

# RECORDS

of the

# INDIAN MUSEUM

(A JOURNAL OF INDIAN ZOOLOGY)

Vol. XXXVII, Part I

APRIL, 1935

	Page
On Two undescribed forms of the Genus <i>Oligotoma</i> with a description of the external genitalia of <i>Oligotoma michaeli</i> and distributional records of some Indian Forms. <i>S. Mukerji</i>	1
On a New Oxyurid from a Squirrel. <i>S. S. Patwardhan</i> .. ..	11
Records of Indian Trypetidae (Diptera) with descriptions of some apparently new species. <i>H. K. Munro</i> .. .. .	15
Nematodes from a common Indian Lizard ( <i>Uromastix hardwicki</i> ) with remarks on <i>Kalicephalus parvus</i> Maplestone, 1932. <i>R. C. Chatterji</i> .. .. .	29
On the Systematic Position of the Loach, <i>Homaloptera hingi</i> Herre. <i>S. L. Hora</i> .. .. .	37
On a Collection of Echiuroids of the Genus <i>Thalassema</i> Lamarck in the Indian Museum, Calcutta. <i>B. Prashad</i> .. .. .	39
On Three South Indian Crabs (Decapoda, Brachyura) of the Madras Museum. <i>Heinrich Bals</i> .. .. .	45
Notes on Fishes in the Indian Museum.	
XXIV. Loaches of the Genus <i>Nemachilus</i> from Eastern Himalayas, with the description of a New Species from Burma and Siam. <i>S. L. Hora</i> .. .. .	49
Notes on Indian Mygalomorph Spiders. II. <i>F. H. Gravely</i> ..	69
Further Notes on Crustacea Decapoda in the Indian Museum.	
VII. On a New Species of Freshwater Crab (Family Potamonidae) from the Bombay Presidency, together with notes on some allied species. <i>B. Chopra &amp; K. N. Das</i> ..	85

Calcutta :

PUBLISHED BY THE DIRECTOR, ZOOLOGICAL SURVEY OF INDIA

1935

Price Rupees Three and annas eight or six shillings

NZ—RI/37.

**RECORDS**  
of the  
**INDIAN MUSEUM**

(A JOURNAL OF INDIAN ZOOLOGY)

**Vol. XXXVII, 1935.**

EDITED BY  
THE DIRECTOR,  
ZOOLOGICAL SURVEY OF INDIA.



Calcutta:  
PUBLISHED BY THE DIRECTOR, ZOOLOGICAL SURVEY OF INDIA  
1936.

*Price As. 6 or 8d.*

## CONTENTS.

---

	<i>Page.</i>
<b>PART I.—Published April, 1935.</b>	
On two undescribed forms of the Genus <i>Oligotoma</i> with a description of the external genitalia of <i>Oligotoma michaeli</i> and distributional records of some Indian Forms	1
On a New Oxyurid from a Squirrel	11
Records of Indian Trypetidae (Diptera) with descriptions of some apparently new species	15
Nematodes from a common Indian Lizard ( <i>Uromastix hardwicki</i> ) with remarks on <i>Kalicephalus parvus</i> Maplestone, 1932	29
On the Systematic Position of the Loach, <i>Homaloptera hingi</i> Herre	37
On a Collection of Echiuroids of the Genus <i>Thalassema</i> Lamarck in the Indian Museum, Calcutta	39
On Three South Indian Crabs (Decapoda, Brachyura) of the Madras Museum	45
Notes on Fishes in the Indian Museum.	
XXIV Loaches of the Genus <i>Nemachilus</i> from Eastern Himalayas, with the description of a New Species from Burma and Siam	49
Notes on Indian Mygalomorph Spiders. II	69
Further Notes on Crustacea Decapoda in the Indian Museum.	
VII. On a New Species of Freshwater Crab (Family Potamonidae) from the Bombay Presidency, together with notes on some allied species	85
<b>PART II.—Published June, 1935.</b>	
On a Collection of Trichoptera from the Indian Museum.	93
The Male of <i>Ornithoctonus minax</i> (Thorell)	211
Description of a new species of <i>Hemirhamphid</i> Fish, <i>Dermogenys burmanicus</i> from Lower Burma, with notes on Sexual Dimorphism and its taxonomic significance	213
New Asilidae from India (Insecta : Diptera)	219
Acanthocephalan Parasites of Certain Fishes from Calcutta	231
The Amphibians and Reptiles obtained by Capt. Kingdon Ward in Upper Burma, Assam and S. W. Tibet	237

	Page.
PART III.— <i>Published September, 1935.</i>	
New Indian Chalcidoidea (Parasitic Hymenoptera)	241
Notes on some Rare and Interesting Fishes from the Andaman Islands, with descriptions of two New Freshwater Gobies	259
Report on some Amphipoda, Isopoda, and Tanaidacea in the collections of the Indian Museum	279
New Oriental Dragonflies (Order Odonata)	321
The Nematode Genus <i>Deletrocephalus</i> Diesing, 1851	335
First Record of the Trichogrammatid Chalcid Genus <i>Chaetostricha</i> Walker from India, with a description of a New Species	337
Records, Notes and Descriptions of <i>Bremus</i> from Asia (Bremidae : Hymenoptera)	339
Interessante und Neue Schwimmkäfer des Indischen Museums in Calcutta	365
Notes on Fishes in the Indian Museum.	
XXV On two New Species of Cyprinid Fishes from Deolali, Nasik District, Bombay Presidency	375
Fish of the Naga Hills, Assam	381
PART IV.— <i>Published December, 1935.</i>	
Notes sur des Cyclopides d'eau douce de l'Inde, avec descriptions d'une espece nouvelle et de deux varietés nouvelles	405
A New Encyrtid Chalcid Genus <i>Krishnieriella</i> , gen. nov., from India	421
Studies on Indian Itonididae (Cecidomyiidae : Diptera).	
II. Descriptions of new midges and galls.	425
On Trematode parasites from <i>Ptyas korroë</i> (Schlegel 1837) and <i>P. mucosus</i> (Linnaeus 1758) from Rangoon	455
A Note on the systematic position of <i>Psilorhynchus aymonieri</i> Tirant from Cambodia	459
Further Notes on Crustacea Decapoda in the Indian Museum.	
VIII. On the Decapod Crustacea collected by the Bengal Pilot Service off the Mouth of the River Hooghly. Brachygnatha (Oxyrhyncha and Brachyrhyncha).	463

## LIST OF PLATES.

---

		<i>Follow page</i>
Plate I.	New species of <i>Thalassema</i> . . . . .	44
Plate II.	South Indian Crabs . . . . .	48
Plate III.	<i>Nemachilus</i> from Eastern Himalayas . . . . .	68
Plate IV	<i>Paratelpusa (Barytelpusa) mccanni</i> , sp. nov. . . . .	92
Plate V.	Indian Acanthocephala . . . . .	236
Plate VI.	Fishes of the Andaman Islands . . . . .	278
Plate VII.	<i>Psilorhynchus homaloptera</i> , sp. nov. . . . .	404
Plate VIII.	Cyclopides d'eau Douce de l'Inde . . . . .	420
Plate IX.	Crabs from Sandheads . . . . .	514

LIST OF AUTHORS.

	<i>Page.</i>
BALSS, HEINRICH.	
On Three South Indian Crabs (Decapoda, Brachyura) of the Madras Museum	45
BARNARD, K. H.	
Report on some Amphipoda, Isopoda, and Tanaidacea in the collection of the Indian Museum	279
BROMLEY, STANLEY W.	
New Asididae from India (Insecta : Diptera)	219
CHATTERJI, R. C.	
Nematodes from a common Indian Lizard ( <i>Uromastix     hardwicki</i> ) with remarks on <i>Kalicephalus parvus</i> Maple- stone, 1932	29
CHOPRA, B.	
Further Notes on Crustacea Decapoda in the Indian Museum. VII. On a New Species of Freshwater Crab (Family Potamonidae) from the Bombay Presidency, together with notes on some allied species ( <i>in collabora-     tion with Das, K. N.</i> )	85
CHOPRA, B.	
Further Notes on Crustacea Decapoda in the Indian Museum. VIII. On the Decapod Crustacea collected by the Bengal Pilot Service off the Mouth of the River Hooghly. Brachygnatha (Oxyrhyncha and Brachy- rhyncha)	463
DAS, K. N.	
Further Notes on Crustacea Decapoda in the Indian Museum. VII. On a New Species of Freshwater Crab (Family Potamonidae) from the Bombay Presidency, together with notes on some allied species ( <i>in collaboration     with Chopra, B.</i> )	85
DATTA, M. N.	
Acanthocephalan Parasites of Certain Fishes from Calcutta ( <i>in collaboration with Poddar, T. N.</i> )	231
FRASER, F. C.	
New Oriental Dragonflies (Order Odonata)	321

	Page.
FRISON, T. H.	
Records, Notes and Descriptions of <i>Bremus</i> from Asia (Bremidae : Hymenoptera)	339
GOGATE, B. S.	
On Trematode parasites from <i>Ptyas korros</i> (Schlegel 1837) and <i>P. mucosus</i> (Linnaeus 1758) from Rangoon	455
GRAVELY, F. H.	
Notes on Indian Mygalomorph Spiders. II	69
GRAVELY, F. H.	
The Male of <i>Ornithoctonus minax</i> (Thorell)	211
GSCHWENDTNER, L.	
Interessante und Neue Schwimmkäfer des Indischen Museums in Calcutta	365
HORA, S. L.	
On the Systematic Position of the Loach, <i>Homaloptera</i> <i>lingi</i> Herre	37
HORA, S. L.	
Notes on Fishes in the Indian Museum. XXIV Loaches of the Genus <i>Nemachilus</i> from Eastern Himalayas, with the description of a New species from Burma and Siam	49
HORA, S. L.	
Notes on Fishes in the Indian Museum. XXV On two New species of Cyprinid Fishes from Deolali, Nasik District, Bombay Presidency ( <i>in collaboration with</i> <i>Mukerji, Dev Dev</i> )	375
HORA, S. L.	
Fish of the Naga Hills, Assam ( <i>in collaboration with</i> <i>Mukerji, Dev Dev</i> )	381
HORA, S. L.	
A Note on the systematic position of <i>Psilorhynchus aymo-</i> <i>nieri</i> Tirant from Cambodia	459
LINDBERG, K.	
Notes sur des Cyclopides d'eau douce de l'Inde, avec descriptions d'une espèce Nouvelle et de deux variétés Nouvelles	405
MANI, M. S.	
New Indian Chalcidoidea (Parasitic Hymenoptera)	241

	Page.
MANI, M. S.	
First Record of the Trichogrammatid Chalcid Genus <i>Chaetostricha</i> Walker from India, with a description of a new species . . . . .	337
MANI, M. S.	
A New Encyrtid Chalcid Genus <i>Krishnieriella</i> , gen. nov., from India . . . . .	421
MANI, M. S.	
Studies on Indian Itonididae (Cecidomyiidae : Diptera) II. Descriptions of new midges and galls.	425
MAPLESTONE, P. A.	
The Nematode Genus <i>Deletrocephalus</i> Diesing, 1851	335
MARTYNOV, A. B.	
On a collection of Trichoptera from the Indian Museum	93
MUKERJI, DEV DEV	
Description of a new species of Hemirhamphid Fish, <i>Dermogenys burmanicus</i> from Lower Burma, with notes on Sexual Dimorphism and its taxonomic significance	213
MUKERJI, DEV DEV	
Notes on some Rare and Interesting Fishes from the Andaman Islands, with descriptions of Two New Fresh- water Gobies . . . . .	259
MUKERJI, DEV DEV	
Notes on Fishes in the Indian Museum. XXV On two New species of Cyprinid Fishes from Deolali, Nasik District, Bombay Presidency ( <i>in collaboration with</i> <i>Hora, S. L.</i> ) . . . . .	375
MUKERJI, DEV DEV	
Fish of the Naga Hills, Assam ( <i>in collaboration with</i> <i>Hora, S. L.</i> ) . . . . .	381
MUKERJI, S.	
On two undescribed forms of the Genus <i>Oligotoma</i> with a description of the external genitalia of <i>Oligotoma michaeli</i> and distributional records of some Indian Forms	1
MUNRO, H. K.	
Records of Indian Trypetidae (Diptera) with descriptions of some apparently new species . . . . .	15

	<i>Page.</i>
PODDAR, T. N.	
Acanthocephalan Parasites of Certain Fishes from Calcutta <i>(in collaboration with Datta, M. N.)</i>	231
PATWARDHAN, S. S.	
On a New Oxyurid from a Squirrel	11
PRASHAD, B.	
On a Collection of Echiuroids of the Genus <i>Thalassema</i> Lamarck in the Indian Museum, Calcutta	39
SMITH, MALCOLM A.	
The Amphibians and Reptiles obtained by Capt. Kingdon Ward in Upper Burma, Assam and S. W. Tibet	237

## INDEX.

[N.B.—An asterisk (\*) preceding a name denotes a new variety or sub-species; a dagger (†) indicates a new species; a double dagger (‡) a new genus or sub-genus; a double asterisk (\*\*) a new family or sub-family; synonyms are printed in italics.]

	<i>Page.</i>		<i>Page.</i>
<b>A</b>		Amphipoda	<b>279</b>
Acacia leucophloea	448, 449	Amphipsyche	185, 196, 201, 203
sp.	447	†bengalensis	201, 209
Acanthaceae	452	†distincta	196, 197, 209
<i>Acanthodon</i>	69	†indica	199, 200, 201, 209
barkudensis	69	nirvana	209
constructor	69	propinqua	200, 201
Acanthogyrus acanthogyrus	231, 232, 233	proluta	196, 197
Acanthoneura	23	sp.	199, 209
†gravelyi	24	†tricalcarata	197, 198, 209
<i>Acanthoneura</i> (Bezi)	23	vedana	199, 209
Acanthopthalmus pangia	383, 384	‡Amphipsychella	201, 203
Acclathura	306	†extrema	201, 202, 203, 209
<i>Achelous whitei</i>	481, 482	<i>Amphitrite gracilimanus</i>	481
<i>Acidia erythraspis</i>	23	<i>Ampithoe inda</i>	305
<i>Acidia</i> (Ocneros) praestans	21	<i>intermedia</i>	305
<i>Acoura obscura</i>	56	<i>lobata</i>	305
<i>Acroceratitis</i>	16	ramondi	305
<i>plumosa</i>	16	<i>vallanti</i>	305
Acrotaeniostola	18, 19	Ampithoidae	305
†apiventris	19	Anacardiaceae	446
flavoscutellata	18	Andrenosoma †choprai	227
scutellaris	18	Anandaliella	77, 78
sexvittata	18	†pectinifera	76, 78
†spiralis	18	travancorica	78
Actumnus	47	Annulipalpia	93
<i>Actumnus nudus</i>	46	Anthuridae	306
<i>Aegeria</i>	471	Aoridae	295
<i>Aegle marmelos</i>	444	Apanthura <i>dubia</i>	306
Aeschnidae	321, 324	sandalensis	306
Aeschnophlebia	323	Aplocheilus melastigma	259, 260
Aethaloptera	185, 192, 193, 194	Apoclea †indica	225
sexpunctata	192, 209	Apocryptes bato	266
Agapetus	108	Apseudes	313
jakutorum	109	chilkensis	314, 316
kirgisorum	109	galapagensis	319
sibiricus	109	†gymnophobia	317
†triangularis	108, 109, 204	meridionalis	319
Agrion	330	<i>sapensis</i>	314, 316
atrata	330	spinosus	315
†atrocyana	321, 330	Apseudidae	313
†coomani	321, 331	Apsilochorema	110
cornelia	331, 332	†annandalei	110, 111, 204
grandaeva	331	indicum	111, 112, 204
haemorrhoidalis	332	sutshanum	110, 112
laosica	331, 332	Archineura	328
melli	331	basilactea	329
Agrionidae	329	hetaerinoides	320
Alaplactana	13	incarnata	320
Aleuris	30	Arctopsyche	170
Allocotosia auratus	230	lobata	170, 207
Allorchestes aquilinus	293, 294	Arctopsychidae	170, 207
Ambassis nama	381	Ariidae	260
Amblycepidae	382, 385, 386	Arius <i>andamanensis</i>	260
Amblyceps mangois	56, 382, 386	<i>sumatranus</i>	260
Ampelisca pusilla	279	thalassius	260
Ampeliscidae	279	venosus	260
<i>Amphiaschna beesoni</i>	324	Ascaridia columbae	29
		Asellidae	313

	<i>Page.</i>		<i>Page.</i>
Asellus	313	Brachygnatha	463, 466
Asilidae	219	Brachyrhyncha	463, 464, 474
Asilinae	219, 230	Brachyura	45
Asilus	219	Bremidae	339
aurimystax	230	Bremus	339
opulentus	230	atrocinctus	360
orientalis	219, 230	atrocinctus terminalis	360
†ricardoii	219	channicus brevigeneralis	362
Asphondylia	446	dentatus	351, 352, 353, 354, 355
rivocae	452	*concinus	352, 354, 355
Astochia †canis	223	*surdus	553
determinatus	230	eximius	355
maculipes	230	festivus	356
Asystasia caromandeliana	452	flavescens	361
Atypidae	70	flavothoracicus	341
Atypus	70	funerarius	354, 356
dorsualis	70	lateritus	353, 356
sp.	72	genalis	353
†sutherlandi	70, 71	grahami	353, 354
Awaous	261	*ordinatus	353, 354
genivittatus	262	haemorrhoidalis	356
lachrymosus	262	albopleuralis	357
melanocephalus	261	hortorum	346, 348
ocellaris	262	ignitus	351
personatus	261	*cancellatus	351
Azuma frontalis	328	sub-collaris	351
		longiceps	340, 341
		mearnsi bakeri	361
		dilutus	361
		geei	361
		melaleucus	356
		melanurus subdistinctus	341, 349
		†metcalfi	357, 358
		mimeticus gantokiensis	348
		geminatus	348
		insidiosus	348
		turneri	349
		miniatus	342
		montivagus	341
		montivolans	359
		oculatus *crassus	342
		haemorrhous	340
		orichalceus	354, 355
		*conjunctus	354, 355
		orientalis	351
		buccinatoris	359
		khasianus	359
		oshanini	340
		portschinskyi	346, 348
		†pressus	342, 343, 344
		†priscus	349
		†religiosus	344, 345, 348
		rotundiceps	361, 362
		*cruentatus	362
		*protensus	361, 362
		runderatus	348
		rufocognatus	352, 354
		saltuarius	346, 348
		†securus	346, 347, 348
		semenovianus	342
		sikhimi	354
		speciosus	351
		supremus	346, 348
		trifasciatus	359
		tunicatus	339, 340, 350
		Bremus (Agrobombus)	349, 350, 359
		Bremus (Alpigenobombus)	351, 352, 353, 355

## B

Badis badis	384
Bagridae	382, 385
†Bainidiplosis	427
†championi	428, 429
Barbus chrysopterus	381
clavatus	382, 383, 388
conchoniis	383
hexagonolepis	382, 383, 389
hexastichus	381, 389
oatesii	383, 384
ticto	375, 382, 383, 389
tor	383, 389
Barilius barila	381, 383, 388
bendelesis	375
bendelesis chedra	383, 384
dogarsinghi	383, 385
sp.	375
vagra	381
Barychelidae	73
Barytelphusa	85
Bathygobius	266
fuscus	261, 266
Bidessus geminus	365, 374
†regimbarti	367, 374
signatellus	368
thermalis	365, 367, 368
Bifila	432
Bignoniaceae	452
Blattoidea	95
Blennidae	271
Blenniinae	273
Blennius	273
semifasciatus	261, 273, 274
Boerhaavia spp.	453
Boyeria vinosa	322
Bombus altaicus	341
longiceps	340
montivagus	341
vulgaris	339, 340

	Page.		Page.
<i>Bremus</i> ( <i>Bremus</i> )	350, 351	<i>Charybdis</i> ( <i>Goniohellenus</i> ) <i>hoplites</i>	
<i>Bremus</i> ( <i>Diversobombus</i> )	348	<i>vadorum</i>	465, 493
<i>Bremus</i> ( <i>Hortobombus</i> )	344, 345, 346,	<i>sinensis</i>	465, 493
	347	<i>vedorum</i>	464, 493, 494, 495, 496
<i>Bremus</i> ( <i>Lapidariobombus</i> )	341, 342,	<i>Charybdis</i> ( <i>Goniosoma</i> ) <i>callianassa</i>	464,
	344		489, 490, 491, 493
<i>Bremus</i> ( <i>Mucidobombus</i> )	350	<i>crusiatus</i>	464, 482, 483
<i>Bremus</i> ( <i>Orientalibombus</i> )	356, 357,	<i>crucifera</i>	482
	359	<i>merguiensis</i>	464, 484, 485, 486, 487
<i>Bremus</i> ( <i>Pratobombus</i> )	360, 361	<i>miles</i>	464, 486, 487
<i>Bremus</i> †( <i>Pressibombus</i> )	342	<i>rostrata</i>	464, 491, 492, 493
<i>Bremus</i> ( <i>Rufipedibombus</i> )	355	<i>variegata</i>	464, 488, 489, 490
<i>Bremus</i> ( <i>Sibiricobombus</i> )	341, 342	<i>Chelyophora</i>	16
<i>Bremus</i> ( <i>Subterraneobombus</i> )	349	<i>borneana</i>	16
<i>Bruchus quadrimaculatus</i>	337, 338	<i>histrionica</i>	16
<i>Buchnania latifolia</i>	427	<i>plumosa</i>	17
<i>Bufo lentiginosus</i>	457	<i>separata</i>	17
<i>stuarti</i>	238	† <i>siamensis</i>	17
<i>viridis</i>	238	<i>striata</i>	17
<i>Butea frondosa</i>	430, 432	<i>Cheumatopsyche</i>	175, 177
		<i>albofasciata</i>	176
		<i>Cheumatopsyche</i> ( <i>Hydropsychodes</i> )	
		<i>angusta</i>	178
		† <i>columnata</i>	177, 178, 208
		† <i>curvata</i>	178, 179, 208
		<i>infascia</i>	176
		<i>sp.</i>	179, 208
		† <i>truncata</i>	175, 176, 177, 207
		<i>Cheumatopsyche</i> ( <i>Ulmeria</i> ) <i>chloro-</i>	
		<i>gastra</i>	207
		<i>lebasii</i>	207
		<i>stenocyta</i>	207
		<i>suffusa</i>	207
		<i>Chilobrachys</i>	75, 84
		<i>fimbriatus</i>	84
		<i>fumosus</i>	84
		<i>hardwicki</i>	84
		<i>Chimarra</i>	123, 126, 130
		† <i>aberrans</i>	126, 127, 130, 205
		<i>bicolor</i>	205
		† <i>digitata</i>	123, 124, 125, 129,
			130, 205
		† <i>kumaonensis</i>	124, 125, 126, 205
		† <i>minuta</i>	128, 205
		<i>pilosella</i>	205
		<i>pulla</i>	205
		<i>sp.</i>	129, 205
		<i>spp.</i>	130
		<i>Chlorogomphus</i>	324
		<i>Chloropsyche</i>	185, 193
		<i>Choeroichthys</i>	276
		<i>sculptus</i>	261, 276, 277
		<i>Chonophorus</i>	261
		<i>melanocephalus</i>	262
		<i>Cirolana</i>	308
		<i>fluviatilis</i>	308, 309, 310, 311, 312
		<i>hirticeps</i>	309
		<i>nigra</i>	308, 309, 310, 312
		<i>pleonastica</i>	308, 309, 310, 311, 312
		<i>pustulosa</i>	308, 309
		<i>sculpta</i>	308, 309
		<i>sulcata</i>	308, 309, 312
		<i>sulcaticauda</i>	308, 309
		<i>venusticauda</i>	308, 309, 312
		<i>willeyi</i>	308, 309, 310, 312
		<i>Climacobasis modesta</i>	332
		<i>Clininae</i>	271
		<i>Cleistostoma</i>	48

## C

<i>Cadaba indica</i>	441
<i>Caecidothea kawamurai</i>	313
<i>Calamoceratidae</i>	95
<i>Calathura borradalei</i>	306
<i>Caliaeschna</i> (?) <i>acutifrons</i>	323
<i>Callichrous bimaculatus</i>	385
<i>Calliopiidae</i>	280
<i>Calliopioides pictus</i>	280
<i>Calommata</i>	72
<i>Calotes kingdon-wardi</i>	238
<i>Cancer tyche</i>	505, 506
<i>Caphyrinae</i>	464, 497
<i>Capparidae</i>	441
<i>Capparis sepiaria</i> (?)	442
<i>Cardiospermum halicacabum</i>	444
<i>Catla catla</i>	231
<i>Catometopa</i>	463
<i>Cecidomyia cerris</i>	442
<i>Cecidomyiidae</i>	425
<i>Cecidomyiella crataevae</i>	442
<i>Cephalaeschna</i>	323
† <i>biguttata</i>	321
<i>Cephalandra indica</i>	450
<i>Ceradocus rubromaculatus</i>	286
<i>Ceroplastodotes cajani</i>	421, 423
<i>Chaetosticha</i>	337
<i>Chaetostricha</i>	337
<i>dimidiata</i>	337
<i>minutissimum</i>	337
† <i>mukerjii</i>	337, 338
<i>phaseoli</i>	337
<i>pretiosa</i>	337
<i>pulchra</i>	337
<i>schlicki</i>	337
<i>wernerii</i>	337
<i>Chalcididae</i>	242
<i>Chalcidinae</i>	249
<i>Chalcidinariae</i>	249
<i>Chalcidoidea</i>	241
<i>Chalcis</i>	249
<i>Chalcis</i> ( <i>partim</i> )	250
<i>Charybdis</i>	488
<i>bimaculata</i>	488
<i>hoplites</i>	465, 493, 494, 495, 496, 497
<i>pusilla</i>	496



	Page.		Page.
<i>Doolea ovis</i>	463, 464, 467, 468, 469	<i>Eriopisa</i>	283
<i>ovis japonica</i>	467	<i>chilkensis</i>	283, 284
<i>tetraptera</i>	463, 468, 471	<i>Eriopisella</i>	284
<i>Dolophiliella</i>	121	<i>sechellensis</i>	284, 285
<i>chinensis</i>	122	<i>Eucharidae</i>	253
† <i>relicta</i>	121, 205	<i>Eucyclops</i>	408
<i>Dolophilodes</i>	122	<i>indicus</i>	408
† <i>indicus</i>	122, 205	† <i>multicolor</i>	405, 408
<i>ornata</i>	122	<i>prasinus</i>	408
<i>Doryichthys insularis</i>	259	<i>Euleia</i>	22
<i>Doryichthys sculptus</i>	276	<i>Euleia (Acidiella) erythraspis</i>	23
<i>Doryrhamphinae</i>	275	<i>Euleia (Acidiostigma) apicalis</i>	22
<i>Doryrhamphus</i>	275	† <i>flucens</i>	22, 23
<i>melanopleura</i>	261, 275, 276	<i>Eulophidae</i>	256
<i>Dracunculus medinensis</i>	408, 411	<i>Eupelmiariae</i>	254
<i>Dromiacea</i>	463	<i>Eupelminae</i>	254
<i>Dynopsylla grandis</i>	442	<i>Euplectriariae</i>	256
<i>Dysmachus tolmeroides</i>	230	<i>Euplectrus</i>	256
<i>Dytiscidae</i>	365	<i>bussyi</i>	257
		<i>coylonensis</i>	256
		<i>euplexiae</i>	256
		† <i>himalayaensis</i>	257
		<i>leucostomus</i>	256
		<i>nyctemerae</i>	257
		<i>Euricarcinus maculatus</i>	46
		<i>Euridicidae</i>	308
		<i>Exhayalella</i>	294
		<i>Exochlaenus</i>	244
		<i>Exostoma</i>	386
		<i>berdmorei</i>	386
		<i>labiatum</i>	382, 384, 386
		F	
		<i>Farzandia nagpurensis</i>	234
		<i>Ficus bengalensis</i>	453
		<i>glomerata</i>	441
		<i>nervosa</i>	442
		<i>religiosa</i>	454
		<i>rumphii</i>	426
		<i>Funambulus pennanti pennanti</i>	13
		G	
		<i>Galene bispinosa</i>	464, 465, 509, 510, 512
		<i>granulata</i>	464, 465, 466, 510, 511, 512
		<i>Gammaridae</i>	281
		<i>Gammarus annandalei</i>	283
		<i>fluviatilis</i>	282
		<i>gregoryi</i>	283
		<i>pulex</i>	270, 281
		<i>pulex extensus</i>	281, 282
		<i>Garra abhoyai</i>	383, 385
		<i>gotyla</i>	381
		<i>kempi</i>	382, 383, 384, 390
		<i>lissorhynchus</i>	382, 383, 384, 390
		<i>naganensis</i>	382, 383, 385, 390, 391
		<i>rupeculus</i>	383
		<i>Gastromyzoninae</i>	37
		<i>Gastrozona montana</i>	20
		<i>Gaurodytes biguttatus</i>	365
		<i>conspersus</i>	365
		<i>Gecarcinuous (Gecaroinucus) jac-</i>	
		<i>quemontii</i>	85
		<i>Glossogobius</i>	267
		<i>giuris</i>	250, 261, 267

## E

<i>Echo</i>	329
<i>Echo incarnata</i>	329
<i>Ecnomus</i>	139, 143
<i>ceylanicus</i>	146
† <i>costalis</i>	144, 145, 205
<i>crepidulus</i>	148
<i>digitatus</i>	206
<i>falcatus</i>	206
<i>fitcheri</i>	206
† <i>forcipatus</i>	206
<i>hendersoni</i>	140, 141, 142, 206
† <i>indicus</i>	140, 141, 142, 143, 205
<i>montanus</i>	139, 140, 205
† <i>moselyi</i>	142, 143, 205
† <i>obtusus</i>	145
† <i>oppositus</i>	147, 205
<i>pseudotenellus</i>	145
<i>pusanus</i>	145, 146, 205
<i>similis</i>	142, 143
<i>spp.</i>	148, 206
<i>tenellus</i>	139, 148, 205
<i>tumidus</i>	140
<i>Egeria</i>	471, 472
<i>arachnoides</i>	464, 471, 472
<i>herbstii</i>	472
<i>indica</i>	472
<i>Elachertinae</i>	256
<i>Elaphe mandarina</i>	239
<i>taeniura taeniura</i>	239
<i>Elaphromyia adatha</i>	26
<i>pterocallaeformis</i> var.	26
<i>siva</i>	26
<i>Elasmopus</i>	286
<i>subcarinatus</i>	286
<i>Eleotridae</i>	259, 270
<i>Eleotris</i>	270
<i>fusca</i>	259, 261, 270, 271
<i>Embioptera</i>	1
<i>Encyrtidae</i>	254, 421
<i>Enneapterygius</i>	271
<i>Epophthalmia frontalis frontalis</i>	328
<i>frontalis *malabarensis</i>	321, 328
<i>vittata cyanocephala</i>	329
<i>vittata</i>	329
<i>Erethistes elongata</i>	382, 384
<i>hara</i>	382

	Page.		Page.
Glossosoma	105, 107	Heloograma	271
caudatum	107	Hemilea †nidella	21
dentatum	105, 204	punctilabris	21
†fissum	106, 204	Hemimyzon	460
<i>Glyptosternum labiatum</i>	386	sinensis	397
Glyptothorax	386	<i>Hemirhamphus brachynopterus</i>	217
Gobiidae	259, 261	Hetaerina	329
Gobiinae	263	Heteropezinae	425
<i>Gobius grammepomus</i>	261, 262	Homaloptera	37, 459
<i>litturatus</i>	261	bilineata	53
<i>melanocephalus</i>	261, 262	modesta	53
<i>personatus</i>	261	<i>Homaloptera hingi</i>	37
<i>semidoliatus</i>	267	Homalopteridae	37, 459
<i>stoliczkae</i>	261	Homalopterinae	37, 461
Gomeza	463	Hopea parviflora	447
bicornis	505	wightiana	447
distincta	465, 502, 504, 505	Horidiplosis	439
<i>formosae</i>	502, 504, 505	fici	439, 441
*indica	464, 500, 502, 504	†mathuri	439, 440
<i>distincta</i> var.	500, 505	Hyale	292, 293
<i>vigntispinosa</i>	505	breviceps	279, 292, 293
Gonioclema	427	nilssoni	292
Gonioneptunus	488	Hyalopsyche	167
Goniosoma variagatum bimaculatum	488	amurensis	167, 168, 169, 170
Gonoplacidae	463, 464, 465, 513	†parsula	169, 207
Grandidierella	279, 295, 302	rivalis	167, 169, 207
bonnieri	296, 297, 298, 299, 300, 301	†similis	167, 168, 169, 170, 207
elongata	297	sp.	170
gilesi	296, 297, 300	Hyastenus dicanthus	463, 466, 467
graviceps	296, 297, 298, 299	spinosus	467
†lignorum	297, 300, 301	Hydaticus nigrifulus	374
†macronyx	297, 300	pacificus	374
mahafalensis	296, 297, 300	Hydatopsyche	179
megnae	295, 296, 297, 299, 300	feminalis	180
Grewia orientalis	442, 443	†spatulata	179, 180, 208
Gyanacantha dohrni	326	Hydromanicus	184
†incisura	321, 325	brunneus	208
Gyrinocheilidae	461	feanus	208
Gyrinocheilini (sic)	461	luctuosus	208
Gyrinocheilus	460, 461	orientalis	208
aymonieri	461	truncatus	184, 185, 208
kaznakoi	460, 461	<i>Hydromanicus (partim)</i>	182
pustulosus	460	marginatus	181
	<b>H</b>	<i>Hydropsyche</i>	175
Halimede	46, 506, 507	<i>Hydropsyche (partim)</i>	170, 173
<i>dofleini</i>	506	asiatica	207
fragifer	505, 506, 508	feminalis	180
hendersoni	506	gracilis	171
ochtodes	506	guttata	171
thurstoni	505, 506, 507	hamifera	174
tyche	46, 464, 465, 505, 506, 507, 508	indica	207
<i>Halimus</i>	467	javanica	174
dicanthus	466	kaznakovi	170, 171, 207
<i>Halticella (partim)</i>	249	†obscura	171, 172, 207
Haploclastus	78, 79	ornatula	171
cervinus	79, 80	†pallidipennis	174, 207
kayi	79	processuata	175, 207
nilgirinus	69, 79, 80	sp.	175
†tenebrosus	79, 80	†tenuicornis	173, 207
Harpactireae	75	Hydropsychidae	170, 207
Heliaeschna uninervulata	324	Hydropsychinae	170, 185
Heligmomerus	69	Hydropsychodes	177
barkudensis	70	indica	208
Heligmoneura (Asilus) armatipes	230	<i>Hydropsycholes angusta</i>	177
montanus	230	auripennis	177
yenpingensis	230	concava	177
		falcifera	177
		kraepelini	177



	Page.		Page.
<i>Macronema vitrinum</i>	195	<i>Nemachilus</i>	37, 38, 49, 50, 51, 52, 53, 56, 59, 62, 63
Macronematinae	185	<i>botia</i>	50, 51, 52, 65, 66, 384, 397
<i>Macrones bleekeri</i>	385	<i>beavani</i>	50, 51, 61, 63, 64, 66
Macrophthalminae	48	<i>bitturio</i>	50
Macrothele	72	<i>chryseus</i>	63
<i>vidua</i>	69, 72	<i>corica</i>	50
Maera othonides	285	† <i>dayi</i>	50, 57, 61
Magnifera indica	446	<i>denisonii</i>	63, 375
Malidae	463, 464, 466	† <i>devdevi</i>	50, 51, 54, 55, 67
Maira † <i>longirostra</i>	227	<i>hingi</i>	37
Mastacembelidae	384, 385	<i>kangjupkhulensis</i>	384, 397, 398
Matrona	330	<i>manipurensis</i>	382, 383, 385, 398, 399
Medaeus	45, 46	<i>montanus</i>	54, 55, 62
<i>ornatus</i>	46	<i>multifasciatus</i>	50, 51, 61, 62, 66, 399
† <i>rouxi</i>	45, 46, 466, 507	<i>multifasciatus (Vincig.)</i>	50, 62
<i>Medaeus nodosus</i>	506	<i>prashadi</i>	384, 385
Megophrys	375	<i>rupecola</i>	59, 60, 382, 384, 400
<i>minor</i>	237	<i>rupecola (Günther)</i>	58, 59
<i>Mehdiella</i>	30	<i>rupecola *inglisi</i>	50, 51, 58, 59, 60, 67, 400
Meinertomyia	425	<i>savona</i>	50, 51, 56, 57, 58, 67
† <i>aequipalpis</i>	425, 426, 427	<i>savona (Day)</i>	50, 56, 57, 61
<i>fasciata</i>	425	<i>scaturigina</i>	51, 61, 62, 64, 65, 66, 67, 401
† <i>inaequipalpis</i>	425, 426	<i>shanensis</i>	38
Melanotrichia	119	† <i>shebbearei</i>	50, 52, 53
<i>singularis</i>	119, 204	<i>sikmaiensis</i>	384, 385
<i>singularis var ?</i>	119, 120	<i>sp.</i>	63
<i>Melopoeus</i>	81, 82, 211, 212	<i>subfusca</i>	382, 384, 401, 402
Melothria amplexicaulis	450	<i>subfusca (McClell.)</i>	62, 64, 65
<i>heterophylla</i>	451	<i>turio</i>	50
Menippinae	47	† <i>vinciguerrae</i>	50, 61, 62
Mesocyclops hyalinus	419	<i>zonalternans</i>	384
<i>leuckarti</i>	409, 412	<i>Neochilobrachys</i>	74, 82, 83
<i>aequatorialis</i>	412	<i>subarmatus</i>	82
* <i>deccanensis</i>	408, 412, 418	<i>Neoitamus †khasiensis</i>	223
<i>oithonoides</i>	418, 419	<i>Neolasioptera cephalandrae</i>	450
<i>rylovi</i>	412, 415, 419	<i>Neolophonotus †indicus</i>	222
* <i>vermifer</i>	411, 412, 413, 415, 418, 419	<i>Neptunus gracilimanus</i>	465
Microhyla	375	<i>innominatus</i>	465, 481
Microstylum ? <i>apicale</i>	230	<i>Neptunus (Hellenus)</i>	482
? <i>trimelas</i>	230	<i>andersoni</i>	480
Mirogobius	263, 264	<i>hastoides</i>	464, 477, 478
<i>stellatus</i>	263	<i>unidens</i>	478
Misopatha	432	<i>pulchricristatus</i>	464, 465, 479, 480
† <i>tamaricis</i>	432, 433, 434	<i>spinipes</i>	479, 480, 481
Mnais	332	<i>spinipes</i>	465, 479, 480
Momordica charantia	450	<i>Neptunus (Lupocycloporus)</i>	481
Morus alba	427	<i>gracilimanus</i>	464, 481, 482
Mukia scabrella	450, 451	<i>whitei</i>	465, 481
Murraya exotica	444	<i>Neptunus (Neptunus) pelagicus</i>	464, 476, 485
Mygalomorph	69	<i>sanguinolentus</i>	464, 474, 475
<i>Myiolia</i>	22	<i>Niphargus chilkensis</i>	283, 284
<i>Myioleja</i>	22	<i>Nusa elva</i>	230
Mystus bleekeri	382, 385	<i>Nyctagineae</i>	453
N			
<i>Naiia tripudians</i>	35	O	
<i>Naja naja</i>	35	<i>Octonema rotundicauda</i>	37
Nandidae	384, 385	Ocypodidae	48
Natrix nuchalis	239	<i>Odina wodier</i>	427, 435, 438
<i>subminiata helleri</i>	239	† <i>Odinadiplosis</i>	435
Neanastatus	254, 255	† <i>odiniae</i>	436, 437
<i>pulchericarpus</i>	254, 255	Odonata	321
† <i>ramakrishnai</i>	255, 256	<i>Oediceros sp.</i>	279
<i>trochantericus</i>	254, 255		





	Page.
<i>Rhyacophila</i> † <i>rhombica</i>	98, 99, 100, 204
<i>scissa</i>	204
† <i>similis</i>	99, 100, 204
spp.	104
<i>tecta</i>	204
Rhyacophilidae	93, 203
<i>Rhynchobdella dhanasorii</i>	384, 385
<i>Rioxa quinquemaculata</i>	24
Rutaceae	444

## S

<i>Sandracottus maculatus</i>	374
Sapindaceae	444
Sason	73
<i>armatoris</i>	73
<i>cinctipes</i>	73
<i>robustum</i>	73
<i>Scalopidia spinosipes</i>	463, 464, 465, 513, 514
<i>Schismatogobius</i>	263, 264
<i>bruy nisi</i>	263
<i>Schistura rupecula</i>	58
<i>savona</i>	56
<i>subfusca</i>	66
<i>Schizaspidia</i>	253
<i>furcifera</i>	254
† <i>indica</i>	254
<i>manipurensis</i>	254
<i>scutellaris</i>	254
<i>Schizomyia acaciae</i>	449
<i>Scutiger sikkimensis</i>	238
<i>Setodes sexpunctata</i>	192
<i>Selenocosmia</i>	75, 83
<i>himalayana</i>	80, 83
<i>kulluensis</i>	83
<i>pugnax</i>	80, 83
† <i>sutherlandi</i>	80, 83
sp.	84
<i>Selenocosmia</i> ( <i>Lyrognathus</i> ) <i>pugnax</i>	83
<i>Selenocosmieae</i>	74
<i>Selenocosmiidae</i>	74
<i>Selenocosmiinae</i>	74, 75, 76, 77, 78, 82
<i>Sericostomatidae</i>	95
<i>Serrulatus</i>	408
<i>Smicrinariae</i>	251
<i>Solindinelleus</i>	255
<i>Sophira</i> † <i>phlox</i>	25
<i>venusta</i>	25
Siluridae	382, 385
Siluroidea	385
Sisoridae	382, 385, 386
<i>Sphaerozius</i>	47
<i>nitidus</i>	47
<i>nudus</i>	46, 47
<i>panope</i>	47
<i>Spilochalcis</i>	251
† <i>indica</i>	252, 253
<i>janeiroensis</i>	252
<i>simlaensis</i>	252
<i>Stactobia</i>	119
sp.	119, 204
<i>Stenopogon</i> † <i>subtus</i>	229
<i>Stenopsyche</i>	131, 135, 136
<i>angustata</i>	131, 132
<i>denticulata</i>	134
† <i>furcatula</i>	134, 135, 205

	Page.
<i>Stenopsyche griseipennis</i>	131, 136, 205
† <i>quadrilobata</i>	131, 132, 205
<i>siamensis</i>	139
<i>similis</i>	136
† <i>splendida</i>	133, 205
Stenopsychidae	130, 205
<i>Stenopus</i>	471
<i>Stereospermum chelonoides</i>	452
<i>Stictaspis</i>	16
<i>Stigmatogobius sadanundio</i>	266
Strongylinae	335
Strongyloidea	335
<i>Strongylus dimidiatus</i>	336
<i>Strychnos potatorum</i>	452
<i>Stypiura</i>	250
† <i>variabilis</i>	250
<i>Syciopterus garra</i>	259
<i>Synagapetus</i>	107, 108
† <i>himalayanus</i>	107, 204
Syngnathidae	259, 275
<i>Syngnathus melanopleura</i>	275
<i>Synidotea variegata</i>	313

## T

<i>Tachygonetria</i>	31
<i>microstoma</i>	31
<i>poweri</i>	31
<i>quadrilabiata</i>	31
<i>uncinata</i>	31
<i>Taenioides rubicundus</i>	266
<i>Taeniostola limbata</i>	17
Talitridae	287
<i>Talitrus</i>	287
sp.	287
<i>Talorchestia</i>	279, 289
<i>ancheidos</i>	289
<i>australis</i>	289
<i>gracilis</i>	289
<i>japonica</i>	288, 290
<i>martensii</i>	288, 289, 290
<i>Tamarix dioica</i>	435
Tanaidacea	279, 313
<i>Tanypteryx</i>	324
<i>Telephlebia</i>	323
<i>Telphusa planata</i>	85
<i>Tephrella decipiens</i>	23
<i>Thalassema</i>	39
† <i>arkati</i>	39, 41
<i>branchiorhynchus</i>	43
<i>caudex</i>	39, 40
<i>diaphanes</i>	41
<i>kempi</i>	40, 41
† <i>marshalli</i>	39, 42
<i>Thaparia</i>	31
<i>Thelandros</i>	29, 30, 31
† <i>baylisi</i>	31, 32
<i>echinatus</i>	34
† <i>kasauli</i>	33, 34
<i>micruris</i>	31, 32, 33, 35
<i>numidicus</i>	35
<i>oswaldocruzia</i>	29
<i>sahariensis</i>	31, 32, 33
<i>sceleratus</i>	29
<i>sexlabiata</i>	35
† <i>taylori</i>	29, 30, 31, 33

	Page.		Page.
Themara	23		
Theraphosidae	74		
Thrigmopoeae	74, 75, 79		
Thrigmopoeus	79, 81		
insignis	80, 81		
Tiliaceae	442		
Tinodes pullulans	206		
Trichogramma	337		
Trichoneminae	335		
Trichoptera	93		
Trifila	439		
Trimeresurus jerdoni	240		
monticola	240		
Tripterygion	271, 272		
atriceps	272, 273		
hemimelas	272		
trigloides	271, 272		
Tripterygion (Enneapterygius) fasci-			
atum	261, 272, 273		
<i>Tripterygium</i>	271		
Trirhithrum	17		
Tropocyclops	408		
Trypetidae	15, 16		
		<b>U</b>	
<i>Ulmeria</i>	175		
<i>Uromastix hardwicki</i>	29		
Urticaceae	453		
		<b>V</b>	
Vaimosa			268
†koumansii		261, 268,	269, 270
macrognaethus			269, 270
Vidalia ceratophora			22
		<b>W</b>	
Winnertzia			427, 428
		<b>X</b>	
Xanthidae	47, 463, 464, 465,		505
Xanthininae ( <i>sic</i> )			464, 505
Xenanthura brevitelson			308
†orientalis			307
		<b>Z</b>	
Zaocys nigromarginatus			239
Zizyphus jujuba			445, 446
sp.			446
xylopyra			445, 446
Zonogobius			267
semidoliatus			261, 267

ON TWO UNDESCRIBED FORMS OF THE GENUS *OLIGOTOMA*  
WITH A DESCRIPTION OF THE EXTERNAL GENITALIA  
OF *OLIGOTOMA MICHAELI* AND DISTRIBUTIONAL  
RECORDS OF SOME INDIAN FORMS.

By S. MUKERJI, D.Sc.

In the collection of Embioptera of the Indian Museum, I came across two undescribed forms belonging to the genus *Oligotoma* Westw. One of these species is remarkable in that it appears to be the smallest amongst the Embiids so far recorded from India, while the second exhibits a considerable range of variation in the basal joint of the left cercus in specimens from different localities. In this paper, in addition to giving detailed descriptions of the two new forms, I have included a list of records of the localities from which the various species in the collection of the Indian Museum are represented. I also describe and figure the genitalia of *Oligotoma michaeli* MacLachlan as the earlier descriptions by MacLachlan, Hagen, Needham and Enderlein are incomplete.

The descriptions are drawn up from specimens preserved in alcohol, as a result of which the colouration of the specimens is a little paler. The specimen to be examined was laid on a slide with a second piece of thick glass over it to keep it flat: alcohol or dilute glycerine was run slowly between the two pieces of glass by means of a pipette and the specimen was then examined under a strong light. The appendages of the terminal segment were studied *in situ* by both transmitted and reflected light. The drawings of the wings, appendages, etc., were made with the help of a camera lucida.

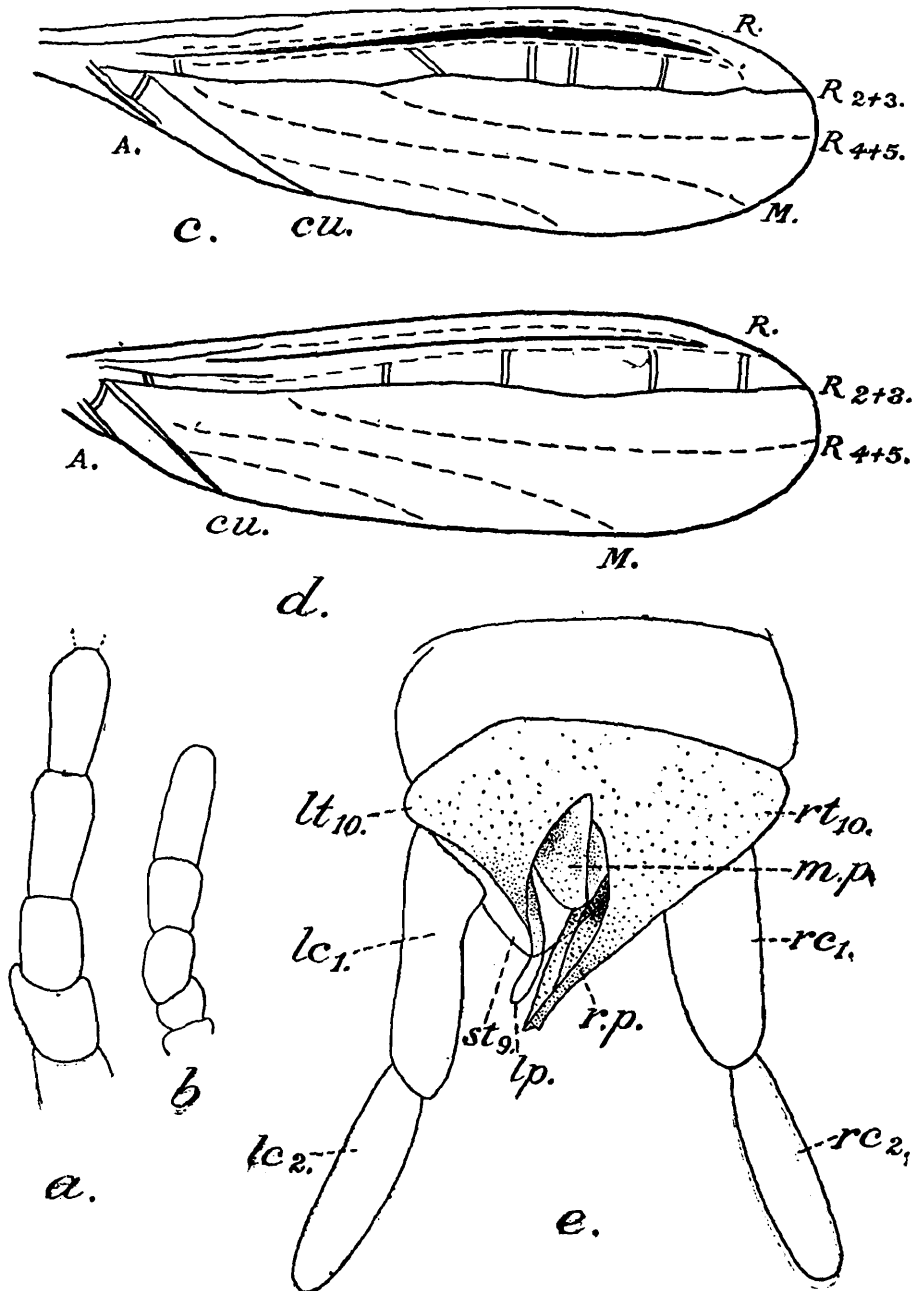
I am indebted to the authorities of the Zoological Survey of India for giving me facilities to work on the collection of the Embioptera in the Indian Museum.

***Oligotoma minuta*, sp. nov.**

General colour brownish yellow; anterior pair of legs brownish testaceous; second and third pair of legs somewhat concolourous with the body; cerci also of the same colour as the body; 10th abdominal segment brownish testaceous.

Head more or less oval, with the anterior margin somewhat broader, castaneous; black eyes situated at its broadest part, slightly projecting anterolaterally, reniform in shape, their concavities approaching the base of the antennae. Antennae (text-fig. 1a) brownish yellow, joints whitish; 1.75 mm. long, with 14 joints; 1st somewhat thick and short; 2nd thick, slightly longer and closely united with 1st; 3rd the smallest of all and nearly uniform in thickness throughout; rest of the segments more or less similar in shape and size; first four segments have proportional lengths of 7:12:9:16. Maxillary palpi (text-fig. 1b) pale brown in colour, lengths of the joints in proportions 4:10:18:19:32.

First thoracic tergite somewhat rectangular, narrowed anteriorly, its anterior and posterior angles produced but rounded; mesially it has a short suture. Second thoracic tergite subquadrate in shape, with its anterior end rounded, two lateral edges parallel and straight; posterior margin bears two rather large concavities leaving distinct spaces between the second and third thoracic tergite; dorso-anteriorly the tergite bears a heart-shaped raised area carrying a few brownish hairs on its anterior



TEXT-FIG 1.—*Oligotoma minuta*, sp. nov. Male.

a. First five antennal joints  $\times 48$ ; b. Maxillary palp.  $\times 48$ ; c. Right anterior wing.  $\times 8.4$ ; d. Right posterior wing.  $\times 8.4$ ; e. External genitalia with 10th abdominal segment as seen from above.

A.= Anal vein; C.= Costal vein; Cu= Cubital vein; l. c. b. p.= Left cercus basipodite,  $lc_1$ ,  $lc_2$ = First and second joint of the left cercus; l.p.= Process of the left tenth tergal plate;  $lt_{10}$ = Left tenth tergal plate; M.= Median vein; m.p.= Median plate;  $plc_1$ = Process of the first joint of the left cercus;  $R_1$ ,  $R_2+3$ ,  $R_4+R_5$ = Radial veins;  $rc_1$ ,  $rc_2$ = First and second joints of the right cercus; r.p.= Process of the right tenth tergal plate;  $rt_{10}$ = Right tenth tergal plate;  $st_9$ = Ninth sternal plate.

margin. Third or last thoracic tergite similar in structure to the second, its anterior margin less rounded, raised portion somewhat triangular dorsally with its posterior edge reaching about half the length of the tergite; the posterior fourth of the tergite overlapped by the first abdominal segment; dorsally the tergite bears a longitudinal median suture. The thoracic segments are sparingly covered with brownish hairs.

Legs normal except as regards the arolia or ventral pads of the tarsi; hind pair of legs with very small pad on the first tarsal joint (metatarsus), arolia of the second tarsal joint comparatively large. Tarsal claws of each pair of legs curved at apex and not differing from one another.

Wings more or less hyaline with pale brownish pigmented bands. In the anterior wing (text-fig. 1c),  $R_1$  brownish yellow,  $R_{2+3}$  complete but  $R_{4+5}$  only represented by a complete pigmented band; M and anterior branch of Cu only represented by pigmented areas, straight stem of Cu as a true vein. Basal radio-median cross-vein absent, no true cross-vein between C and  $R_1$ ; 4-5 cross-veins between R and  $R_{2+3}$ ; one oblique cross-vein at the base between  $R_1$  and R, none between the two branches of R, and none between  $R_{4+5}$  and M; a slight notch, apparently the remnant of a cross-vein, between the anal A and the basal stem of Cu and R.

In the posterior wing (text-fig. 1d) C,  $S_c$ , R,  $R_s$ ,  $R_{2+3}$ , and the straight branch of Cu well developed,  $R_{4+5}$ , M and the upper branch of Cu represented by pigment bands only; no cross-vein between C and  $R_1$  or between  $R_1$  and  $R_{2+3}$  3-4 cross-veins between  $R_1$  and R, a small oblique cross-vein present at the base; no radio-median cross-vein, no cross-vein between the two branches of R, between  $R_{4+5}$  and M or between M and upper branch of Cu; a rather thick notch present between the basal stem of Cu and R, (just where the fork begins) and A, this probably represents a cross-vein. In both the wings the "pseudo-radial lines"<sup>1</sup> are well represented.

The first abdominal segment rather small, overlapping the metathorax; the anterior margin irregularly convex; second to eight segments similar to one another; ninth small and compressed; the tenth asymmetrical; appendages as shown in (text-fig. 1e). Right half of the Xth tergite ( $rt_{10}$ ) larger than the left ( $lt_{10}$ ), its distal half abruptly narrowing into a spinous process, concave inwardly (r. p.); left half of tenth tergite with a projecting piece (lp). IXth sternite ( $st_9$ ) with a triangular process, concave dorsally and distally reaching half way along the length of the process of the left tergal plate. There is also a cone-shaped narrow median plate (m. p.) with its distal end rounded. Cerci more or less similar in shape; first joint of the left cercus (l.  $c_1$ ) slightly longer and less stout than that of the right (r.  $c_1$ ), second joint of the left (l.  $c_2$ ) slightly longer than that of the right (r.  $c_2$ ), more or less similar in shape. Segments of left cercus sub-equal; terminal segments of right cercus (r.  $c_2$ ) longer and narrower than basal joint (r.  $c_1$ ).

The form of the chitinous process of Xth tergite together with the size of the insect at once distinguish this species.

Female unknown.

Male: Total length 4.25 mm.; Forewing 3 mm.; Hindwing 2.5 mm.

---

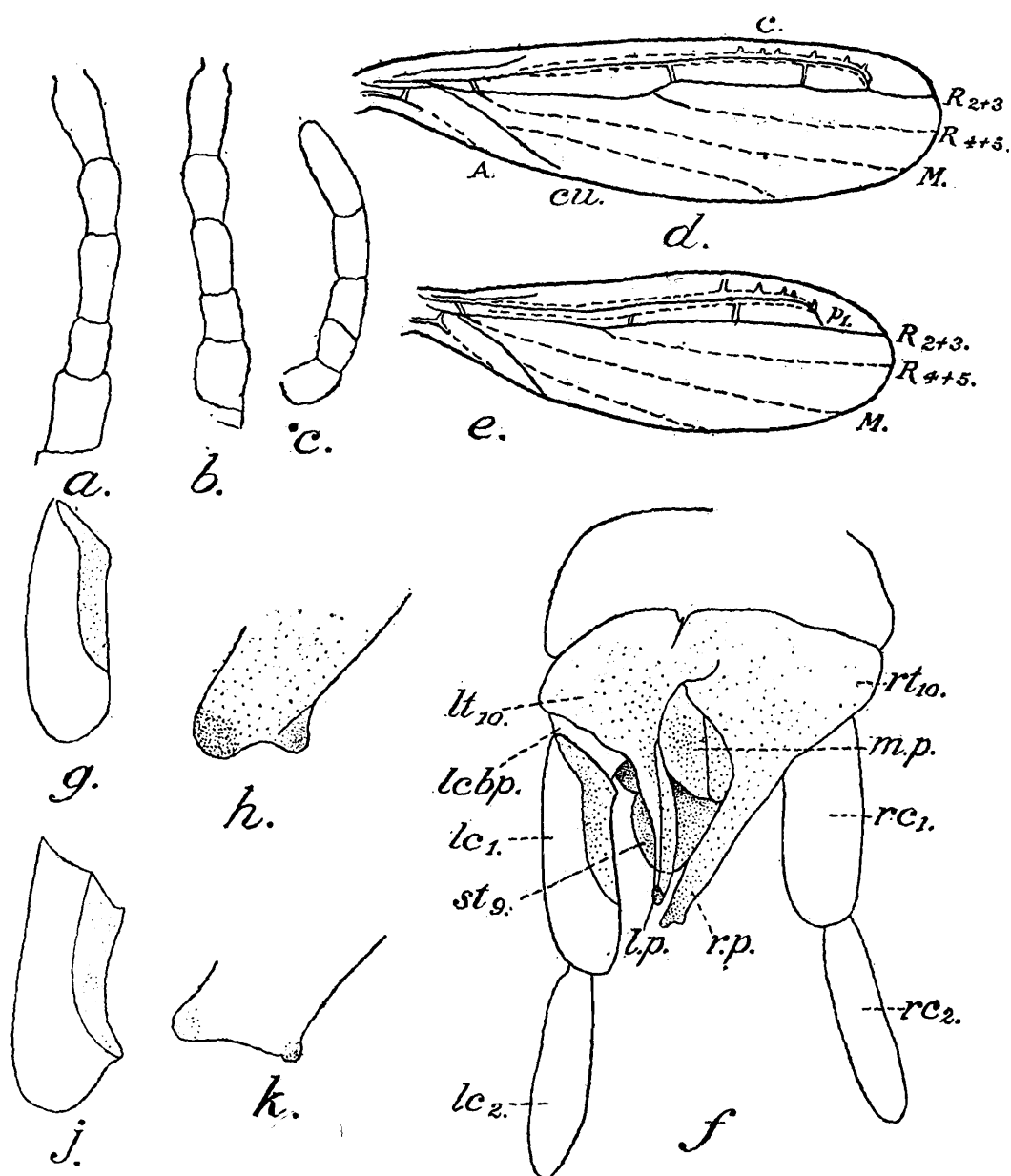
<sup>1</sup> Mukerji, S., *Rec. Ind. Mus.* XXIX, 4, p. 260 (1927).

There are four specimens, all males, in the Indian Museum Collection; presumably all collected from Calcutta and its suburbs, as follows:—

C. Paiva Coll.; 15.iv.14. in house; F. H. Gravely Coll.: 21.v.11, Zoological Garden, Alipore; F. H. Gravely Coll.: 19.v.15. in house at light; F. H. Gravely Coll. 25.xi.16.

**Oligotoma ceylonica**, Ender. var. **variegata**, nov.

*Male*.—General colour yellowish brown; anterior  $\frac{2}{3}$ rd of the head reddish brown, posterior  $\frac{1}{3}$ rd brownish yellow; pseudo-radial lines of



TEXT-FIG. 2.—*Oligotoma ceylonica* var. *variegata*, nov. Male.

- a. First six antennal joints; (Ceylon specimen)  $\times 12$ ; b. First six antennal joints (Barkuda specimen)  $\times 12$ ; c. Maxillary palp.  $\times 30$ ; d. Right anterior wing  $\times 2.6$ ; e. Right posterior wing  $\times 2.6$ ; f. External genitalia with 10th abdominal segment as seen from above; g. Basal joint of the left cercus (Barkuda specimen)  $\times 30$ ; h. Process of right tenth tergal plate (Barkuda specimen)  $\times 96$ ; j. Basal joint of left cercus (Ceylon specimen)  $\times 30$ ; k. Process of right tenth tergal plate (Ceylon specimen)  $\times 96$ .

Lettering same as in text-fig. 1.

wings reddish-brown; antennae with the joints of lighter colour; legs yellowish brown with the joints paler, segment bearing the claw somewhat paler; hairs of the body long, brownish-yellow; the sides of the abdomen of a darker colour than the general colouration of the body; intersegmental spaces of the abdomen lighter; abdominal segments mottled brown dorsally; appendages of right and left plate of the Xth tergite of a slightly darker tint than the general body.

Head somewhat small; surface markings not very prominent though in some cases about 4 indistinct longitudinal lines present in the posterior  $\frac{1}{3}$ rd of head, two dorsolateral ones more or less straight, pair of sub-dorsal ones somewhat thicker and their distal ends at the margin of the head thickened in the shape of triangles; pigment bands of a brownish colour arise from a pigmented mass of the same colour occupying the anterior  $\frac{2}{3}$ rd of the head; head somewhat bulging laterally in front of the eyes; head about 0.45 mm. long and 0.62 mm. broad behind the eyes; region posterior to the eyes also slightly bulging and distal margin well rounded; eyes only slightly projecting laterally, large about  $\frac{2}{3}$ rd visible from above; antennae moderately developed, about 14-19 segments visible<sup>1</sup>; 1st joint thick and short; 2nd considerably larger, about 1.4 times as long as broad; proximal antennal joints (text-figs. 2a, b) have their lengths in the proportions of 8 : 16 : 12 : 20 : 15 : 22; antennal hairs of medium size; maxillary palpi (text-fig. 2c) 5 jointed, lengths of segments in the proportions of 9 : 8 : 9 : 11 : 19.

Pronotum subquadrate, its angles more or less rounded laterally, sides somewhat excavated, transverse sulcus present as a fine streak; about two thirds from anterior edge; median longitudinal suture present in the posterior two thirds of the pronotum as a fine sulcus, posteriorly the pronotum bears a triangular raised portion; the transverse sulcus mentioned above forms the base of the triangle while the longitudinal suture runs perpendicular to the base. Mesonotum quadrangular, its anterior margin bears a small concavity which slightly projects into the pronotal area divided into three somewhat raised triangular areas and a posteromedian area irregular in shape. Metanotum similar in structure to mesonotum, slightly narrowed posteriorly, longitudinal suture occupies about half the distance between apex and base; the posteromedian concavity absent, its area occupied by convexly arched overlapping anterior portion of first abdominal segment.

Metatarsus of the fore-leg nearly as long as tibia. Wings more or less normal (text-fig. 2c and d), greatest breadth of anterior and posterior wings nearly equals 1 mm.; sub-hyaline with pale yellowish pigment bands;  $R_1$  brown; pseudo-radial lines sharp and well developed;  $R_{2+3}$  complete  $R_1$  posteriorly curved falling into  $R_{2+3}$ ,  $R_{4+5}$  only represented by a short basal piece and complete pigment band; M and anterior branch of Cu only represented by pigment band; straight stem of Cu present as a true vein. A very small oblique indistinct cross-vein, perhaps the representative of the basal radiomedian cross-vein, present. No true cross-veins between C and  $R_1$  but about 6 indistinct small incom-

<sup>1</sup> Owing to the brittle nature of the antennal joints, specially in specimens preserved in spirit, it is difficult to determine their exact number.

plete veinlets dorsal to the pseudo-radial lines of the wing. Between  $R_1$  and  $R_{2+3}$  in the anterior wing 3 cross-veins present, 2 posterior to the fork and one very small anterior to the fork near to the base. In the hind-wing 2-3 cross-veins between  $R_1$  and  $R_{2+3}$  none between the two branches of  $R_3$  and none between  $R_{4+5}$  and M. In all the four wings a somewhat indistinct cross-piece between Cu and A present. Abdomen as in the genus; first abdominal segment small, semilunar in shape, overlapping metasternum, its anterior arched edge somewhat serrated, second smaller than following segments; rest of the segment more or less similar in shape; their breadth gradually reaches their maximum near about the middle of the abdomen after which it gradually decreases to the 9th segment. 9th segment more or less compressed, narrow. In the apical segment of male (text-fig. 2f) left part of 10th tergite ( $lt_{10}$ ) with a long finger shaped process curved towards left (l. p.), the terminal portion somewhat narrower, round, tip of this process bearing a very minute groove visible only under a high power of microscope. Right part of 10th tergite ( $rt_{10}$ ) with a long process (r. p.) slightly broad basally, only terminal  $\frac{1}{4}$ th narrower, terminal end bearing a small concavity with two round protuberances, a large one along inner angle and a small one along the outer angles (text-figs. 2h and k); IXth sternite ( $st_9$ ) with flat irregularly shaped and terminally rounded appendages; left cercus basipodite (l. c. b. p.), ring shaped, moderately developed, occupying the area between the basal joint of the left cercus and the left portion of the Xth tergite ( $lt_{10}$ ): Basally the process of the 9th sternite adjacent to the cercus basipodite (l. c. b. p.). The median process or sclerite (m. p.), situated between the bases of the process of left and right portions of Xth tergite, rather small, terminally rounded and with a pigmented straight median suture. First joint of right cercus proportionately developed; the terminal joint slightly longer than the basal. Basal joint of left cercus slightly longer than that of the right; about  $\frac{2}{3}$ rd of the inner margin of the basal joint excavated (text-figs. 2g and j) the cavity extending nearly to the outer angle of the proximal end of the joint. Terminal joints of both the cerci of nearly the same length as the first or proximal, but distinctly thinner. Lengths of the first and second joints of left cercus are in the proportions of 15:13. Abdomen about 2.5 mm. long with cerci, and 0.5 mm. broad.

Female unknown.

Male total length 5.5 mm.; fore-wing 3.75 mm.; hind-wing 3.0 mm. There are four specimens, all males, in the Indian Museum collection.

*Localities*.—N. Annandale Coll. Barkuda Island, Chilka Lake, Ganjam District, Madras, 1.x.22 at light; Barkuda Island, Chilka Lake, Ganjam District, Madras, 2.viii.23. (Badly preserved); F. H. Gravely Coll. Peradeniya, Ceylon, 25. v.10; Peradeniya, Ceylon, vii.1910.

In its external genitalia the new variety resembles *Oligotoma ceylonica* Enderl., and *O. japonica* Oka. The process of the left tenth tergal plate is finger-shaped and long in both; in *O. ceylonica* the tip of the process of the left tenth tergal plate is more or less rounded, its apex somewhat straight reaching nearly to the terminal end of the appendage of the Xth sternite. In the case of *ceylonica* var. *variegata*, nov., on the other hand, the tip of the process (text-fig. 8, 1. p.) though round, is somewhat narrow

terminally and its distal half is curved and extends beyond the appendage of the 9th sternite ( $st_9$ ) as in *O. japonica*. In the var. *variegata*, there is a small cavity at the tip of the process (l. p.). The process of the right tenth tergal plate in the var. *variegata* is not abruptly narrowed as in *ceylonica* but is of more or less equal thickness throughout; terminally this process bears a distinct depression which is furnished with two round protuberances at the inner and outer angles (text-figs. 2*h* and *k*). In the var. *variegata* the left cercus basipodite is not spread out and does not bear the two uvula-shaped appendages as in the case of *ceylonica*. As is shown in the figure, this structure appears to be more or less annular in shape. The median plate (m. p.) is distinct and broadly rounded off; this structure has not been shown by Enderlein in the figure of genitalia of *O. ceylonica*. The basal joint of left cercus of *O. ceylonica* is only slightly scooped out at the base but in var. *variegata* the anterior  $\frac{2}{3}$ rd of the basal joint of left cercus bears a distinct cavity (text-figs. 2*g* and *j*)<sup>1</sup>. It will thus be seen that *Oligotoma ceylonica*, *O. japonica* and the present form resemble each other closely and I regard the new form as a variety of Enderlein's *O. ceylonica*. It is therefore suggested that a separate *ceylonica* group should be erected to which these three forms may be assigned.

DESCRIPTION OF THE EXTERNAL GENITALIA OF *OLIGOTOMA MICHAELI*  
MACL.

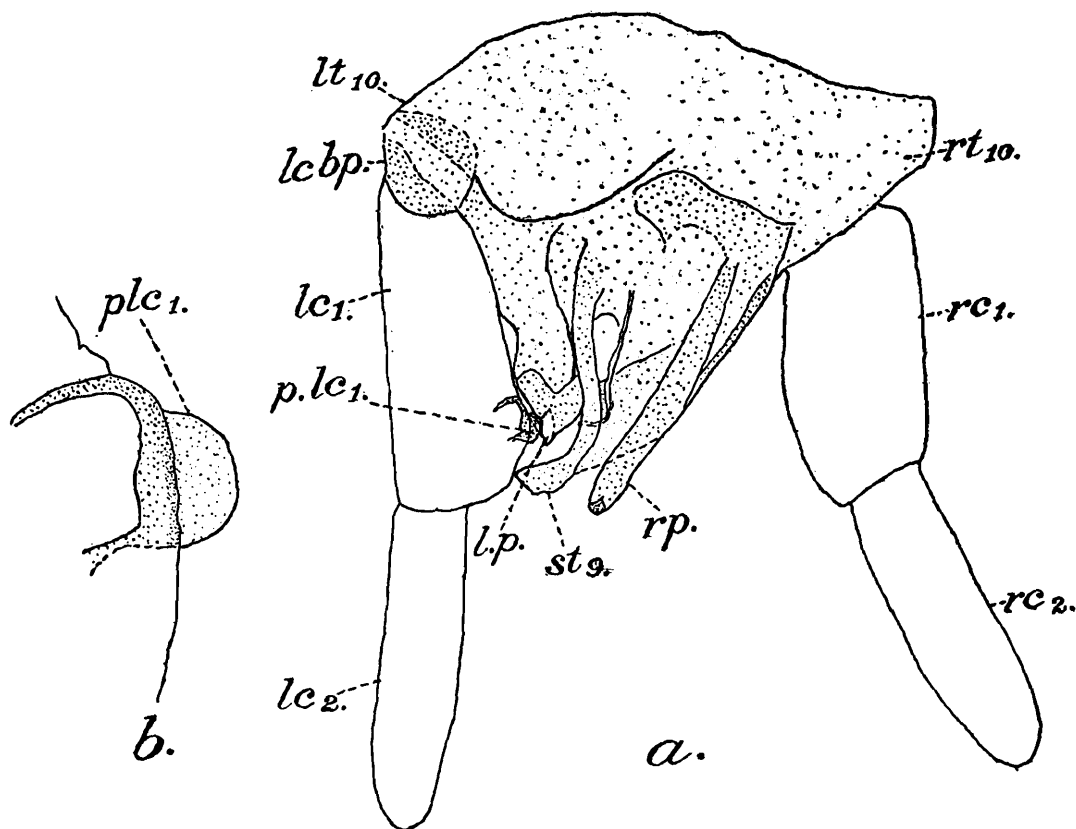
*Male*.—Among the Embiids, *Oligotoma michaeli* MacL. is one of the oldest known species, having been described as early as 1877. Hagen (1885) gives a detailed description of the external genitalia, but as no figure was published with his description, it is difficult to follow him. Later Needham (1909) figured the external genitalia, but this and the account of the genitalia of the species in the otherwise excellent monograph of Enderlein (1912) are far from complete. I, therefore, give a detailed description of the external genitalia of a specimen which I believe to belong to this species.

The 10th tergite assymmetrical, appendages as shown in the figure (text-fig. 3), right half of the Xth tergite ( $rt_{10}$ ) larger than the left ( $lt_{10}$ ), its distal half produced into a finger-shaped process which apparently bears a concavity at the apex (r. p.); the left half of Xth tergite with a projecting process (l. p.) bearing a slight constriction; it then broadens distally but narrows abruptly near the end. 9th sternite subtriangular, produced into a somewhat laminated process directed towards left cercus, it projects beyond the process of the left plate. In the specimen before me, I failed to trace a distinct median plate. Cerci distinctly assymmetrical, first joint of left cercus (l.  $c_1$ ) somewhat narrow basally, and distinctly broadened distally, next the distal end of the joint it bears on its inner margin a small cup-shaped process (text-fig. 10. *b. plc.*<sub>1</sub>) first joint of left cercus slightly longer but less stouter than that of the right ( $rc_1$ ); distal joint of both cerci similar

---

<sup>1</sup> The area of excavated portion is variable in specimens collected from different localities and the extent of variation is indicated by the figures.

in shape and size. Lengths of basal joints of left and right cerci are in the proportion of 45 : 38.



TEXT-FIG. 3.—*Oligotoma michaeli*, MacL.

a. External genitalia of the male with 10th abdominal segment as seen from above  $\times 21$ ; b. A portion of the basal joint of left cercus  $\times 91.6$ . Lettering same as in text-fig. 1.

The specimen was very kindly sent to me by Mr. T. B. Fletcher, Imperial Entomologist, Pusa, Bihar, and is labelled :—Assam, Shillong 4,900 ft. 30.v.18. A. G. R. Coll. : (Pusa).

#### DISTRIBUTIONAL RECORDS OF SOME INDIAN FORMS.

##### *Oligotoma saundersi* Westw., 1837.

*Males*.—Ross I., Andamans; at light, 29.iii.11 (C. Paiva); Saugor, Central Provinces; at light, 19.iii.19 (F. H. Gravely); Burhanpur, Central Provinces; 4-6.iii.19 (F. H. Gravely); Medha, Yenna Valley, Satara District, ca. 2,200 ft., Bombay Pres.; 23.iv.12 (F. H. Gravely); Barkuda I., Chilka Lake, Ganjam District, Madras Pres.; at light, 17.iii.24 (N. Annandale); Calcutta Museum Compound, Bengal; 12.vii.10 (S. W. Kemp); Calcutta, Bengal; 7.viii.14 (F. H. Gravely); Calcutta, Bengal; in house, at light, 9.vii.26 (S. Rebeiro); Calcutta, Bengal; in house, Museum Compound, at light, 3.ii.11 (F. H. Gravely); Calcutta, Bengal; in house, Museum Compound, at light, 26.x.10 (F. H. Gravely); Ratnagiri District, ca. 400 ft.; 1-2.v.12 (F. H. Gravely).

##### *Oligotoma latreillei* Ramb., 1843.

*Males*.—Medha, Yenna valley, Satara district, ca. 2,200 ft., Bombay Pres.; 17-23.iv.12 (F. H. Gravely); Burhanpur, Central Provinces; 4-6.iii.19 (F. H. Gravely); Peradeniya, Ceylon; 1.vi.10 (F. H. Gravely).

##### *Oligotoma greeniana* Enderl., 1912.

*Males*.—Peradeniya, Ceylon; at light, 9.VI.10; Peradeniya, Ceylon; viii.10; Peradeniya, Ceylon; VI.10 (F. H. Gravely).

## BIBLIOGRAPHY.

- Enderlein, G. (1912).—Embiiden, *Collections Zoologiques du Baron Edm. de Selys Longchamps*, Fasc. III, No. 5, pp. 1-121, pls. I-IV, 76 text-figs.
- Hagen, H. (1885).—Monograph on Embiidina. *Canad. Entomologist*, XVII, pp. 14-155, 171-178, 190-199, 206-229.
- MacLachlan, R. (1877).—On the nymph stage of the Embiidae with notes on the habits of the family. *Journ. Linn. Soc. London* XIII, pp. 373-384, pl. xxi.
- Mukerji, S. (1927).—On the morphology and Bionomics of *Embia minor* sp. nov., with special reference to its spinning organ. A Contribution to our knowledge of the Indian Embioptera. *Rec. Ind. Mus.*, XXIX, IV, pp. 253-282, pl. xxiii, 10 text-figs.
- Needham, J. G. (1909).—Note on the Neuroptera in the collection of the Indian Museum. *Rec. Ind. Mus.*, III, p. 185, pl. xx, fig. 12.
- Okajima, G. (1926).—Description of a new species of *Oligotoma* from Japan together with some notes on the family Oligotomidae (Embiidina). *Journ. Coll. Agri. Imp. Univ. Tokyo*, VII, No. 4, pp. 411-432, pls. xxxi-xxxiii.
- Tillyard, R. J. (1923).—The Embioptera or web-spinners of Western Australia. *Journ. Proc. Roy. Soc. W. Australia*, Part I, pp. 61-68, 3 figs.



## ON A NEW OXYURID FROM A SQUIRREL.

By S. S. PATWARDHAN, *M.Sc.*, Nagpur University Post-graduate Research Scholar, Department of Zoology, College of Science, Nagpur, C. P., India.

The Nematode worms described in this paper were obtained from the intestine of a squirrel. The material consisted of five females and only one male.

### ***Latibuccana funambulensis*, gen. et sp. nov.**

*Description.*—The worms are comparatively thin and elongated. Body tapers at both ends. The anterior end is curved ventrally. The posterior end or the tail, in both the sexes (Figs. *d* and *e*) terminates in a finely pointed process. The cuticle is finely striated transversely and it is without plectanæ. Total length of the male is 12.5 mm. and its maximum breadth 0.32 mm. Total length of the female is 20.0 mm. to 22.5 mm. and maximum breadth 0.48 mm. to 0.5 mm. The oesophagus with the bulb (Fig. *b*) measures 1.74 mm. in length in male and 1.94 mm. to 2.1 mm. in female. The oesophageal bulb (Fig. *b*) is separated from the rest of the oesophagus by a constriction and contains the valvular apparatus. The bulb measures 0.23 mm. in length and 0.17 mm. in diameter in male and 0.25 mm. to 0.29 mm. in length and 0.18 mm. in diameter in female. The cervical alae (Fig. *a*) are broad and extend to 0.78 mm. from the anterior end in male and 0.92 to 1.0 mm. in female. The maximum breadth of the alae is 0.06 mm. in male and 0.085 mm. in female. Lateral phalanges are absent.

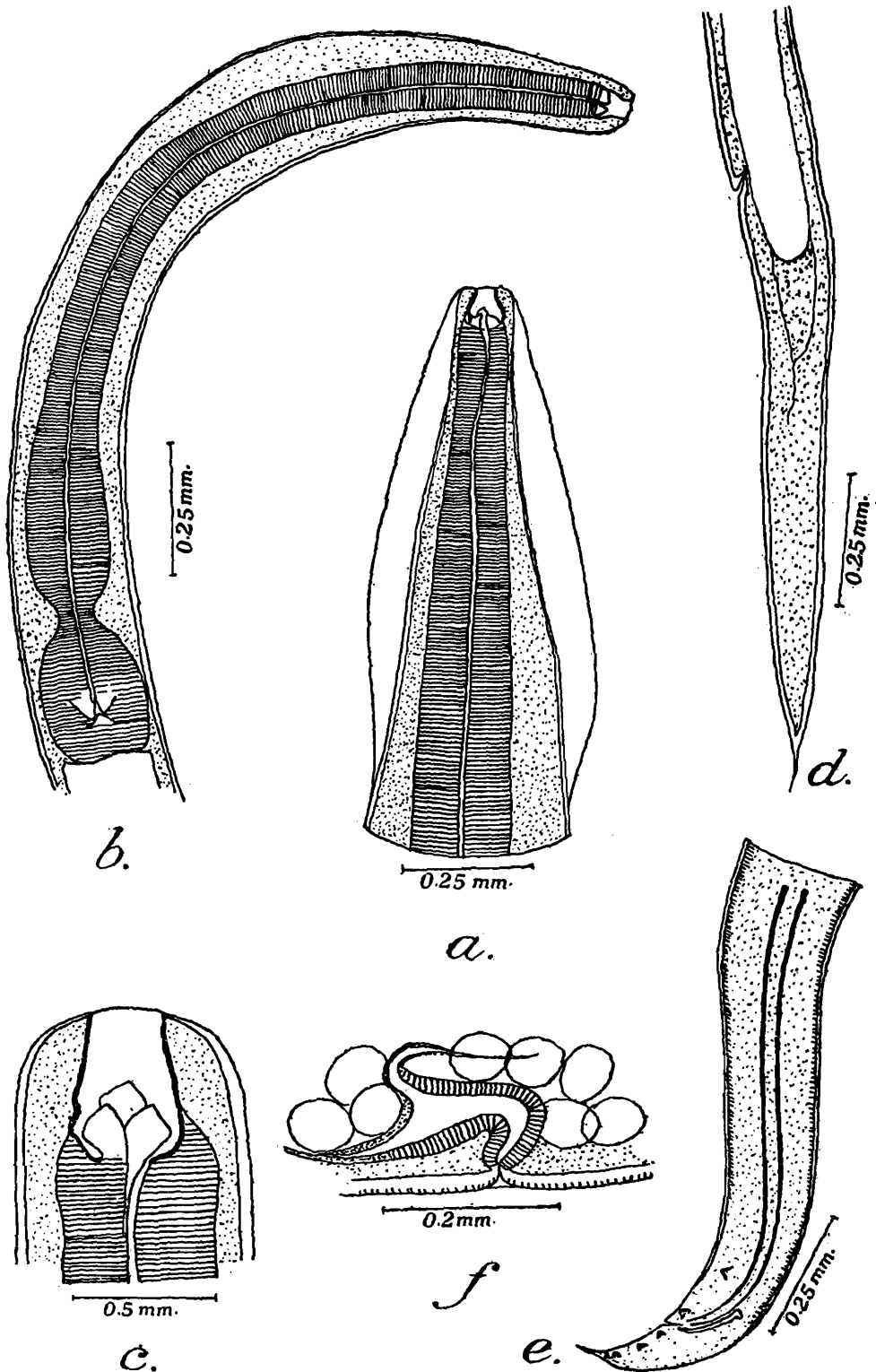
At the anterior extremity is the oral aperture (Fig. *c*) surrounded by two indistinct lips. The buccal cavity is large, 0.059 mm. in depth and 0.043 mm. in diameter in female. It is lined by a very thick layer of chitin which gives it an appearance of a buccal capsule. It contains three prominent teeth projecting into it at its base. A short pharynx is present at the commencement of the oesophagus.

*Male*: The posterior extremity (Fig. *e*) is curved ventrally. The caudal alae are absent. There are six pairs of sessile papillae of which two pairs are pre-anal and the remaining four pairs post-anal. There are two equal, thin and elongated spicules, measuring 0.90 mm. in length. The gubernaculum is short, thick and curved.

*Female*: Vulva is situated in front of the middle of the body (Fig. *f*) at the junction of the anterior two-fifth and the posterior three-fifth. It is a transversely depressed slit. Vagina is elongated, muscular and directed anteriorly. The two uterine tubes (Fig. *f*) are opposed. Eggs are thick-shelled, contain an embryo and measure 0.087 mm.  $\times$  0.061 mm.

*Discussion.*—Referring to the classification given by Yorke and Maplestone (1926) this worm belongs to the family Oxyuridae Cobbold 1864, because of the presence of an oesophageal bulb, double uterine tubes and the absence of the precloacal musculature or sucker. It

belongs to the sub-family Cosmocercinae Railliet 1916, because of the presence of two equal spicules and a gubernaculum.



*Latibuccana funambulensis*, gen. et sp. nov..

*a.* Ventral view of anterior part with cervical alae; *b.* Lateral view of anterior part with oesophagus; *c.* Anterior part showing buccal cavity and three teeth; *d.* Lateral view of caudal extremity of female; *e.* Lateral view of caudal extremity of male; *f.* Lateral view of female genitalia to show the vulva and opposed uterine tubes.

The sub-family Cosmocercinae, contains at present seven genera which can be easily diagnosed by the key given by Azim (1931), but

the worm described in this paper cannot be assigned to any known genus of this sub-family though it comes nearer to the genus *Alaplectana* Azim 1931 on account of the presence of broad cervical alae. But it differs from it in having indistinct lips, a wide buccal cavity, in having the vulva situated in front of the middle of the body and in the absence of pedunculated papillae. I, therefore, propose the new genus *Latibuccana* for the reception of this species and designate *Latibuccana funambulensis*, nov. as the type-species.

*Generic characters.*—Cosmocercinae; Lips two indistinct; buccal capsule present with three teeth at its base; a short pharynx present; oesophagus with a posterior bulb separated by a constriction; cuticle free from plectanes; cervical alae prominent; tail in both sexes finely pointed; male without caudal alae and pedunculated papillae; vulva in front of the middle of the body; eggs contain embryo.

In Rodents.

*Specific diagnosis.*—Length of male 12.5 mm., maximum breadth 0.32 mm.; length of female 21.25 mm. and maximum breadth 0.49 mm.; oesophagus with the bulb in male 1.74 mm. long and 2.02 mm. in female; length and diameter of the bulb in male 0.23 mm. and 0.17 mm. and in female 0.27 mm. and 0.18 mm.; cervical alae extend to 0.78 mm. from the anterior end in male and 0.96 mm. in female; maximum breadth of the alae in male 0.06 mm. and 0.085 mm. in female; buccal cavity 0.059 mm. in depth and 0.043 mm. in diameter; spicules 0.90 mm. in length; vulva at the junction of anterior 2/5th and posterior 3/5th; eggs in uterus measure 0.087 mm. × 0.061 mm.

*Host.*—*Funambulus pennanti pennanti* Wroughton.

*Habitat.*—Intestine.

*Locality.*—Nagpur, C. P., India.

The type-specimen is deposited in the collection of the Zoological Survey of India, Indian Museum, Calcutta.

#### REFERENCES.

- Azim, M. Abdel (1931). A Note on *Alaplectana* Nov. Gen. Sub-family Cosmocercinae Railliet, 1916, Family Oxyuridae Cobbold, 1864. *Ann. Trop. Med. Parasit.* XXV, pp. 373-376.
- Yorke, W & Maplestone, P. A. (1926). *The Nematode Parasites of Vertebrates*, pp. 205-211.



## RECORDS OF INDIAN TRYPETIDAE (DIPTERA) WITH DESCRIPTIONS OF SOME APPARENTLY NEW SPECIES.

By H. K. MUNRO, *B.Sc., F.R.E.S., Pretoria.*

In considering the Trypetidae of the Oriental Region, it seems that the only work dealing with them as a whole is Bezzi's monograph published in 1913—over twenty years ago. Since then numerous species have been described but little appears to have been done to clear up the confusion that is evident as soon as one attempts to work with representatives of the Oriental forms of this family. Both Bezzi's work on the African, and Hendel's on the palaeartic Trypetidae have some bearing on them and the latter's keys to the genera of the world are of much use. Added to this an increasing amount of work is being done on the Australian Trypetidae, and Shiraki's recent monograph on the Trypetidae of the Japanese Empire, dealing as it does with that outlying portion of the Oriental Region, Formosa, cannot be ignored.

It was with much interest, therefore, that I received from the Indian Museum, Calcutta, a small collection of Trypetidae and I take this opportunity of expressing my sincere thanks to the Assistant Superintendent in charge of the Entomological Section for his kindness in sending me the material.

As regards the species that appear to be undescribed, one can only feel that there must remain some element of doubt as there are still so many species described by earlier workers (Walker and others) that have not been recognised again since their description. The position can only satisfactorily be dealt with by an examination, and re-description, of the types, discarding names when types are no longer extant. There would, however, be no possibility of this being done at an early date, so that a description, even as a synonym, may be of some ultimate use.

The types of all the species are deposited in the Indian Museum, Calcutta.

### ***Dacus (Zeugodacus) gavisus*, sp. nov.**

Allied to *caudatus* F. and *tetrachaetus* Bez. (Bezzi 1919, p. 419) but differs from the former in having only two inferior orbital bristles, the narrow costal stripe on the wing not dilated at the apex and the yellow thoracic markings more pronounced, and from the latter as the yellow supra-alar fasciae are not extended beyond the suture, although the wing-pattern is similar.

Type (No.  $\frac{1034}{H6}$ ), a male, Barkuda Id., Chilka Lake, Ganjam district, Madras Presidency, 15-22.vii.16, F. H. Gravely.

Length, 6.3 mm., of wing 4.0 mm. *Head* yellow, normal; *occiput* reddish brown with a wide yellow margin, about one-third distance between orbit and neck; *frons* twice as long as wide, flat, yellowish, a dark lateral spot, darker centrally towards the front, and slightly raised and yellow before lunule, bristles black, thin, one superior orbital, two

inferior, the ocellars very small but distinct; *lunule* small, brownish; *antennae* a little longer than face, third joint about three times longer than wide; *arista* brown, bare; *face* flat with a pair of large round black spots; cheeks narrow, *genae* moderate; *palpi* flat, light brownish, not strongly curved; *proboscis* short.

*Thorax* rugose, black with pale pubescence and extensive yellow markings; *dorsum*, before suture, the middle third chestnut with grey dust just crossing suture on median line, and a narrow dark median stripe; on the sides black; *humeri* yellow; behind suture shining black with a wide median and a pair of wide supra-alar yellow fasciae from suture to scutellum; suture broadly yellow on sides; *pleura*: *propleura* brownish, *mesopleura* yellow touching *humeri* with rather less than half on the lower anterior corner black; double *hypopleural* spot yellow; *sterna* black with a broad yellow bar along top, touching yellow of *mesopleura*. *Scutellum* yellow; *post-scutellum* and *mesophragma* black; *bristles* black, one supra-alar and *pre-scutellars* present, no *humeral*. *Legs* yellow, *tarsi* slightly darkened, *hind tibiae* moderately so. *Halteres* yellow. *Wing* normal, a narrow *costal* stripe from *stigma* to beyond end of third vein where it is not dilated; *anal* streak slight mainly marked by darkish hairs along point of *anal* cell which is about two-thirds of the length of the end of the sixth vein; *supernumerary lobe* moderate.

*Abdomen* yellow, first segment blackish, second with black anterior edge, third black on anterior third the black extended as a narrow, median line to the end of fifth segment, fourth black on lateral third, fifth on anterior corner; segments well marked. *Venter* and *genitalia* blackish-brown.

### **Dacus (Chaetodacus) diversus** Coq.

A male, Cochin State, ix.1914. F. H. Gravely.

The frontal bristles in this species are rather small and thin; two inferior and one superior orbitals; the ocellars are very small and hair-like, but distinct. There is a double yellow *hypopleural* spot.

### **Chelyophora** Rond.

While Bezzi (1918, p. 229) accepted his genus *Stictaspis* as a synonym of *Chelyophora* Rond., although with some doubt, on Hendel's statement that he had examined the genotype of *Chelyophora*, Enderlein (1920, p. 355) placed both *Stictaspis* Bez. and *Acroceratitis* Hend. as synonyms of Rondani's genus. From material I have been able to examine, I have no doubt that *Stictaspis* and *Acroceratitis* are the same. Further, as Hendel's name was published in February 1913 and Bezzi's in May of the same year, *Acroceratitis* must take precedence. The type of *Chelyophora* seems to be *borneana* Rond., a species quite unknown to me, and one, moreover, apparently overlooked and not recorded again by later writers. At present Hendel's statement quoted above may be accepted. Shiraki (1933, p. 133) in his study of the Japanese Trypetidae uses only *Acroceratitis* omitting reference to the other two names, only quoting *Chelyophora histrionica* de Meij. as a synonym of *Acroceratitis plumosa* Hend.

***Chelyophora siamensis*, sp. nov.**

A large species allied to *Ch. striata* Frogg. from Ceylon. Both differ from the other two Oriental species, *separata* Bez. and *plumosa* Hend. in having the marginal band on the wing broadly united to the basal and the cubital free. In *striata* the scutellum is black, while in this new species it is divided into the three black apical spots by narrow yellow lines.

Type (No.  $\frac{1035}{H6}$ ), a male, Lat Bua, Kao, East Siam, 18.x.16, C. Boden Kloss.

Length 7.1 mm., of wing 6.8 mm. *Head* short as in species of *Trirhithrum* Bez., length half and height  $\frac{7}{8}$  the width, light yellowish-brown; *occiput* flat above, moderate below; *frons* a little longer than wide and wider than an eye; slight darkish pubescence, ocellar dot black, vertical plates moderately marked, bristles strong, black, two superior and two inferior orbitals, ocellars strong; *lunule* small; *antennae* normal, second joint rather large and bristly, third about three times as long as wide, narrowed outwardly with a rather sharp apical point; *arista* plumose, plumosity wider than third antennal joint; *face* flat with shallow grooves; cheeks narrow; *genae* twice width of third antennal joint and with black setulae, the bristle strong; *palpi* with black setulae at end; *proboscis* apparently with rather long labellae.

*Thorax*: dorsum yellow and black with yellow pubescence, the yellow as a pair of sub-median stripes united along hind edge and a pair of narrow lateral stripes from above humeri rather indistinctly across suture ending in a distinct elongate spot at inner posterior supra-alar bristle; *pleura* and *sterna* mostly blackish yellow, more yellow along top of mesopleura and the hypopleural spots. Scutellum with yellow base and three more or less quadrate apical black spots; post-scutellum shining black, mesophragma shining blackish-brown; bristles black, cervicals paler, dorso-central on line of anterior supra-alar, two mesopleurals and four scutellars. *Halteres* yellow. *Legs* yellowish brown, front femora with a row of strong black bristles and black setae at end of hind femora, middle tibiae with a single apical spur, clothing brownish, hind tibiae rather arcuate. *Wing* normal; pattern yellowish brown, a slight, humeral band and rather few basal brown streaks, a strong basal band and united marginal, the medial is united to the marginal but the cubital is free; third vein bristly and costal bristle strong.

*Abdomen* normal; first and second segments yellowish-brown, the pubescence pale, but black on hind margin; third segment short, black, with black pubescence; fourth whitish, blackish with black pubescence on front edge and in middle, fifth yellowish with blackish pubescence; strong setae on hind edge of fifth and moderate on hind edges of third and fourth segments. *Venter* yellowish-brown, genitalia blackish.

***Taeniostola limbata* Hend.**

A specimen from Pashok, alt. 2,000 feet Darjiling district, East Himalayas, 26.V—14.VI.16, F. H. Gravely.

This agrees closely with the description and also with a paratype I have had on loan from the Deutsches Entomologisches Institut in

Berlin-Dahlem. The wing is a little longer, 8.0 mm. and only 7.0 mm. in the paratype, and the spot on the end of the scutellum is larger, extending from between apical bristles towards base for two-thirds the length of the scutellum.

**Acrotaeniostola spiralis**, sp. nov.

This is a typical *Acrotaeniostola* the other three species of which genus are recorded from Japan. It seems closest to *sexvittata* Hend. but differs from this and from *scutellaris* Mats. (a variety or a synonym of *sexvittata*) by the yellow scutellum. *A. flavoscutellata* Shir. also has a yellow scutellum, but is otherwise a much blacker species. *A. spiralis* differs from all the others in the simpler, reduced, more or less spiral, wing-pattern.

Type (No.  $\frac{103^3}{H0}$ ), a female, Rangamati, Chittagong Hill Tracts, Bengal, 11-16.VII.15. R. Hodgart.

Length 7.1 mm., of wing 6.6 mm., of base of ovipositor 1.0 mm. A brownish-yellow species. *Head* and appendages brownish; *occiput* flat above, lower swellings moderate; *frons* about a quarter longer than wide, parallel-sided, slight blackish pubescence anteriorly and appearing grey-dusted obliquely, ocellar dot blackish, bristles normal, two superior and three inferior orbitals, ocellars strong, as long as anterior of the upper orbitals; *lunule* small; *antennae* about as long as face, third joint about three times as long as wide; arista plumose; *face* rather concave with the edge of epistome slightly upturned; cheeks almost linear, genae barely as wide as third antennal joint; palpi with strong black setae at end, proboscis retracted in specimen.

*Thorax*: dorsum brown, pleura rather paler but blackened posteriorly; light brown, shining pubescence on dorsum, bristles black, cervicals strong, dorso-centrals on line of anterior supra-alars, two mesopleurals, sternopleural and pteropleural present. Scutellum yellow, rather flat on top, four bristles; post-scutellum and mesophragma shining brownish black. *Halteres* brown. *Legs* rather paler brown than pleura. *Wing* (Fig. 1) stigma short and acute apically; third vein bristly; the pattern consists of a short humeral bar and a brown stripe that more or less encircles the wing.

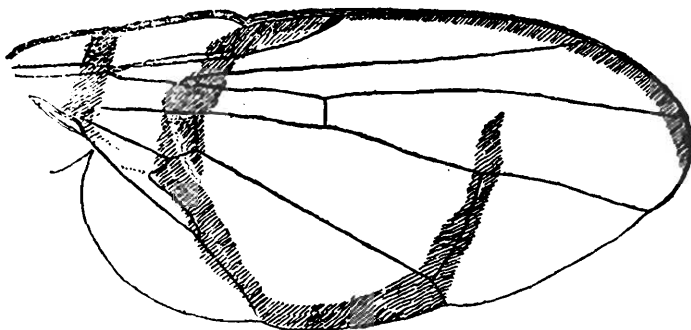


FIG. 1.—*Acrotaeniostola spiralis*, sp. nov. Wing.

*Abdomen* yellowish-brown, more or less shining brownish-black on segments 4, 5 and 6 and on sides of third; pubescence black, brown-shining. Base of ovipositor short conical, flattened in specimen, brownish-black with black pubescence; second joint brownish, third shining black nib-shaped.

***Acrotaeniostola apiventris*, sp. nov.**

A smaller species that may be placed in *Acrotaeniostola* : the antennae and point of the anal cell are quite typical, but it differs in having two inferior orbital bristles, long ocellars and an atypical wing-pattern.

Type (No.  $\frac{1037}{H6}$ ), a male, Pashok, alt. 2,000 feet Darjiling district, East Himalayas, 26.V—14.VI.16. F. H. Gravely.

Length 4.7 mm., of wing 5.3 mm. *Head* yellowish, length half, height two-thirds width; *occiput* brown centrally, lower swelling not prominent; *frons* nearly a third longer than wide, vertical plates and ocellar triangle somewhat glistening, scanty brownish pubescence anteriorly, bristles black, two superior orbitals, the anterior one before middle of frons, two inferior, the ocellars long and strong; *lunule* small; *antennae* rather darker yellow, third joint about twice as long as wide, upper edge straight, the lower curved upward to apical point, arista brown, plumose; *face* concave, cheeks linear, genae narrow, eye rounded, palpi and proboscis retracted in specimen.

*Thorax* brown, a yellowish bar from humeri along sides of dorsum above wing-base to scutellum and extended to pleura to include mesopleura except their anterior lower corner, and a pair of yellow hypopleural spots; dorsal pubescence pale; bristles black, normal, dorso-centrals on line of anterior supra-alars. Scutellum yellow with four bristles. *Halteres* yellowish. *Legs* yellow, hind femora brown. *Wing* (Fig. 2) pattern a small series of rather disconnected brownish transverse bars; stigma brown; third vein bristly.

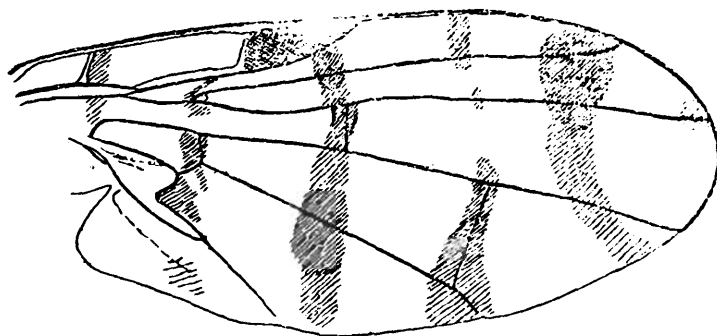


FIG. 2.—*Acrotaeniostola apiventris*, sp. nov., Wing.

*Abdomen* reminiscent of that of a honey-bee and is striking on account of the great development of the second segment which reaches the middle of the abdomen and is broadly developed on the sides, it is yellow with pale pubescence and some grey dust on hind margin (more extensively laterally) where it is also blackened; the third segment projects as a thin, narrow, black edge behind the second; the fourth is of more normal size, blackish anteriorly, yellowish with whitish dust posteriorly; the fifth segment is an obscure reddish-yellow with black hind margin which is interrupted in the middle line; there are some black setulae on the hind edges of the segments and four bristles on the fifth. Genitalia and venter yellowish but obscured by folding of abdomen.

**Gastrozona montana**, Bez.

Bezzi, 1913, p. 106.

A pair, Pashok, alt. 2,000 feet Darjiling district, East Himalayas, 26.V—14.VI.16. F. H. Gravely. The male is labelled "*Gastrozona montana* Bez., compared with type, C. Paiva."

**Phagocarpus immsi** Bez.

Bezzi, 1913, p. 131, Pl. x, fig. 72.

There is a pair of specimens "Sureil, Mangpu, Darjiling district 5,000 feet IV-V.17. S. W Kemp" The female also bears a label "*Phagocarpus immsi* Bez. compared with type, C. Paiva. 2 specimens"

After careful comparison with available literature, it is difficult to decide whether these are really *immsi* or not. There are slight differences to be noted and on these it might be possible to describe each specimen as a separate new species. Such a course, however, is not considered advisable owing to the small amount of data and material available. It may be noted that only the single male type of *immsi* has been recorded, and in regard to these two specimens, it is difficult to say whether the observed differences are sexual or specific.

Specimen A, male. This may be a genuine male of *immsi*, but is rather smaller than the type, length 4.2 mm., wing-length 5.0 mm. It is generally darker than appears to be the case in *immsi*. In the latter Bezzi states the head is entirely yellow, but in this specimen it is brownish and the frons almost reddish brown and it does not seem that this is due to discolouration. In *immsi* the thorax is stated to be dark reddish on the dorsum, pale reddish on the sides; here it is generally more blackish. The wing pattern is almost identical. The hyaline spot above the discal cell in the first basal is much smaller and rather inconspicuous. At the base of the wing both costal cells and immediately below the inner are quite hyaline, while in the figure of *immsi* there is shown a faint infuscation to the extreme base, leaving only the outer costal cell hyaline (except its outer end brown in each case). Further, in this male, the basal half of the discal cell is not yellowish.

Specimen B, female. This is rather larger than the type: length 6.6 mm., wing-length 6.0 mm. and differs in one point that may be of some specific value, namely the greater length of the third antennal joint.

Before discussing this, it may be as well to consider somewhat the other species of the genus. In the Formosan species, *vulgaris* Shir. the third vein is bristly for its whole length. In *permundus* Harris the extreme base of the wing is heavily infuscated. In the four other species the third vein is bristly to the upper cross-vein and the extreme base of the wing (at least the outer costal cell) hyaline. As regards the length of the third antennal joint, in *permundus*, Hendel (1927, p. 94) says nothing as to there being any difference in the sexes, although Shiraki (1933, p. 184) would seem to imply that it is shorter in the male. In *formosanus* Shir., although both sexes are described nothing is said of the relative lengths of this joint. Of *connexus* Shir. and *immsi* Bez. only the male has been described. The question therefore is whether in this female, the greater length of the third antennal joint is merely sexual or not.

The general colouration is dark as in the male just noted, but the frons is more yellowish. The slight pubescence is brownish and the bristles black, two inferior and three superior orbitals, the ocellars thin and short; the antennae are nearly as long as the face, the third joint yellow and about three times as long as wide, rather elongate oval, somewhat more narrowed on the distal half; the arista is pubescent. The thorax seems much as described for *immsi* but darker. On the wing the extreme base is hyaline as described in the male above, the basal half of the discal cell is however yellow and the hyaline spot in the first basal cell large, nearly the width of the cell, and squarish. The abdomen is shining black with black pubescence as is the base of the ovipositor; the greyish hind margins of first and third segments rather narrow and not pronounced; base of ovipositor short cylindrical, about as long as last two segments of pre-abdomen.

***Hemilea cnidella*, sp. nov.**

This species appears to be close to *Acidia (Ocneros) praestans* Bez. (1913, p. 141) but differs in having the forepart of the wing entirely brown, no hyaline spots on the costa and only a narrow posterior hyaline margin which is broken by a short brown streak at the lower cross-vein; in the last point it differs from *punctilabris* Bez. (1928, p. 107).

Type (No.  $\frac{1038}{H6}$ ), a male, Pashok, alt. 2,000 feet Darjiling district, East Himalayas, 26.V—14.VI.16. F. H. Gravely.

Length 5.2 mm., of wing 5.5 mm. *Head* light yellowish brown, length about half, height five-sixths of width; *occiput* flat, moderate below; *frons* flat, blackened on hind half, deeper yellow in front, slight black pubescence, about a quarter longer than wide, bristles black, two superior, three inferior orbitals (four inferiors on one side), ocellars moderate; *lunule* small; *antennae* yellow, two-thirds length of face, third joint rounded at end, arista pubescent; *face* flat with shallow grooves, cheeks narrow, genae a little wider than third antennal joint; palpi and proboscis apparently normal but retracted.

*Thorax* moderately swollen, dorsum light yellowish brown, translucent, with black pubescence; pleura humeri and scutellum rather paler, mesophragma somewhat blackened; bristles normal, black, dorso-centrals rather nearer pre-scutellars than anterior supra-alars, two mesopleurals, sternopleural and pteropleural present, four scutellars.

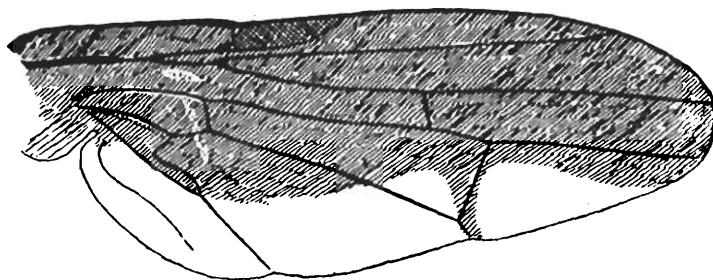


FIG. 3.—*Hemilea cnidella*, sp. nov., Wing.

*Legs* pale yellowish brown. *Halteres* yellow. Wing (Fig. 3) third vein bristly, fore part of wing brown with only sub-hyaline basal fold-streaks.

*Abdomen* shining black with black pubescence, first and second segments mottled yellow and also a spot on front centre of third. Venter and genitalia black.

### **Vidalia ceratophora** Bez.

Bezzi, 1913, p. 136, Pl. ix, fig. 42.

A specimen from Pashok, alt. 2,000 feet Darjiling district, East Himalayas, 11.VI.16. L. C. Hartless. It is labelled "*Vidalia ceratophora* Bez. compared with type"

It may be noted that the wing is brown to the tip—in Bezzi's figure the tip is represented as broken off, and the spot in the first posterior cell is rather sub-hyaline.

### **Euleia** Walk.

I have used the name *Euleia* for *Myioleja* Rond. 1856 and *Myiolia* Hendel 1927 and Shiraki 1933 as proposed by Bates (1933, p. 101).

### **Euleia (Acidiostigma) apicalis** (Bez.).

Bezzi, 1913, p. 144, Pl. ix, fig. 47 (*Acidia*).

A pair, Darjiling, 6,000-7,000 feet East Himalayas, 12.VI.14. F. H. Gravely. One specimen is labelled "*Acidia apicalis* Bez. compared with type, C. Paiva"

### **Euleia (Acidiostigma) lucens**, sp. nov.

Allied to *apicalis* (Bez.) but differs as the wing-pattern forms a continuous band from base to apex and the cheeks are narrower.

Type (No.  $\frac{1039}{H6}$ ), a female, Darjiling, 6,000-7,000 feet East Himalayas, 12.VI.14. F. H. Gravely.

Length 6.0 mm., of wing 6.4 mm. *Head* yellowish brown, length two-thirds, height about five-sixths width; *occiput* rather convex and moderate below; *frons* rather more than one and a half times long as wide, slight blackish pubescence, strongly silvery shining obliquely, ocellar dot black, bristles normal, black; two superior and three inferior orbitals, ocellars rather small and thin; *lunule* small; *antennae* two-thirds length of face, third joint rounded at end, arista pubescent; *face* flattish with moderate grooves, cheeks narrow, genae wider than third antennal joint, eye rather rounded; proboscis and palpi normal.

*Thorax*: dorsum black with black pubescence and moderate strongly shining silvery dust, rest of thorax, including edges of dorsum and scutellum yellowish brown, only a narrow stripe from humeri to wing-base yellowish and post-scutellum and mesophragma shining black with slight dust. Scutellum slightly convex and a little blackish pubescence on sides. Bristles normal, black, dorso-centrals on line of anterior supra-alars, lower of the two mesopleurals weak, sternopleural and pteropleurals present, four scutellars. *Legs* and *halteres* concolourous with pleura,

middle tibiae with single spur. *Wing* (Fig. 4) large, costal bristle absent, stigma elongate, narrow, third vein bristly.

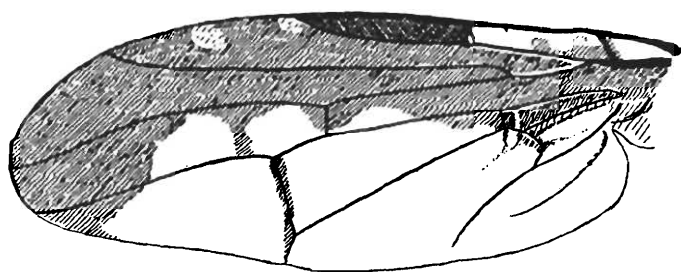


FIG. 4.—*Euleia (Acidiostigma) lucens* n. sp., Wing.

*Abdomen* shining black with black pubescence, segments one and two yellow, third more or less broadly yellow in middle and slightly on sides, fourth slightly yellow in centre and somewhat along hind edge, fifth on hind edge and sixth more broadly so. Base of ovipositor short, only a little longer than fifth segment, shining black with black pubescence, flattened in specimens. Venter yellowish.

#### ***Euleia (Acidiella) erythraspis* Bez.**

Bezzi, 1913, p. 145, Pl. x, fig. 50.

Two females, one "near Ghoom, 6,000-7,000 feet Darjiling district, East Himalayas, 11.VI.14. F. H. Gravely" and labelled "*Acidia erythraspis* Bez. compared, C. P." the other "Birch Hill Park, Darjiling, East Himalayas, 7.VI.23. H. S. Rao"

#### ***Tephrella decipiens* Bez.**

Bezzi, 1913, p. 152, Pl. x, fig. 56.

One specimen, Sureil, Mangpu, Darjiling district 5,000 feet IV-V.17, S. W. Kemp. Labelled "*Tephrella decipiens* Bez. compared with Indian Museum specimens, C. Paiva."

#### ***Acanthoneura* Macq.**

In this genus one finds much confusion which has to some extent been cleared up by Hendel (1927, p. 57) although as he says a critical review of the Oriental forms is necessary, and this should include comparison with related African groups. Apart from anything else, to obtain the necessary material presents a serious problem, and added to this is the necessity of examining genotypes and types of species scattered in various European institutions and elsewhere.

A mistake to be noted is that the *Acanthoneura* described by Bezzi (1913, p. 116) is not Macquart's genus, but *Themara* Walk. Hendel's differentiation (l. c.) seems correct and is acceptable, namely that in *Acanthoneura* the fifth vein is bare, but bristly in *Themara*. In the absence of specimens it is not possible to allocate correctly the various species described under *Acanthoneura*. For example those placed in this genus by Enderlein (1911, p. 414 *et sec.*) may be put into at least four genera. Nothing is said as to whether the fifth vein is bristly or not, although it is represented as bare in the figures given.

**Acanthoneura gravelyi**, sp. nov.

This species may be distinguished from others that may be assigned to this genus by the different wing pattern. The base is generally more hyaline and in particular, the hyaline indentation on the basal half of the stigma is extended across the submarginal cell to the second vein.

Type (No.  $\frac{1040}{H6}$ ), a male, Pashok, alt. 2,000 feet Darjiling district, East Himalayas, 26.V—14.VI.16. F. H. Gravelly.

Length 6.4 mm., of wing 8.4 mm. *Head* yellow, about one quarter higher and two-thirds wider than long; *occiput* translucent, glistening, convex not markedly prominent below; *frons* yellow on hind two-thirds, vertical plates glistening whitish and a short narrow streak from black ocellar dot less so, reddish on anterior third, moderate brown pubescence, about a third longer than wide and a fourth narrower than an eye; bristles black, two superior, one inferior orbital, ocellars small, hair-like; *lunule* small; *antennae* (third joint of right missing) about two-thirds length of face, third joint about three times as long as wide, brownish, blackened above and at rounded apex, arista brownish, plumose; *face* with shallow grooves, epistome somewhat prominent, cheeks linear and genae about as wide as third antennal joint, both glistening silvery obliquely, genal bristle strong; proboscis short, palpi broadly black at apex.

*Thorax* yellowish brown with black pubescence, pleura rather lighter and humeri yellowish; *scutellum* as thorax, almost bare, with a small yellow apical spot; post-scutellum and mesophragma blackish-brown; bristles normal, black; two mesopleurals, sternopleural strong, dosrocentrals half way between pre-scutellars and anterior supra-alars, six scutellars, the middle pair small. *Legs* as thorax, with brownish clothing, middle tibiae with single spur. *Wing* (Fig. 5) third vein bristly.

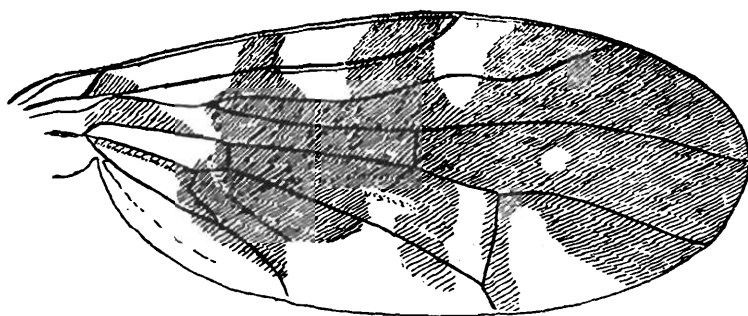


FIG. 5.—*Acanthoneura gravelyi*, sp. nov., Wing.

*Abdomen*: first segment yellowish, second with anterior third black, third anterior two-thirds, fourth black, yellowish on hind margin, fifth black; pubescence brownish to black, paler on yellow, setae on hind margins of segments moderate, stronger on sides and at end of fifth; venter black to yellow; genitalia shining black.

**Rioxa quinquemaculata** Bez.

Bezzi, 1913, p. 115, Pl. ix, fig. 27.

A female, Pashok, alt. 2,000 feet Darjiling district, East Himalayas, 26.V—14.VI.16. F. H. Gravelly. Labelled "*Rioxa quinquemaculata* Bez. det. Paiva".

Bezzi's figure shows that the first vein ends mid-way between the ends of the auxiliary and second veins, while in this specimen it ends nearer to the end of the second vein.

***Sophira phlox*, sp. nov.**

Very close to *Sophira venusta* Walk. (1857, p. 34); it differs in the thoracic markings, the absence of black bands on the abdomen and a somewhat different, although very similar, wing-pattern.

Type (No.  $\frac{1041}{H6}$ ), a female, above Tura, Garo Hills, Assam, 3,500—3,900 feet 15.VII-30.VIII.17. S. Kemp.

Length 8.2 mm., of wing 8.6 mm. *Head* brownish, almost spherical; *occiput* moderate, convex; *frons* brown, flat, very slight pubescence anteriorly, slightly narrower than an eye and width about two-thirds length, bristles black, rather weak, two superior and one inferior orbital, no ocellars; *lunule* small; *antennae* yellow, two-thirds length of face, third joint somewhat narrowed to rounded end; *arista* sparsely plumose; *face* with rather deep grooves, *epistome* moderately prominent; *cheeks* narrow, almost linear, *genae* about as wide as third antennal joint; *palpi* brownish, rather small; *proboscis* brown, short.

*Thorax* reddish-brown, shining, pale brownish pubescence, a lateral black stripe from above humeri narrowing and disappearing towards dorso-central bristle (there is no lateral sutural stripe as in *venusta*), a transverse black bar from one inner posterior supra-alar to the other before but not touching scutellum; *pleura* lighter, more reddish-brown, *post-scutellum* yellow, *mesophragma* shining black, yellowish in middle, *scutellum* as dorsum, small; bristles normal, there are cervicals, humeral, one mesopleural; the pteropleural and sternopleural are missing on specimen and are apparently absent; dorso-centrals behind line of anterior supra-alars, three-fifths the distance between suture and scutellum from suture. *Wing* (Fig. 6) flame yellow with broad brown markings along costa and some veins; third vein bristly. *Legs* elongate, coloured as *pleura*. *Halteres* blackish.

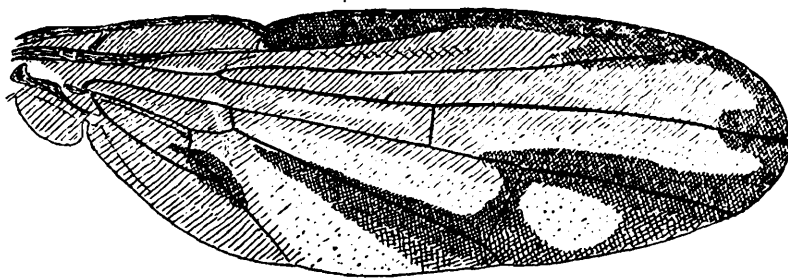


FIG. 6.—*Sophira phlox*, sp. nov., Wing.

*Abdomen* narrow, yellow, no black bands, pubescence yellow, segments well-marked and conspicuously overlapping; sixth short; base of ovipositor short, flat in specimen, colour and pubescence as pre-abdomen, a little longer than fourth segment (or than fifth and sixth together); *venter* yellowish.

**Elaphromyia pterocallaeformis** Bez. *var.*

Two pairs, Sureil, Mangpu, Darjiling district 5,000 feet IV-V.17. S. W. Kemp.

As far as can be judged in the absence of additional material for comparison, these may be regarded as at least only a variety of *pterocallaeformis* Bez. (1913, p. 155). They agree as well as may be expected with Bezzi's description, but it may be noted that the more hyaline spots along the costa are very variable (as they are, too, in the African species, *E. adatha* Walk.) These specimens differ in having three pairs of spots on the abdomen, in the female a pair on the fourth, fifth and sixth segments, in the male one pair on the fourth, and two on the fifth segment, the latter rather inclined to form a pair of short streaks. Generally speaking too the colouration of the head, legs and body seem darker and not as yellow as one would suppose to be the case in *pterocallaeformis*. A careful comparison with the description of *E. siva* Frey (1917, p. 19) from Ceylon would seem to suggest that it is very little different from *pterocallaeformis* Bez.

**Paratephritis abstractus**, sp. nov.

Allied to *Paratephritis fukaii* Shir. (1933, p. 436) from Japan, but differs in having four inferior orbital bristles, rather wider cheeks (eyemargins, Shiraki) and a more projecting epistome; there are more numerous sub-hyaline spots on the wing (as in *P. formosensis* Shir.) and the hind margin behind the longitudinal hyaline streak is reticulate. The number of the lower inferior orbital bristles is not of very great importance in these forms; in his generic diagnosis Shiraki states there are two in *Paratephritis*, but in the figure of the head of *P. fukaii* three are shown.

Type (No.  $\frac{1042}{R6}$ ), a male, Lebong, 6,600—6,000 feet Darjiling district 13.VI.14. F. H. Gravely.

Length 4.5 mm., of wing 4.5 mm. *Head* brown with slight grey dust more or less all over, length three-fifths, height four-fifths width; *occiput* flat above and blackish centrally, moderate and paler below, the bristles dirty yellow with some black setulae on sides; *frons* flat, one-fifth longer than wide, with moderate, coarse, yellow pubescence, ocellar dot black, round it paler and vertical plates faintly greyish, bristles black, upper of two superior orbitals yellow, four inferior orbitals, ocellars strong; *lunule* moderate; *antennae* short, two-thirds length of face, third joint more or less rounded; arista dark brown, short pubescent; *face* concave, epistome moderately prominent (more so than in *fukaii*); cheeks broad (wider than in *fukaii*) about two-thirds width of third, antennal joint, genae about one-third wider than this joint; proboscis and palpi retracted, the former short.

*Thorax* blackish-brown, blacker on dorsum with brown dust and yellow pubescence; bristles black, normal, dorso-centrals a little before line of anterior supra-alars. *Scutellum* flat, more or less triangular, yellowish at apex, four bristles. *Legs* brown, hind femora with short row of bristles at outer end. *Wing*: third vein with a few weak setulae at extreme base; brown, costal cells and stigma almost entirely brown,

otherwise with numerous yellow sub-hyaline spots ; across outer quarter a hyaline transverse bar, irregular in width ; a basal hyaline bar across second basal, anal and discal cells to line of upper cross-vein, there being a couple of brown spots on the hyaline in the discal cell ; behind this longitudinal hyaline bar, that is including the axillary cell and the third posterior except broadly at its outer end, reticulate, so that the hyaline bar is not as pronounced as is case in *fukaii*.

*Abdomen* black, second segment broadly yellowish on hind margin, third and fourth slightly so, and fifth moderately ; pubescence black except on paler areas and on median line yellow. Venter black, genitalia yellow.

#### BIBLIOGRAPHY.

- Bates, M., 1933.—*Psyche*, XL, pp. 48-56.  
 Bezzi, M., 1913.—*Mem. Ind. Mus.*, III, No. 3.  
 Bezzi, M., 1918.—*Bull. Ent. Res.*, VIII, pp. 215-251.  
 Bezzi, M., 1919.—*Philippine Journ. Sci.*, XV, pp. 411-442.  
 Bezzi, M., 1928.—*Dipt. Brachycera and Athericera of the Fiji Islands*.  
 Enderlein, G., 1911.—*Zool. Jahrb. Abt. für Syst.*, XXXI, 407-460.  
 Enderlein, G., 1920.—*Zool. Jahrb. Abt. für Syst.*, XLIII, 336-360.  
 Frey, R., 1917.—*Öfv. Finska Vet. Soc. Förh.*, LIX, Afd. A, No. 20, pp. 1-36.  
 Froggatt, W. W., 1909.—*Report on Fruit-flies, etc.*  
 Hendel, F., 1914.—*Wien. Ent. Zeit.*, XXXIII, pp. 73-98.  
 Hendel, F., 1915.—*Ann. Mus. Nat. Hung.*, XIII, pp. 424-467.  
 Hendel, F., 1927.—in Lindner, *Die Fliegen der Pal. Region*, 49 *Trypetidae*.  
 Shiraki, T., 1933.—*Mem. Sci. & Agric. Taihoku Imp. University*, VIII, *Ent.* No. 2.  
 Walker, F., 1857.—*Journ. Proc. Linn. Soc., Zool.*, I, pp. 33-36.



NEMATODES FROM A COMMON INDIAN LIZARD (*UROMASTIX HARDWICKI*) WITH REMARKS ON *KALICEPHALUS PARVUS* MAPLESTONE, 1932.

By R. C. CHATTERJI, *Helminthological Institute, University of Rangoon.*

The material described in the present paper consisted of ten tubes of nematodes from the intestine of *Uromastix hardwicki* and one from the intestine of pigeon, sent for identification by Col. Taylor, Director of the Central Pasteur Institute, India, to whom I wish to acknowledge my indebtedness. The pigeon nematodes consisted solely of *Ascaridia columbae* (Gmelin, 1790) : those from the lizard comprised four species of *Thelandros* of which three are new. I have here to express my thanks to Dr. H. A. Baylis of the British Museum for kindly sending me the diagnoses of *Thelandros sceleratus* Travassos, 1923 and *T. oswaldocruzia* Travassos, 1925.

***Thelandros taylori*, sp. nov.**

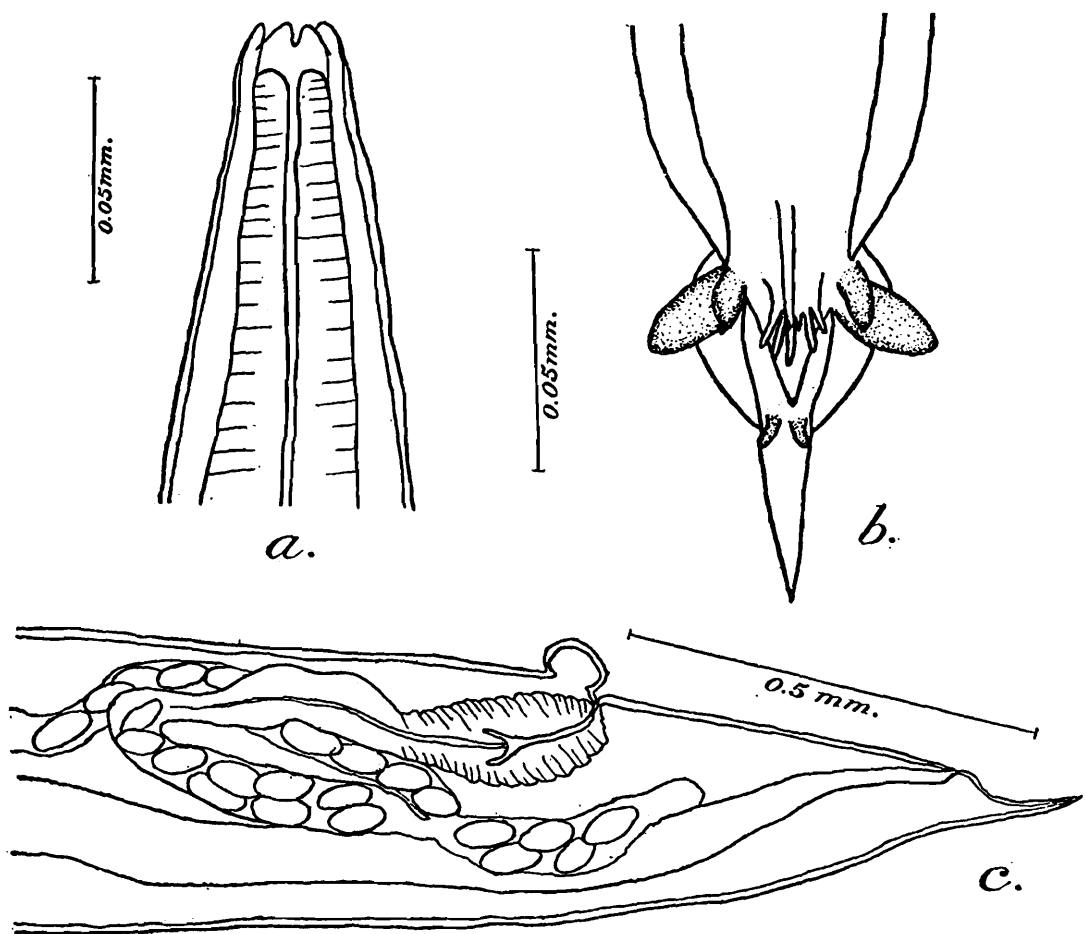
Adults small, females approximately one and half times as large as males ; latter posteriorly curved ventrally, former more or less straight. Body in both sexes tapering from the middle towards the extremities. Cuticle thick, with fine transverse striations. Lateral alae absent, except near posterior portion of male. Body margins in some females were found to be appreciably separated from the cuticle simulating the presence of lateral alae : careful examination revealed that the striations in such structures corresponded with the cuticular striations of the body and that the appearance was due to an artefact caused by plasmolysis at the time of fixation. Mouth terminal, bounded by three bi-lobed lips. Pharynx small. Oesophagus long, muscular, with more or less uniform breadth, measuring a little approximately one-third length of body and projecting into pharynx. Excretory pore situated behind the bulb.

Male : length 2-2.5<sup>1</sup>, maximum diameter near middle of body 0.15-0.22. Cuticular striations 0.007-0.012 apart. Oesophagus including the bulb 0.624-0.84 long. Nerve ring approximately 0.098-0.13 from anterior end. Tail 0.05-0.078 long, suddenly constricted at level of cloaca and continued as a dorsally-directed process with a terminal spike, the process being provided with two conspicuous lateral alae extending for more than half its length. Three pairs of caudal papillae present, two pairs preanal and one pair at the extremity of the caudal alae, at approximately the beginning of the spike. Of the two cloacal pairs, the posterior larger than the anterior. Anterior lip of cloaca fringed, the posterior forming a comparatively long posteriorly-directed conical process with a blunt end. Spicule short, tapering to a fine point, 0.035-0.045 in length.

---

<sup>1</sup> All measurements are in millimetres.

Female: Length 2.96-4, maximum thickness 0.21-0.4. Cuticular striations 0.012-0.015 apart. Length of oesophagus 1-1.5. Nerve ring situated approximately 0.14-0.2 behind anterior end of body. Vulva with prominent anterior lip, close to anus. Vagina muscular, directed anteriorly, 0.08-0.12 long, passing forwards to join a more or less flask-shaped muscular sphincter: this consists of a very muscular bulb, the centre of which is hollowed out and bears a large papilla carrying on its anterior face the opening of the genital canal. Ovejector short, very muscular, directed anteriorly. Arising from it a common reservoir egg sac or trompe curves backwards and divides anteriorly into two uteri, one of which curves posteriorly and then runs anteriorly parallel to the other. Coils of ovaries on each side of oesophageal bulb and the excretory pore a little behind it. Tail short, 0.108-0.156 long, ending in a fine point. Eggs oval 0.08-0.095  $\times$  0.047-0.065.



TEXT-FIG. 1.—*Thelandros taylori*, sp. nov.

a. Dorso-ventral view of anterior end; b. Ventral view of posterior end of male; c. Lateral view of posterior end of female.

In most characters the present species agrees with the diagnosis of *Thelandros* Wedl, 1862: the presence of caudal alae and the peculiar posterior displacement of the vulva towards the anus are features in which it differs. A resemblance to *Pharyngodon* Diesing, 1861 and *Aleuris* Thapar, 1925 is afforded by the first character. Too much importance has been attached by some workers to the generic value of the caudal alae in the male Reptilian Oxyurids. *Mehdiella* Seurat, 1918

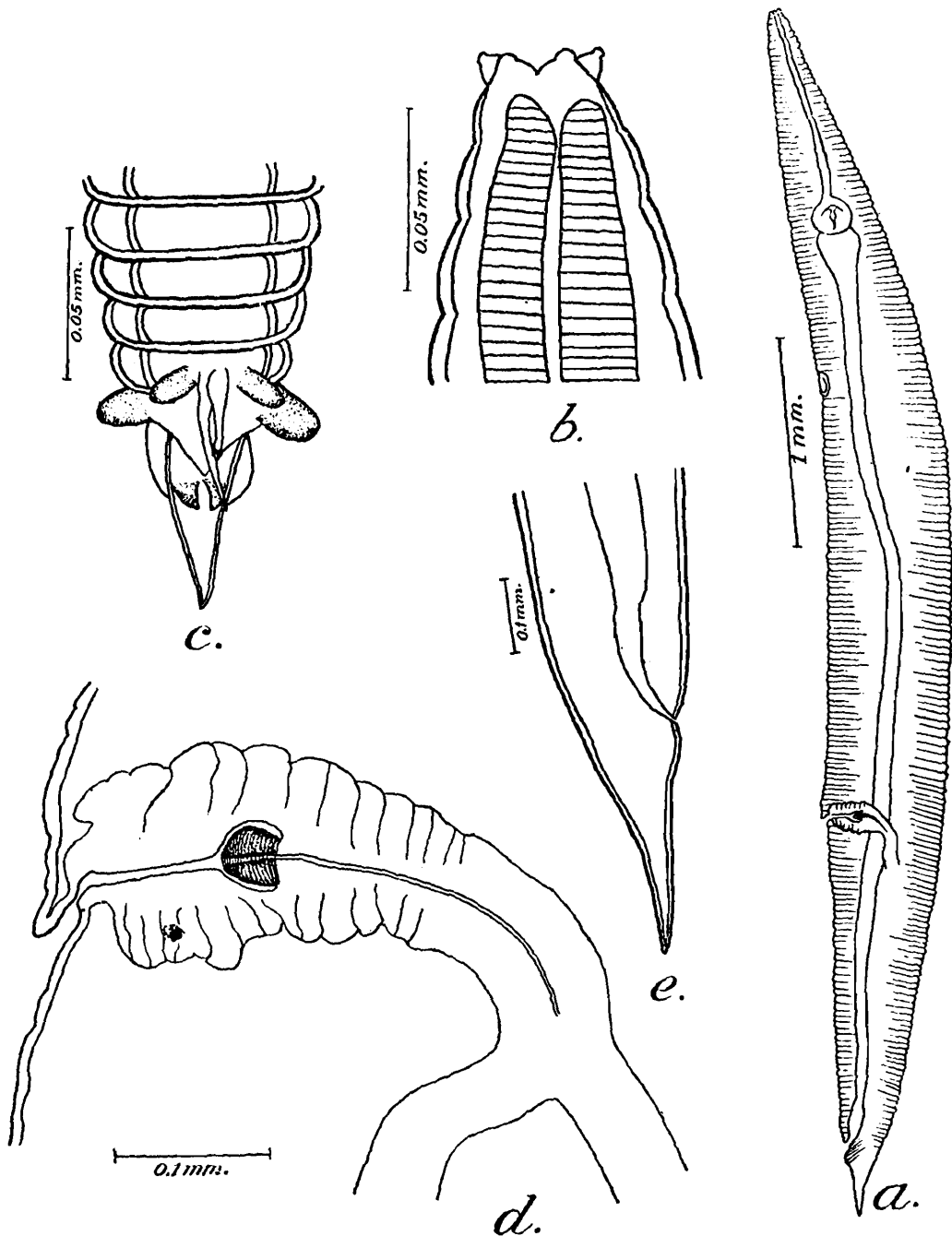
has been separated by Seurat (1918) and Yorke and Maplestone (1926) from *Tachygonetria*, Wedl, 1862, mainly on the presence of narrow caudal alae in the male: this character, however, has been ignored by Baylis and Daubney (1926), who accordingly have regarded the former genus as a synonym of the latter. Further work by Ortlepp (1933) has revealed that in the genus may exist all variations, from a non-alar type as in the majority of the species, through *T. microstoma* (Drasche, 1884) and *T. uncinata* (Drasche, 1884) with narrow alae, to the well developed alar condition in *T. poweri* Ortlepp, 1933, and *T. quadrilabiata* Ortlepp, 1933. It is also possible that the same condition exists in the genus *Thelandros* and no importance, therefore, beyond a specific value can be attached to the presence of this character in the present form. The position of the vulva close to the anus indicates a relationship with the genus *Thaparia* Ortlepp, 1933, but in the absence of other characters, such as a differentiated glandular part of the oesophagus, a spicule of extraordinary large size, and the presence of a gubernaculum, this resemblance must be dismissed. The peculiar position of the vulva, though an important character and one which does not occur in any other species of *Thelandros* is not of sufficient importance to justify the creation of a new genus.

#### ***Thelandros baylisi*, sp. nov.**

Worms small, females approximately one three-fourth times as long as males. Posterior portion of latter curved ventrally, females straight. Body broadest in the middle, attenuating towards extremities. Cuticle thick, with comparatively coarse striations. Body wall in some females compressed a little behind the head giving rise to false appearance of cephalic alae like those of *T. taylori*, sp. nov. Cuticle increases in thickness, appearing as broad rings in posterior portion of male. Mouth with three prominent bi-lobed lips, each provided with a papilla. Pharynx small, with the duct of the oesophageal glands opening on its dorsal surface. Oesophagus long, with a pre-bulbular constriction. Oesophago-intestinal valves projecting into the chyle intestine. Excretory pore a little behind the bulb.

Male: Length 2.5-3.7, maximum diameter 0.175-0.22. Oesophagus including the bulb 0.65-0.8 long. Oesophageal bulb more or less spherical, approximately 0.98 in diameter. Tail constricted at level of cloaca, provided anteriorly with a pair of small alar expansions, one on each side. Anterior lip of cloaca fringed, though much less so than *T. taylori*, sp. nov.: posterior lip conical and produced backwards, ending bluntly. Three pairs of caudal papillae present: two pairs large and preanal, the posterior pair being larger than the anterior, third pair small and situated at the extremity of narrow caudal expansions. Spicule short, 0.03-0.06 long. Gubernaculum absent. Posterior end of male peculiarly thickened and enclosed in a prepuce like sheath as in *T. micruris* Rauther, 1918, and *T. sahariensis* Baylis, 1930. This originates from the region of the cloaca, extends forward for a short distance and gradually merges into the body cuticle. Cuticle in the sheath extremely thick, as a result the entire surface of the rings formed

by its striations cannot be brought in one focus. The pronounced separation of the cuticle of the sheath from the ventral surface of the body, recorded in *T. sahariensis* Baylis, 1930, and figured by Rauther in *T. micruris*, does not usually exist in this case. It was noted in a few cases where it was obviously the effect of plasmolysis: this explanation may also possibly apply to the cases quoted.



TEXT-FIG. 2.—*Thelandros baylisi*, sp. nov.

a. Lateral view of female; b. Dorso-ventral view of anterior end; c. Ventral view of posterior end of male; d. lateral view of valval region; e. Lateral view of posterior end of female.

Female: Length 3.8–6.3, maximum breadth 0.3–0.66 nearly in the middle of the body. Cuticular striations approximately 0.16–0.06 apart. Oesophagus 1–1.62 long. Intestine continued into a well-pronounced rectum. Nerve ring approximately 0.165–0.22 behind

anterior end of body. Vulva well behind middle of body, 1.26–2.2 from the posterior extremity, provided with an anterior lip, shorter than that of *T. taylori*, sp. nov. Genital canal opening into the muscular vagina through a large papilla at the apex of the ovejector. The egg-sac or trompe agrees with that of *T. micruris* Rauther, 1918, in shape and size. Uteri arise posteriorly from the trompe and run forward, parallel to each other. Ovarian coils close to level of vulva. Tail, 0.234–0.37 long, attenuated posteriorly unlike *T. micruris*. Eggs oval, with a thin shell 0.08–0.098 × 0.05–0.06 in size.

The presence of a caudal prepuce-like sheath in the male distinguishes the present species from all others except *T. micruris* Rauther, 1918 and *T. sahariensis* Baylis, 1930. The resemblance to the former is very close as both have the same host and the same geographical distribution: they differ however in the more posterior position of the excretory pore in the new form, in the female of a similar posterior displacement of the vulva and, in the male, of narrow caudal alae. Allowing for the movement of the decimal point one place to the right in *T. micruris* Rauther, 1918 as suggested by Baylis (1930, p. 126)—a procedure which harmonises these measurements with those of specimens of that species obtained by me from the Kasauli material—the present form shows differences in size and proportionate lengths of the oesophagus. The differences from *T. sahariensis* are obvious discrepancies in the size of the body and the proportionate lengths of body structures. The more posterior position of the vulva and the presence of narrow caudal alae, are additional characters which distinctly separate these two forms.

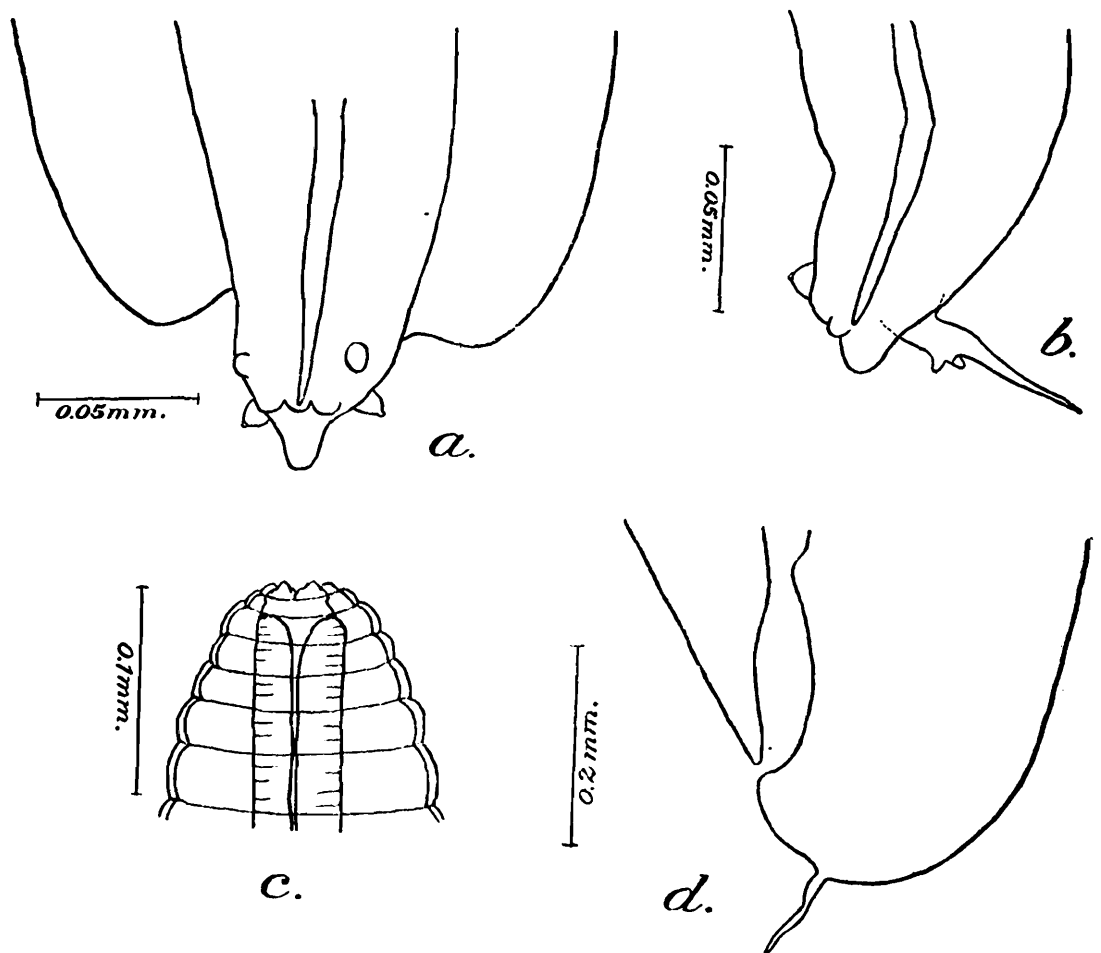
### ***Thelandros kasauli*, sp. nov.**

Unfortunately only two male specimens—both badly preserved—were obtained from a total of 1156 parasites: one with unusually compressed body and the other a young specimen with the oesophagus protruding out of the ruptured cuticle. Lateral alae distinct in the latter and originate approximately 0.236 from the anterior end, narrow at first but gradually widening posteriorly, attaining a breadth of approximately 0.04 towards the posterior end of body. Caudal extremity with the usual three pairs of papillae—one preanal and two postanal. The preanal pair and the anterior pair of postanal papillae well-developed, approximately of the same size: posterior pair of postanal papillae situated on terminal appendage of tail at about one-third its length from the base. Anterior lip of cloacal aperture simple, with projections only at angles. Posterior lip a comparatively long posteriorly directed conical process with a blunt termination.

Dimensions of both the specimens are as follows:—

	No. 1.	No. 2.
Total length	2.32	1.638
Maximum thickness	0.44	0.156
Interval between cuticular striations	0.015–0.03	0.012–0.015
Length of oesophagus	0.67	0.49
Size of oesophageal bulb	0.118 × 0.137	0.09 × 0.103
Nerve ring from anterior end	0.138	..
Length of spicule	0.114	0.094

Females much stouter than males. Length variable usually 3.35–7. Maximum width 0.33–0.98. Mouth surrounded by three bi-lobed lips. Pharynx small. Oesophagus very muscular, 0.8–1.15 long with more or less uniform breadth. Bulb measures 0.138–0.195 × 0.156–0.234. Nerve ring approximately 0.09–0.14 from anterior extremity of body and excretory pore in between oesophageal bulb and vulva. Vulva a little behind middle of body, 1.54–3.22 from posterior end, and bounded by two lips—one anterior and the other posterior—more conspicuous in younger than in older specimens owing to the profuse uterine development and consequent body swelling of the latter. Vagina strongly muscular, 0.156–0.4 long, curving posteriorly to meet the ovejector. At this point of union is a sphincter through which runs the genital duct. Ovejector muscular, at its junction with vagina: further back the muscles become less prominent. It continues into the common reservoir, which runs posteriorly for a short distance, and then meets the two uteri, one a little posterior to the other. Tail divided into an anterior blunt portion and a terminal caudal spike, length 0.058–0.158 and 0.078–0.11 respectively. Eggs oval, 0.086–0.102 × 0.055–0.063.



TEXT-FIG. 3.—*Thelandros kasauli*, sp. nov.

- a. Ventral view of posterior end of male; b. Lateral view of posterior end of male;  
c. Dorso-ventral view of anterior end; d. Lateral view of posterior end of female.

Of all the species included in this genus only three are known to possess males in which the spicules exceed a length of 0.1; these are *Thelandros*

*echinatus* (Rudolphi, 1819), *T. numidicus* Seurat, 1918, and *T. sexlabiata* Ortlepp, 1933, with spicules 1.105, 0.2 and 0.124 respectively. It is distinguished from *T. echinatus* in the presence of the postequatorial position of the vulva and the absence of the fringed anterior cloacal lip. In the absence of caudal alae it shows a marked difference from *T. numidicus* Seurat, 1918. It differs from *T. sexlabiata* in the absence of oesophageal funnel and the cuticular alae in the female; the pointed caudal extremity of the male and the presence of the terminal spike on the blunt end of the tail are further distinguishing characters.

#### ***Thelandros micruris* Rauther, 1918.**

In all eight females were obtained. The dimensions were larger than those recorded by Rauther (1918). Length 4.6–5.73, maximum thickness 0.487–0.546. Cuticular striations 0.02–0.04 apart. Nerve ring at about 0.126–0.146, and excretory pore 1.13–1.4, from anterior end. Length of oesophagus 0.79–0.936. Tail short and conical, approximately 0.28–0.37 long. Vulva with conspicuous anterior lip, close behind middle of body, 2.1–2.63 from posterior extremity of body. Uterus mostly devoid of eggs, when present oval and approximately  $0.07 \times 0.047$ .

#### ***Kalicephalus parvus* Maplestone, 1932.**

Ortlepp (1923) under the name of *Kalicephalus parvus* described one male and two immature females from the stomach of *Lampropeltis getulus* (Linnaeus, 1766) (syn. *Coronella getula*) from North America. Due to an oversight Maplestone in 1932 recorded under the same name three specifically distinct male nematodes from the intestine of the common Indian cobra, *Naja naja* (Linnaeus, 1758) (syn. *Naja tripudians*). On the attention of Dr. Maplestone being drawn to this, he suggested to the author to rename the species; the name *K. maplestonei* nom. nov. (= *K. parvus* Maplestone 1932 nec Ortlepp 1923) is therefore proposed for it.

#### REFERENCES.

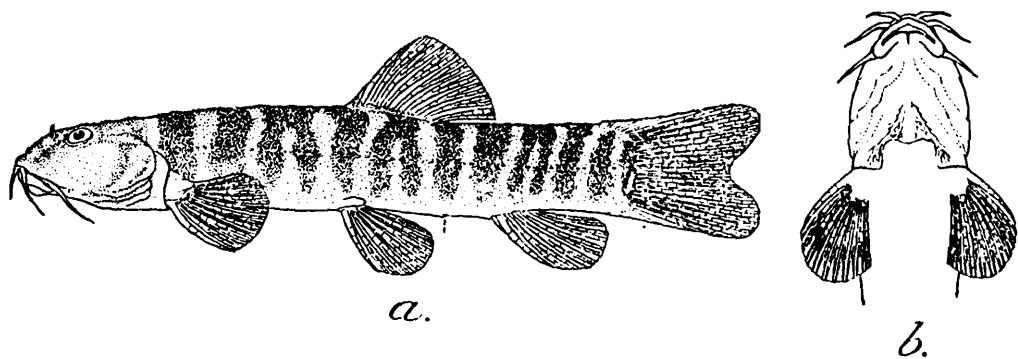
- Baylis, H. A. (1923).—Report on a collection of parasitic nematodes, mainly from Egypt. Part ii. Oxyuridae. *Parasitol.* XV, pp. 20-23.
- Baylis, H. A. (1930).—Mission Saharienne Augiéras—Draper, 1927-28. Parasitic Nematodes. *Bull. Mus.* (2) II, pp. 126-128.
- Baylis, H. A. and Daubney, R. (1926).—*A synopsis of the Families and Genera of Nematoda.*
- Linstow, O. von (1897).—Nemathelminthen grosstentheils in Madagascar gesammelt. *Arch. f. Naturg.* LXIII, p. 31.
- Maplestone, P. A. (1932).—Parasitic nematodes obtained from animals dying in the Calcutta Zoological Gardens. *Rec. Ind. Mus.* XXXIV, pp. 253-254.

- Ortlepp, R. J. (1923).—Observations on the nematode genera *Kalicephalus*, *Diaphanocephalus*, and *Occipitodontus* g. n., and on the larval development of *Kalicephalus philodryadus* sp. n. *Journ. Helminthol.* I, pp. 187-188.
- Ortlepp, R. J. (1933).—On some South African Reptilian Oxyurids. *Onderstepoort Journ. Vet. Sci., Animal Industry* I, pp. 99-106; pp. 109-112.
- Rauther, M. (1918).—Mitteilungen zur Nematodenkunde. *Zool. Jahrb., Anat. u. Ontog.* XL, (4) pp. 457-461.
- Seurat, L. G. (1917).—Sur les Oxyures des Sauriens du Nord-Africain. *Arch. Zool. exp. et gén. Paris* LVI, pp. 412-430.
- Thapar, G. S. (1925).—Studies on the Oxyurid Parasites of Reptiles. *Journ. Helminthol.*, III, pp. 25-30, pp. 41-42.
- Yorke, W. and Maplestone, P. A. (1926).—*The Nematode Parasites of Vertebrates.*

## ON THE SYSTEMATIC POSITION OF THE LOACH, *HOMALOPTERA HINGI* HERRE.

By SUNDER LAL HORA, D.Sc., F.R.S.E., F.A.S.B., Assistant Superintendent, Zoological Survey of India, Calcutta.

Early in 1934, Dr. Albert W. Herre sent in exchange to the Zoological Survey of India a valuable collection of Chinese fishes which included, in addition to other forms, three specimens of his species *Homaloptera hingi* (*Lingnan Sci. Journ.* XIII, p. 287, 1934) from Hongkong. Though the species has a greatly depressed form and its paired fins are horizontally placed, a careful examination of the material has convinced me that it is not a species of the genus *Homaloptera*, but must be assigned to the genus *Nemachilus*. In its pectoral fin, there are 10 to 11 rays, of which only one outer ray is simple; the ventral fin has 7 rays, of which only one outer ray is simple. In my recent monograph on the Homalopteridae (*Mem. Ind. Mus.* XII, p. 275, 1932), it was indicated that in *Homaloptera* "the pectoral possesses 14 to 20 rays, of which 4 to 8 outer rays are simple. The ventral is provided with 8 to 10 rays, of which 2 outer rays are simple" In *Protomyzon*, which possesses one simple ray in the paired fins, the number of rays in the pectoral fin is 22. It is thus clear that *Homaloptera hingi* cannot be included either in the Homalopterinae or in the Gastromyzoninae.



*Nemachilus hingi* (Herre).  $\times 1\frac{1}{2}$ .

a. Lateral view; b. Ventral surface of head and anterior part of body.

The colouration of the species, its long barbels and the structure of its lips and jaws also confirm the identification of *Homaloptera hingi* as a species of the genus *Nemachilus*. It appears to be closely allied to *Octonema rotundicauda* Martens (*Monatsber. Ak. Wiss. Berlin*, p. 608, 1868) from Hongkong. In both the species, the nasal flap is produced into a barbel-like process. The caudal fin of *rotundicauda* is stated to be round, whereas that of *hingi* is slightly emarginate with two rounded lobes. In *rotundicauda* the lateral line pierces only a few scales, while in *hingi* it is continued to the base of the caudal fin. The systematic position of *rotundicauda* has been discussed in my monograph referred to above (p. 267).

Several species of *Nemachilus* are found in the torrential streams of India and further east. Some of these, by the modification of their form and by the position and structure of their paired fins, are well adapted for life in swift currents. In this connection reference may be made to a species like *N. shanensis* Hora (*Rec. Ind. Mus.* XXXI, p. 322, pl. xv, figs. 5 and 6, 1929) from Burma. Usually species of *Nemachilus* are found lying among pebbles at the bottom, where their alternate light and dark bands make them inconspicuous. Homalopterid fishes, on the other hand, adhere to rocks and boulders where their uniformly grey or broadly marbled colour harmonises beautifully with the dark background.

# ON A COLLECTION OF ECHIUROIDS OF THE GENUS *THALASSEMA* LAMARCK IN THE INDIAN MUSEUM, CALCUTTA.

By B. PRASHAD, *D.Sc., F.R.S.E., F.A.S.B., Director, Zoological Survey of India, Calcutta.*

(Plate I)

Within recent years the Indian Museum has received very valuable collections from the Sandheads, off the mouth of the River Hooghly, made by the members of the Bengal Pilot Service from time to time. In two of these collections were included three specimens of a very interesting species of the genus *Thalassema* Lamarck. This species, though allied in the development of gills on the proboscis to the peculiarly modified group of estuarine species<sup>1</sup> of the genus found in eastern waters, is new to science, and is described in this paper under the name *Thalassema arkati*,<sup>2</sup> sp. nov. A specimen received some years back from Dr. H. H. Marshall from the estuarine waters of the Irrawady, from off Rangoon, cannot also be assigned to any of the previously known species, and is described under the name *Thalassema marshalli*, sp. nov.

The opportunity has also been taken to report on a large series of specimens of the genus collected round the Andamans and Nicobars by the Surgeon-Naturalists to the Marine Survey of India during the years 1921-26, and a few specimens collected by Dr. S. W. Kemp at Port Blair in 1921.

## ***Thalassema caudex* Lampert.**

1883. *Thalassema caudex*, Lampert, *Zeitschr. Wiss. Zool.* XXXIX, p. 340.  
1898. *Thalassema caudex*, Shipley, *Proc. Zool. Soc. London*, p. 472, pl. xxxvii, fig. 11.  
1899. *Thalassema caudex* Shipley, *Willey's Zool. Results*, p. 346.  
1913. *Thalassema caudex*, Wharton, *Philippine Journ. Sci.* VIII, pp. 262, 263.

The description of *T. caudex* was based on specimens from the Red Sea in the Wurzburg Museum; Lampert also referred some specimens from the Indian Ocean in the Berlin Museum to this species. Shipley identified as *T. caudex* specimens collected by Professor J. Stanley Gardiner at Rotuma.

The species is represented in the collection before me from the following localities:

1. Reef on Aberdeen, north of Jetty at South Point, Port Blair, Andamans. S. W. Kemp. 18.ii.21 1 specimen.
2. East Coast of Camorta Island, Nicobars (St. 616). R. B. S. Sewell. 2.x.22 1 specimen.

---

<sup>1</sup> For a detailed account of the species reference may be made to Prashad, B., *Mem. Asiat. Soc. Bengal*, VI, pp. 323-338, pl. xi (1919); also see *id.*, *Rec. Ind. Mus.*, XVI, pp. 399-402 (1919).

<sup>2</sup> For the derivation of the specific name *arkati*, see Komp, S., *Rec. Ind. Mus.* XXV, p. 405 (1923).

- |  |              |
|--|--------------|
| 3. Camorta Island, west of Jetty, Nicobars (St. 619). R. B. S. Sewell. 13.xii.21 | 1 specimen.  |
| 4. Macpherson Straits, Andamans (St. 657). R. B. S. Sewell. 29.i.24              | 2 specimens. |
| 5. East Bay, Kachal, Nicobars (St. 673). R. B. S. Sewell. 9.iii.25               | 3 specimens. |
| 6. Nankauri Harbour, Nicobars (St. 710). R. W. G. Hings-ton. 11.ii.26            | 1 specimen.  |

I give below a detailed description of the three well preserved specimens from the reef on Aberdeen, Port Blair. They were found under a stone close to the highwater mark, and in the Station Book their colour is described by Dr. Kemp as follows: "Proboscis pale yellow, finely mottled with bright apple green which becomes most intense on the lateral margins. Anterior two-thirds or more of body pale grey, broadly striped longitudinally with deep red. Tubercles at distal end of body white, showing when this portion of the animal is expanded as white spots on a dull red ground." Preserved in spirit the animals appear pale yellow with the regions of the muscle bands slightly darker.

*Measurements (in millimetres).*

Total length	73	59	48
Maximum width	19	18.5	16.5
Length of proboscis	18.5	19	18

Seen with the naked eye the surface shows small, rounded papillae on the anterior third or a little more of the body, and prominent, rounded to ovoid papillae on the posterior third. Under a binocular microscope the papillae are found to be present all over the surface, but they are more minute in the middle region of the body. There are 18-19 longitudinal muscle bands separated by narrow intervals, more marked in the middle region of the body. Three pairs of segmental organs with the lateral margins of their funnels produced into long, spirally coiled lobes were found in all the three specimens; the anteriormost of the three pairs lies in front of the setae. The anal vesicles vary in length, but generally do not exceed half the length of the animal; they are provided with brownish funnels.

The specimens from the other localities agree in general with the Port Blair specimens described above, and I have no doubt that they are all *T. caudex* Lampert. The proportion of the length of the proboscis to the entire length, which Wharton describes as  $\frac{1}{3}$ , is variable, differing according to the state of preservation of the material. The two ventral margins of the proboscis form near its base a short, closed tube, but are quite separate from one another throughout the remainder of its length.

In general appearance *T. caudex* resembles *T. kempi* Prashad,<sup>1</sup> but the latter species, as I have confirmed by a re-examination of the type and the specimen recorded below, has *four* and not *three* pairs of segmental organs. My description of this species, however, needs correction in that the anterior two pairs of segmental organs are situated in front of the setae.

<sup>1</sup> Prashad, B., *Mem. Asiat. Soc. Bengal*, VI, pp. 336, 337 (1919).

***Thalassema kempi* Prashad.**

1919. *Thalassema kempi*, Prashad, *Mem. Asiat. Soc. Bengal*, VI, p. 336, fig. 2.

A single specimen of this interesting species was collected by Lt.-Col. R. B. S. Sewell in the east end of Macpherson Straits, Andamans (St. 657) on 29th January, 1924.

This specimen has a total length of 60 mm. with a maximum width of 20 mm. ; the proboscis is 19 mm. long. The specimen preserved in spirit is of a dirty yellowish colour, and 20 longitudinal muscle bands can be easily distinguished. On dissection it was found that this specimen like the type of *T kempi* has four pairs of elongate segmental organs.

***Thalassema diaphanes* Sluiter.**

1888. *Thalassema diaphanes*, Sluiter, *Natuurk. Tijdschr. Nederl. Ind.* XLVIII, p. 244, pl. iii, figs. 1-7.

1899. *Thalassema diaphanes*, Shipley, *Willey's Zool. Results*, p. 366.

1902. *Thalassema diaphanes*, Shipley, *Faun. Geog. Maldive & Laccadive Archipel.* I, p. 128, pl. vi, fig. 2.

1913. *Thalassema diaphanes*, Wharton, *Philippine Journ. Sci.* VIII, pp. 262, 263.

*T diaphanes* has previously been recorded from the Bay of Batavia ; Pigion Island, New Britain ; Hulule, Maldives ; and Minikoi, Laccadive Islands.

The single specimen from a small bay on the north side of the east end of Macpherson Straits—near Chiryatapu ; Andamans (St. 657), collected by Lt.-Col. R. B. S. Sewell on 20th January, 1924, from a sandy and rocky bed, undoubtedly belongs to this species.

The specimen is 48 mm. long, while the proboscis is 38 mm. long. The proboscis forms a closed tube near its junction with the body on the ventral surface, the closed part being less than  $\frac{1}{4}$  of a millimetre long. In the description of the species Sluiter remarked " Der Russel ist an der basis röhrenförmig geschlossen " ; this is not shown clearly either in Sluiter's figure or in that of the living animal by Dr. C. Forster Cooper from the Maldives. The skin is very thin and diaphanous. The skin papillae, though minute in the anterior third of the animal, can be readily distinguished even under a low magnification ; round the anal opening they are comparatively large and more rounded. There is only a single pair of segmental organs, which are short and without the spirally coiled lobes of the lateral margins of the funnels. The anal vesicles are short, and closely resemble those figured by Sluiter.

***Thalassema arkati*, sp. nov.**

The body, as shown in Pl. I, fig. 1, is elongate-ovoid with the anterior third narrower and almost cylindrical. The anal opening is surrounded by a number of elongate papillae, which form a sort of fringe round it (Pl. I, fig. 4). About a quarter of an inch distant from the anus is a ring-shaped thickening of the integument, which seems to serve as an anchoring device for the animal. The proboscis (Pl. I, fig. 2) is short and stumpy, about  $\frac{1}{3}$ - $\frac{1}{4}$  of the total length ; its ventral margins are free to the base, and the free margins to a little behind the

tip are cut up or produced into short, variously branched gill-like processes (Pl. I, fig. 4). The colour of the animals in spirit is creamy to yellowish. The surface of the body, including the proboscis, is covered by minute, rounded to ovoidal papillae; in the middle region of the body the papillae are very minute or even absent, while in the posterior region next to the annular thickening mentioned above, the papillae are transversely elongated, ovoid; no papillae can be distinguished in the region below the annular thickening. Two golden yellow or darkish hook-like setae are present in the usual situation on the ventral side. The longitudinal musculature consists of 8 distinct bundles separated by broad interspaces. There are two segmental organs on either side opening behind the level of the setae. The segmental organs are very long, tubular structures, being only slightly shorter in length than the body of the animal, and the lateral margins of their funnels are produced into spirally coiled lobes. The anal vesicles are of a light yellowish colour, very thin and about  $\frac{1}{3}$  the length of the animal.

*Measurements (in millimetres).*

	Holotype.	Paratypes.	
Total length	47	44	28
Maximum width	21	18	12
Length of proboscis	11	11	8

*Holotype* No. W.  $\frac{3168}{1}$  in the collection of the Zoological Survey of India (Indian Museum), Calcutta; *Paratypes* No. W.  $\frac{3176}{1}$ .

*Distribution.* Two specimens were collected by Captain C. Park of the Bengal Pilot Service at Sandheads in June, July, 1927, while one specimen was collected by the officers of the S. P. V. "Lady Fraser" in January 1934.

*Remarks.* The species differs from all marine species of the genus in bearing gill-like prolongations along the free ventral margins of the proboscis and an annular thickening round the anus. From the group of estuarine species of the genus which have gills on the proboscis, it is easily distinguished by its longitudinal musculature, which is broken up into distinct bundles.

***Thalassema marshalli*, sp. nov.**

*T. marshalli* is a species of small size, rounded anteriorly and narrowing down to almost a point posteriorly (Pl. I, fig. 5); its total length being 25 mm. and the maximum width 8 mm. The proboscis is 5.8 mm. long and its free ventral margins provided with greatly branched gill-like structures (Pl. I, figs. 6, 7). The colour of the single, rather badly preserved specimen in spirit is bluish yellow. The surface of the body is covered over by minute, rounded papillae; these are very minute or absent in the middle region of the body, and are more prominent in the posterior third. The longitudinal musculature is continuous. On dissection only two pairs of minute, finger-shaped segmental organs were seen behind the level of the prominent, hook-like ventral

setae. The alimentary canal in the unique holotype was badly damaged, while the body cavity was full of a bluish mud, and it is, therefore, not possible to describe the form of the anal vesicles.

*Holotype* No. W.  $\frac{3166}{1}$  in the collection of the Zoological Survey of India (Indian Museum), Calcutta.

*Distribution.* The unique holotype was collected by Dr. H. H. Marshall in the estuarine waters of the Irrawady, near Rangoon, Burma.

*Remarks.* The species is allied to *T. branchiorhynchus* Annandale & Kemp<sup>1</sup>, but the form of the body and the proboscis are distinctive, while the gill-structure is quite different in the two species.

---

<sup>1</sup> Annandale, N. & Kemp, S., *Mem. Ind. Mus.* V, p. 61, fig. 2 (1915).

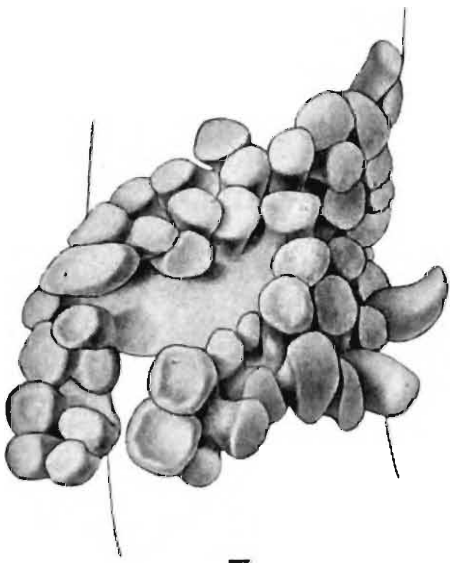
## EXPLANATION OF PLATE I.

### *Thalassema arkati*, sp. nov.

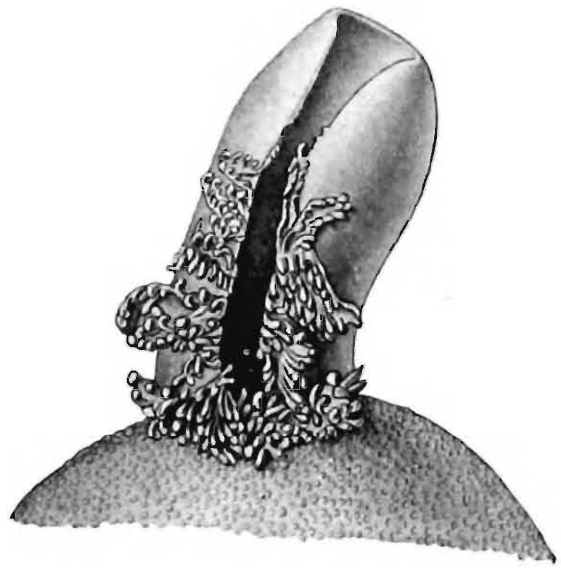
- FIG. 1. Entire animal, ventral view.  $\times ca. 1\frac{1}{2}$ .  
FIG. 2. The proboscis and anterior region of the body.  $\times 3$ .  
FIG. 3. A portion of the free, ventral margin of the proboscis showing the gill-like structures.  $\times ca. 20$ .  
FIG. 4. Anal region with the annular thickening.  $\times ca. 5$ .

### *Thalassema marshalli*, sp. nov.

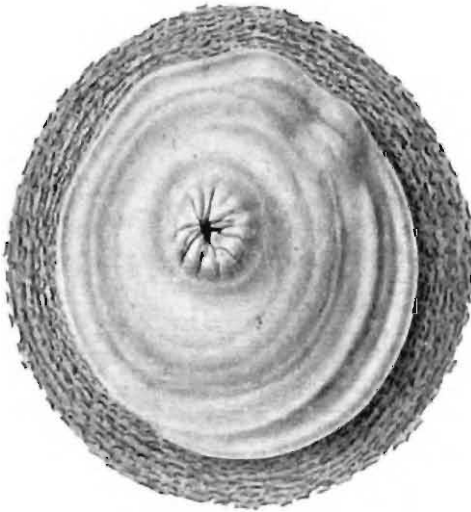
- FIG. 5. Entire animal, ventral view.  $\times 1\frac{1}{2}$ .  
FIG. 6. The proboscis and anterior region of the body.  $\times ca. 10$ .  
FIG. 7. A portion of the gill-like fringe, still further magnified.



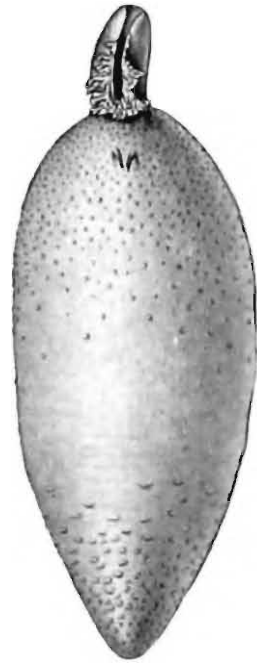
7.



6.



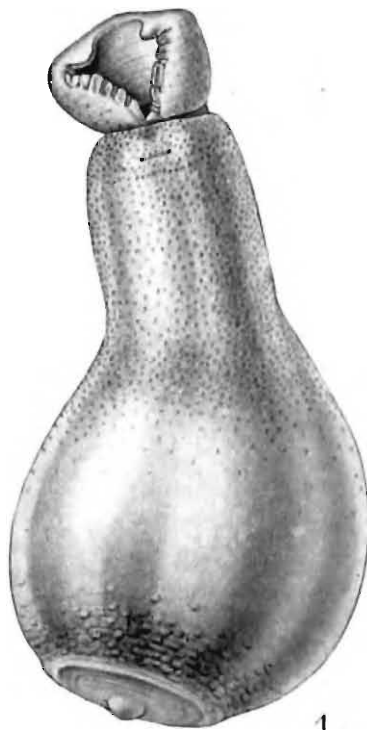
4.



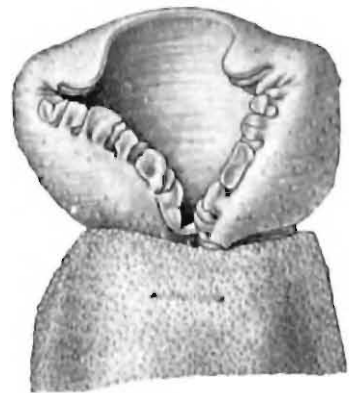
5.



3.



1.



2.

ON THREE SOUTH INDIAN CRABS (DECAPODA, BRACHYURA)  
OF THE MADRAS MUSEUM.

By HEINRICH BALSS, *Munich*.

(Plate II)

Dr. B. Chopra of the Zoological Survey of India, Indian Museum, Calcutta, sent me a small collection of crabs belonging to the Madras Museum for identification. This collection contained a new species of the genus *Medaeus*, of which I had already an example from the collections of the Basel Museum, besides two other forms, the systematic position of which had not previously been understood correctly.

***Medaeus rouxi*, sp. nov.**

(Plate II, figs. 1 and 2.)

1 male, Pamban, Gulf of Manaar, Madras Presidency. F. Müller Coll. (*Mus. Basel*).

1 female, Krusadai Island, Gulf of Manaar (*Mus. Madras*).

I dedicate this new species to the distinguished Carcinologist Dr. Jean Roux, Custodian of the Natural History Museum of Basel.

*Description.* The carapace is slightly convex; its length is  $\frac{5}{6}$ th its breadth. Its upper surface, which is divided by grooves, bears in certain regions clusters of small granules, while the grooves themselves appear only slightly roughened. Two very characteristic flat rounded efflorescences project from the hepatic region (one on either side) as lobe-shaped structures. There are also bundles of long hairs distributed on the front and on the median gastric region. The two median lobes of the front project forwards, and are separated from one another by a deep groove. The front towards the sides is slantingly truncate, and is separated from the upper border of the orbit by a deep groove, from which the two antennae project forwards. The two grooves on the upper margins of the orbits are distinct. The outer orbital tooth is well developed and is of the same shape as the three teeth following it along the margin of the carapace; all of these are very broad, project widely outwards, end in blunt points, and have strongly rounded posterior margins. The last tooth of the lateral border is somewhat smaller than the others. Between the outer orbital tooth and the 1st lateral tooth there is another tooth, the subhepatic, which is smaller but projects so far upwards as to be distinctly visible in dorsal view. The postero-lateral margin of the carapace runs obliquely in a straight line posteriorly. In reference to the ventral side of the carapace the following points may be noted:—the lateral wall, the third maxilliped and the sternum are strongly granulose; on the lower margin of the orbit there is a broadly rounded lobe, while the inner tooth which lies close to the base of the second antenna, is narrower, longer and more pointed. Between this and the front are situated the infra-orbital second antennae, of the three joints of which the first is the longest

and the third the shortest. The flagella are relatively long. The two chelipeds are symmetrical and of the type of the genus *Halimede*. They bear on the margin of the merus, which lies next to the carapace, on the carpus and on the upper margin of the chelae broad, rounded, granulose lobular efflorescences similar to the lobes on the hepatic region. From above one can distinguish on the carpus four such projections and a pointed spine on the inner side; further smaller ones are present near the junction of the carpus and the palm. The palm bears on the upper margin two rows, each consisting of four such projections; the outer surface and the inner are strongly granulose and the granules are arranged in straight rows. The fixed finger and the dactylus are arched inwards; the hook-shaped, pointed fingers cross each other, and on the cutting edge both have about five broad teeth. The upper border of the dactylus bears near its joint with the palm many rows of granules. The pereopods are long and narrow, the upper margins of some of the joints are sharp; the carpi show on the posterior side traces of a carina. The dactyli are only slightly shorter than the propodites, and have horny tips.

*Measurements.*

Length of carapace	.	5 mm.
Breadth of carapace		6 mm.
Length of palm	.	5 mm.
Length of 3rd pereopod	.	7.5 mm.
		(merus 3 mm.; carpus 1.5 mm.; propodus 1.5 mm.; dactylus 1.5 mm.).

The type of this species is deposited in the Basel Museum.

*Systematic Position.* In the lobular projections on the chelipeds and the hepatic region, this species comes very close to the genus *Halimede* (e.g., *H. tyche* of Herbst), but is distinguished by the oblique front (which in *Halimede* is transversely shortened), by its not greatly elongated and narrow abdomen of the male, which is characteristic of the genus *Halimede*; in our form, on the other hand, it has the usual Xanthid shape. I, therefore, assign this species provisionally to the genus *Medaeus* Dana, in which, at least in *M. ornatus* Dana from Hawaii, the chelae have lobular teeth. *M. rouxi* is distinguished from this species by the lobular projections on the hepatic region and the untoothed upper margins of the merus and the pereopods.

***Sphaerozius nudus* (A. Milne Edwards).**

(Plate II, figs. 3 and 4.)

1867. *Actumnus nudus*, A. Milne Edwards, *Ann. Soc. Entomol. France* (4) VII, p. 265.  
 1887. *Actumnus nudus*, de Man, *Journ. Linn. Soc. London* (Zool.) XXII, p. 49, pl. ii, figs. 4, 5 (not 2, 3 as indicated).  
 1898. *Actumnus nudus*<sup>1</sup>, Alcock, *Journ. As. Soc. Bengal* LXVII, p. 207.

1 female without eggs (carapace length 14.8 mm.; carapace breadth 18.8 mm.), Pamban, Gulf of Manaar, September, 1925.

1 female with eggs (carapace length 9.4 mm.; carapace breadth 12 mm.) Krusadai Island, Gulf of Manaar, 16-22, September, 1925.

<sup>1</sup> *Nec A. nudus* Grant & McCulloch, *Proc. Linn. Soc. N. S. Wales* XXXI, p. 17 (1906), which is *Eurycarcinus maculatus*, vide McCulloch, *Rec. Austral. Mus.* VII, p. 57 (1908).

In the paper cited above de Man gave a detailed description of this species, and it is only necessary to supplement it with a description of the larger cheliped. This is distinctly larger than the other; its merus is short and stumpy, and reaches up to the antero-lateral border of the carapace; its upper margin is sharp and without teeth; its lateral surface is smooth. On the other hand the upper surface of the carpus is tuberculate, the tubercles increase in size anteriorly and appear pearl-shaped. Its inner surface is smooth, and is marked off from the upper by a row of small tubercles. An inner tooth is only slightly indicated. The palm is relatively broad, its margins are rounded, and its entire upper surface is beset with pearl-shaped tubercles, which are larger along the upper than along the lower margin. The entire inner surface is finely granular or almost smooth. The moveable finger is curved, hook-shaped, and near its point of articulation finely granular. Its cutting edge bears about 6 teeth; the proximal ones are pointed, while the distal is broader. The fixed finger, which lies in a straight line with the lower margin of the palm, proximally bears a strong, bifid tooth; distally also it has two smaller, bifid teeth. The finger is of a light-brown colour.

*Systematic Position.* Alcock remarked that this species does not belong to the genus *Actumnus*. It is certainly very closely allied to *Sphaerozius nitidus* Stimpson and *S. panope* (Herbst), particularly in (1) the form of the carapace which is strongly arched; (2) the broad triangular marginal teeth (*Actumnus* has pointed spines); (3) the form of the rostrum; (4) the form of the large chela with the broad tooth on the fixed finger, as is generally found in species of the genus *Sphaerozius*; and (5) the great difference in the two chelae (in *Actumnus* the chelae are more similar).

In view of the form of the "Ruten" (=Pleopods 1 and 2 of the male) I have assigned *Sphaerozius* to the Menippinae, while *Actumnus* belongs to the Pilumninae (see Balss, pp. 510-513). Unfortunately I have before me only young males of this species, but have no doubt that in this species also the form of the "Ruten" would correspond to that of the Menippinae.

The specific name *nudus* is unfortunate, as this form is distinguished from other species of the genus by its granulations.

*Measurements of the larger chela of the larger female.*

Length of carpus (inner margin)	7 mm.
Length of palm (upper margin)	5.7 mm.
Length of palm (lower margin including the fixed finger)	15 mm.
Breadth of palm	9.3 mm.

***Leipocten sordidulum* Kemp.**

1915. *Leipocten sordidulum*, Kemp, *Mem. Ind. Mus.* V, p. 244, pl. xii, fig. 8 text-figs. 16-20.

2 males, 3 females, Ennur Backwater, Madras.

*Systematic Position.* In view of the form of its carapace Kemp included this small crab in the Xanthidae, but for the following reasons

I believe that it should be referred to the Macrophthalminae of the family Ocypodidae :

1. The chela of the male with a single tooth on the dactylus and the greatly curved finger has the form usually found in this subfamily.
2. The chela of the female is smaller and differs in shape from that of the male ; this is the case in the Macrophthalminae.
3. The form of the third maxilliped and the abdomen of the male resembles exactly that of *Paracleistostoma depressum* de Man.
4. The form of the buccal region and the palatal ridges is exactly similar to that of *Cleistostoma*.

#### LITERATURE.

1. Alcock, A. (1898). Materials for a Carcinological Fauna of India. No. 3. The Brachyura Cyclometopa. Part I. The Family Xanthidae. *Journ. As. Soc. Bengal* LXVII, pp. 67-233.
2. Balss, H. (1932). Ueber einige systematisch interessante Xanthidae (Crustacea Decapoda Brachyura) der Harmsschen Reisen nach der Sundaarchipel. *Zeit. Wissen. Zool.* CXLII, pp. 510-519.
3. Grant, F. E. & McCulloch, A. R. (1906). On a collection of Crustacea from the Port Curtis District, Queensland. *Proc. Linn. Soc. New South Wales* XXXI, pp. 2-53.
4. Kemp, S. (1915). Fauna of the Chilka Lake, Crustacea Decapoda. *Mem. Ind. Mus.* V, pp. 243-247, pl. xii, fig. 8.
5. McCulloch, A. R. (1908). Studies in Australian Crustacea. No. I. *Rec. Austral. Mus.* VII, pp. 51-59, pl. xii.
6. de Man, J. G. (1887). On the Podophthalmous Crustacea of the Mergui Archipelago. *Journ. Linn. Soc. London (Zool.)* XXII, pp. 49-52, pl. ii, figs. 4, 5.
7. Milne-Edwards, A. (1867). Descriptions de quelques especès (et genres) nouvelles de Crustacés Brachyures. *Ann. Soc. Ent. France* (4) VII, pp. 263-288.

EXPLANATION OF PLATE II.

*Medaeus rouxi*, sp. nov.

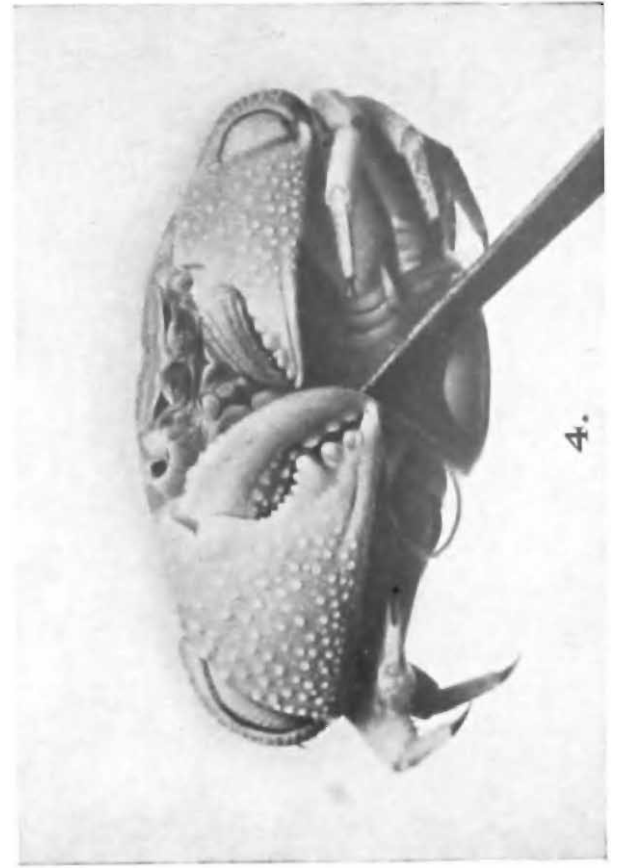
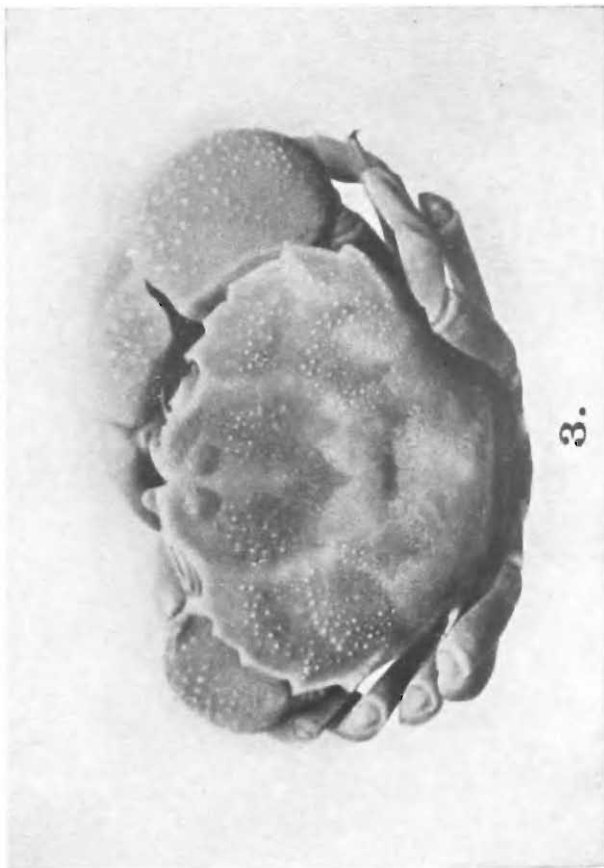
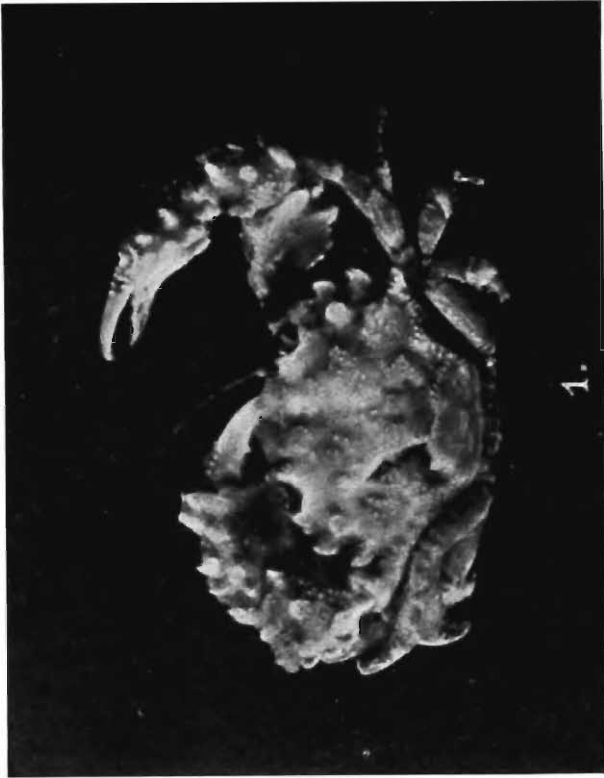
FIG. 1.—Dorsal view of specimen from Pamban :  $\times ca. 5$

FIG. 2.—Ventral view of same :  $\times ca. 5$ .

*Sphaerozius nudus* (A. Milne-Edwards).

FIG. 3.—Dorsal view of specimen from Pamban :  $\times 2.5$ .

FIG. 4.—Ventral view of same :  $\times 2.5$ .



## NOTES ON FISHES IN THE INDIAN MUSEUM.

### XXIV. LOACHES OF THE GENUS *NEMACHILUS* FROM EASTERN HIMALAYAS, WITH THE DESCRIPTION OF A NEW SPECIES FROM BURMA AND SIAM.

*By* SUNDER LAL HORA, *D.Sc., F.R.S.E., F.A.S.B., Assistant Superintendent, Zoological Survey of India, Calcutta.*

(Plate III)

The Nemachili of Eastern Himalayas are of special interest, as almost all the loaches (Cobitidae) described by Hamilton<sup>1</sup> in his "Gangetic Fishes" were obtained from the northern or north-eastern parts of Bengal. From the following table it is clear that the 12 species of loaches described by Hamilton were obtained during the period he carried out a survey of Bengal. In 1807, he surveyed the district of Dinajpur and from the commencement of the rainy season of 1808 till the advent of the cold weather, he was stationed at Goalpara. The first half of 1809 was spent in surveying Rangpur and during the cold weather of 1809-10 he was in the Purnea district. The rainy season of 1810 was spent at Nathpur near the Nepal frontier. All these districts are situated along the base of the Eastern Himalayas.

In the following table I give a list of the twelve species described by Hamilton with relative information as to their provenance and dates of descriptions of the different species in his "Original Notes."

"GANGETIC FISHES."		"ORIGINAL NOTES."	
Scientific Name.	Locality.	Locality.	Date of description.
* <i>Cobitis botia</i> , p. 350	North-eastern parts of Bengal.	Goalpara	1st July, 1808.
„ <i>gongota</i> , p. 351	Northern Bengal towards mountains.	Patgong	25th March, 1809.
„ <i>cucura</i> , p. 352	Kosi River	Nathpur	4th August, 1810.
„ <i>guntea</i> , p. 353	Ponds and fresh rivers of Bengal.	Goalpara	?
„ <i>dario</i> , p. 354	Northern rivers of Bengal	Dumdumma	20th October, 1807.
„ <i>pangia</i> , p. 355	North-eastern parts of Bengal.	Goalpara	30th July, 1808.
„ <i>geto</i> , p. 355	North-eastern parts of Bengal.	„	14th August, 1808.
„ <i>balgara</i> , p. 356	Kosi River	Nathpur	7th June, 1810.
* „ <i>savona</i> , p. 357	„ „	„	14th July, 1810.
* „ <i>turio</i> , p. 358	Brahmaputra River	Goalpara	30th October, 1810.
* „ <i>bilturio</i> , p. 359	„ „	„	8th November, 1808.
* „ <i>corica</i> , p. 360	Kosi River	Malnayi	29th March, 1810.

<sup>1</sup> Hamilton, *An Account of the Fishes in the River Ganges and its branches* (Edinburgh, 1822).

The drawings of the species discovered during the survey period were executed at Government expense and Hamilton was not allowed to take these drawings with him to Europe after his retirement. Most of the Cobitidae are, therefore, not figured in his monumental work, but his illustrations were reproduced later by McClelland<sup>1</sup> with full acknowledgment.

The five species marked with an asterisk(\*) in the above table are without sharp, suborbital spines and are referable to the genus *Nemachilus*. There has been considerable doubt about the precise specific limits of these species, but a study of the extensive material from round about the type localities has shown that *N. turio* and *N. bilturio* are synonymous with *N. botia*, the differences between them being due to sexual characters (*N. turio* and *N. bilturio* were described from female specimens, while *N. botia* represents male specimens), or to individual variation in colouration. *N. botia* is widely distributed in India and Burma. *N. savona* has been rediscovered and is described in detail; while for Day's *savona*, a new name *N. dayi* has been proposed. *N. corica* is already well known and deserves no further consideration in this place.

After Hamilton, McClelland described several new loaches, mostly from Assam, though there is reason to believe that his *Cobitis (Schistura) scaturigina* came from the Darjeeling Himalayas. Günther<sup>2</sup> added another *Nemachilus* to the fauna of the Eastern Himalayas by describing *N. beavani* from the Kosi River. Day<sup>3</sup> described *N. multifasciatus* from Darjeeling and Assam. The taxonomy of these three species is very confusing, but an attempt has been made in this paper to define their specific limits. Besides these old forms, two new species—*N. shebbearei* and *N. devdevi*—and a new variety—*N. rupecola* var. *inglisi*—have been found in collections from this area. Of the new species, *N. devdevi* is fairly common in the small streams below Darjeeling Himalayas, while *N. shebbearei* is represented by a single specimen from the Teesta Valley. The new variety, characterised by the presence of well-defined nasal barbels, is an eastern race of the commonest loach of the Western Himalayas.

The specimens described from Burma and Siam as *N. multifasciatus* Day are shown to be specifically distinct and the name *vinciguerrae* is proposed for them.

The nine species of *Nemachilus* from the Eastern Himalayas may be distinguished by the following key:—

- A. About 14 branched rays in dorsal. (Body irregularly blotched; caudal fin entire or slightly emarginate) *N. botia* (H. B.).
- B. Not more than 8 branched rays in dorsal.
  - I. Body without vertical bands.
    - a. Body with one or two longitudinal series of spots *N. corica* (H. B.).
    - b. Dorsal surface and sides with a uniform dull grey colour *N. shebbearei*, sp. nov.

<sup>1</sup> McClelland, Ind. Cyp. As. Res. XIX, pp. 302-309 (1839).

<sup>2</sup> Günther, Cat. Fish. Brit. Mus. VII, p. 350 (1868).

<sup>3</sup> Day, Fish. Ind., p. 617, pl. cliii, fig. 7 (1878).

## II. Body with vertical bands.

## a. Lateral line incomplete.

1. Caudal fin without bands ; vertical bands few, broad and saddle-shaped, not extending to ventral surface
2. Caudal fin with four or more bands ; body encircled by a number of bands

*N. devdevi*, sp. nov.*N. multifasciatus* Day.

## b. Lateral line complete.

1. Dorsal surface and sides dark with narrow, yellowish bands
2. Dorsal surface and sides pale-olivaceous with dark, vertical bands separated by broad, yellowish interspaces.

*N. savona* (H. B.).

## α. Well-marked nasal barbels

*N. rupecola* var. *inglisi*, nov.

## β. Nasal flaps not produced into barbels.

- i. Dorsal and caudal fins marked with numerous, irregular, narrow bands
- ii. Dorsal with or without a row of spots ; caudal with or without 1-3 V-shaped, fairly broad markings.

*N. multifasciatus* Day.

\* Body with a few broad and bold bands encircling it ; a broad, black band at base of caudal ; ventrals extending to anal opening

*N. beavani* Günther.

\*\* Body with narrow, incomplete bands not extending to ventral surface ; a narrow, black bar at base of caudal ; ventrals not extending to anal opening

*N. scaturigina* (McClell.).

In the above key *N. multifasciatus* is given in two places as it may have a complete or incomplete lateral line.

Though, in 1928, I had examined the material of *Nemachilus* in the collection of the British Museum, it was found necessary to refer to the old material again to determine the precise specific limits of the species described by Hamilton, McClelland, Günther and Day. Mr. J. R. Norman very kindly sent me a few duplicate specimens for examination and a sketch of the typical specimen of *N. beavani*. I am most grateful to him for his valuable assistance. The artists of the Zoological Survey of India and Babu R. Bagchi have executed the drawings with their usual skill and care and for this I am thankful to them. I have also to tender my thanks to Messrs. G. E. Shaw and E. O. Shebbeare who sent me an interesting collection of loaches from the Darjeeling Himalayas for study. Dr. B. Prashad has read through the paper and for this my thanks are due to him.

***Nemachilus botia* (Ham. Buch.).**

1934. *Nemachilus botia*, Mukerji, *Journ. Bombay Nat. Hist. Soc.* XXXVII, p. 39, pl. 1, fig. 1 ; pl. iii, figs. 3 and 4.

Regarding the habitat of *Cobitis botia*, Hamilton<sup>1</sup> remarked that "The *Botia* is found in the rivers of the north-eastern parts of Bengal, and is nearly of the same size and qualities for eating as the *Loach*." It was characterised as : "A *Cobitis* with a prickle under each eye ; with six tendrils ; with cloud-like marks on the sides ; and with fourteen

<sup>1</sup> Hamilton, *Fish. Ganges*, p. 350 (1822).

rays in the dorsal, and eight in each ventral fin." The 'prickle' referred to above is the broad, cartilagenous process which is present in the males of several species of *Nemachilus* and is regarded as a secondary sexual character.<sup>1</sup> Female specimens of *N. botia* obtained at Goalpara were described by Hamilton as *Cobitis bilturio*, and, from the nature of colouration and general facies, it seems probable that his *C. turio* from Goalpara is also based on a somewhat abnormal female form of *Nemachilus botia*, the chief differences being that in *C. turio* the dorsal fin is shorter and the dorsal profile is more elevated. The collection before me contains several specimens of *N. botia* from the base of the Darjeeling Himalayas. Mukerji (*op. cit.*) has recently given a detailed description of this form. The species is very variable and is distributed all over northern India and Burma.

***Nemachilus shebbearei*, sp. nov.**

(Plate III, figs. 1 and 2.)

D. 2/8 ; A. 1/6 ; P. 10 ; V. 8 ; C. 18.

The remarkable loach, which I associate with the name of my friend Mr. E. O. Shebbeare, Conservator of Forests, Bengal, possesses a very characteristic facies. The body is low and the head is long and pointed. The dorsal profile is arched, while the ventral profile in front of the anal fin is straight and horizontal. The ventral surface is flattened and the paired fins are placed horizontally. The length of the head is contained 5 times in the total length and 4.1 times in the length without the caudal. The greatest width of the head is almost equal to its height at the occiput and is contained 1.8 times in its length. The eyes are prominent and are situated almost in the middle of the length of the head ; the diameter of the eye is contained 5 times in the length of the head, 2 times in the length of the snout and 1.6 times in the interorbital width. The eyes are dorso-lateral in position and are not visible from the ventral surface. The mouth is situated on the ventral surface slightly behind the tip of the snout ; it is small, semicircular and horizontal. The lips are fleshy and continuous at the angles of the mouth ; the lower lip is interrupted in the middle. The upper jaw overhangs the lower which is sharp and shovel-like. The barbels are subequal and are as long as the diameter of the eye. Below the anterior border of the eye is a bony process which is a characteristic feature of the males of several species of *Nemachilus*. The gill-openings are mostly restricted to the sides.

The body is depressed, while the tail region is compressed from side to side. The greatest depth of the body is contained 9 times in the total length and 7.4 times in the length without the caudal. The body is covered with small scales which are more conspicuous in the posterior region and are totally absent on the ventral surface in front of the anal opening. The lateral line is incomplete, terminating above the anal fin. The caudal peduncle is stout ; its least height is contained 1.4 times in its length.

---

<sup>1</sup> Hora, *Rec. Ind. Mus.* XXIV, p. 81 (1922).

The dorsal fin is inserted in advance of the ventral and its commencement is slightly nearer to the tip of the snout than to the base of the caudal. It is long and has a concave margin; its longest ray is considerably greater than the depth of the body below it. The pectoral fin is shorter than the head and is separated from the ventral by a distance less than half of its length. The ventral fin is provided with a fleshy appendage; it does not extend to the anal opening which is situated almost midway between the tip of the ventral and the commencement of the anal fin. The caudal fin is shorter than the head and is emarginate with somewhat pointed lobes.

In the unique specimen of the species, the colouration is dull black on the dorsal surface and the sides. There are faint indications of colour bands in places. The ventral surface is pale-olivaceous. There is a large black blotch at the base of the caudal fin.

*Type-specimen.*—F  $\frac{11720}{1}$ , *Zoological Survey of India, Indian Museum, Calcutta.*

*Locality.*—Rivers of N. Bengal. (Messrs. G. E. Shaw and E. O. Shebbeare sent to the Indian Museum for identification a large collection of fish from the rivers and streams below Darjeeling. Though the majority of the specimens were properly labelled, some including the type of the species had no indication of any definite locality, but there can be no doubt that they were obtained from the Eastern Himalayas).

*Remarks.*—*Nemachilus shebbearei* is a *Homaloptera*-like species<sup>1</sup> with a greatly pointed snout and superficially resembles forms like *H. bilineata* Blyth and *H. modesta* (Vinciguerra). The presence of a single undivided ray in the paired fins and the characters of the mouth and its associated structures, however, show that it is a species of *Nemachilus*. From other species of the genus it can be readily distinguished by its characteristic facies and colouration.

*Measurements in millimetres.*

Total length including caudal	45.0
Length of caudal	8.0
Depth of body	5.0
Length of head	9.0
Width of head	5.0
Height of head at occiput	4.9
Length of snout	3.6
Diameter of eye	1.8
Interorbital width	3.0
Longest ray of dorsal	7.7
Longest ray of anal	4.2
Length of pectoral	8.5
Length of ventral	7.?
Length of caudal peduncle	3.8
Distance between tip of snout and commencement of dorsal	18.0
Distance between commencement of pectoral and that of ventral	10.2
Distance between tip of snout and anal opening	27.0

<sup>1</sup> Hora, *Mem. Ind. Mus.* XII, p. 274 (1932).

**Nemachilus devdevi**, sp. nov.

(Plate III, figs. 5 and 6.)

1878. *Nemachilus montanus*, Day (in part),<sup>1</sup> *Fish. India*, p. 616.1889. *Nemachilus montanus*, Day (in part), *Faun. Brit. Ind. Fish. I*, p. 230.

D. 2/8 ; A. 2/5 ; P. 10 ; V. 6-8 ; C. 16.

*Nemachilus devdevi* is a small and slender species in which the dorsal profile is slightly arched and the ventral profile is almost straight and horizontal. The ventral surface in front of the anal opening is somewhat flattened, and the paired fins are placed horizontally. The head is narrow and broadly pointed ; its length is contained from 4.1 to 5 times in the total length without the caudal. The width of the head is considerably greater than its height at the occiput and is equal to the length of the head behind the nostrils. The depth of the body is contained from 6 to 8 times in the length without the caudal. The head is proportionately smaller and the body more slender in larger specimens. The eyes are dorso-lateral in position and are not visible from the ventral surface ; they are situated nearer to the tip of the snout than to the hinder border of the operculum. The diameter of the eye is contained from 3.6 to 4.2 times in the length of the head and from 1.2 to 1.6 times in the length of the snout. The interorbital width is almost equal to or slightly greater than the diameter of the eye. The eye is proportionately larger in smaller individuals. The nostrils are close to the anterior border of the eye and are separated by a cutaneous fold which terminates in a sharp point. The mouth is semicircular and horizontal, and is bordered by fleshy lips which are continuous at the angles ; the lower lip is imperceptibly interrupted in the middle. The upper jaw is produced in the middle into a broad process ; the lower jaw is sharp and shovel-like. The barbels are subequal and are longer than the diameter of the eye. The gill-openings do not extend very far below the bases of the pectoral fins.

In places the body seems to be covered with small indistinct scales ; but the ventral surface is totally devoid of them. The lateral line is incomplete and terminates above the ventral fin. The caudal peduncle is long and muscular ; its least height is contained from 1.7 to 2 times in its length.

The dorsal fin begins slightly in advance of the ventrals and its commencement is somewhat nearer to the base of the caudal than to the tip of the snout. The longest ray of the dorsal is greater than the depth of the body below it, but is shorter than the longest ray of the anal. The paired fins are similar in shape, being pointed in the middle ; the pectoral fin is somewhat shorter than the head and extends for more than half the distance to the base of the ventral fin which just approaches the anal opening. The ventral fin possesses a well-developed appendage. The anal fin is separated from the base of the caudal by a considerable distance. The caudal fin is lunate, and is as long as the pectoral.

---

<sup>1</sup> Specimens from "Teesta" referred by Day to this species do not belong to it,

The colouration is very characteristic of the species. There are only a few, broad irregular bands on the body which are much wider than the interspaces between them. The bands extend from the dorsal surface to the sides, in some cases descending below the lateral line while in others they are restricted to the upper half of the body. The dorsal surface of the head is grayish and sometimes marked with short, irregular bars. The general colour of the body is pale-olivaceous while the ventral surface is much paler. The dorsal fin is marked with a series of two black marks across its rays and the proximal half of the caudal fin is invariably coloured gray. There is usually a deep black spot or short bar at the base of the caudal fin.

*Type-specimen.*—F  $\frac{11752}{1}$ , *Zoological Survey of India, Indian Museum, Calcutta.*

*Locality.*—Eastern Himalayas ; small streams below Darjeeling and in Sikkim.

*Remarks.*—*Nemachilus devdevi* is readily distinguished by its slender body, characteristic colouration, incomplete lateral line and proportions. I have great pleasure in associating the name of this species with that of Mr. Dev Dev Mukerji of the Zoological Survey of India.

There are 10 specimens in the British Museum (Nos. 89. 2. 1. 1648-57) from "Teesta" presented by Day as *Nemachilus montanus* (McClelland), but they differ from the form described by McClelland<sup>1</sup> from the Simla Hills. Though the specimens have lost much of their characteristic shape and colouration, they agree very closely with the new species described above. I examined these specimens in London in 1928 and, through the kindness of Mr. J. R. Norman, the authorities of the British Museum recently loaned me two of these specimens for detailed study.

*Measurements in millimetres.*

Total length including caudal	36.5	43.0	43.4
Length of caudal	6.1	7.3	7.3
Depth of body	5.1	4.7	4.6
Length of head	7.2	7.5	8.0
Width of head	5.0	5.2	5.5
Height of head at occiput	4.0	4.0	3.8
Length of snout	2.4	3.0	3.0
Diameter of eye	2.0	1.8	2.0
Interorbital width	2.1	2.2	2.2
Longest ray of dorsal	5.6	5.3	6.0
Longest ray of anal	6.0	6.0	6.3
Length of pectoral	6.1	7.0	7.8
Length of ventral	5.3	6.4	7.0
Length of caudal peduncle	5.3	7.2	7.0
Least height of caudal peduncle	3.1	3.6	4.0
Distance between commencement of pectoral and that of ventral	9.1	10.2	11.0

<sup>1</sup> McClelland, Ind. Cyprinidae, *As. Res.* XIX, pp. 307, 440, pl. lvii, fig. 1 (1838).

**Nemachilus savona** (Ham. Buch.).

(Plate III, figs. 3 and 4.)

1822. *Cobitis savona*, Hamilton, *Fish. Ganges*, p. 357.  
 1839. *Schistura savona*, McClelland, *As. Res.* (Ind. Cyprinidae) XIX, pp. 308, 442, pl. liii, fig. 3 (Reproduced from Buchanan's MS. drawing).  
 1839. *Acoura obscura*, Swainson, *Fishes* II, p. 310 (Name only).  
 1846. *Cobitis savona*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XVII, p. 32.  
 1854. *Cobitis savona*, Bleeker, *Verh. Bat. Gen.* XXV, p. 70 (Name only).  
 1868. *Nemachilus savona*, Günther, *Cat. Fish Brit. Mus.* VII, p. 354.

*Nemachilus savona* is a small loach which was discovered by Hamilton from the Kosi River.<sup>1</sup> The most striking feature of the species is its colouration—"Above the colour is dusky, with narrow yellowish bars; below it is white. The fin of the tail is dotted. The eyes are golden." The caudal fin, according to Hamilton, ends in a crescent. So far as I can judge from the literature, the species has never been discovered since Hamilton's time though the name has been used in a loose sense by several ichthyologists<sup>2</sup> for species of *Nemachilus* characterised by narrow bands. Recently, I have obtained abundant material from the base of the Darjeeling Himalayas which undoubtedly is referable to *N. savona*, and I take this opportunity to redescribe it with figures as the existing descriptions are inadequate.

Among the 144 drawings of fish<sup>3</sup> left behind in India by Hamilton at the time of his departure in 1815, there is a beautiful delineation of *N. savona* (No. 54, labelled *Cobitis Savon Khurika*). It was reproduced by McClelland in his Indian Cyprinidae, and served as the basis of the remarks by Cuvier & Valenciennes and Günther. Günther was so impressed with the colouration of the species that he kept it apart in a section by itself which he characterised as: "Body with narrow yellow transverse bars." The figure shows that there is a row of black dots along the middle of the rays of the dorsal fin. Confusion regarding the identity of this species seems to have been started by Day who referred to it specimens obtained "from the hills near Raniganj" and from "N. W. Provinces." A specimen from the latter locality is figured in his *Fishes of India* (pl. clv, fig. 8). A comparison of Day's figure and description of *savona* with Hamilton's figure and description of *savona* brings out the following differences in colouration:—

Day's <i>savona</i> .	Hamilton's <i>savona</i> .
1. Ground-colour of the dorsal surface of the body is 'purplish.'	Ground colour of the dorsal surface of the body is 'dusky.'
2. Dorsal fin is marked with 4-5 rows of spots and the base marked with blotches.	Dorsal fin is marked with a single row of spots, and the base is devoid of any markings.
3. Caudal fin is marked with several irregular bands.	Caudal fin is marked with three indistinct rows of spots.
4. The number of yellowish narrow bands is 14.	The number of yellowish narrow bands is 9.
5. Ventral and anal fins are banded	Ventral and anal fins are devoid of markings.

<sup>1</sup> According to Buchanan's 'Original Notes' concerning *Gangetic Fishes*, *Cobitis savona* was obtained in the Kosi River at Nathpur. In my account of *Amblyceps mangois* (*Rec. Ind. Mus.* XXXV, p. 612, 1933), I referred to this locality and indicated that the ecological conditions prevailing there may have been similar to those now found in the small streams at the base of the Eastern Himalayas.

<sup>2</sup> Beavan, *Freshwater Fish India*, p. 109 (1877); Day, *Fish India*, p. 619, pl. clv, fig. 8 (1878); *Faun. Brit. India, Fishes*, I, p. 234 (1889); Vinciguerra, *Ann. Mus. Civ. Stor. Nat. Genova* (2) IX, p. 211 (1890); Jenkins, *Rec. Ind. Mus.* V, p. 128 (1910); Annandale, *Rec. Ind. Mus.* XVI, pp. 125, 127 (1919).

<sup>3</sup> Hora, *Mem. Ind. Mus.* IX, p. 173 (1929).

It is clear from the above that, so far as the colouration is concerned, the two forms are not conspecific. I have examined large numbers of fresh specimens of both kinds and am of opinion that Day's *savona* represents a new species which may be designated **Nemachilus dayi**.<sup>1</sup> *N. savona* (Ham. Buch.) may be redescribed as follows :—

D. 3/8 ; P. 9 ; V. 7 ; A. 2/5 ; C. 20.

*Nemachilus savona* is a small and slender species in which the body is pointed at both ends. The dorsal profile is slightly and gracefully arched, while the ventral profile is almost horizontal and straight throughout. The ventral surface is flattened, but the fish appears to be sub-cylindrical. The head is narrow and pointed ; its length is contained 5.5-5.8 times in the total length and 4.7 times in the length without the caudal. The width of the head is contained 1.5-1.6 times and the height at occiput 1.9-2.0 times in its length. The eyes are prominent, dorso-lateral in position and not visible from the ventral surface ; they are situated almost wholly in the anterior half of the head. The diameter of the eye is contained 3.3-3.5 times in the length of the head, 1.5-1.7 times in the length of the snout and 1.6-1.8 times in the interorbital width. The interorbital space is flat or slightly convex. The mouth is inferior, transverse and semicircular ; it is bordered by fleshy lips which are fimbriated. The lips are continuous at the angles of the mouth, but the lower lip is interrupted in the middle and ends on both sides in fleshy, prominent areas. The upper jaw is produced in a beak-like process in the middle which projects in front of the lower jaw. The lower jaw has a plain sharp edge which is not notched. The three pairs of barbels are short and stumpy ; the outer rostral and the maxillary pairs are longer than the eye while the inner rostrals are as long as the eye.

The depth of the body varies considerably ; it is contained 7.1-11 times in the total length and 6-9 times in the length without the caudal. The body is covered with small, but well defined, scales which are more prominent in the posterior region. The ventral surface is smooth and devoid of scales. The lateral line is complete and runs in a groove along the middle of the body. The caudal peduncle is rather long ; its least height is contained 1.9-2 times in its length.

The dorsal fin is inserted in advance of the ventral and its commencement is invariably nearer to the tip of the snout than to the base of the caudal, but in some specimens it is equidistant. The longest ray of the dorsal fin is longer than the depth of the body below it. The outer edge of the fin is obliquely truncate. The paired fins are fan-like, horizontal and broadly pointed in the middle. The pectorals do not extend to the ventrals which are separated from the anal opening by a considerable distance. The anal fin, when laid flat, does not reach the base of the caudal which is emarginate and possesses rounded lobes.

A reference to the characteristic colouration of the species has already been made. In the large number of specimens before me, the dorsal and lateral surfaces of the head and body are dark-brown, the head being

---

<sup>1</sup> Specimens Nos. 89.2.1.1697-9 of the British Museum collection belong to this species. They were collected by Day from the "N. W. Province." Both dorsal and caudal fins are spotted with numerous, irregular, dark spots.

darker than the body; while the ventral surface in front of the anal fin is pale-olivaceous, behind the anal it is marked with the bands descending from the sides. The body is marked with 9-10 narrow, yellowish bands which almost encircle the fish. Of these bands, there are 4<sup>1</sup> in front of the dorsal fin, 2 or 3 below it and 3 or 4 behind it. There is a vertical black mark at the base of the caudal fin which is of a somewhat grayish colour. The fins are usually devoid of any markings but in some specimens the caudal fin is provided with one or two V-shaped bands and the rays of the dorsal and anal fins are marked with black dots in the middle. The ventral surface of the head is irrorated with black dots which are also present along the edges of the ventral surface.

*Distribution.*—Hamilton collected specimens of *Nemachilus savona* in the Kosi River at Nathpur which used to be situated in the extreme north-east of the district of Bhagalpur (as delimited at present) and close to the boundary of Purnea. Large series of specimens have recently been collected from the foot of the Darjeeling Himalayas at Sevoke and Siliguri. It seems probable that this species has a wide range in the small, rapid and clear streams of the eastern sub-Himalayan region.

*Measurements in millimetres.*

Total length including caudal	33.0	32.0	32.0	31.0
Length of caudal	5.0	5.6	4.8	5.8
Depth of body	4.6	4.3	3.9	2.8
Length of head	6.0	5.6	5.6	5.3
Width of head	4.0	3.6	3.6	3.2
Height of head at occiput	3.0	2.9	2.7	2.6
Length of snout	2.0	1.7	1.7	1.5
Diameter of eye	1.2	1.0	1.0	1.0
Interorbital width	2.0	1.8	1.8	1.6
Longest ray of dorsal	5.0	5.0	5.0	5.0
Longest ray of anal	3.8	4.3	3.6	4.0
Length of pectoral	6.0	5.3	5.6	6.0
Length of ventral	5.4	4.2	4.8	4.6
Length of caudal peduncle	5.0	4.0	4.6	4.6
Least height of caudal peduncle	2.5	2.2	2.2	2.2
Distance between tip of snout and commencement of dorsal	12.6	13.1	12.6	12.0
Distance between commencement of pectoral and that of ventral	8.0	7.5	7.5	7.0

***Nemachilus rupecola* var. *inglisi*, nov.**

(Plate III, figs. 9 and 10.)

1869: *Nemachilus rupecola*, Günther, *Cat. Fish. Brit. Mus.* VII, p. 351.

“*Schistura rupecula*” was described by McClelland<sup>2</sup> from “Mountain streams at Simla,” and since then the species has been found to be widely

<sup>1</sup> In Hamilton's MS drawing the first band, which is situated immediately behind the head, is not shown but 9 bands in all are figured (3 predorsal, 2 subdorsal, 4 post-dorsal).

<sup>2</sup> McClelland, *Journ. As. Soc. Bengal*, VII, p. 948, pl. lv, fig. 3 (1838); *Ind. Cyprinidae*, *As. Res.*, p. 309, pl. lvii, fig. 3 (1839).

distributed in the Western Himalayas. In the Eastern Himalayas, it is replaced by a form which, though very similar, is readily distinguished by certain well-marked characters.

Günther described *N. rupecola* from 5 specimens obtained in Sikkim, and an examination of these examples has shown that they are identical with hundreds of specimens collected at different places below Darjeeling. The most conspicuous feature of this form is, as has already been noticed by Günther, that the barbels are well developed and that there is a distinct nasal appendage. The last character has been considered of great taxonomic value by certain authors<sup>1</sup> in subdividing the vast assemblage of species grouped under the generic name *Nemachilus*, but I<sup>2</sup> have shown elsewhere that there are a number of species showing all possible gradations between the total absence and the presence of a distinct nasal barbel. Though this character is useful in distinguishing species within the genus, it cannot be used for separating closely allied forms into different genera.

In the typical *rupecola* of the Western Himalayas the nasal appendage is present, but is not so well marked and it seems desirable to separate the Darjeeling form into a distinct variety which I have the pleasure of associating with the name of Mr. C. M. Inglis, Curator of the Natural History Museum at Darjeeling. The new variety may be described as follows :—

D. 2/7 ; A. 1/5 ; P. 12 ; V. 8 ; C. 16.

*Nemachilus rupecola inglisi* is an elongated, stout muscular fish in which the dorsal profile is slightly arched, and the ventral profile is straight and horizontal throughout. The ventral surface in front of the anal opening is flattened and the paired fins are horizontally placed. The head is short and broad, being only slightly longer than broad. The length of the head is contained 4.5-5.1 times in the length without the caudal and the height of the body 5.2-7.1 times in the same dimensions. The eyes are dorso-lateral in position, are situated almost in the middle of the head and are not visible from the ventral surface. The nostrils are situated near the superior margin of the eye and are separated by a flap bearing a well-developed barbel. The mouth is semicircular and horizontal ; it is situated slightly behind the tip of the snout. The lips are fleshy and are continuous at the angles of the mouth ; the lower lip is interrupted in the middle. The upper jaw is produced into a beak-like process in the middle, while the lower jaw is notched in the corresponding position. All the barbels are longer than the diameter of the eye ; the inner rostrals are shorter than the other two pairs. The gill-openings are mostly restricted to the sides.

The body is covered with small, indistinct scales which are embedded in the skin. The lateral line is complete. The ventral surface appears to be totally devoid of scales. The caudal peduncle is deep and stout ; its least height is contained 1.1-1.3 times in its length.

---

<sup>1</sup> Jordan and Fowler, *Proc. U. S. Nat. Mus.* XXVI, p. 768 (1903) ; Weber and Beaufort, *Fish Indo-Austral. Archipel.* III, p. 35 (1916).

<sup>2</sup> Hora, *Rec. Ind. Mus.* XXXI, p. 312 (1929).

The dorsal fin is inserted opposite the ventrals, and its commencement is nearer to the base of the caudal than to the tip of the snout. The longest ray of the dorsal is shorter than the depth of the body. The anterior margin of the fin is rounded. The pectoral fin is shorter than the head, and is separated from the ventral by a considerable distance. The ventral fins which are similar to the pectorals, are broad and rounded, and do not extend as far as the anal-opening, which is situated at a distance equal to the diameter of the eye from the commencement of the anal fin. The anal fin is separated from the caudal by a considerable distance. The caudal fin is almost as long as or somewhat shorter than the head; it is either truncate or slightly bilobate with the lobes rounded.

The body is marked with 14 to 16 vertical bands which are broader than the interspaces between them. A black spot is usually present at the base of the anterior dorsal rays, and generally there are short, dark streaks on the outer rays of the dorsal and caudal fins. The arrangement and the number of colour bands varies considerably and in some young examples they are absent altogether. The dorsal surface of the head is marked with closely set black spots.

*Type-specimen.*—F  $\frac{11755}{1}$ , Zoological Survey of India, Indian Museum, Calcutta.

*Locality.*—Eastern Himalayas, rivers below Darjeeling and in Sikkim.

*Remarks.*—The variety *inglisi* differs from the typical *rupecola* in the possession of a distinct nasal barbel, relatively smaller fins and in its stouter built. The position, form and structure of its paired fins indicate that this variety is better adapted for life in rapid currents than the typical form. The outer rays of the paired fins are provided with adhesive pads on the ventral surface.

*Measurements in millimetres.*

Total length including caudal	68.5	58.0	66.5	83.5	80.2	93.3	88.5	70.0
Length of caudal	9.3	10.0	9.2	13.8	11.8	13.0	12.1	10.5
Length of head	12.3	10.5	11.3	13.6	13.2	15.8	15.8	12.3
Greatest depth of body	10.0	8.0	11.0	11.2	10.2	11.2	11.5	9.0
Length of snout	5.8	4.5	5.0	6.2	6.5	7.8	7.2	5.6
Interorbital distance	5.4	4.2	5.0	6.0	5.8	6.3	6.2	4.5
Length of caudal peduncle	9.2	7.3	8.2	10.2	9.5	12.3	10.0	7.7
Least height of caudal peduncle	8.2	6.0	7.2	9.2	8.7	8.4	9.0	7.0
Longest ray of dorsal	8.5	7.5	9.0	10.5	9.8	10.8	10.8	8.2
Length of pectoral	11.0	10.0	11.2	14.3	13.0	14.0	13.8	11.0
Length of ventral	10.2	9.2	10.3	13.8	12.4	13.0	12.4	9.8
Longest ray of anal	7.0	7.2	7.3	9.8	9.0	10.5	10.8	8.2
Distance between tip of snout and commencement of dorsal.	32.0	26.2	30.2	36.3	36.0	41.6	41.0	32.0
Distance between commencement of pectoral and that of ventral.	20.0	16.5	19.8	21.0	21.3	25.0	24.0	18.5
Distance between tip of snout and anal opening.	44.0	36.8	43.0	50.6	49.8	57.0	56.2	42.4

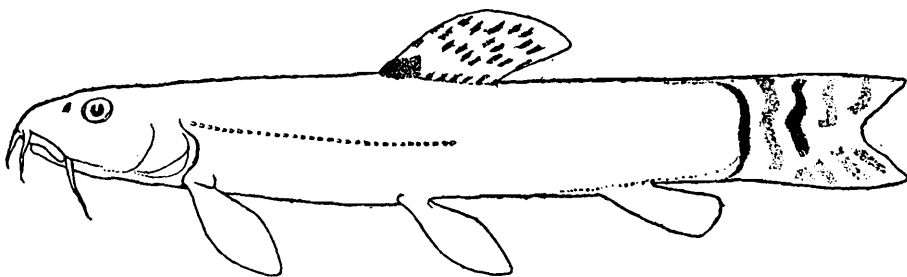
**Nemachilus multifasciatus** Day.

1878. *Nemachilus multifasciatus*, Day, *Fish. Ind.*, p. 617, pl. oliii, fig. 7.

1889. *Nemachilus multifasciatus*, Day, *Faun. Brit. Ind. Fish.* I, p. 231.

*Nemachilus multifasciatus*, which was described by Day from "Darjeeling and Assam", has never been collected again from these places. The Burmese and Siamese specimens reported under this name<sup>1</sup> are not conspecific with the Indian species and I propose for these the name *Nemachilus vinciguerrae*, sp. nov. (*vide* p. 62).

With the original description, Day figured a specimen from Darjeeling which is preserved in the collection of the Zoological Survey of India, but is unfortunately not in a fit condition for taxonomic purposes. Mr. J. R. Norman has sent me for study Day's specimen of the species from Assam (No. 89.2.1.1669), and it is now clear that the species has to be regarded as valid, it is distinguished by the colour-markings on the dorsal and caudal fins. Day, describes the colouration as follows; "vertical bands as wide as the ground colour, pass from the back to the lower surface of the abdomen, those between the head and the dorsal fin are numerous, while there are about five posterior to it. In some examples these anterior bands coalesce. A dark band at the base of the caudal and dark marks on the head radiating from the eye. *Fins yellow, the dorsal with four bands of spots and an equal number or more on the caudal. Ventrals and anal with two bands each*" (Italics are mine). Hitherto, more attention has been paid to the markings of the body, but I have indicated that in two other Eastern Himalayan species—*N. beavani*



TEXT-FIG. 1.—Lateral view of a typical specimen of *Nemachilus multifasciatus* Day from Assam, showing the colour pattern on the dorsal and caudal fins.  $\times 1\frac{2}{3}$ . (Brit. Mus. No. 89.2.1.1669).

and *N. scaturigina*—the bands in front of the dorsal break up resulting in numerous bands as described by Day for his *multifasciatus*. This feature is also characteristic of *N. vinciguerrae*. The chief distinguishing feature of *N. multifasciatus* lies in the fact that the dorsal and caudal fins are provided with many rows of spots which are sometimes irregularly distributed. The only other species, which shows this character, is Day's *savona* for which I have proposed the name *dayi* (*vide* p. 57). The two species can be readily distinguished by the colouration of the body—narrow, yellowish inter-spaces between bands in *dayi* and wide, pale interspaces between bands in *multifasciatus*.

<sup>1</sup> Vinciguerra, *Ann. Mus. Civ. Stor. Nat. Genova* (2) IX, p. 209 (1890); Mukerji, *Journ. Bombay Nat. Hist. Soc.* XXXVII, p. 43 (1934); Hora and Mukerji, *Rec. Ind. Mus.* XXXVI, p. 135 (1934).

Day included McClelland's *subfusca* with a query in the synonymy of his *multifasciatus*, but assigned Günther's *montanus*<sup>1</sup> (*nec* McClelland) definitely to its synonymy. I have discussed the specific identity of *subfusca* in another place (*vide* p. 65) and shown that it is synonymous with *N. scaturigina*. In Günther's *N. montanus* the dorsal and caudal fins are provided with a single row of spots, so it is not conspecific with *multifasciatus*. I have examined the two specimens of Günther's *montanus* in the British Museum and am of opinion that they do not belong to McClelland's *montanus* from the Simla Hills.

In the Assamese specimen of *N. multifasciatus*, the ventrals do not reach the anal opening; the lateral line is incomplete,<sup>2</sup> extending only as far as the commencement of the ventral; scales are minute but fairly distinct; the upper jaw is produced into a prominent beak in the middle and the lower jaw is emarginate to receive this prominence. As the specimen is flabby, no reliance can be placed on the measurements of its various parts. The colouration of the body is faded, but the rows of spots on the dorsal and caudal fins are fairly distinct.

### ***Nemachilus vinciguerrae*, sp. nov.**

(Plate III, fig. 12.)

1890. *Nemachilus multifasciatus*, Vinciguerra (*nec* Day), *Ann. Mus. Civ. Stor. Nat. Genova* (2) IX, p. 209.

1834. *Nemachilus multifasciatus*, Mukerji (*nec* Day), *Journ. Bombay Nat. Hist. Soc.* XXXVII, p. 43.

1934. *Nemachilus multifasciatus*, Hora & Mukerji (*nec* Day), *Rec. Ind. Mus.* XXXVI, p. 135.

In my<sup>3</sup> revision of the fishes of the genus *Nemachilus* from Burma, it was indicated that Vinciguerra's *N. multifasciatus* may be a new species, but as the precise specific characters of Day's *N. multifasciatus* were not known, it was decided not to deal with the species. Recently, Mukerji described Burmese and Siamese material which he referred to *multifasciatus* (*sensu lato*). Mukerji and I identified a specimen from the S. Shan States as *N. multifasciatus* as recognised by Vinciguerra. Having now examined a tolerably good specimen of Day's *multifasciatus*, I am in a position to refer the Burmese and Siamese specimens to a distinct species for which I propose the name *N. vinciguerrae*. A full description of this species has already been published by Mukerji, and only a few necessary notes are added here to supplement his account. The body is marked with a number of vertical bands which, in some specimens, break up anteriorly. The dorsal surface and sides of the head are covered with short, black markings. In the middle of the base of the caudal fin, there is a well-marked, short, prominent, vertical band. The dorsal fin has one, sometimes two, series of spots; the caudal fin has two V-shaped bands and the ventral and anal fins with one band each. The body is slender. The lateral line is complete. The scales are better developed than in *N. multifasciatus*. The beak of the upper jaw is not so prominent as in *N. multifasciatus*.

<sup>1</sup> Günther, *Cat. Fish Brit. Mus.* VII, p. 350 (1868).

<sup>2</sup> According to Day, the lateral line is complete in *N. multifasciatus*.

<sup>3</sup> Hora, *Rec. Ind. Mus.* XXXI, p. 314 (1929).

*Type-specimen.*—F.  $\frac{11754}{1}$ , Zoological Survey of India, Indian Museum, Calcutta.

**Nemachilus beavani** Günther.

(Plate III, fig. 11.)

1868. *Nemachilus beavani*, Günther, *Cat. Fish Brit. Mus.* VII, p. 350.

1877. *Nemachilus beavani*, Beavan, *Freshwater Fish India*, p. 107.

1924. *Nemachilus* sp., Hora, *Rec. Ind. Mus.*, p. 28, fig. 1.

The species was described from a single specimen, two inches long, collected by Lieut. R. C. Beavan from the "Kossye River," but no figure of it has so far been published. Day<sup>1</sup> referred specimens from the Bhavani River to this species and regarded his *Nemachilus chryseus*<sup>2</sup> as a synonym of *N. beavani*, which, according to him, is found in "Bowany in Madras and Mysore, also Orissa." Day's *N. beavani* is probably conspecific with *N. denisonii* Day, a very variable species as regards its colouration, but I have no doubt, that it is not the same as Günther's *beavani*.

Recently, Fowler<sup>3</sup> assigned a large series of specimens from the headwaters of the Sutlej and Beas Rivers to *N. beavani* and gave a short description of his specimens. Unfortunately he has made no observations on colouration. According to him, the species is characterised "by its broad or depressed head and well-developed rudimentary caudal rays." In the collection of the Zoological Survey of India, there are half a dozen specimens received in exchange from the Academy of Natural Sciences, Philadelphia, and determined by Dr. H. W. Fowler as *N. beavani*. The colour is faded. From their general facies and form of the caudal fin, they can be readily distinguished from Günther's *beavani* in which the head is not so depressed and the snout is obtusely pointed. I shall discuss the identity of Fowler's *beavani* in my account of the *Nemachilus* from the Western Himalayas.

In 1924, I described specimens of *Nemachilus* from the Garo Hills in Assam, but was unable to assign them to any species. Recently a large number of similar specimens have been collected in the small streams below Darjeeling and while identifying them, it was found necessary to investigate the precise specific limits of *N. beavani*. The matter was referred to Mr. J. R. Norman of the British Museum who sent me a sketch of the type-specimen of Günther's species. The drawing, which is reproduced here, leaves no doubt that my Garo Hills and Darjeeling specimens have to be referred to *N. beavani*. As a fairly complete description of the species has already been published (Hora, 1926) a few notes are given here regarding variation in its colouration.

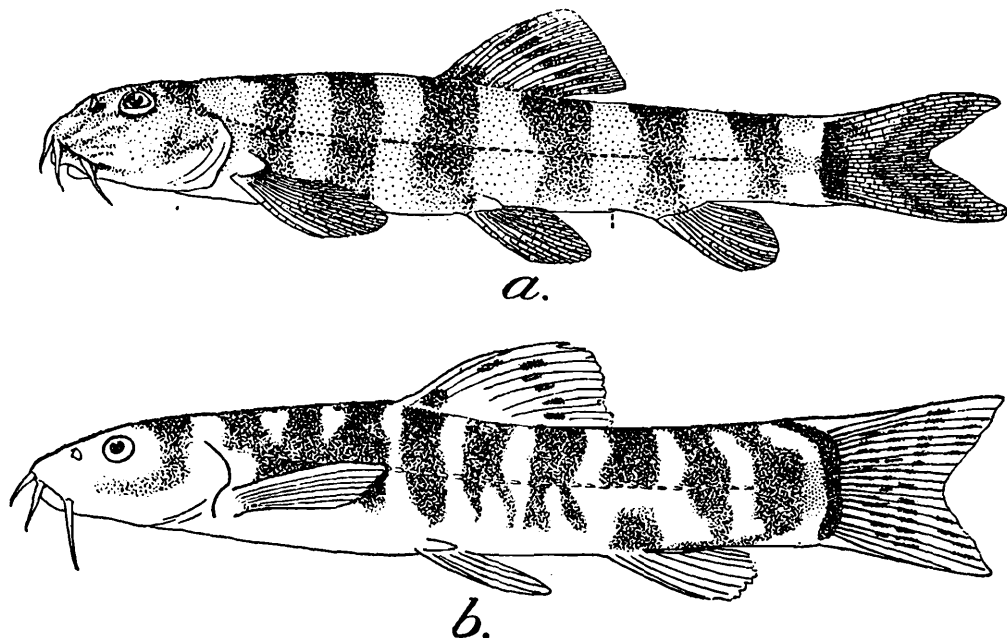
The characteristic feature of the species is that the vertical bands are broad and fewer in number. The dark band at the base of the caudal fin is broad and conspicuous, though in the type-specimen it is somewhat narrower. In certain specimens the bands, especially those

<sup>1</sup> Day, *Fish. India*, p. 620, pl. clvi, fig. 8 (1878).

<sup>2</sup> Day, *Journ. Linn. Soc. London (Zool.)* XI, p. 529 (1873).

<sup>3</sup> Fowler, *Proc. Acad. Nat. Sci. Philadelphia* LXXVI, p. 71 (1924).

anterior to the dorsal fin, break up and form numerous narrow bands as has already been figured in the case of the Garro Hills specimens.



TEXT-FIG. 2.—Lateral view of *Nemachilus beavani* Günther. ×2.

a. Fresh specimen from the Darjeeling Himalayas.

b. Sketch\* of the type-specimen in the British Museum.

\* In sending the sketch, Mr. J. R. Norman observed that "Markings are very faded and indistinct—with exception of dark band across base of caudal and dark spots on rays of dorsal fin."

*Nemachilus beavani* is fairly abundant in small streams at the base of Eastern Himalayas. In specimens obtained from very fast currents, there is invariably a well-developed fleshy appendage in the axil of the pectoral fin. The ventral fins are also provided with fleshy appendages.

### ***Nemachilus scaturigina* (McClelland).**

(Plate III, figs. 7-8.)

1839. *Cobitis* (*Schistura*) *scaturigina*, McClelland, *As. Res.* (Ind. Cyprinidae, XIX, pp. 308, 443, pl. liii, fig. 6.

1839. *Cobitis* (*Schistura*) *subfusca*, McClelland, *ibid.*, p. 308, 443, pl. liii, fig. 5.

1846. *Cobitis subfusca*, Cuvier & Valenciennes, *Hist. Nat. Poiss.* XVIII, p. 80.

1854. *Cobitis scaturigina*, Bleeker, *Verh. Bat. Gen.* XXV, p. 70 (name only).

1854. *Cobitis subfusca*, Bleeker, *ibid.*, p. 70 (name only).

1868. *Nemachilus subfuscus*, Günther, *Cat. Fish Brit. Mus.*, VII, p. 351.

1868. *Cobitis scaturigina*, Günther, *ibid.*, p. 347 (foot-note).

1877. *Nemachilus subfuscus*, Beavan, *Freshwater Fish Ind.*, p. 108.

1878. *Cobitis scaturigina*, Day, *Fish India*, p. 614 (reference under *Nemachilus botia*).

*Nemachilus scaturigina* was described by McClelland in his account of the Indian Cyprinidae, but he assigned the authorship to Hamilton-Buchanan under a misapprehension. The species was described from a figure in the Royal Botanical Garden at Calcutta and McClelland remarked that "This species is also without suborbital spines, and in my opinion is nearly allied to *S. subfusca*; the ventrals are, however, round, and the rays of the dorsal are marked on the middle with a brown spot. I cannot find this species referred to in the *Gangetic Fishes*, though

it is figured in Buchanan's collection." It is now well-known that Hamilton left behind in India drawings of 144 species of fish and 13 years later when McClelland examined them there were 150 drawings. There is no doubt, therefore, that 6 of these drawings did not belong to Hamilton's collection and had been added to it later, possibly by Wallich. I have shown elsewhere<sup>1</sup> that one of these six drawings is *Cobitis scaturigina*, to which there is no reference even in Hamilton's 'Original Notes' concerning the "Gangetic Fishes."

McClelland found the drawing labelled as "*Cobitis scaturigina*" and adopted this name for the species. The drawing is still preserved among Hamilton's collection of drawings in the Library of the Asiatic Society of Bengal (No. 53 of Volume IV), but unfortunately it bears no name and it is difficult, therefore, to decide about the actual authorship of the name. Day<sup>2</sup> did not find the name on the plate when he examined these illustrations in 1871. In view of these circumstances and the fact that McClelland introduced this species in scientific literature with a distinct indication, the authorship of the species should be assigned to him.

McClelland regarded *Cobitis scaturigina* as a close ally of his *C. subfusca* from "Upper Assam" and his figures of the two species indicate close similarity. From a study of the large material obtained at the base of the Darjeeling Himalayas, I find that the two forms are identical, though they represent colour variations in the same species, I have adopted the name *scaturigina* in preference to *subfusca* for the simple reason that the former is characterised before<sup>3</sup> the latter in McClelland's work (p. 308).

Between 1815, when Hamilton left India, and 1838, when McClelland examined Hamilton's collection of fish drawings, it is known that Wallich and Hardwicke used this collection extensively and had copies made of some of the drawings. It is also known that both Wallich and Hardwicke had drawings made of species not represented in Hamilton's collection, and further it is known that both these workers paid frequent visits to the Darjeeling Himalayas and made collections of fish there. Whereas Hardwicke's illustrations were published by Gray,<sup>4</sup> it is likely that drawings made by Wallich were kept mixed up with Hamilton's collection. I presume that the drawing of *Cobitis scaturigina* belonged to Wallich and was executed from a specimen collected below Darjeeling Himalayas. If this be so, the specimens obtained at Sevoke and other places represent topotypes of the species.

Both *scaturigina* and *subfusca* had a chequered career and their specific identity has not been elucidated so far. Cuvier and Valenciennes and Bleeker described them from McClelland's brief descriptions and figures. Günther regarded *scaturigina* as a doubtful species and gave a brief description of *subfusca* after McClelland. According to Day, "The *Cobitis scaturigina* McClell. is an elongated variety of *Nemachilus botia*, the height of the body being about  $6\frac{1}{2}$  in the total. I have obtained

<sup>1</sup> Hora, *Mem. Ind. Mus.* IX, p. 173 (1929).

<sup>2</sup> Day, *Proc. As. Soc. Bengal*, p. 202 (1871).

<sup>3</sup> The order of precedence is changed on page 443, but this is immaterial.

<sup>4</sup> Gray, *Illustrations of Indian Zoology*, 2 vols. (London : 1832).

it in Assam." It is impossible to say how Day came to this conclusion for there is not the least likeness between the figures of *scaturigina* and *N. botia*. The general facies, the colouration and the form of the caudal fin are absolutely different in the two species. *Schistura subfusca* was included by Day with a query in the synonymy of his *Nemachilus multifasciatus* which was described from Darjeeling and Assam. It is shown here that *N. multifasciatus* is a very characteristic species distinguished by the colouration of the dorsal and caudal fins and is quite distinct from McClelland's species.

In the collection of the British Museum, there are five specimens (No. 72.4.17.32), collected in North-east Bengal by Dr. T. C. Jerdon, labelled as *N. scaturigina*. This seems to be a mixed lot as the two specimens loaned to me for examination from the British Museum belong to two species—*N. scaturigina* and *N. beavani*. Though the colour is very much faded, the two species can be readily distinguished by the position of the anus with reference to the ventral fins.

In view of the great confusion prevailing about the specific limits of *N. scaturigina*, it may be redescribed as follows :—

D. 2/7 ; A. 2/5 ; P. 10 ; V. 8 ; C. 19.

*Nemachilus scaturigina* is a small, elongated species in which both the dorsal and the ventral profiles are almost straight and horizontal. The ventral surface is somewhat flattened in front of the ventral fins. The head is long, narrow and pointed anteriorly ; its length is contained 4.2-4.5 times in the total length without the caudal. The width of the head is contained 1.4-1.6 times and the height of the head 1.6-1.8 times in its length. The snout is somewhat longer than the postorbital part of the head. The eyes are dorso-lateral in position and are not visible from the ventral surface. The diameter of the eye is contained 4.5.3 times in the length of the head ; 1.6-2.2 times in the length of the snout and is almost equal to or is contained up to 1.4 times in the interorbital width. The mouth is small, semicircular and horizontal ; it is situated on the ventral surface behind the tip of the snout and is bordered by fleshy lips. The lower lip is interrupted and reflected towards the sides in the middle. The lips are plain without corrugations, but they may be slightly crenulated. The lower jaw is sharp and shovel-like and the upper jaw is vertical and lies in front of the lower jaw. In the male specimens, there is a fleshy, loose pad below the eye and the upper surface of the anterior pectoral rays is tuberculated. All the three pairs of barbels are longer than the eye, but the outer rostral barbels are the longest.

The body is narrow and elongated ; its depth is contained from 5.4 to 6.5 times in the total length without the caudal. It is covered with small, inconspicuous scales which are somewhat more prominent in the tail region and are absent from the ventral surface. The lateral line is complete, and runs in a narrow groove along the middle of the body. The caudal peduncle is short and high ; its least height is contained 1.1-1.5 times in its length.

The dorsal fin begins in advance of the ventrals and its commencement is almost equidistant between the tip of the snout and the base

of the caudal fin ; its anterior margin is slightly rounded but the posterior margin is obliquely truncate. The longest ray of the dorsal is usually longer than the depth of the body below it. The paired fins are horizontally placed and pointed in the middle. In the mature males, the first two rays are broad and elongated, while a number of the outer rays are provided with tubercles on the dorsal surface. The pectoral fin is separated from the ventral by a considerable distance. The ventral fin does not reach the anal opening. The caudal fin is emarginate with both the lobes pointed.

In spirit specimens the head and body are grayish above and pale-olivaceous below. There are about 9 to 12 saddle-shaped, narrow, dark bands which descend on the sides from the dorsal surface, but do not extend to the ventral surface. In some specimens, the bands are interrupted, so they appear as series of blotches irregularly distributed. Sometimes the bands are split up into secondary bands. This condition becomes more pronounced in front of the dorsal fin and in extreme cases results in the *multifasciatus*-type of colouration. There is a narrow black bar at the base of the caudal fin and one or two series of dots forming a V-shaped pattern on the fin itself. The rays of the dorsal fin are also infuscated in the middle. There is a black spot at the base of the anterior dorsal rays.

*Distribution.*—Eastern Himalayas and Assam. Most of the specimens in the collection of the Zoological Survey of India were obtained from small streams at the base of the Darjeeling Himalayas. *N. scaturigina* is not as common as *N. rupecola* var. *inglisi*, *N. savona* or *N. devdevi*.

*Measurements in millimetres.*

Total length without caudal	41.0	43.3	44.6	42.5
Length of caudal	11.0	11.3	12.0	Damaged.
Depth of body	6.3	8.0	7.5	7.0
Length of head	9.5	9.8	9.8	10.0
Width of head	6.0	6.7	6.7	6.0
Height of head at occiput	5.3	6.0	5.8	5.3
Length of snout	4.0	4.0	4.0	3.6
Diameter of eye	1.8	2.2	2.5	2.0
Interorbital width	2.6	2.4	2.5	2.5
Longest ray of dorsal	8.6	7.3	8.0	8.3
Longest ray of anal	6.5	7.0	8.0	6.5
Length of pectoral	9.8	10.0	11.0	9.0
Length of ventral	7.0	7.6	7.0	7.0
Length of caudal peduncle	6.0	7.0	6.8	6.0
Least height of caudal peduncle	4.7	4.5	5.5	5.6
Distance between tip of snout and commencement of dorsal	21.2	22.0	22.0	21.5
Distance between commencement of pectoral and that of ventral	13.0	13.0	13.5	13.0

EXPLANATION OF PLATE III.

*Nemachilus shebbearei*, sp. nov.

FIG. 1.—Lateral view of type-specimen.  $\times 2$ .

FIG. 2.—Ventral surface of head and anterior part of body of same.  
 $\times 2$ .

*Nemachilus savona* (Ham. Buch.).

FIG. 3.—Lateral view.  $\times 2\frac{2}{3}$ .

FIG. 4.—Ventral surface of head and anterior part of body.  $\times 2\frac{2}{3}$ .

*Nemachilus devdevi*, sp. nov.

FIG. 5.—Lateral view of type-specimen.  $\times 2\frac{1}{3}$ .

FIG. 6.—Ventral surface of head and anterior part of body of same.  
 $\times 2\frac{1}{3}$ .

*Nemachilus scaturigina* (McClelland).

FIG. 7.—Lateral view.  $\times 2$ .

FIG. 8.—Ventral surface of head and anterior part of body.  $\times 2$ .

*Nemachilus rupecola* var. *inglisi*, nov.

FIG. 9.—Lateral view. Nat. size.

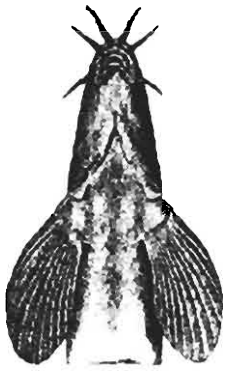
FIG. 10.—Ventral surface of head and anterior part of body. Nat. size.

*Nemachilus beavani* Günther.

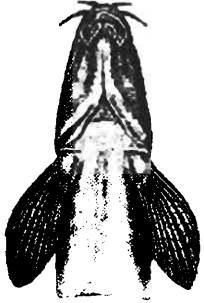
FIG. 11.—Ventral surface of head and anterior part of body.  $\times 2$ .

*Nemachilus vinciguerrae*, sp. nov.

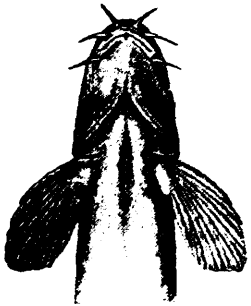
FIG. 12.—Lateral view of one of Vinciguerra's Burmese specimen of  
" *Nemachilus multifaciatus* ". Nat. size.



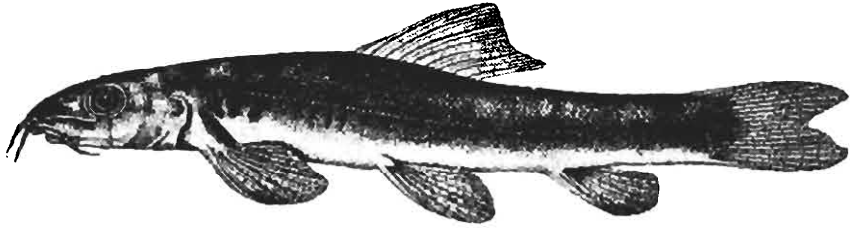
2.



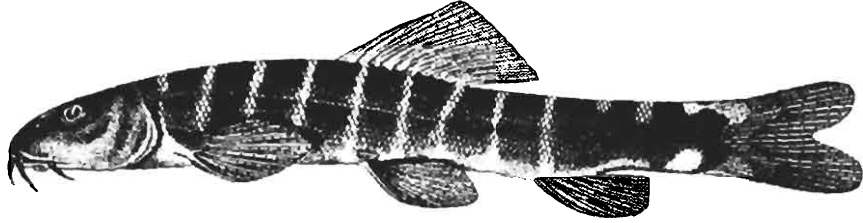
4.



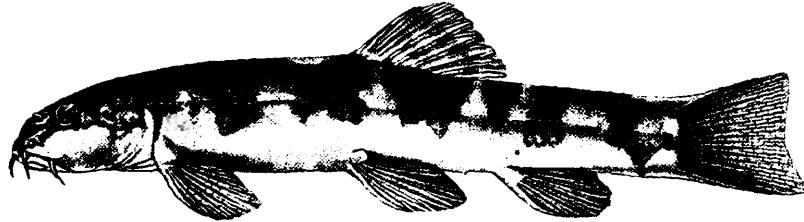
6.



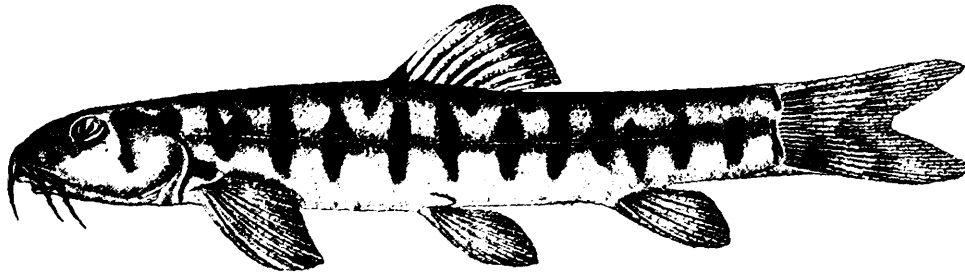
1.



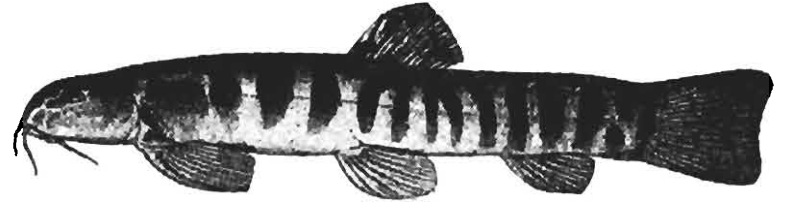
3.



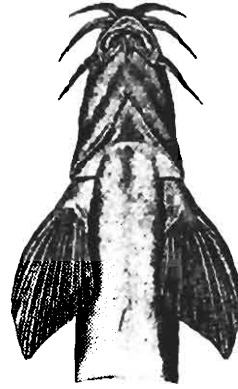
5.



7.



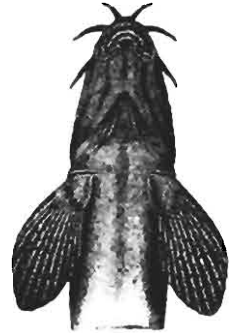
9.



8.



10.



11.



12.

R. Bagchi, del.

*Nemachilus* from Eastern Himalayas.

## NOTES ON INDIAN MYGALOMORPH SPIDERS, II.

By F. H. GRAVELY, D. Sc., Superintendent, Government Museum, Madras.

The first series of these notes appeared in 1915 in Vol. XI of these "Records." Two new species and some additional information were added in 1921 (Vol. XXII) in an account of the Spiders of Barkuda Island in the Chilka Lake. I have to thank Mr. H. Chennappaiya, Zoological Assistant in the Madras Government Museum, for assistance in working out the additional material, mostly sent by the Indian Museum, Calcutta, which is dealt with in this paper.

Mygalomorph spiders are popularly regarded as poisonous, but authentic records of their bites seem to be rare. The effects of bites of two species, *Macrothele vidua* and *Haplocastus nilgirinus*, are described below (pp. 73 & 81).

### Family CTENIZIDAE.

#### Genus *Heligmomerus* Simon.

The specimen recorded in the first series of these notes, and stated therein as possibly introduced into the Botanical Gardens at Sibpur near Calcutta, was probably indigenous, as a well-grown female of the genus has since been found on the ground floor of the Museum House, Calcutta, and a number of smaller ones have been sent from Serampore by Mrs. Drake. In the absence of males the species cannot be adequately defined.

The species described as *Acanthodon barkudensis* in the second paper mentioned above, proves on further examination to have the tibiae of the third pair of legs of the female excavate above and must, therefore, be transferred to this genus. In the male this excavation is, however, obsolete—which suggests that *Idiops biharicus*, described from a male only in the first paper, may perhaps also belong to this genus.

#### Genus *Idiops* Perty.

Simon's merging of the genus *Acanthodon* in this genus escaped my notice when I was writing the second of the above mentioned papers, and the common trap-door spider of Madras, therein referred to as *Acanthodon constructor*, should be *Idiops constructor*.

The genus is further represented in the Madras Museum collection by females from Horsleykonda, 3,000-4,100 ft., Chittoor District and from Panchgani in the Western Ghats, Satara District (Bombay Presidency) and in the Indian Museum collection by a very young specimen from Medha, ca. 2,200 ft., Yenna Valley, Satara District.

Concerning the bearing of Indian species on the classification of the group Idiopseae, see the first of those papers, pp. 260-261.

Genus **Conothele** Thorell.

The Indian Museum collection contains two specimens from the Nicobars, one from Goalpara, Assam, two from the Darjeeling District (Ghumti, 1,500-5,000 ft. and Kalimpong, 600-4,500 ft.) and a male, probably of this genus, from Mundali, 9,000 ft., Chakrata, United Provinces. The specimens from the Darjiling District are probably identical with one from Kurseong recorded as allied to *C. birmanica* Thorell, by Simon in 1900 (*Bull. Soc. Ent. Fr.* 1900, pp. 151, 219). The male from Mundali "builds nest in deodar humus", an unusual situation for this genus which seems generally to build on tree-trunks, and has only a very light hollow on the upper surface of the tibiae of the third legs though no less than in the male of *Heligmomerus barkudensis*, in the female of which it is quite distinct. Until the female is found, therefore, its generic position cannot be determined with certainty.

Genus **Damarchus** Thorell.**Damarchus bifidus**, sp. nov.

A single male from Tindharia, Darjeeling District; a single female, apparently adult and presumably of the same species from Kalimpong, 2,000-4,000 ft. in the same District; and immature specimens from the latter locality and from Sureil, 5,000 ft., an unrecorded locality at 1,000-3,000 ft. and Gopaldhara, all in that District also.

♂. Resembles *D. assamensis* in size and in the general form of the palps and palpal organ. The structure of the first pair of legs is, however, intermediate between that of *D. assamensis* and *D. excavatus*, the base of the protarsus being lightly excavate with an extensive area of fine spiniform denticles; and the tibial apophysis of these legs differs from those of both those species in being composed of three distinct parts, a basal part and two distal parts which arise from it (fig. 1 a).

♀. Also resembles *D. assamensis* rather than *D. excavatus* in size and proportions, being of distinctly larger and stouter build than the latter, of which alone I have specimens at hand for comparison.

## Family ATYPIDAE.

The material belonging to this family has been worked out by Mr. Chennappaiya, who has drawn up the following account of it, including the description of the new species *Atypus sutherlandi*.

Genus **Atypus** Latreille.**Atypus sutherlandi**, Chennappaiya, sp. nov.

The Indian Museum contains a number of specimens collected by Dr. Sutherland at Kalimpong in the Darjeeling District at altitudes between 2,000-4,500 ft. The largest female has been selected as the type specimen.

This species differs from *A. dorsualis* in the presence of spines on some of the joints of the legs. According to Pocock (*Fauna of British India, Arachnida*, p. 158) the legs of *A. dorsualis* are without spines.



The posterior spinnerets are four-jointed, the third and fourth joints being respectively two and three times as long as they are wide.

The patella, tibia and tarsus of the palp are subequal.

♀. Total length up to 1.52 cm., carapace up to  $0.62 \times 0.52$  cm. The carapace is as long as the patella, tibia and metatarsus of the first and fourth legs.

The maxilla is broad and rounded at its anterior end, and has closely set denticles on its ventral surface (fig. 1 *d*). The tarsus of the palp is armed with a single pectinate claw. The tarsi of the legs are stouter and shorter than in the male, and they and the metatarsi are armed with a number of spines dorsally and on the anterior face.

♂. Total length up to 0.85 cm., carapace up to  $0.38 \times 0.35$  cm. The carapace is as long as the patella and tibia of the first and fourth legs.

The distal end of the maxilla is more or less pointed and its ventral surface is hairy but without denticles (fig. 1 *c*). The palpal organ is shown in fig. 1 *b*. Its style is very slender, straight and finely pointed, protected dorsally by a chitinous sheath which is wider distally than at the base, with raised lateral margins. The tibiae and metatarsi of the legs are armed with a few spines beneath and at the apex. The tarsi are densely hairy but are practically without spines.

#### **Atypus sp.**

There are in the Indian Museum collection two dried up and badly damaged specimens and a number of silken tubes collected by Mr. Anstead at Kilkundha, 6,500 ft. in the Nilgiri Hills. They were taken from galleries on tea stems.

#### Genus **Calommata** Lucas.

There are five specimens belonging to this genus in the Indian Museum. They were collected by Mrs. Drake at Saharanpur in the United Provinces. Three of them are evidently young.

#### Family **DIPLURIDAE**.

#### Genus **Ischnothele** Ausserer.

#### **Ischnothele ? dumicola** Pocock.

Two specimens in the Madras Museum, one from Horsleykonda, 3,000-4,100 ft., Chittoor District, and one (immature) from the Netterikal region of the Kalakad forest, Tinnevely District, both collected by Mr. E. Barnes, probably belong to this species hitherto recorded only from Poona in Western India.

#### Genus **Macrothele** Ausserer.

#### **Macrothele vidua** Simon.

There are numerous specimens of this species in the Indian Museum from the Darjeeling District (Kurseong 5,366 ft., Pashok 2,000 ft., Kalimpong 2,000-4,500 ft., and Sitong Ridge 4,700 ft.).

The late Dr. Sutherland informed me of a boy 14 years old being bitten on the finger by a well grown female of this species which, however, only bites on such great provocation that though the boys in his school often kept specimens in captivity he had never known another instance. "The pain extended up the arm and down the side. After twenty-four hours the finger was still swollen."

#### Family BARYCHELIDAE.

#### Genus **Diplothele** Cambridge.

A single specimen in the Madras Museum from Horsleykonda, 3000-4100 ft., Chittoor District, belongs to this genus. It is, however, somewhat larger than *D. walshi* from Orissa and Ganjam, and is likely therefore to belong to a new species.

#### Genus **Sason** Simon.

Pocock recognises three Indian and Ceylonese species—*S. robustum*, *S. cinctipes* and *S. armatoris*—in his account of the genus in the Arachnid volume of the *Fauna of British India* series (1900). *S. armatoris* seems to differ from *S. robustum* only in having a complete row of teeth on the labium of the male. Of the two males before me, both from a wall in the compound of the Madras Museum, one has this complete row of teeth and the other is without a trace of it; and I can find no other difference between them. *S. cinctipes* is known only from the female, which differs from *S. robustum* only in having the carapace low and as long as the patella, tibia and half protarsus of the first leg instead of high and as long as the patella, tibia and whole protarsus of the first of the somewhat shorter legs. But Cambridge says (*Proc. Zool. Soc., London*, 1883, p. 353) in defining the new genus which he established for the reception of *robustum* that the carapace is "tolerably convex above, rather higher a little in front of the thoracic indentation than at the eyes" which Pocock intensifies to "Carapace high, strongly elevated in front of the fovea, which is situated on its posterior slope; lightly convex or sloped downwards anteriorly" and contrasts with "carapace much lower, being scarcely elevated posteriorly in front of the fovea, so that the latter is situated almost on a level with the upper surface of the carapace, the area between the fovea and the eye being almost horizontal." Of these three descriptions that given by Cambridge suggests a condition intermediate between the two given by Pocock and describes most accurately the specimens before me, which seem, moreover, to indicate that the differences noted in Pocock's descriptions are more trivial than they at first appear.

I am thus able to recognize only a single species, *S. robustum* (Cambridge), and must include in this species Pocock's *cinctipes* and *armatoris*.

#### **Sason robustum** (Cambridge).

The Madras Museum contains specimens from Tirupati hills (R. V. Seshaiya), and Horsleykonda 3,000-4,100 ft. in Chittoor District; Madras City; Nekkundram, Chingleput District; Trivandrum, Travancore (K.

S. P. Aiyangar) ; and Anuradhapura, Ceylon. Among these the only males are the two from Madras referred to above, both of which were collected in July.

#### Family THERAPHOSIDAE.

That the Oriental forms of this family are more closely related to one another than to forms from other regions was pointed out in 1895 by Pocock (*Ann. Mag. Nat. Hist.* (6) XV, pp. 166-167), who divided them into two sections, to which he gave family rank under the names Ornithoctonidae & Selenocosmiidae.

In 1897 Simon (" *Histoire Naturelle des Araignees* " II, pp. 916-919) divided them into five groups, the forms without stridulating organ being included with a number of others from other regions in the Ischnocoleae and the forms with stridulating organs divided into Ornithoctoneae, Selenocosmieae, Thrigmopoeae and Poecilotherieae, containing exclusively Oriental forms except that two genera of the Selenocosmieae extend into the Australian region.

In 1915 I pointed out (*Rec. Ind. Mus.* XI, pp. 265-269) that the Selenocosmieae differed from the other three groups with stridulating organs in having the anterior margin of the labium densely and somewhat finely granular instead of more sparsely and coarsely so ; and that this character was shared by a few species with either no stridulating organ or a rudimentary one of the Selenocosmiine type. As these species obviously stand at the base of the evolutionary series of genera composing the Selenocosmieae I suggested that this group might be redefined in accordance with the character of the labium instead of that of the stridulating organs, so that they might be included within it ; and I pointed out (p. 282) that the subgenus *Neochilobrachys*, Hirst, could conveniently be raised to generic rank and redefined so as to include them. And I further suggested the possibility that means might ultimately be found of separating the rest of the Oriental species included in Simon's group Ischnocoleae from the remainder of that group, so that they could likewise be placed with Oriental forms to which they too are likely to be most closely related.

Petrunkévitch, in his "*Systema Araneorum*", published in 1928 (*Trans. Conn. Ac. Art. Sci.* XXIX, pp. 1-270) gives *Neochilobrachys* generic rank (p. 84) in his sub-family Selenocosmiinae, but defines the latter with reference to the stridulating organs, thus necessarily excluding from the former all forms without any such organ. He unites Simon's Ornithoctoneae and Thrigmopoeae into a single sub-family Ornithoctoninae, and Simon's Selenocosmieae and Poecilotherieae with the African Harpactireae into a single sub-family Selenocosmiinae. All Oriental species without stridulating organs are evidently included in his sub-family Ischnocolinae.

My knowledge is confined to Oriental genera, but so far as these are concerned it seems clear that those included by Petrunkévitch in his Ischnocolinae stand at the base of the different evolutionary series contained in his Ornithoctoninae and Selenocosmiinae. Whether the Ischnocolinae as defined by Petrunkévitch should be maintained intact, or should have such genera as can be shown to stand at the base of particular series transferred from it to them, is therefore mainly a matter of

taxonomic convenience. The material for the present paper convinces me that the Ornithoctoneae and Thrigmopoeae form a homogeneous, though probably somewhat ramified, evolutionary series and that their union into a single sub-family is therefore best. As regards the union of the Selenocosmiinae, Poecilotherieae and Harpactireae I am not, however, convinced.

Of the Harpactireae I have no experience and can therefore only quote Pocock's opinion of 1895 that "the genera comprising either of the two groups into which the Oriental genera fall are more nearly related *inter se* than any one of them is to any Ethiopian genus known to me"; to which I would add that my experience of these Oriental genera leads me to believe that this is likely in the end to prove true.

As regards the Poecilotherieae the further material before me only confirms my opinion expressed in 1914 (*Journ. Asiatic Soc. Bengal*, N. S. X, p. 417).—"The stridulating organ of the Poecilotherieae. . . somewhat resembles that of *Chilobrachys*, but could only be derived from it by a considerable degeneration of the claviform bacilli. It could be more directly derived from *Selenocosmia*; but there is no evidence that *Selenocosmia* ever occurred in the Indian Peninsula, or that *Poecilotheria* ever occurred out of it. Indeed, if the former genus had ever entered this Peninsula it might be expected to occur there more abundantly than further east, just as the Ischnocoleae do; and if the latter had originated further east it is difficult to see, in view of its peculiar habits, by the competition of what other group it could have been exterminated there. The labium of *Poecilotheria*, moreover, is sparsely denticulate, not closely granular. Most probably, then, *Poecilotheria* originated from the Ischnocoleae or Thrigmopoeae (or both) in the Indian Peninsula itself, the modified habits of its earliest arboreal ancestors having been in some way correlated with an increase in the potentiality of these ancestors to give rise to forms more highly specialised than themselves." If this is so *Poecilotheria* should be classed with the Thrigmopoeae in the Ornithoctoninae rather than in the Selenocosmiinae. Its stridulating organ is, however, so distinct that it seems better to place it by itself in a separate sub-family Poecilotheriinae.

In order to emphasise the special relationship with the Selenocosmiinae of the species without stridulating organ that resemble them in the nature of the anterior margin of the labium, I still prefer to define this sub-family with reference to the latter so that it may include the whole evolutionary series, from species resembling the Ischnocolinae in the absence of stridulating organs, to the genus *Chilobrachys* in which the specialisation of these organs reaches its climax. The structure of the anterior margin of the labium is, it is true, a somewhat trivial character; but when an otherwise trivial character is so definitely correlated with more obviously important ones it is often found to have special phylogenetic significance. And though the difference between the two forms of labia is very small it is quite definite and therefore much easier to recognise than are many of the differences between eyes or legs that are habitually used in the classification of spiders.

Retaining, therefore, at least provisionally, in the widely distributed Ischnocolinae all species without stridulating organs except such as are

shown by the labium to have special affinity to the Selenocosmiinae, and excluding from the latter sub-family the African group Harpactireae, the above mentioned phylogenetic considerations lead me to adopt the following classification of Oriental sub-families:—

- |   |                              |
|---|------------------------------|
| 1. Anterior border of labium more or less sparsely armed with moderately coarse granules or denticles                       | 2.                           |
| Anterior border of labium closely and finely granular   | 4. <i>Selenocosmiinae</i> .  |
| 2. Stridulating organs between outer surface of chelicerae and inner surface of coxae of palps absent                       | 1. <i>Ischnocolinae</i> .    |
| Stridulating organs present in the above position.  | 3.                           |
| 3. Stridulating bristles on inner surface of coxae of palps spiniform or dentiform  | 2. <i>Ornithoctoninae</i> .  |
| Many of the stridulating bristles on inner surface of palp bacilliform or clavate; one or more stout denticles also present | 3. <i>Poecilotheriinae</i> . |

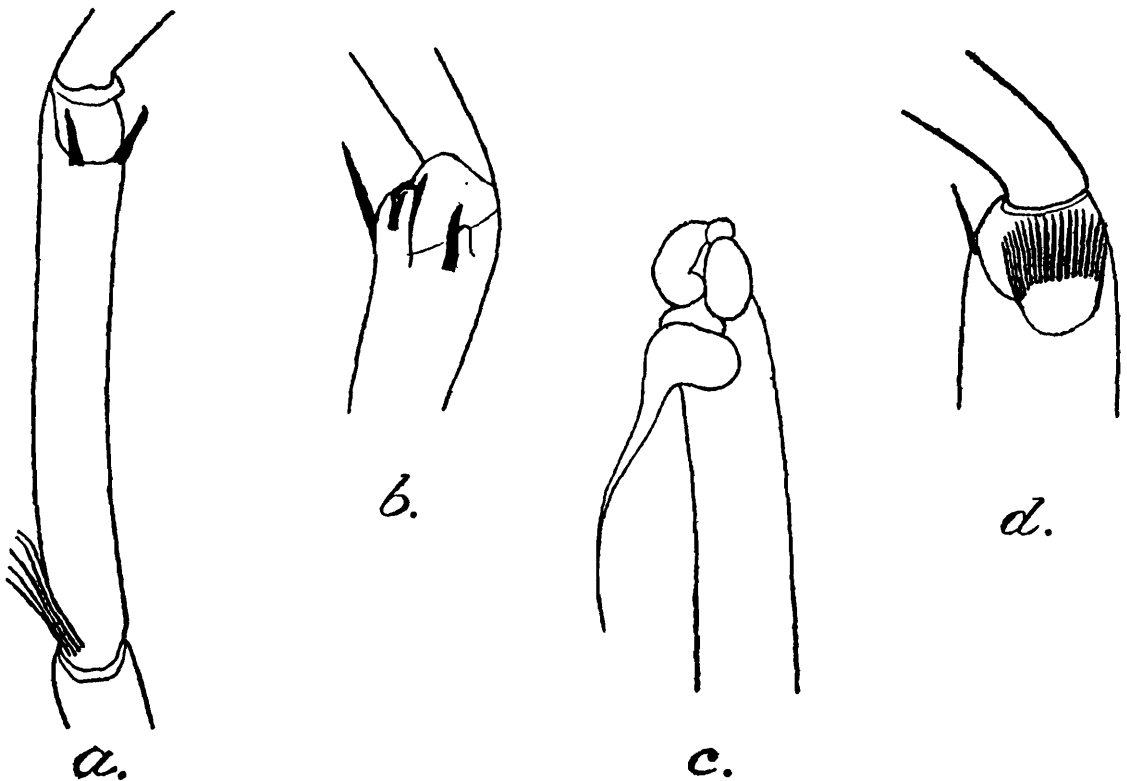
Sub-family ISCHNOCOLINAE.

Genus *Plesiophrictus* Pocock.

*Plesiophrictus blatteri*, sp. nov.

One male and one female—the latter probably immature—collected by the late Fr. Blatter from Panchgani, Satara District, in the Indian Museum collection.

♂. Total length 1.9 cm., carapace 1.0 × 0.8 cm. Allied to *P. millardi*, Pocock and *P. satarensis*, Gravely, from localities not far distant, but



TEXT-FIG. 2.—Mygalomorph Spiders.

- a. Tibia of first leg of male (hair omitted) of *Plesiophrictus blatteri*, sp. nov.  
 b. Distal end of tibia of first leg of male (hair omitted) of *Plesiophrictus madraspatanus*, sp. nov.  
 c. Palpal organ of *Annandaliella pectinifera*, sp. nov.  
 d. Distal end of tibia of first leg of male (hair omitted) of same.

differing from both in the armature of the first pair of legs. Colour brownish, the tarsus and protarsus of first two pairs of legs whitish. Labium sparsely tuberculate in front. Posterior sigilla of sternum marginal. Palps somewhat long and slender, the tibia about four times as long as broad; palpal organ not markedly dissimilar from that of *P. satarensis*. Legs in the order 4, 1, 2, 3; patella and tibia of second pair about equal to carapace in length; tibia of first pair (fig. 2 a) with basal cluster of spines on outer side and a ventral pair of apical spines of which that on the outer side is the stouter, but without any definite apophysis; protarsus of first pair with a single mid-ventral apical spine.

♀. Total length 1.8 cm., carapace 1.0 × 0.8 cm., somewhat paler in colour than the male and probably not full grown. Legs much shorter and stouter than in male, with femur, patella and tibia of second pair about equal in length to carapace. The first pair of legs has the tibia unarmed, but a single mid-ventral apical spine is present on the protarsus as in the male; like the following pairs they are brownish throughout.

#### **Plesiophrictus madraspatanus, sp. nov.**

A number of specimens in the Madras Museum from Madras city and the following places in the adjoining District of Chingleput:—Velacheri; Nagalapuram Hill 500-2,400 ft.; and Kambakkam Hill 200-800 ft. and 1,000 ft.

♂. Size extremely variable; total length 0.7 to 2.0 cm., carapace 0.35 × 0.25 to 0.9 × 0.65 cm. Colour brownish, somewhat dark in large specimens, paler in small ones; anterior legs not ornamented with white hair. Labium somewhat densely tuberculate in front. Posterior sigilla of sternum marginal. Palps shorter than in *P. blatteri*, their tibiae being only about twice as long as broad; palpal organ much as in *P. blatteri* and *P. satarensis*. First and fourth legs of about equal length, the former perhaps slightly longer than the latter; second legs shorter, but longer than third; patella and tibia of first pair about equal to carapace in length. Tibia of first pair with or without a single ventral spine a little on outer side near base; otherwise unarmed except at apex (fig. 2 b) which bears on outer side an almost straight spine, ventrally a large curved apophysis with trifid apex, and on inner side a smaller conical apophysis with a curved spine about twice its length arising from its base. These structures can be more easily seen in specimens of moderate size than in very large ones in which they are apt to be obscured by the dense covering of very dark hair, for which reason a male of moderate size has been selected as type, together with a female from the same locality, Nagalapuram Hill.

♀. Total length up to 1.9 cm., carapace up to 0.8 × 0.6 cm. Closely resembling the male except for the absence of special tibial armature on the first legs, the only spine on which is the usual mid-ventral one at the apex of the protarsus.

#### **Genus Annandaliella Hirst.**

This genus cannot belong to the Selenocosmiinae, where it has been placed by Petrunkevitch (*loc. cit.*, p. 83), for it has no stridulating organ

between the chelicerae and palps. The presence of a row of stout spines on the inner surface of each of the chelicerae, presumably forming a simple type of stridulating organ between them, in well grown females of the type species and in all known phases of the new species described below, distinguishes it from all other Oriental genera and seems to indicate that it represents an independent line of evolution from primitive Ischnocoline stock, a line distinct from those of the Ornithohtoninae, Poecilotheriinae and Selenocosmiinae. As it seems undesirable to form a special sub-family for so small a genus, it can most conveniently be placed at the end of the Oriental Ischnocolinae, though this unfortunately breaks the sequence from the more typical Ischnocolinae to the most primitive genus of Ornithohtoninae, *Haploclastus*.

The genus *Annandaliella* is already known from Travancore, Cochin, Ootacamund in the Nilgiri Hills, and Coimbatore, the type species *A. travancorica* being known from Travancore and Cochin. A male recently collected by Mr. P. N. Krishnaier shows that the Coimbatore form belongs to a different species which must now be described.

#### ***Annandaliella pectinifera*, sp. nov.**

Several specimens from Coimbatore, collected by Mr. P. N. Krishnaier of the Agricultural College. Also one collected by Mr. T. Bainbrigge-Fletcher at the same place. Both collectors found them in the ground, the former "in and near ant nests in the soil at varying depths" The single male, which must be taken as the type specimen, was collected early in November. This and the specimen collected by Mr. Bainbrigge-Fletcher are in the Indian Museum. This species differs from *A. travancorica* in the colour of the male, in the presence of stridulating spines on the opposed surfaces of the chelicerae in male and young as well as in adult female specimens, and in the form of the palpal organ and tibial apophysis (fig. 2 *c* & *d*).

♂. Total length 1.7 cm., carapace 0.8×0.6. Colour dull brownish, darker above than below; with fine golden hair below with reddish hair on the outer margin of the chelicerae and the inner margin of the coxae of the palps; front tarsi (? also protarsi) perhaps slightly whitish. Posterior sigilla of sternum marginal. Chelicerae with stridulating organ as in the female of *A. travancorica*. Palpal organ with style long and slender as in *A. travancorica*, but less strongly and less evenly curved. Legs in the order 1, 4, 2, 3, the first and fourth sub-equal. Patella and tibia of fourth pair about equal to carapace in length. The front legs are armed, as in *A. travancorica*, with an apophysis on the inner and a spine on the outer side of the distal end of the tibia below, and the usual mid-ventral apical spine on the protarsus.<sup>1</sup> The apophysis is in the form of a short broad lobe bearing a comb-like series of stout black spines.

♀. Total length up to 2.4 cm., carapace up to 0.9×0.7 cm. Chelicerae with stridulating spines on their opposed surfaces not only in well grown specimens but also in quite small ones. Otherwise probably indistinguishable from the female of *A. travancorica*.

---

<sup>1</sup> This spine is present in *A. travancorica*, not absent as would appear from my description.

## Sub-family ORNITHOCTONINÆ.

For reasons already given (above, p. 75) I follow Petrunkevitch in uniting Simon's groups *Thrigmopoeae* and *Ornithoctoneae* in this sub-family. The coxae of the palps of the most primitive species, which belong to the genus *Haploclastus*, differ from those of *Plesiophrictus* in having their inner surface somewhat thinly covered with long straight hairs instead of naked, some of those near the base being more or less spiniform. The stridulating organ consists of these spiniform hairs and of some more or less spatulate ones adjoining the basal part of the scopula fringing the lower margin of the chelicerae. Two such species are recorded below, both much smaller in size than *H. nilgirinus*, in which the spiniform bristles on the coxa of the palp are stronger and thus more highly differentiated.

In *Thrigmopoeus* the stridulating bristles of the palps are arranged in a definite curved band, but none of those on the chelicerae are spatulate.

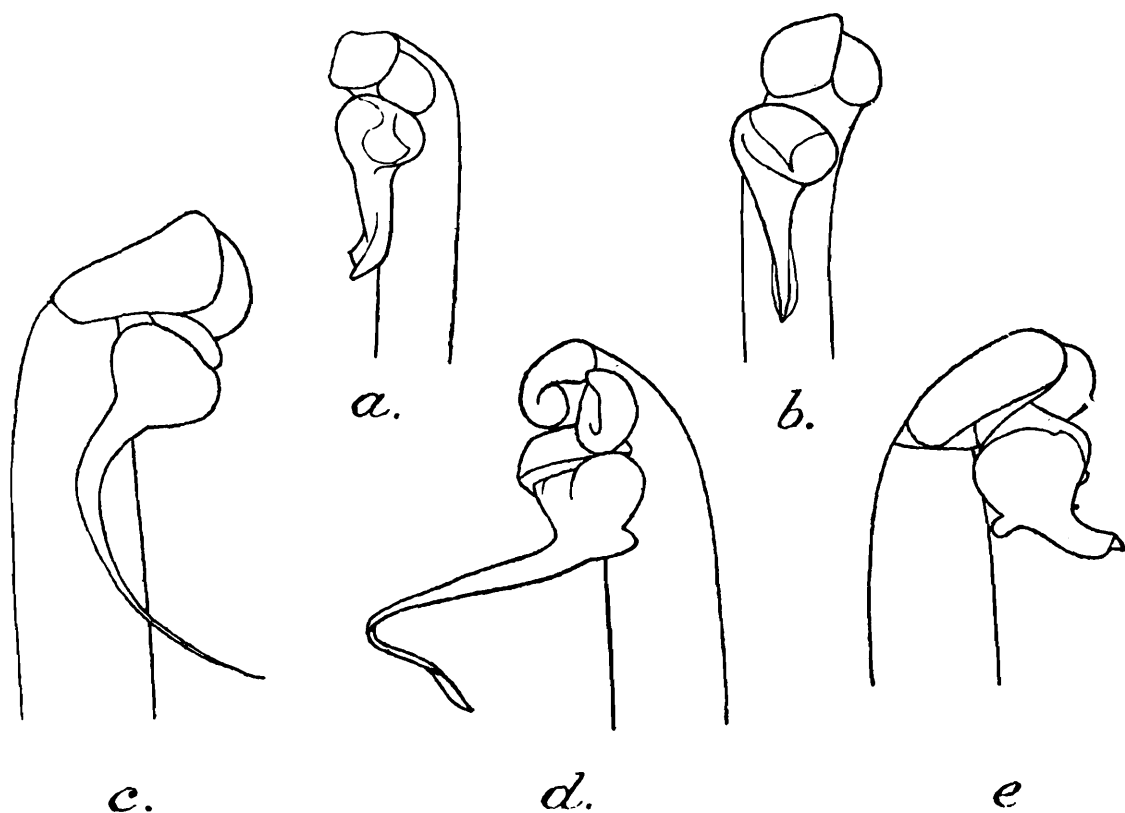
The remaining Indian and Burmese species seem to me to represent no more than a single genus *Cyriopagopus*. (See below pp. 81-82.) In this also the chelicerae are without spatulate bristles. The stridulating bristles on the palps, however, reach a higher degree of specialization than in the preceding genera, being individually stronger, but fewer in number; and the chelicerae are thickly covered with hair on their outer side.

Genus **Haploclastus** Simon.**Haploclastus tenebrosus**, sp. nov.

A single male (lacking both legs of the second pair) from the High Wavy Mountains, Madura District, S. India, in the Indian Museum. Though it may possibly be the male of *H. cervinus* from the neighbouring Palni Hills this is not very probable, and in any case it seems safest to describe it under a separate name till identity is established. In none of the species so far described is the male known. This specimen is evidently allied to *H. cervinus* Simon and *H. kayi* Gravelly, (the latter from the Cochin timber forests) but lacks the distinctive colouration of the anterior legs of the latter, is much darker than either and has much longer legs—the last being, however, a usual male characteristic.

Total length 2 cm., carapace 1.1 × 0.8 cm. Colour dark brown, the hind pairs of legs slightly paler. Posterior sigilla of sternum long and narrow as in both *H. cervinus* and *H. nilgirinus*, marginal as in the former but not in the latter. Stridulating organ consisting of a small cluster of hair-like and spatulate bristles adjoining the basal part of the scopula of the chelicerae and of fine hair-like bristles scattered over the anterior face of the coxa of the palp. Palps long and slender, the tibia about five times as long as broad; palpal organ as in fig. 3 *c*. Legs unarmed, first very slightly longer than fourth, much longer

than third; tibia and half patella of first pair about equal to carapace in length.



TEXT-FIG. 3.—Mygalomorph Spiders, Palpal organs.

a. *Haploclastus tenebrosus*, sp. nov.

c. *Selenocosmia sutherlandi*, sp. nov.

b. *Thrigmopocus insignis* Pocock.

d. *Selenocosmia pugnax* Pocock.

e. *Selenocosmia himalayana* Pocock.

### **Haploclastus cervinus** Simon.

The Madras Museum contains females from Vilpatti, Shembaganur ca. 6,000 ft., and Kodaikanal ca. 6,500-7,500 ft., in the Palni Hills of S. India. A specimen with egg cocoon is slightly smaller than Simon's type which Pocock suggests, after describing the much larger *H. nilgirinus*, may have been young.

The stridulating organ consists of a small cluster of hair-like and spatulate bristles adjoining the basal part of the scopula of the chelicerae and of fine hair-like bristles scattered over the anterior face of the coxa of the palp.

### **Haploclastus nilgirinus** Pocock.

The Madras Museum contains a single somewhat damaged specimen of this immense species collected by Mr. S. Ananda Rao from Savarimullay, Vandiperiyar, Travancore, where it had bitten a cooly.

The stridulating organ consists of a small cluster of hair-like and spatulate bristles adjoining the basal part of the scopula of the chelicerae, and of bristles scattered over the anterior face of the coxa of the palp which are hair-like distally and ventrally but more spiniform basally and dorsally. A similar differentiation is present in the two preceding species but is less marked as the bristles are less strong.

Regarding the bite Mr. Ananda Rao writes: "The bite on the cooly was quite a severe one and was inflicted on the fore-finger. When he was brought to me, which was almost immediately after the bite, I noticed that the bitten spot was bleeding and the finger, as also the palm, had swollen. He was also complaining of severe twitching pain extending up to the shoulder. The wound was treated in the usual way, *i.e.*, washing with a lotion of potassium permanganate, an application of tincture of iodine and dressing. The pain and swelling persisted for three days, after which they subsided. But, curiously enough, even now after a lapse of nearly six months since the occurrence, he states that he has no proper sensation in that finger and that it gets very easily benumbed when the hand is wet."

### Genus **Thrigmopoeus** Pocock.

#### **Thrigmopoeus insignis** Pocock.

The Indian Museum possesses a male from Castle Rock, N. Kanara District, and a female from near Karmal, six and a half miles from Castle Rock. The male, which has not previously been recorded, differs from the female chiefly in its somewhat smaller size (carapace 1.8 cm. long) and in its relatively longer and more slender legs, of which the tibia of the first pair is equal to the carapace in length. The palpal organ is shown in fig. 3*b*. The front legs are unarmed as in the female. The stridulating organ consists, as in the female, of a group of stout curved bristles immediately above the basal part of the scopula of the chelicerae and of bristles on the anterior face of the coxa of the palps arranged in the manner characteristic of the genus.

### Genus **Cyriopagopus** Simon.

In the first series of these notes I showed (p. 281) that *Cyriopagopus* and *Melopoeus* were male and female forms respectively belonging to a single genus, and suggested the probability that *Ornithoctonus* would have to be merged with them, though in the absence of specimens of that genus I was unable to come to a definite conclusion. The specimens recorded below seem to me to show that this suggestion was right, and that all three genera should be merged into one, for which the name *Cyriopagopus* has priority.

#### **Cyriopagopus andersoni** (Pocock).

Three damaged specimens in the Indian Museum, two collected by Mr. Coggin Brown in Tavoy, and one by Capt. Harris in "Burma."

Apart from the practically straight fovea of the carapace I find these specimens extremely difficult to distinguish from the next species. The stridulating spines on the inner surface of the coxa of the palp are slightly more elongated, but this difference, too, is not a very marked one.

**Cyriopagopus minax** (Thorell).

Three females collected by Mr. C. S. Barton at about 1,500 ft. on the hills between the Thaungyin and Me-Ping rivers, N. Siam; two females collected by Mr. H. W. Brigge from Pitsanulok, N. Siam. All in the Indian Museum.

This species is very like the last but has the fovea slightly but definitely procurved. The fourth legs are thinner than the first, as stated by Pocock, but the difference seems to me to be practically confined to the protarsus. I cannot detect any definite difference, such as he mentions in distinguishing between the genera *Melopoeus* and *Ornithoctonus* on p. 205 of the Arachnid volume in the *Fauna of British India* series, between the fourth tibiae of this species and those of his figure of *C. andersoni* (*Journ. Linn. Soc. Zool.* XXIV, pl. xxii). Unfortunately the specimens of the latter species before me have the legs so broken that their fourth tibiae cannot be recognised with certainty, none remaining attached.

## Subfamily POECILOTHERIINAE.

Genus **Poecilotheria** Simon.**Poecilotheria subfusca** Pocock.

The Indian Museum collection contains a male and a female collected by Mr. Senior White from Sudugang Estate, Matale, Ceylon, a female from 1,386 ft. on the same estate, and another from Dankanikota.

Except in the last specimen the pale markings described by Pocock are scarcely distinguishable.

**Poecilotheria regalis** Pocock.

One specimen from Shencottah in Travancore and one from Madanapalle in Chittoor District in the Madras Museum, and one from the latter locality in the Indian Museum.

## Subfamily SELENOCOSMIINAE.

As pointed out above (p. 75) this family is here defined, as in my earlier series of these notes, with reference to the structure of the anterior margin of the labium, so as to include in the genus *Neochilobrachys* not only the type species *N. subarmatus*, Hirst, with a very simple form of stridulating organ between the chelicerae and the coxae of the palps, but also certain still more primitive species agreeing with the *Ischnocolinae* in having no stridulating organ in this position. These species, which appear to stand at the base of the *Selenocosmiine* evolutionary series, differ from Oriental species of the *Ischnocolinae* and agree with the *Selenocosmiinae* in having the anterior margin of the labium densely and finely instead of more sparsely and coarsely granular.

Genus **Neochilobrachys** Hirst.

There is a single damaged female specimen of this genus, entirely without stridulating organs, in the Madras Museum. It was collected by Fr. Blatter at Panchgani in the Western Ghats, Satara District (Bombay Presidency). The genus has not previously been recorded from the Indian Peninsula.

Genus **Selenocosmia** Ausserer.**Selenocosmia sutherlandi**, sp. nov.

One male in the Indian Museum, collected by Dr. Sutherland at Kalimpong, 600-4,500 ft., Darjeeling District. Both this and the next species differ from *S. himalayana* (fig. 3 e) and *S. kulluensis*<sup>1</sup>, in the male sex at least, in having the anterior median eyes larger than the anterior laterals, as well as in the form of the palpal organ (fig. 3 c).

Total length 1.25 cm., carapace 0.7×0.55 cm. Chelicerae and carapace reddish brown, abdomen greyish brown, palps and legs yellowish brown. Both legs and body covered with long hair. Anterior eyes much larger than posterior; anterior medians separated by a distance scarcely equal to half the diameter of one of them, larger than anterior laterals, with which they are almost contiguous. Stridulating organ much as in *S. himalayana*, its bacilli very slender in this small specimen. Style of palpal organ long, curved and finely pointed, without the basal projection found in *S. himalayana*, *S. kulluensis* and *S. pugnax*. Legs in the order 4, 1, 2, 3, the patella and tibia of the second pair about equal to carapace in length.

**Selenocosmia (Lyrognathus) pugnax** Pocock.

Two damaged males from the Khasi Hills, one of them from Shillong, in the Indian Museum collection, evidently belong to this species. If, as seems probable, the three described species of *Lyrognathus* are really one, the name *crotalus*, Pocock, must be given priority over the others; but for the present it seems wisest to identify these specimens as *pugnax* since this is the species described from Shillong. No male *Lyrognathus* seems yet to have been described.

Total length 2.2 cm., carapace 1.2×0.9 cm. Colour dark brown, darker above than below; covered with long hair. Anterior eyes larger than posterior, anterior medians larger than anterior laterals, separated from each other by fully half the diameter of one of them and from anterior laterals by almost the same distance. Palpal organ (fig. 3 d) resembling that of *S. sutherlandi* in its long, curved and finely pointed style, but with a basal projection like that of *S. himalayana* though somewhat smaller. Legs in the order 4, 1, 2, 3, the fourth pair slightly thicker than the first, the patella and tibia of the second pair about equal to the carapace in length.

---

<sup>1</sup> *S. kulluensis* was described by Chamberlin in 1917 from a male from the Kullu Valley (*Bull. Mus. Comp. Zool. Harvard*, LXI, 1917-18, pp. 68, 69, pl. v, figs. 2, 3). It is probably identical with the male of *S. himalayana*, Pocock, Hirst's description of which (*Ann. Mag. Nat. Hist.*, XIX, 1907, pp. 523-4, text-fig. 2) was evidently unknown to him.

**Selenocosmia** sp.

Several females collected by Dr. Kemp at Port Blair, Andaman Islands, are in the Indian Museum.

Genus **Chilobrachys** Karsch.**Chilobrachys fumosus** Pocock.

The Indian Museum has specimens from the following localities in the Darjiling District.—Kalimpong, 2,000-4,500 ft.; Jor Pokri, nr. Sitong, 4,800 ft.; Sitong Ridge, *ca.* 4,700 ft.; Mangpu; Sureil, 5,000 ft.; Pashok, 2,500 and 3,500 ft.; Kurseong, 5,366 ft.; and stream at Baumpukri nr. Punkabari, 400-500 ft.

**Chilobrachys fimbriatus** Pocock.

One specimen from Castle Rock, N. Kanara District, in the Indian Museum and two from Panchgani, Satara District, in the Madras Museum.

**Chilobrachys hardwickii** Pocock.

One specimen from Hazaribagh, Bihar, “lives in trees, bite dangerous”, in the Indian Museum collection.

## FURTHER NOTES ON CRUSTACEA DECAPODA IN THE INDIAN MUSEUM.

### VII. ON A NEW SPECIES OF FRESHWATER CRAB (FAMILY POTAMONIDAE) FROM THE BOMBAY PRESIDENCY, TOGETHER WITH NOTES ON SOME ALLIED SPECIES.

By B. CHOPRA, D.Sc., and K. N. DAS, M.Sc., Zoological Survey of India, Calcutta.

#### (PLATE IV.)

Recently Mr. C. McCann of the Bombay Natural History Society sent to us for identification a large number of Potamonid crabs that he had collected round about Bombay in connection with some work on the biology of these crabs that he was carrying on at the time. The collection for the most part consists of *Paratelphusa* (*Barytelphusa*) *guerini* M.-Edw., a species that is known to occur commonly in the Bombay Presidency and the adjoining areas, and one or two specimens each of *Paratelphusa* (*Barytelphusa*) *jacquemontii* (Rathbun) and *Gecarcinucus* (*Gecarcinucus*) *jacquemontii* M.-Edw.; the two latter species also are common in Bombay and parts of the Western Ghats. Along with these species, there are four specimens, two males and two females, that though agreeing closely with *P. guerini*, show some well-marked and constant characters that are not met with in this species. A careful examination of a large number of specimens of *P. guerini* and its allies in the collection of the Zoological Survey of India has shown that these specimens represent a hitherto undescribed species. In addition to these four specimens, another example, a large male, of the new species has been found in the collection of the Zoological Survey mixed with the material of a variety of *P. guerini*.

Alcock<sup>1</sup> in his admirable account of the Indian Potamonids recognised two varieties of *Paratelphusa* (*Barytelphusa*) *guerini*, viz., var. *planata* A. M.-Edw., and var. *pocockiana* Henderson. *P. guerini* was described by H. Milne-Edwards<sup>2</sup> in 1853, and except for the name of the genus and subgenus in which it has been included by different authors, there has been no doubt about its validity; the position assigned to it by Alcock in the *jacquemontii* group of his sub-genus *Barytelphusa* of the genus *Paratelphusa* is now generally accepted. The position of the other two forms, *planata* and *pocockiana* has, however, given rise to some doubt. The former was described by A. Milne-Edwards<sup>3</sup> in 1869 as *Telphusa planata* from a single specimen from Bombay, while Henderson<sup>4</sup> described the latter from material obtained at Jubbulpore. Wood-

<sup>1</sup> Alcock, *Cat. Ind. Decap. Crust.*, part i, Brachyura, fasc. ii. Potamonidae, pp. 87-89, fig. 57 (1910).

<sup>2</sup> Milne-Edwards, *Ann. Sci. Nat.* (3) XX, p. 210 (1853).

<sup>3</sup> A. Milne-Edwards, *Nouv. Arch. Mus. Hist. Nat. Paris* V, p. 181, pl. xi, fig. 3 (1869).

<sup>4</sup> Henderson, *Trans. Linn. Soc. London* (2) Zool. V, p. 384, pl. xxxvii, figs. 5-8 (1893).

Mason<sup>1</sup> and Ortmann<sup>2</sup> considered *planata* as only a synonym of *guerini*, but the latter recognised *pocockiana* as a distinct species. Miss Rathbun<sup>3</sup> in her monumental work on "Les Crabes d'eau douce" came to the conclusion, apparently after an examination of the type-specimen, that *planata* was a valid species, whereas *pocockiana* was probably the same form as *guerini*. Alcock, who had ample material of both these forms from various localities, including those from which they had originally been collected, considered both of them distinct from *guerini*, as also from one another, but instead of recognising them as distinct species relegated them to varietal rank. We have also carefully re-examined the Indian Museum material, and are convinced that Alcock was right in considering both *planata* and *pocockiana* as distinct from *guerini*, but we are inclined to believe that the differences between the three forms are sufficiently well-marked for recognising the first two as distinct species, rather than as varieties of the third. The chief difference between the three forms, as stressed by Alcock, is in the convexity or flatness of the dorsal surface of the carapace, but in addition to this we have found a few other minor differences, which appear to be constant, at least in the material at our disposal. Some of these differences are shown in a tabular form on page 91.

Before giving a description of our new species we wish to express our thanks to Mr. C. McCann for affording us an opportunity to examine his valuable collection. A study of the fine series of specimens of *Paratelphusa guerini* that he had collected has enabled us to understand the limits and also the relationships of this species.

### **Paratelphusa (Barytelphusa) mccanni, sp. nov.**

The carapace (Plate IV, fig. 1) is more or less flat, though the three main regions have their individual convexities. Its length is a little over two-third of its greatest breadth, though in the females the carapace is proportionately slightly longer. In the males the depth<sup>4</sup> is about three-fifth of the length, but in young females it is slightly less. The surface is practically smooth, but under a lens a few sparsely-scattered punctations can be seen on the gastric region; in the younger examples these punctations extend to the branchial regions also. Besides these, the outer half of each epibranchial region is traversed by numerous short oblique ridges—these are very clearly seen in small specimens only, but become indistinct in larger examples, and barely any traces of these are left in a large male specimen.

The cervical groove is more or less deep and distinctly marked throughout its course. It forms a broad V, with its posterior part, where it bounds the mesogastric area, forming almost an arc of a circle. It is deeper in the posterior part than anywhere else; anteriorly it

<sup>1</sup> Wood-Mason, *Journ. As. Soc. Bengal* XI, p. 203 (1871).

<sup>2</sup> Ortmann, *Zool. Jahrb., Syst.* X, pp. 306, 307 (1898).

<sup>3</sup> Rathbun, *Nouv. Arch. Mus. Hist. Nat. Paris* (4) VI, VII, VIII (1904-06); see VII, pp. 186, 187, pl. xvi, figs. 2 and 4 of Vol. VI (1905).

<sup>4</sup> The depth of the carapace has been measured as explained on p. 89.

becomes broader and shallower and near the post-orbital crest it is rather faint. It stops short at its junction with the crest well on the inside and behind the lateral epibranchial tooth. The mesogastric furrow is deep and well-marked.

The front (Plate IV, figs. 1 and 2), as is usually the case, is somewhat broader in smaller individuals than in larger ones, but the breadth at the base of the antennae is always slightly less than one-fourth the greatest breadth of the carapace. Its sides are only slightly convergent, so that the front has a square-cut appearance. It is considerably deflexed and its edge is faintly bilobed. Its surface is sparsely punctate. The angles formed by the sides with the anterior border are somewhat rounded right angles.

The orbits and their inner gaps are wide. Their borders are almost smooth, but the lower border, especially its inner part, shows indications of being faintly crenulate; this is better seen in smaller examples. The external orbital angle is rather broad, low and bluntly pointed and there is no trace of a gap between it and the lower border of the orbit.

The antero-lateral borders of the carapace, which are strongly arched, are not sharply defined and only in small examples are more or less crenulate. The lateral epibranchial tooth is very minute, especially in larger examples. The postero-lateral borders are more or less straight and strongly converge posteriorly. The posterior border is straight.

The epigastric and post-orbital crests are well pronounced, making a bold continuous ridge on either side of the mesogastric furrow. The epigastric portion is blunt and thick, while the post-orbital part is sharper and more crest-like; in a smaller specimen it is very faintly crenulate. The crest on either side runs in a more or less straight line, with a slight anterior concavity and only a very small part of the epigastric crest lies in front of an imaginary line joining the upper border of the two orbits. The crests stop short on the dorsum of the carapace well behind the lateral epibranchial tooth, though in smaller specimens there are very faint indications of its turning backwards to join the lateral border. On either side of the carapace there is a deep concavity between the upper border of the orbit and the post-orbital crest; this concavity becomes broad and somewhat shallow near the lateral border of the carapace. The cervical groove does not anywhere cut the crest, but meets it near the outer end of the crest.

In the abdomen of the male (Plate IV, fig. 4) the sides of the sixth segment are distinctly convergent and slightly convex. The length of this segment is considerably less than its greatest breadth (at the proximal border) and slightly more than the breadth at the distal end. In the seventh segment the length equals the breadth at the base and the distal end is regularly and somewhat broadly rounded.

The mandibular palp has the structure that is peculiar to the genus *Paratelphusa*. The exopodite of the external maxilliped (Plate IV, fig. 3) is considerably longer than the ischium and carries the usual plumose flagellum. The longitudinal groove running parallel to the inner border of the ischium is comparatively faintly marked; the merus is considerably broader than long and is more or less quadrangular in shape, its anterior border being more or less straight.

The chelipeds (Plate IV, fig. 5) are very unequal in both the sexes, only very slightly more so in the male than in the female. In the merus the borders are coarsely crenulate and the outer surface is covered with obscure rows of squamiform low tubercles. The inner margin of the merus has a short blunt spine about its middle and its upper and outer surfaces are rugose and sparsely pitted. The outer and upper surfaces of the palm and the fingers are also pitted and are covered with scale-like markings. The pitting of the fingers has a linear arrangement and there are a few rows of very minute granules on the upper surface of the dactylus. There is a row of squamiform tubercles on the lower border of the palm. The tips of the fingers are strongly hooked, and cross each other when they meet. Both the fingers are broad, the fixed finger being only a little broader than the dactylus. In the larger chela the dactylus is arched and the fingers, therefore, gape when the tips are apposed. The palm is a little less than one and a half times as high as its length along the upper border and the dactylus is one and a quarter times as long as the height of the palm. The fingers have fairly even teeth along the cutting margins. The length of the lower border of the palm and the fixed finger is somewhat less than twice the height of the palm. In the smaller chela the dactylus is less arched and there is hardly any gap when the tips meet. The palm is proportionately less high and the fingers are proportionately longer, the height of the former being considerably less than one and a half times its length along the upper border and the latter being more than one and a quarter times the height of the palm. The lower border of the palm and the fixed finger is also a little more than twice the height of the palm, and the teeth are smaller and more even. The chelae in the female are more or less like those in the male and the proportions of the various parts are also practically similar. The differences between the larger and the smaller chela mentioned for the male, can be seen in the female also.

The walking legs (Plate IV, fig. 1) are strong and are considerably shorter than the chelipeds. The measurements of some of the segments of the third and fourth legs are given below in millimetres. The meropodites are considerably flattened, but their breadth is less than half of their length. Their anterior border is bluntly crenulate, especially

Sex.	♂	♂	♂	♀	♀
Carapace length	37.5	27.0	26.0	21.0	18.0
3rd Walking leg—					
Length of meropodite	22.0	18.0	17.0	14.2	12.2
Breadth of meropodite	9.5	7.0	6.4	5.5	5.0
Length of propodite	13.5	10.5	9.8	8.5	7.3
Breadth of propodite	6.2	4.6	4.2	3.6	3.1
Length of dactylus	16.0	13.2	..	10.4	..
4th Walking leg—					
Length of meropodite	19.0	14.5	..	11.4	9.8
Breadth of meropodite	8.0	6.0	..	4.7	4.0
Length of propodite	10.7	8.2	..	6.6	5.7
Breadth of propodite	6.0	4.8	..	3.4	3.0
Length of dactylus	14.5	11.3	..	8.8	7.4

in the anterior pairs. The upper margins of the carpus, propodus and dactylus and the lower margins of the last two segments are spinate. The propodus in the third pair of legs is more than twice as long as broad, but in the ultimate pair the breadth is more than half of the length. The upper margin of the propodus is distinctly bicarinate in the first pair of walking legs, both the carinae bearing minute spines; the carinae become progressively blunt in the posterior pairs and only the one at the anterior side bears spines. The dactylus is considerably longer than the propodus and is only slightly arched, bears four rows of small spines, two on the upper margin and two on the lower, and ends in a sharply pointed horny tip.

Measurements of three specimens, two males and one female, are given below in a tabular form. The largest male has a carapace length of 37.5 mm. and the greatest breadth 54.6 mm., while the smallest example, a young female, has the carapace 18 mm. long and 26 mm. broad.

The colour of the spirit specimens is dark-brown, with the larger examples becoming pale on side, retaining, however, the brown colour on the gastric region of the carapace.

*Type-specimen.*—C 716/1, Zoological Survey of India (*Ind. Mus.*).

*Locality.*—The type specimen, a large male, with its larger chela missing, was collected in rice fields at Kumta in North Kanara District, Bombay Presidency, by Mr. P. V. Wagle some years back. The other four examples, two males and two females, were obtained by Mr. C. McCann of the Bombay Natural History Society at Andheri, near Bombay between August and October, 1934.

In the following table we have given the measurements and proportions of the carapace and some appendages, etc., of three examples of *P. mccanni*, and for purposes of comparison have included similar measurements and proportions of two typical specimens, a male and a female, of each of the three allied species, *P. guerini*, *P. planata* and *P. pocockiana*. The length of the carapace has been measured along the median line and its depth represents the least distance along the middle line between the dorsal surface of the carapace and the thoracic sternum a little in front of the terminal abdominal segment. Most of the measurements have been taken with a pair of parallel-jawed calipers, giving direct reading on a dial; all the measurements are in millimetres.

Sex.	<i>P. guerini.</i>		<i>P. planata.</i>		<i>P. pocockiana.</i>		<i>P. mccanni.</i>		
	♂	♀	♂	♀	♂	♀	♂	♂	♀
Carapace length	35.0	32.7	36.4	22.2	32.9	37.0	37.5	27.0	18.0
Carapace breadth	50.6	45.3	53.3	31.5	46.8	51.9	54.6	39.8	26.0
Fronto-orbital breadth	32.8	29.3	32.3	20.4	29.6	33.3	33.2	24.6	16.6
Epibranchial breadth	39.1	35.7	40.2	25.3	36.7	40.6	40.5	30.0	20.0
Carapace depth	23.5	21.0	23.1	12.9	19.4	20.5	22.5	16.4	10.0
Front (breadth at base of antennae)	14.3	12.7	14.0	8.9	13.1	14.8	13.2	9.6	6.4
<u>Carapace length</u>									
<u>Carapace breadth</u>	.691	.721	.682	.704	.703	.712	.684	.678	.692

Sex.	<i>P. guerini.</i>		<i>P. planata.</i>		<i>P. pocockiana.</i>		<i>P. mccanni.</i>		
	♂	♀	♂	♀	♂	♀	♂	♂	♀
Carapace depth	.671	.642	.634	.581	.589	.554	.600	.607	.555
Carapace length									
Front breadth	.282	.280	.262	.282	.279	.285	.241	.241	.246
Carapace breadth									
Large Chela :—									
Height of Palm	21.8	13.3	25.8	12.6	21.6	19.6	..	17.2	9.6
Length of upper border of Palm	14.3	9.3	17.0	8.0	14.7	13.8	..	12.0	6.8
Length of Dactylus (Upper border)	28.0	17.3	35.4	14.7	28.5	23.9	..	21.0	11.6
Length of lower border of Palm and Fixed Finger.	38.5	26.6	48.0	21.9	39.5	37.2	..	31.2	17.3
<u>Height of Palm</u>	1.52	1.43	1.51	1.57	1.46	1.42	..	1.43	1.41
<u>Upper border of Palm</u>									
<u>Dactylus</u>	1.28	1.30	1.37	1.16	1.31	1.21	..	1.22	1.20
<u>Height of Palm</u>									
<u>Lower border of Palm</u>	1.76	2.00	1.86	1.73	1.82	1.89	..	1.81	1.80
<u>Height of Palm</u>									
Small Chela :—									
Height of Palm	13.6	11.2	16.6	8.6	13.8	13.9	15.5	10.3	6.2
Length of Upper border of Palm	10.5	8.2	11.7	5.8	10.3	10.6	11.8	7.8	4.7
Length of Dactylus (Upper border)	19.6	15.3	24.1	10.9	19.6*	19.5	21.0	14.0	8.4
Length of lower border of Palm and Fixed Finger	29.0	24.4	33.6	16.8	28.9	29.4	31.6	21.8	13.2
<u>Height of Palm</u>	1.29	1.36	1.41	1.48	1.33	1.31	1.31	1.32	1.31
<u>Upper border of Palm</u>									
<u>Dactylus</u>	1.44	1.36	1.45	1.26	1.42	1.40	1.35	1.35	1.35
<u>Upper border of Palm</u>									
<u>Lower border of Palm</u>	2.13	2.17	2.02	1.95	2.09	2.11	2.03	2.10	2.12
<u>Height of Palm</u>									
Abdomen of Male :—									
Length of sixth segment in middle line	7.3		7.0		6.2		7.6	5.5	
Breadth of sixth segment at proximal end	8.6		9.0		8.4		10.0	7.5	
Breadth of sixth segment at distal end	6.1		6.5		6.1		7.1	5.2	
Length of seventh segment	7.4		7.4		6.4		7.2	5.2	

\* Slightly broken.

*Paratelphusa (Barytelphusa) mccanni* closely resembles *P. (B.) guerini* and is undoubtedly a member of the group in which, besides the latter species, *P. (B.) planata* and *P. (B.) pocockiana* are included. The epigastric and post-orbital crests forming a continuous prominent ridge on either side of the mesogastric furrow and ending on the dorsum of the carapace well behind the level of the greatly reduced lateral epibranchial tooth show the close resemblance between the present species and other members of the *guerini* group. A large number of other characters also show this similarity in an unmistakable way.

Some of the characters in which the new species differs from its nearest allies, *P. guerini*, *P. planata* and *P. pocockiana* are clearly brought out in the accompanying table. The most noteworthy of these differences

Table giving some of the characters in which *Paratelphusa maccanni* differs from *P. guerini*, *P. planata* and *P. pocockiana*.

<i>Paratelphusa guerini</i> .	<i>Paratelphusa planata</i> .	<i>Paratelphusa pocockiana</i> .	<i>Paratelphusa maccanni</i> .
1. Carapace strongly convex	1. Carapace less convex.	1. Carapace almost flat.	1. Carapace almost flat, but less so than in <i>P. pocockiana</i> .
2. Cervical groove deep and distinct throughout.	2. Cervical groove distinct throughout, but deep only posteriorly.	2. Cervical groove shallow and faint.	2. Cervical groove deep in the posterior part, becoming shallow and faint anteriorly.
3. Epigastric and post-orbital crests forming a bold curve on either side of the mesogastric furrow, with a considerable part of the epigastric crest lying in advance of the upper borders of the orbits; epigastric crests blunt and thick.	3. The crests forming a more or less straight line with only a very small part of the epigastric crest in advance of the upper borders of the orbits; epigastric crests not quite as blunt as in <i>P. guerini</i> .	3. The crests considerably arched more or less as in <i>P. guerini</i> , with a considerable part of the epigastric portion in advance of the upper borders of the orbits; epigastric crests very little blunt.	3. The crests forming a more or less straight line, with only a very small part of the epigastric portion in advance of the upper borders of the orbits; epigastric crests blunt and thick.
4. Front more than one-fourth of the greatest breadth of the carapace, with its sides anteriorly convergent.	4. Front more than one-fourth of the greatest breadth of the carapace, with its sides only somewhat convergent.	4. Front more than one-fourth of the greatest breadth of the carapace with its sides parallel.	4. Front less than one-fourth of the greatest breadth of the carapace, with its sides only slightly convergent anteriorly.
5. Antero-lateral borders of the carapace crest-like, crenulate.	5. Crests on the antero-lateral borders less pronounced.	5. Crests on the antero-lateral borders less pronounced.	5. Antero-lateral borders of the carapace hardly forming a crest, at least in large specimens.
6. Ischial groove distinct.	6. Ischial groove faint.	6. Ischial groove very faint.	6. Ischial groove faint.
7. Depth <sup>1</sup> of carapace in males more than three-fifths of its length.	7. Depth of carapace in males only a little more than three-fifths of its length.	7. Depth of carapace in males less than three-fifths of its length.	7. Depth of carapace in males about three-fifths of its length.
8. Spine on inner margin of carpus of cheliped long and sharp.	8. Spine sharp, but smaller than in <i>P. guerini</i> .	8. Spine sharp, but smaller than in <i>P. guerini</i> .	8. Spine small and blunt.
9. Sides of 6th abdominal segment of male straight or slightly concave, its length considerably more than its breadth at the distal end; length of seventh segment considerably more than its breadth at base.	9. Sides of 6th abdominal segment of male straight or slightly concave, its length more than its breadth at distal end; length of seventh segment considerably more than its breadth at base.	9. Sides of 6th abdominal segment of male straight or slightly concave, its length equal to its breadth at distal end; length of seventh segment very slightly more than its breadth at base.	9. Sides of 6th abdominal segment of male slightly convex, its length slightly more than its breadth at distal end; length of seventh segment equal to its breadth at base.

<sup>1</sup> The depth of carapace is measured as explained on p. 89, and its proportion to length given in this table represents the average of a number of measurements.

are that in *P. mccanni* the front is always proportionately shorter, though only slightly so; the antero-lateral margins are hardly cristiform; the sixth abdominal segment of the male has somewhat convex sides, with its length only slightly more than its breadth at the distal end; and the seventh segment of the male abdomen is only a little shorter than the sixth.

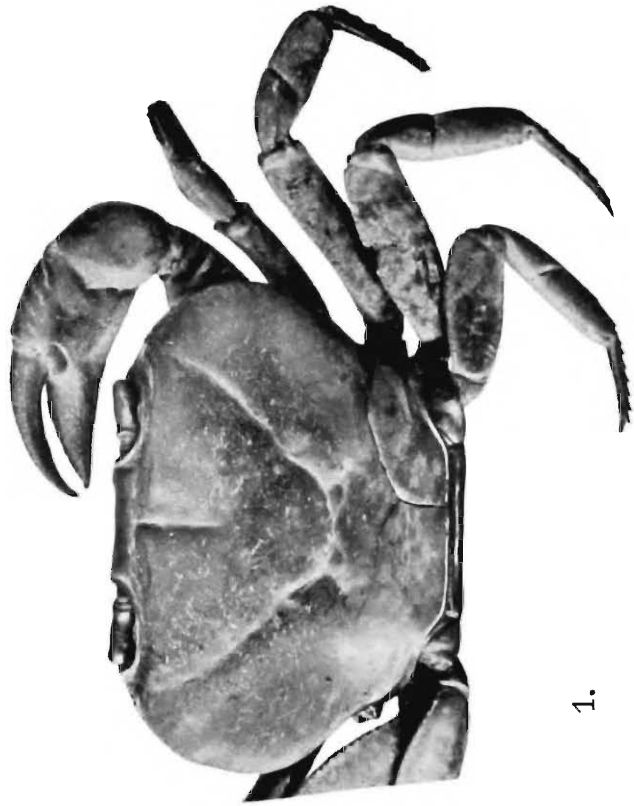
Another character, which helps in separating the species of the *guerini* group and to which both Miss Rathbun and Alcock have attached some importance, is in reference to the relative depth and distinctness of the ischial furrow—a longitudinal groove running parallel to and on the inside of the inner margin of the ischium of the external maxilliped. In *P. guerini* this groove is distinct and deep throughout its course, in *P. planata* it is fainter and in *P. pocockiana* is even less distinct than in *P. planata*. As stated above, in *P. mccanni* also the ischial groove is faint, more or less like that of *planata*. This character is fairly constant, but we have observed a certain amount of overlapping in the collection we have examined. Generally the ischial groove in the different species is as stated above, but in some specimens of *P. planata*, for instance, one may sometimes find it almost as distinct as in typical *guerini*, and in others almost as faint as in *pocockiana*. The same holds good for *P. guerini*, and to a lesser extent for *P. pocockiana* also. We are, therefore, of the opinion that though this character is useful in a general way, too much reliance cannot be put on it alone.

Within the *guerini* group, *Paratelphusa mccanni* appears to resemble *P. planata* more than the other two species.

EXPLANATION OF PLATE IV.

*Paratelphusa (Barytelphusa) mccanni*, sp. nov.

- FIG. 1.—Dorsal view of male specimen : nat. size. The larger cheliped is missing.
- FIG. 2.—Frontal view of same : nat. size.
- FIG. 3.—Ventral view of third maxillipeds of same :  $\times 2$ .
- FIG. 4.—Terminal abdominal segments of same :  $\times 2$ .
- FIG. 5.—Large chela of another male specimen :  $\times ca. 1.5$ .



1.



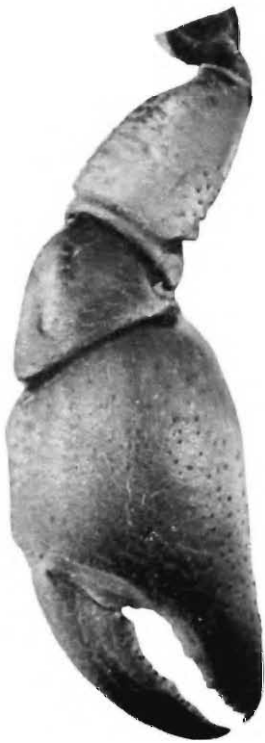
2.



3.



4.



5.

*Paratelphusa (Barytelphusa) meccanni* sp. nov.