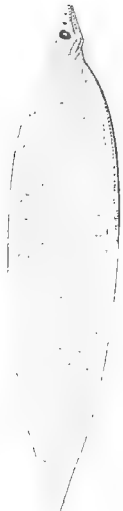
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